REPUBLIC OF KENYA



MINISTRY OF WATER DEVELOPMENT

MERU

DISTRICT WATER DEVELOPMENT STUDY

1993 - 2013

PART 3

GUIDELINES AND RECOMMENDATIONS FOR INVESTMENT PACKAGES

June 1991

WATER RESOURCES
ASSESSMENT SECTION
NAIROBI, KENYA

WRAP
WATER RESOURCES
ASSESSMENT & PLANNING

TNO – INSTITUTE
OF APPLIED GEOSCIENCE
DELFT, THE NETHERLANDS

PREFACE

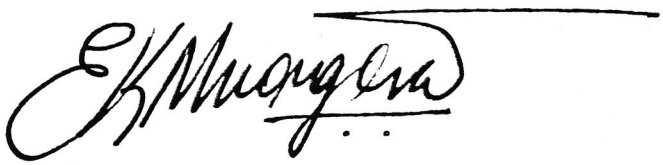
It gives me great pleasure to introduce the District Water Development Study for Samburu District.

The Ministry of Water Development has the task of planning for water resources development, both at national and district levels. Districts have been assigned a major role in the development of the country as illustrated by the District Focus Strategy for Rural Development Policy. Consistent with this policy the Ministry of Water Development has put great emphasis on the studies for District Water Development Planning.

Water resources development can only be successfully undertaken if the long-term planning reflects the balance between availability and exploitation of water. Extensive investigations and monitoring are needed to determine the potential of the water resources and the effects of development on long-term basis. Presently, the Districts do not have the research capacity to carry out the necessary studies independently. To overcome this situation, the Ministry of Water Development has established a Water Resources Assessment Section that supports the Districts in carrying out these studies. The Section is being strengthened by the Water Resources Assessment and Planning Project.

The present study provides extensive information on the availability of water resources, the existing supply, the future water demand and the investments involved in developing the water resources in Samburu District. Equipped with this information the District will be in a better position to plan its supply facilities. It is only after the District succeeds in explaining to the people the limitations of the natural system and the vulnerability of the environment involving them as much as possible in the planning and construction of their water supplies, that the difficult task of providing water to the people will see a good end.

I express the wish that this important study will be optimally used to achieve this common goal.



(E. K. MWONGERA)
Director of Water Development

TABLE OF CONTENTS

Page

PREFACE i

CONTENTS iii

ABBREVIATIONS vii

SUMMARY ix

1. INTRODUCTION 1

1.1 Purpose and Scope of the Study 1
1.2 International Co-operation 2

2. GENERAL APPROACH 3

3. BASIS FOR INVESTMENT 7

3.1 Overview 7
3.2 Technical Base 7
3.3 Socio-economic Base 8
3.4 Institutional Base 10

3.4.1 Context 10
3.4.2 Implementation of District Focus in the Water Sector 11
3.4.3 Community Involvement in the Water Sector 12

3.5 Financial Base 13

3.5.1 Financial Context 13
3.5.2 National-District Financial Systems 14
3.5.3 District Financial Systems 14

4. GUIDELINES FOR DESIGN OF INVESTMENT PACKAGES 17

4.1 Overview 17
4.2 Supply Considerations 17

4.2.1 Available Technologies 17
4.2.2 Socio-Economic Aspects 18
4.2.3 Institutional Considerations 18
4.2.4 Financial Aspects 19

4.3 Demand Considerations 19

Page

4.3.1 General 19
4.3.2 Affordability 20
4.3.3 Community Participation/Willingness to Pay 20
4.3.4 Institutions for Community Participation 21

4.4 Pricing and Cost Sharing Policies 21

5. GUIDELINES FOR APPRAISAL OF INVESTMENT PACKAGES 25

5.1 Overview 25
5.2 Economic and Financial Analysis 25

5.2.1 Introduction 25
5.2.2 Economic Analysis of Water Supply in Small Urban Areas . . 26
5.2.3 Economic Analysis of Water Supply in Rural Areas 27
5.2.4 Financial Analysis 28

5.3 Appraisal Methodology 29

5.3.1 General 29
5.3.2 Development of Criteria 30
5.3.3 Prioritisation 34

6. EXAMPLES OF INVESTMENT PACKAGES 35

6.1 Introduction 35
6.2 Overview of Methodology 37
6.3 Indicative Investment Packages 38
6.4 Investment Packages per Rural Supply Areas 41
6.5 Investment Packages per Water Supply Technology 43
6.6 Urban Water Supply 44

7. RECOMMENDATIONS FOR IMPLEMENTATION OF PACKAGES . . . 47

7.1 General Institutional Aspects 47

7.1.1 Introduction 47
7.1.2 Organisations 47

7.2 Investment Funding 49
7.3 Feasibility Studies 49

7.3.1 Introduction 49
7.3.2 Key Implementation Requirements 50

7.4 Implementation 50

REFERENCES 51

LIST OF TABLES

Page

3.1 Results of Cost Effectiveness Analysis 8

3.2 Distribution of Wage Employment (1988) 10

4.1 Technologies Ranked by Minimum Cost by Cost Recovery Policy 22

6.1 Technologies Ranked by Minimum Discounted Total Cost 36

6.2 Technologies Ranked by Minimum Operation and Maintenance Cost per m3 Yielded. 36

6.3 Technologies Ranked by Minimum Capital Cost per m3 Yielded 37

6.4 Investment Packages - Total Costs Rural Supply - Baragoi Division 41

6.5 Investment Packages - Total Costs Rural Supply - Samburu District 42

6.6 Investment Packages - Technologies and Total Costs Rural Supply 43

6.7 Investment Package - Urban Supplies 45

LIST OF FIGURES

Regional Assessment Studies under WRAP Programme 1981-1990 xi

2.1 Model for Preparation of District Water Development Plan 4

LIST OF PLATES

Plate 1 Proposed Water Development for Domestic and Livestock Supply Investment Package 1B

Plate 2 Proposed Water Development for Domestic and Livestock Supply Investment Package 2B

Plate 3 Proposed Water Development for Domestic and Livestock Supply Investment Package 3B

(All the Plates are enclosed in the Executive Summary)

APPENDICES

1. Maralal: Economic and Financial Analysis of Urban Water Supply

2. Marti: Economic and Financial Analysis of a Rural Market Centre Water Supply

3. Project Proposal - Indicative Investment Packages

4. Investment Packages - Summaries per Location and Supply Area

5. Investment Packages - Summaries per Supply Area and Supply Technologies

6. Investment Package 1A

7. Investment Package 1B

8. Investment Package 2A

9. Investment Package 2B

10. Investment Package 3A

11. Investment Package 3B

12. Report of Planning Mission to Samburu District

ABBREVIATIONS

ASAL	=	Arid and Semi-Arid Lands Development Program
CBWDP	=	Central Baringo Water Development Plan
CC	=	County Council
DANIDA	=	Danish International Development Agency
DDC	=	District Development Committee
DDP	=	Samburu District Development Plan 1989-1993
DvDC	=	Divisional Development Committee
DWDP	=	District Water Development Plan
DWDS	=	District Water Development Study
EEC	=	European Economic Commission
FINNIDA	=	Finnish International Development Agency
GOK	=	Government of Kenya
GSK	=	Groundwater Survey Kenya
GTZ	=	Deutsche Gesellschaft fur Technische Zusammenarbeit
KFRWSDP	=	Kenya Finland Rural Water Supply Development Project in Western Province
KIDP	=	Kitui Development Program
Ksh	=	Kenya shilling
KWAHO	=	Kenya Water for Health Organization
KWDP	=	Kwale District Community Water Supply and Sanitation Project
L.U.	=	Livestock Unit
LBDA	=	Lake Basin Development Authority
lpcd	=	liters per capita per day
MoA	=	Ministry of Agriculture
MOH	=	Ministry of Health
MoLD	=	Ministry of Livestock Development
MoWD	=	Ministry of Water Development
MCSS	=	Ministry of Culture and Social Services
MPND	=	Ministry of Planning and National Development
msl	=	Meters above mean sea level
NGO	=	Non-Government Organization
NORAD	=	Norwegian Agency for Development
ODA	=	Overseas Development Agency
Shs	=	Kenya shilling
SIDA	=	Swedish International Development Agency
UNDP	=	United Nations Development Project
UNICEF	=	United Nations International Childrens Emergency Fund
USAID	=	United States Agency for International Development
WECO	=	Western College of Arts
WRAP	=	Water Resources Assessment and Planning Project

SUMMARY

The present report is Part 3, Guidelines and Recommendations for investment Packages, which is the third of three reports, composing the Samburu District Water Development Study. Part 3 provides the background and methodology for the implementation by the District of investments in the water sector.

Indicative investment packages were developed, which were assumed to comprise one or more investment projects. Four considerations were identified as central to the design of successful investment projects. These were:

- the appropriate technical choice in terms of ability to produce the required quantity and quality, and impact on the environment; the latter is particularly sensitive as there is insufficient data on the direct and indirect impact of water schemes on the ASAL environment.
- the socio-economic base which determines the attitude to participation in the project; this issue is important as nomadic communities of the Samburu are particularly difficult to mobilise, further, social factors add to the technical difficulties of supplying water to nomads and stock as the communities (or parts thereof) move throughout the year.
- the institutional base for design, construction and operation of the investment project, including community consultation during all of these phases, and
- the financial base of the project including the policy framework, particularly on cost sharing and on district financial autonomy, and the financial systems used.

Each of these considerations effect the economic demand of the people for water on the one hand, and the ability of the MoWD and other bodies to supply it on the other.

The major issues raised when the above factors are considered are:

- supply of water for livestock must be provided only in areas where any consequent increase in numbers will not degrade the environment.
- cost sharing policies with respect to government/donor schemes may need to be flexible depending on the community served; full cost sharing (Capital and O&M costs) may be feasible in urban schemes, but for rural schemes cost sharing may have to be limited to recovery of O & M costs.
- even with these limited objectives, the choice of technology must be appropriate to the communities ability and willingness to pay, in particular rural schemes must have minimum O & M costs if they are to be born by the community.
- in order to implement the District Focus policy which gives the District MoWD responsibility for co-ordination the provision of water to the Samburu communities, several facets of the operation of the Central and District MoWD should change.

Based on the above considerations, specific criteria were developed for use in the appraisal of investment projects. These criteria were incorporated in a simple checklist, a version of which, as modified by the DWE, should be included in the DWDP. Such a checklist will enable a quick assessment of the impact and viability of a proposed project.

The checklist covers the following topics:

- water resources
- land use planning/environmental impact
- social impact
- institutional/community participation
- economics/affordability
- finance.

Examples of investment packages were prepared as appropriate for various physical and settlement situations in Samburu. Three possible types of cost policies were applied, based on respectively recovery of full capital and O & M costs, recovery of O & M costs only and minimization of capital costs.

A detailed cost estimate for the whole district was prepared for supply of the water demand projected under scenario 2 for the year 2003. The total capital costs of the rural supplies varies between 107-120 million Shs or 1,600 - 1,800 Shs per capita, depending on the cost recovery approach. The O & M costs vary between 30 - 90 Shs per capita per year.

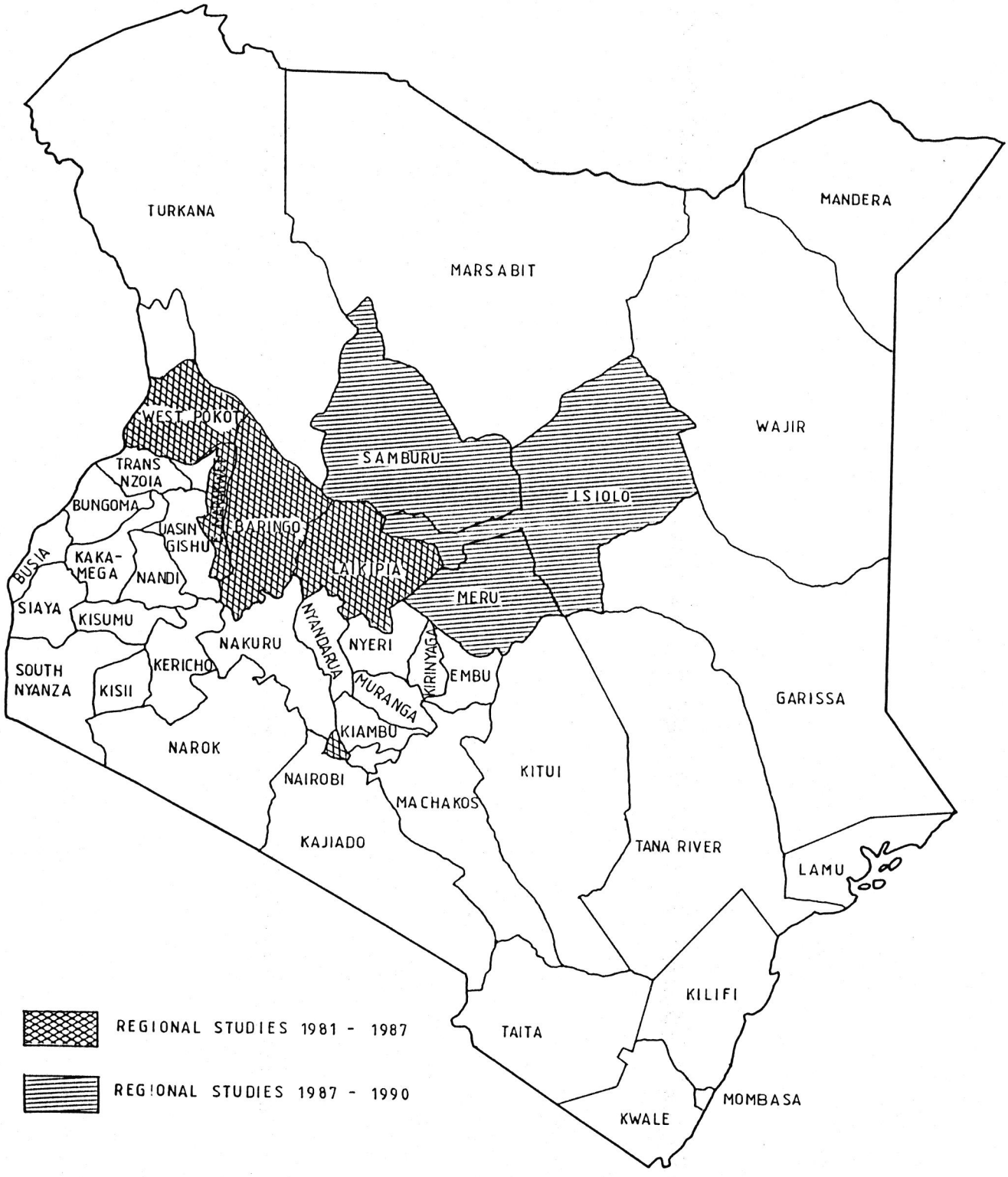
The proposed type of supply technologies for the rural supplies depends on the cost recovery approach, but comprise mainly dug wells with handpumps or windmills, boreholes with motorpumps or windmills, or pans for livestock supply.

The water supply to urban centres was planned for, separate from the rural supplies and a preliminary cost estimate was made.

In order to implement the District Focus policy which gives the District MoWD responsibility for co-ordinating the provision of water to the Samburu communities, several facets of the operation of the Central and District MoWD should change. The most important are:

- District water offices should retain revenue collected as an incentive to better collection and to ease cash flow problems
- the "appropriations in aid" policy with respect to funding of development (capital) works should be clearly specified and revised so as not to disadvantage high cost schemes
- financial systems should be revised to enable these effective management and implementation of District Focus and Cost Sharing policies, in particular, full costs and revenues should be brought together in the one set of accounts
- flexibility in pricing policy is also required by the cost sharing policy catalysing community participation.
- Central office staff, in their role as support to the District, require better training in higher level skills in the areas of training, water resources planning, O & M, financial systems, community mobilisation, technical design, environmental management and project appraisal
- MoWD in general, requires strengthening of the links to other agencies and organisations, both public and private, involved in provision of water supplies.

WATER RESOURCES ASSESSMENT AND PLANNING PROJECT



Regional Assessment Studies under the WRAP Programme 1981-1990

1. INTRODUCTION

1.1 Purpose and Scope of the Study

The District Water Development Study (DWDS) of Samburu District is aimed at providing the basis for the District Water Development Plan (DWDP), which in turn will be the sector input to the District Development Plan (DDP).

The study was undertaken by the Ministry of Water Development in its role of supporting the districts in their task to develop the available water resources in a safe and sustainable way. Two conditions will have to be fulfilled to achieve this goal.

- The development of water resources must be in balance both with the capacity of these resources and with the conditions set by the environment.

- Supply of water to the community must be sustainable, meaning that the proposed schemes be designed in agreement with the technical and financial support capability of the people for whom they will be constructed.

These conditions require a thorough assessment of the situation in the districts and a planning that is in tune with the socio-economic, institutional, and technical developments.

The DWDS can be considered the first stage in the process of formulating a DWDP. The study, based on extensive assessments, describes the water resources development potential in comparison to the projected water demand, discusses the viability of different water supply options in terms of sustainability and safety, and provides estimates of the investment levels involved.

The DWDP based on the study will be more specific in that it also comprises the decisions of the district authorities regarding selection and prioritization of the water development schemes. The plan is to cover a period of 20 years, according to MoWD guidelines, starting from 1993 when operation of the first new schemes will supposedly begin. The DWDP will be an important component of the DDP which includes the entire socio-economical planning of the district in perspective to all the available resources. From the above it may be clear that both plans are closely linked and can only be successfully developed in good co-ordination.

The methodology for planning of water resources development, adopted by the Ministry facilitates full participation of the district authorities, community groups and individuals concerned in all stages of the planning process, which is in line with the District Focus Policy. An outline of the general approach is given in Chapter 2 of this report. A summary of the main aspects of the District Focus Policy related to water development planning is presented in Appendix 1.

In order to provide optimal conditions for district involvement, the DWDS is carried out in three phases. District engineers and institutions concerned with water use and water supply are extensively consulted during the periods of data collection and analysis. The final report includes three volumes, corresponding with the three phases of the study. Each of these volumes is presented and discussed at a DEC-meeting.

The present report on the guidelines and recommendations for investment packages is Part 3 of the DWDS carried out for Samburu District within the framework of WRAP.

The report provides the background and methodology for the implementation by the District of investments in the water sector. Indicative investment packages are developed, consisting of water supply schemes (or projects), which may be used by the District to formulate concrete project proposals. Also requirements for implementation of investment packages are discussed, with respect to strengthening of institutions, execution of feasibility studies and efforts to secure external funding support.

1.2 International Co-operation

The District Water Development Study was undertaken under Co-operative Agreement between the Governments of Kenya and The Netherlands.

The studies are carried out by the Water Resources Assessment Section of the Ministry of Water Development, Nairobi, Kenya in co-operation with the TNO Institute of Applied Geoscience, Delft, The Netherlands, within the framework of the **Water Resources Assessment and Planning (WRAP)** project.

Consultancy services were provided by the Netherlands Economic Institute, Rotterdam, The Netherlands and the International Institute for Hydraulic and Environmental Engineering, Delft, The Netherlands.

2. GENERAL APPROACH

The District Water Development Study (DWDS) is a base study for preparation of the District Water Development Plan (DWDP). All components that constitute the DWDP are also covered by the DWDS.

The model introduced by the WRAP project for preparation of a DWDP is shown in figure 2.1. The DWDS follows this model in analysing the various components that finally will lead to the formulation of the DWDP. The study includes three phases focusing on different aspects of the planning, namely:

- the compatibility of available water resources with water demand in the present situation and for projected demand scenarios
- the viability of the technical options for water supply development based on environmental and sustainability criteria
- the investments involved in the district water development and the technical, institutional, social and financial factors determining the sustainability of selected solutions

The results obtained in the subsequent phases of the DWDS are presented in Part 1, Part 2 and Part 3 of the DWDS report. An outline of the Study is given below.

Water Demand Study (Part 1)

The water demand study comprises of analyses and projections of the water consumption by all water users in the district. The baseline data available from various sources are often incomplete and/or inaccurate. Therefore, thorough scrutiny of the data is needed to ensure sufficient reliability of further analysis. The data is processed using a Database Management System that handles both the calculation of the water demand and the projection of the baseline data.

The water demand is calculated using the procedure laid down in the Design Manual of the Ministry of Water Development. The procedure compels to projections of the water demand in 5, 15 and 25 years time. This, in turn, requires analysis of the growth trends of population, livestock, agriculture, industries, tourism, etc.

The method adopted provides for projections following three different scenarios: a high growth scenario based on optimal conditions in economical development, a medium growth scenario corresponding with national and district development expectations and a low growth scenario taking into account the less favourable conditions set by the environment.

It may be clear that the DWDS depends on the input from other sectors, such as livestock and agriculture, to complete the projections in the most realistic way.

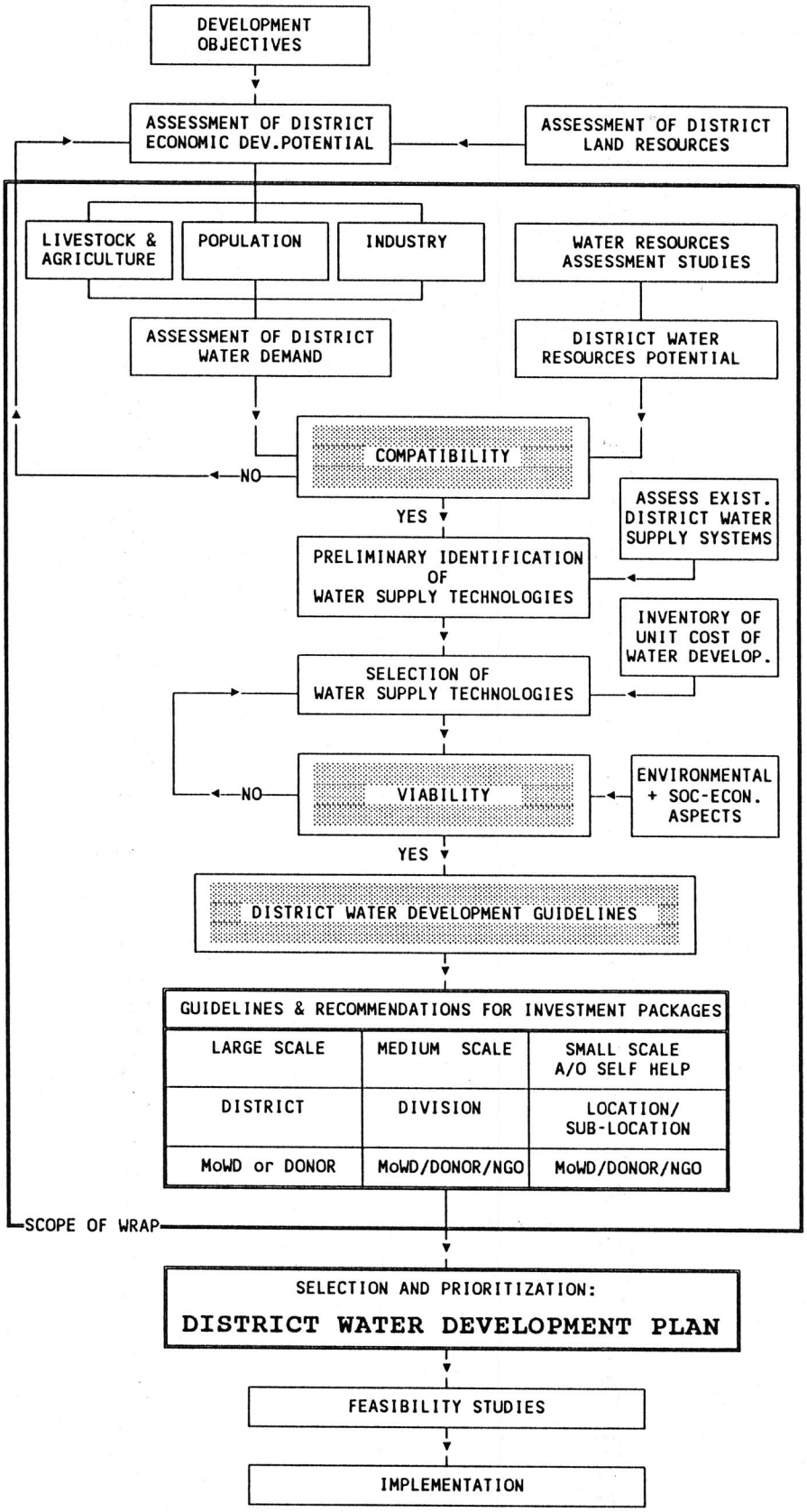


Figure 2.1 **Model for Preparation of District Water Development Plan**

Water Resources Assessment Study (Part 1)

Water resources assessment studies are an essential component of the DWDS. The assessment studies undertaken within the framework of the WRAP project comprise the following:

- An inventory of available data and studies on the water resources in the District

- A field survey including collection of data on surface water and groundwater, rehabilitation of part of the existing measuring stations, installation of temporary measuring stations. Measurements are made of the quantity and quality of water in rivers, springs, wells and boreholes.

- A geophysical reconnaissance survey using vertical electrical or electromagnetic soundings, aimed at providing more insight into the hydrogeological conditions. The results of the survey are checked and calibrated by drilling of exploratory boreholes and test pumping.

- An analysis of the geological, geophysical, hydrological and hydrogeological maps and data, both from the inventory and from field investigations.

From all this information and after careful and systematic analysis, water availability maps are prepared which show the water development potential of the area. The water resources assessment investigations are described in a separate report and a summary of the main conclusions on the water development potential is given in Part 1 of the DWDS report.

Comparison of Water Demand and Available Resources (Part 1)

Having estimated the water demand over the next 25 years and the water resources available in the district, a close analysis is made of the water development potential to decide whether the projected water demand can be met. This analysis of water demand versus water resources availability is carried out for the smallest planning unit: the sub-location.

When comparing the demand with the resources, priorities need to be set whether a district can best support human, livestock, agricultural or industrial development. In this respect both quantity and quality of the water must be considered.

What emerges from this process of comparing the anticipated demand with the resources, is a description of the development potential of the District, based on water availability.

Study of Water Supply Development Options (Part 2)

From the actual and projected water demand and the capacity of existing water supply schemes, the need for further development of the water supplies can be determined.

Limited water resources, contrasting interest or expected negative environmental impact may hamper further development. However, in situations with sufficient water available, often more than one supply option can be considered. A selection of the

best alternative must then be based on considerations of financial, technical and environmental viability.

Phase 2 of the DWDS includes:

- Assessment of existing district water supply systems
- Assessment of technical options for water supply improvement
- Inventory of unit costs for water development based on existing supplies
- Preliminary identification of water supply options and cost
- Study of cost-effectiveness of water supply options

The analyses, results and conclusions arrived at are presented in Part 2 of the DWDS report. Together with Part 1 this forms the basis for the 'District Water Development Guidelines'.

Formulation of Guidelines and Recommendations for Investment Packages (Part 3)

The guidelines and recommendations for the development of the district water resources result in proposals for improvement of the existing water supply situation in the district. The proposed improvements may range from very small local supplies to comprehensive water supply schemes. The investments required to improve the water supply situation have been termed investment packages.

The purpose of the investment packages is to present to the Government of Kenya and interested donors a preliminary estimate of the funds and other inputs needed for water supply development. Each investment package or a combination of them can thus form the core of a water supply project.

Phase 3 of the DWDS includes the following issues:

- Land use, environmental, social, institutional and economic/financial factors to be considered
- Guidelines for assessment of water sector investment proposals
- Examples of investment packages
- Recommendations on required institutional strengthening for implementation of the DWDP
- A framework for a proposal based on the investment packages

The analyses, results, conclusions and recommendations arrived at are presented in Part 3 of the DWDS report. The three parts of DWDS should provide the district authorities with sufficient base information for initiating further development of the water resources in the district.

3 BASIS FOR INVESTMENT

3.1 Overview

Water supply investments must be compatible with the District Development Plan (DDP) and the District Water Development Plan (DWDP). As introduction this chapter will set out an overview of the technical, social, institutional and financial basis for the preparation of investment packages. These issues have been discussed in Parts 1 and 2 of the Study.

On this base, indicative investment packages, consisting of water supply schemes (or projects), for the district are developed in three stages. The first stage (Chapter 4) examines the major factors to be considered with respect to design of these investment packages. This chapter examines both the factors which influence supply of water, the technical, institutional and financial factors in particular, and factors which determine the (economic) demand for water. Affordability and willingness to pay, and the institutions required for community participation are the key factors discussed with respect to the demand side. The second stage (Chapter 5) describes the methodology and criteria for choice of investment, either individual projects or packages, consistent with the DWDP. The last stage (Chapter 6) describes indicative investment packages using the methodology developed in the previous two stages.

The implementation of these investment packages, or any others, will require significant institutional strengthening, feasibility study and efforts to secure external funding support. These requirements are discussed in the concluding chapter (Chapter 7) of the report.

Throughout the Study, a distinction is made between water systems which are suitable for direct government support, and those systems (usually smaller systems) for which the local community must be the focus of development activity. This distinction is necessary because of the widely differing circumstances of different parts of the District, with some parts firmly in the formal, money, economy and others only partly so.

3.2 Technical Base

The various water supply technologies available and appropriate for use in the Samburu District were detailed in Part 2, Chapters 5 and 6. These technologies were selected to address the various types of water resources available in the district. They are summarised in Table 3.1.

The technologies set out in the Table provide the technical options from which are chosen the systems appropriate to the social, financial and institutional structures applicable to each Location and Sub-location within the District.

In general, these options fall into two categories which reflect the above mentioned economic division of the district. These are:

- the small scale urban systems catering for growing urban populations, and,

Table 3.1 Results of Cost Effectiveness Analysis

Ranking Number	Technology	Total Yield (m^3)	Total Capital Costs (Shs)	Total O&M Costs (20 yrs) (Shs)	Total Cost/m^3 (Shs)		
					5% disc.	10% disc.	15% disc.
springs							
1	Spring	76,650	25,000	10,500	8.7	8.2	7.8
3	Spring, 35 m3 Storage	268,275	293,750	627,375	54.5	45.2	40.0
5	Spring, Gravity Distribution, 70 m3	536,550	1,281,250	2,050,125	101.6	86.5	77.9
8	Spring, Gravity Distribution, 200 m3	1,533,000	4,800,000	6,216,000	120.3	104.3	95.2
groundwater							
2	Dug Well with Handpump	76,650	187,500	10,500	44.4	39.4	36.6
4	Dug Well with Handpump	38,325	187,500	10,500	88.9	78.8	73.2
9	Borehole with Handpump	76,650	450,000	73,500	127.4	119.1	114.5
10	Borehole with Motorpump, Distribution	536,550	1,925,000	3,176,250	149.1	123.1	108.4
11	Dug well with Windmill	220,500	1,175,000	283,500	129.2	124.1	121.2
13	3 Boreholes with Motorpump, Distrib.	1,533,000	6,218,750	10,976,427	178.4	148.6	131.8
14	Borehole with Motorpump, Distribution	268,275	1,275,000	1,811,250	180.8	149.7	132.3
15	Borehole with Windmill	220,500	1,425,000	336,000	156.2	150.2	146.8
18	Borehole with Windmill	126,000	1,131,250	336,000	224.4	213.9	207.9
19	Borehole with Motorpump, Limited Distr.	153,300	1,093,750	1,563,240	269.8	221.7	194.9
20	Borehole with handpump	38,325	450,000	73,500	254.8	238.3	229.0
surface water							
6	Surface Water, Weir, Gravity Distr.	268,275	487,500	1,572,375	117.1	93.9	80.7
7	Surface Water, Weir, Gravity Distr.	536,550	1,150,000	3,181,500	124.8	101.4	88.1
12	Pan (5000 m3, 6 months with water)	94,500	312,500	580,125	152.1	127.8	114.0
16	Dam (25000 m3) with Handpump and Trough	383,250	2,137,500	2,669,625	209.1	180.7	164.5
17	Surface Water, Weir, Distribution	1,533,000	7,250,000	16,012,500	233.0	188.6	163.6
21	Surface Water, Dam, Distribution	1,533,000	13,250,000	17,272,500	326.3	278.7	251.7

Note (1) - Total Cost/m^3 is the total discounted cost per cubic meter capacity per year

- the market centres and other rural schemes which must serve a dual role of providing water to people and to animals.

In the future, as more people give up a nomadic existence, the rural schemes may have to cope with increasing demand from small scale agriculture.

3.3 Socio-economic Base

The "rural" district of Samburu is composed of four types of settlement for which water supply is required. These are:

- small urban areas such as Maralal and Wamba (population > 2,000), which serve as major market centres for livestock and as service centres for government, small scale repair facilities, consumer goods and agricultural inputs (but do NOT have a formal agricultural market), they are surrounded by an increasingly permanent low density housing (manyattas) of the Samburu people (the majority population comprising an estimated 70% of the district's inhabitants) and others

- market centres such as Marti and Lodungokwe (population < 2,000), in which the permanent, formal sector structures are ranged along one street (shops selling basic consumer goods, a livestock purchasing agency, a dispensary, etc.), this area is surrounded by an area of very low density housing (manyattas) as above, in addition encampments for poor/ displaced people (kijiji) may be found adjacent the formal sector structures in some areas

- manyattas (encampments) in rural areas, usually temporary, and

- "independent" facilities such as tourist lodges, missions, schools and health centres.

Nomadic peoples are not well represented in the formal urban sector.

In addition water is required for several different uses, some of which must be associated with these settlements. The most important is the demand for water for livestock. The manyattas surrounding the small urban and market centres have many associated herds which constitute a substantial demand. When the cattle move to better pasture, the manyattas sometimes also move. Water is thus required along the routes used by livestock. Tourist facilities have associated demand from wildlife. Other demand from shifting wheat farms and small-scale agriculture (supplying small urban centres) is not yet significant.

Tourist lodges, and large scale agriculture (wheat farming, ranches) are formal sector activities carried out by the private sector. Investments for water supply in these industries can thus be left to the private sector, given that the projected investments are in line with the DWDP. Nomadic pastoralism is the main traditional economic activity and is substantially outside the formal economy. This activity combined with urban demand, cover the majority of the population who will have difficulty in obtaining water without government intervention. They are thus the legitimate focus of government activity in the water sector. However, it should be noted that the approach adopted for these two groups will be, of necessity, quite different.

The average income in the district was estimated at Shs 2,168 per month in 1987. The average income per farmer from the sales of livestock, hides and skins was estimated at Shs 628 in 1987. This low income indicates that selling of animals is not used to obtain a regular income. In fact animals are generally only sold by the pastoralists in case they need money for a specific purpose. District income distribution compared to national income distribution is shown in Table 3.2.

Apart from water, the main constraints to District economic development are limitations on livestock grazing capacity, poor transport links/access to markets and under-developed market structure.

Table 3.2 Distribution of Wage Employment (1988)

	Numbers Employed								
Income Level (Shs)	Under 215	215 to 399	400 to 699	700 to 999	1000 to 1499	1500 to 1999	2000 to 2999	3000 to 5999	Above 6000
National Total									
All industries	3,925	25,148	149,380	173,219	251,396	146,815	170,426	136,009	65,580
Agriculture & Hunting	3,226	15,076	78,403	39,024	16,462	5,166	4,307	4,017	1,881
Samburu District									
All Industries		6	127	329	642	272	657	732	137

Considering the technical options available and the settlement pattern, water will thus be delivered to people and industries in four groupings, which require support of government. These are:

- urban systems with mainly service and small scale industry demand in addition to residential demand,

- market centre systems with some service demand, a small permanent residential demand (sometimes very poor as in the case of people in the "kijijis"), increasing demand from semi-permanent residents, who may require water supply for cattle

- rural supplies for nomadic pastoralists and sedentary rural population, and

- supplies to "independent" facilities in the formal sector. Independent commercial facilities (tourist lodges) or missions do not require government support.

Within these groupings there are social groups which have differing cultural requirements and income levels which will effect their effective demand for the various technical options. This is, these different groups can afford different amounts for their water and have different priorities with respect to availability/quality/use. The result is that they will often demand different things from water supply systems. In order to resolve these competing demands strong institutional systems are required and it is these systems which will now be examined.

3.4 Institutional Base

3.4.1 Context

The existing network of organisations involved in the water sector is complex. With the District Focus Policy, the district is expected to co-ordinate all investment, including investment in water supplies. However, there is a confusion in policy direction between what is known in other countries as "deconcentration", i.e. placing implementation activities of line Ministries at local level while retaining centralised control of staff and budgeting, and "decentralisation", i.e. giving staffing and finance control to the local institutions. The former course has been adopted in Kenya, and, as a consequence, effective district co-ordination of investment, including that in the water sector, is difficult.

Four key activities are required to implement a water supply. It must be planned, designed, constructed and operated. Overall water policy planning, and technical (design) support is the responsibility of the Ministry of Water Development (MoWD). Responsibility for construction and operation is fragmented however. Local offices of line ministries, including the District Office of the MoWD, have considerable autonomy in design and construction of water supply schemes.

Private formal sector organisations, missions and other entities may obtain permits as "water undertakers", to exploit local water resources. The appointment of a water undertaker is done by the Minister of Water Development under the powers of the Water Act (cap.372). There is little reference to District level institutions. This process is, therefore, outside the district focus policy.

Local Water Associations are legal entities which have a Water Permit. They are being formed in some districts to become responsible for existing water systems or to undertake new ones. Permission to utilise water resources under the Water Act is presently given by a committee of the MoWD meeting in Nairobi, but is usually decided on the recommendation of the District Office of the MoWD. The lowest level institutions are the informal water committees. There is only one example of such committee in the Samburu District at South Horr.

In general, the District Office of the MoWD implements urban/market centre supplies such as at Maralal, Baragoi, Wamba, Sukuta Marmar, Lodungokwe, Sirata Oirobi, etc. Smaller schemes are undertaken by communities sometimes assisted by an NGO, such as by Action Aid in eastern Samburu District. Schemes built recently at Tuum and South Horr by the MoWD had a significant self-help input, which may indicate a new trend of project implementation.

3.4.2 Implementation of District Focus in the Water Sector

The existing institutional base of future water investment in the district is limited. In the context of the District Focus policy, the District Development Committee (DDC), assisted by the District Executive Committee, is expected to co-ordinate investment in the water sector. This includes expenditures by the County Council (under the Ministry of Local Government). While the structure is in place, the resources to carry out the required project appraisal, prioritisation and implementation are very limited.

The MoWD District offices are being strengthened as part of the "deconcentration" of Ministry activity. The policy of "appropriations in aid" has been instituted which will link future recurrent expenditure funds allocated to districts to their performance in meeting revenue targets established by Treasury. Wages for lower levels of staff are now the responsibility of the district to pay. This may have a considerable impact on efficiency as there are indications that district level staff are under skilled, and that, compared to the resources available to work with, there may be significant over staffing.

The head office of the Ministry in Nairobi will now concentrate on providing policy, training and technical support, especially as key implementation activity has also been taken over by the National Water Conservation and Pipeline Corporation. In this role, it has begun to institutionalise the assessment and planning process developed, to a great extent, through the WRAP project. The water assessment studies and planning reports are now an important resource for the MoWD, and its staff are being trained in the techniques of assessment. The Planning Unit within the Water Resources Assessment Section is responsible for carrying out these studies and assessments.

However, two major issues remain. The first is the lack of effective implementation of decentralisation policy and the second is that there is no clear policy on which organisation(s) should implement projects at district level. There are several options. These include the District office of the MoWD, the County Councils, NGO's and local Water Associations. The choice of institution will depend on the existing strength of these institutions, and potential for future strengthening.

However, better may be a coordinated approach by all parties involved. This is currently developing in Baringo District with assistance from UNICEF where a district water coordination group has been formed led by an inter-ministerial team and supported by every operational NGO in the district. The inter-ministerial team has representatives of MoWD, MoH and MCSS as well as the DDO and it is to be in contact with all operating organizations in the district who have an interest in water. It has been agreed in Baringo that this group meets every three months for information sharing, decision making, etc.

The district strategy is shared with everyone. Individual groups become the "lead" agency for community mobilization and implementation in their division. Such matters as overlapping and duplication are worked out. Once plans are agreed it is up to each group to implement in their own way. With this approach it will be possible to implement water programmes by different organizations within the overall district strategy.

In the Samburu District, the limited autonomy and resources of the District office of the MoWD restrict its project implementation roles. A significant shift in operational procedures would be required for it to take the initiative in this respect (see subsequent chapters for details). The County Council is even more constrained in any attempt to provide water supplies. It has, in fact, handed over water supplies to the MoWD. With locally raised revenue (excepting that gained from the Samburu National Park, most of which must be used to develop the Park) at a level of approximately Shs 1.5 million, considerable revenue enhancement and operational strengthening would be required if the water supplies were to be the responsibility of the Council.

3.4.3 Community Involvement in the Water Sector

Water Associations or committees, in theory ideal for the implementation and/or operation of small community schemes, also have a weak base in the Samburu District. While various community leaders are present on the Divisional Development Committees and are represented on the DDC by the Divisional Officer, there is no formal structure of community participation, although the informal links through chiefs and sub-chiefs to the elders are said to be effective. Such participation is fundamental to the success of water supply projects in rural areas. No Water Associations have been formed as yet, but community water committees have functioned effectively in some self-help projects (see Paragraph 4.3 below).

The institutional base will also play a key role in the type of system chosen. Systems which require complex or expensive operations and maintenance support will not be easily handled by district institutions. This is particularly important in the choice of system where local communities will have a major role in implementing the systems.

In the coordinatory approach in Baringo District communities are involved especially with point source systems. The district team might concentrate more on the population

centres using conventional schemes. Point sources will be community owned and therefore communities must be involved from the beginning of discussions, planning, cost sharing and implementing.

The participation of the communities in improving their water supply is approached in Baringo District and also in Kisumu District in combination with the community health programme, which has been running successfully for several years. As with other forms of technology health education is about changing attitudes and past practices as well as importing knowledge. It is therefore an activity which extends beyond the life of a development project. An essential operational factor is to identify animators/ educators who come from within the communities in order for them to participate in training and to use that training on a long term basis during and after the project. The task for the water coordinators (or water network) will be to draw on these existing human resources in order to spread essential health/water messages.

3.5 Financial Base

3.5.1 Financial Context

Two sets of structures are central to consideration of the financial systems for water supply. These are:

- policies and systems linking national and district levels, and
- systems operating at district level.

Policy at national level is currently under review. The final form of this policy will be seen in a Cabinet Paper currently under preparation. Although this document is not yet available, certain issues to be addressed in the Paper are clear in the context of the Cost Sharing policy set out in the National Development Plan. These are:

- definition of the extent of cost sharing required from various types of schemes
- mechanisms for tariff setting, and
- incentives for increased efficiency of revenue collection, particularly through the use of the system of "appropriations in aid" such that districts will be able to retain all or most of revenue raised in the district, and authorising disconnections.

At present, these policies are not defined, but the direction of policy is clear. The water sector has the following immediate goals:

- to maximise the amount of revenue collected as a proportion of billed, and
- to maximise the amount of water billed as a proportion of water produced.

Although no definite targets have been set for cost recovery, the objective of all government systems is to improve current performance in this respect. The National Development Plan also states that water supplied should be affordable. The review of tariff policy will no doubt give due consideration to these factors.

These policies have significant implications for the structure of the organisations undertaking water supply, the financial systems they employ and the monitoring that is done, and the choice of system for a particular project (in terms of the capital and operational costs). The current systems can now be described.

3.5.2 National-District Financial Systems

National Ministries, including the MoWD, submit yearly budgets for both development (capital) and recurrent expenditures to Treasury. On final approval, the districts are informed of their allocation on a six monthly basis.

Each district has a District Cash Fund (account) from which line Ministries can make payments. For approved capital expenditures, the Authority to Incur Expenditure (AIE) is cleared from central MoWD. AIEs for approved recurrent expenditures are issued by the District MoWD. The Cash Fund is reimbursed from Treasury. Additional resources are also available through the Rural Development Fund and the EC Micro-project Fund on application, although this allocation must be approved centrally by both Treasury and MoWD.

Revenues are not collected by the District MoWD, but by the District Treasury and thence are forwarded to national level. The District MoWD in this system has no possibility to use the revenues directly.

3.5.3 District Financial Systems

These systems focus on control of individual systems and associated District office support. The existing situation with respect to MoWD schemes in the Samburu District may be summarised as:

- accurate monitoring of water production is sometimes achieved in Maralal, especially for new connections, but many water meters are not serviceable, so monitoring of delivered water is not possible in many schemes despite adequate procedures, and often staff, being available to carry out such monitoring

- the procedures for billing are in place

- collection systems are inadequate, procedures for sanctions are in place but are often not used against non-payers (except in Maralal), collection centres are sometimes remote from the scheme, and not under the control of the MoWD (this situation is not assisted by people's reluctance to pay for an unreliable water supply, and, in some schemes, the reluctance of other government agencies to pay bills)

- the systems for monitoring of actual revenue collected are fragmented with MoWD forwarding receipts to the District Treasurer, who also monitors revenue collected by month (for a number of agencies)
- monitoring of construction by contractors appeared adequate, but, hampered by lack of funds for materials and transport for day labour construction, the MoWD's own projects appear to progress very slowly

- the accounting and payment system for "development" funds is well designed, and would be adequate if funds were made available on time, and if forms were accurately completed

- procedures for monitoring of production, operation and maintenance are comprehensive and, if they were accurately completed, would provide an excellent basis for cost control

- the accounting system for "recurrent" funds would be adequate for small systems if forms were accurately completed,

- there is, as yet, no impact on recurrent funding from the "appropriations in aid" policy, but it is likely to disadvantage the Samburu District if implemented as revenue targets, and appropriations consequent on revenue collection as a percentage of these targets are set without consideration of the types of systems operated by districts (Samburu has high costs because many of the systems require diesel pumps)

- capital budgeting is carried out in a rolling three year period through requests for "development" funds called "estimates", funds are allocated on a six monthly basis, and development expenditures allocated are a fraction of those requested

- the capital budgeting system would be adequate if it were operated efficiently

- the management information systems linking these diverse activities are the major flaw in the system, reporting on revenue collected going through one channel and on expenditures going through another; revenues and expenditures directly related to a scheme are not compared, and no attempt to allocate overhead costs to a specific scheme is made (such a summary should be available to the DWE).

A similar financial system, in a simplified form, would be adequate for community groups. Such a system has been operated by a community based water supply system in Meru District (Murugi - Mugumango).

4 GUIDELINES FOR DESIGN OF INVESTMENT PACKAGES

4.1 Overview

This chapter describes the various considerations involved in the design of investment options in the Samburu District. The focus of the discussion will be on the appropriate choice of a given technology for a given project within the constraints of its water resource, socio-economic, institutional and financial context. Discussion of these considerations will be structured by examining, in turn, those concerning supply, (economic) demand and pricing (which brings supply and demand into equilibrium).

In the analysis, it will be assumed that the policies set out in the National Development Plan are to be implemented. In Chapter 7 the institutional and financial strengthening required to implement these policies will be examined.

4.2 Supply Considerations

4.2.1 Available Technologies

Given the physical environment of the proposed water supply, a certain range of technical options will be available. These options can be ranged on a scale according to their cost per cubic meter of water delivered over, say, 20 years, which is the period used in the DWDP.

The first set of elements to be considered in the physical environment are, of course, those related to the water resources available. These resources should be considered in relation to the potential (water) demand of the inhabitants, in that the total supply must be adequate for projected population increase (see water demand estimation methodology in Part 1 of this Study). In the Samburu District, generally adequate resources are available, especially groundwater resources. However, due to the depth of groundwater, the technologies used to abstract that water may be expensive.

The second set of elements of the physical environment to be considered are those related to land use and environmental issues. "Land use" covers such questions as the actual positioning of the plant, equipment, and associated civil works, in the context of land ownership, and of planned and traditional land use. Additionally, engineering aspects of water systems such as foundations and structural design will be influenced by location. It is important to note that changes in the design due to these considerations may change the order of cost set out in Table 3.1 above. In the Samburu District, the low densities of settlements and the communal nature of most land holdings make it unlikely that these considerations will be of major importance. "Environmental" issues are also important, particularly as regards the impact of livestock movements and their relation to water. In Samburu, this issue is particularly important and sets limits to the growth of livestock numbers, given traditional management techniques.

With a range of feasible technical solutions selected by considering the above mentioned elements, the next phase of the project development can commence.

4.2.2 Socio-Economic Aspects

While most of the important considerations related to these aspects are demand side considerations or related to the final choice of investment options, there are some issues which effect the supply side. In particular, these are the alternative or traditional sources of water and the institutional structures which are appropriate for project design and implementation.

The alternative or traditional supply source may be considered by the people as superior, even if it is demonstrably inferior with respect to technical standards. The importance of community education in this respect cannot be underemphasised. This education campaign should preferably be associated with a sanitation campaign.

The second impact on the supply side is on the structure of the organisation which will supply water. This organisation must be responsive to the structure of the communities identified above. In the Samburu society, the elders have key roles in decision making and should be incorporated in the structures of the implementation organisation if this organisation is to receive government and community support.

Detailed studies as to acceptable and effective forms of education and organisations will be required at feasibility study stage.

4.2.3 Institutional Considerations

With the above issues in mind, the structure of the institutions which will plan, design construct and operate the water system can be considered in more detail. The scale of the projected system will often determine the institutions involved in these activities. These institutions will, in turn, have an impact on the selection of the most appropriate technical option.

The key functions which must be carried out by the selected institutions are:

- information and mobilization of local population
- preliminary design and feasibility study (planning, siting, technology choice)
- approval of project
- detailed design
- construction supervision/construction
- staff training
- operation and maintenance, and
- financial functions (see paragraph 4.2.4 below).

The organisations which undertake these functions, and the community liaison activities which must run in parallel to them, will differ depending on the type of system to be undertaken. The precise allocation of these functions should be a task for the feasibility studies to determine.

In the Samburu District, the MoWD has the ability to undertake surveys and limited ability in design, construction and operation (including finance) of small scale systems. Assessment studies, feasibility studies, complex design, and training are beyond its capacity, and MoWD headquarters (or other agency) support is required for these activities. There are no Water Associations in the district. The assessment of feasibility studies/proposals should be undertaken by the DDC with advice from the district MoWD, but there are insufficient skills in the district to carry out this role properly.

Extensive strengthening of a variety of organisations will thus be required in order to effectively implement either urban or rural/community based projects in the district, under the District Focus Policy.

4.2.4 Financial Aspects

The organisations chosen to implement the project must effectively undertake ALL of the major financial functions associated with any enterprise. This is essential to the sustainability of the project. The key functions and associated systems are:

- accurate monitoring of water production and distribution
- efficient billing systems for water distributed
- efficient collection systems for water billed and effective sanctions against non-payers
- accurate monitoring and cost effective control of construction costs
- ensuring adequate provision for, and cost effective control of, operation and maintenance expenditure
- systems of capital budgeting (development expenditures) which relate to specific water schemes
- accurate and timely reporting of above activities, and
- financial incentives both to individuals and to schemes to implement government policies, e.g cost sharing.

Even if the implementing institution consists of a village Water Association, these tasks must be carried out, and the systems required for these tasks must be present even if in a simplified form. Variations on the current documentation of the MoWD would appear to be adequate if used correctly.

Where more than one organisation is involved, for example where one authority constructs the scheme and another operates it while a third funds construction, the financial relationships between them must be clear. The extent and terms of subsidy and/or cross-subsidy must be described in the accounting systems of the various organisations. In general, the organisation which will operate the scheme should be given control of the funds and the responsibility to perform to (financial) targets.

As we have seen in Paragraph 3.5 above, the financial systems of the MoWD are not fully operational in the Samburu District. Where extensive financial co-ordination with other agencies or communities is required, significant strengthening of existing systems will be required. If the district is to have control of its own financial resources, staffing and expenditures, extensive strengthening, using similar concepts to those suggested in the SIDA Water Use Test Project will be required. Simplified systems along the lines of the current MoWD system will be required for small community systems.

4.3 Demand Considerations

4.3.1 General

The basis of demand for water is the population projections contained in Part 1 of the Study. Different groups of people will have different demands according to their circumstances - which will change over time. The most important change over time will be rising real incomes. People tend to spend more on water as their incomes rise.

Projections of district income growth rates are not yet available, however, and water demand estimates contained in Part 1 provide the best estimate of what might be termed "latent" demand in an economic sense. Whether this demand becomes "effective", that is becomes translated into money spent on water, depends on several factors. The most important of these are affordability and willingness to pay.

4.3.2 Affordability

Central to the choice of a system, given a pricing policy (see 4.4 below), is the affordability of that portion of the cost to be borne by the consumers. Accurate data on the incomes of the various groups of consumers can be obtained in feasibility studies. The normally accepted range of affordability is 3-5% of total household income (Whittington et al., 1989). However, especially in the context of Samburu District, this does not mean people are willing to pay this amount. While the value of family assets (cattle, sheep, goats and donkeys) may be high during the good years, there is little cash income, and the culture inhibits sales of animals, the number of which gives the owner status.

4.3.3 Community Participation/Willingness to Pay

In community based schemes, community participation must start from the feasibility study phase. The participation of the community is vital in determining the type of scheme which they can and will operate successfully. The extent of participation should be much more than the "dig and pay".
The amount that a community is willing to pay will be influenced by cultural issues, the availability of alternative sources (and their cost) and the extent to which they are involved in the project (whether they "own" it or not). Again, these issues must be addressed in a feasibility study of a specific system

In general, in Samburu, the most effective form of community participation has been that practised under the Integrated Food Security Programme in Wamba Division (similar activities have been successful in other Districts). This programme was initiated after the severe droughts of the early 1980's. It has expanded into areas of small scale infrastructure, including water supplies. This programme begins by demanding that the community form a committee, which must make a formal application to the government for the project. This committee must commit the community to pay a substantial sum to the capital works, which is used first. They must also commit a substantial input of labour, half of which is payed for (half in food and half in money). The community thus feels it "owns" the project, and will maintain the scheme to the limits of its financial and organisational ability (these limits should be taken into account when technologies are chosen). The initial community contribution can be almost offset by labour payments.

Since the labourers are mostly women, these programmes constitute a means of transferring a cash income to women. Such income may be appropriated by men or spent on consumer items, but may be the base for a change for the better in the traditional role of Samburu women.

A similar approach to community participation should be adopted for all water supplies which serve people who are not in the formal sector.

4.3.4 Institutions for Community Participation

Community participation in a project does not occur without considerable effort. It must be remembered, especially with respect to groups not fully within the modern sector, that the benefits obvious to the project promoters are not obvious to the potential recipients. Two basic preconditions for effective community participation are:

- education and
- organisation.

The benefits of the project must be made concrete to the people. If there is no obvious advantage of the scheme, if, for example, the people have adequate clean water, free, from wells near the house, it should be asked if a water supply is, in fact, a high priority for the area. While there is a scarcity of readily available water in the Samburu, the perception of the people of as to the priority for water supply (i.e. cattle) and of adequate water quality, must be considered in the planning of any education programme.

The structures and resources for effective participation must also be available from the time of project formulation. These structures include:

- formation and recognition of the community organisation
- establishing a formal process for consultation with the community organisation, and
- providing organisational support, for example in undertaking some administration for these organisations.

Funding of these activities is difficult given the lack of government resources for even routine activities. However, these elements were present in the Integrated Food Security Programme discussed above. The Programme supported the formation of the community committees, provided the administration required for the project, and employed a Samburu to act as a site supervisor (field assistant) and as liaison with a site committee of elders.

Records are kept of attendance, and of food and cash payments. Programme "topping up" of capital expenditures comes from the development budget of the Arid and Semi-Arid Lands Ministry supported by donors. The extent of topping up varies with the type of project, and may vary from 60 to 90 percent of materials cost.

No specific institutional arrangements for educating women about the use of the cash payments they receive has been undertaken.

4.4 Pricing and Cost Sharing Policies

The price of water is the mechanism which brings together supply and demand. Establishing the price of any commodity is a trial and error process but some guidelines can be established in the light of the cost sharing and affordability policies set out in Chapter 3. Two major objectives are to be considered. These are:

- cost recovery, and
- demand management.

Table 4.1 Technologies Ranked by Minimum Cost by Cost Recovery Policy

Summary of rankings

Type / Technology	Supply Capacity (m^3/day)	Overall Rankings			Type Rankings		
		Capital + O & M (Discounted) Cost/m^3	Capital Cost/m^3	O & M Cost/m^3	Capital + O & M (Discounted) Cost/m^3	Capital Cost/m^3	O & M Cost/m^3
Springs							
Spring	10	1	1	1	1	1	1
Spring,	35	3	2	8	2	2	2
Spring, Gravity Distribution,	70	5	5	10	3	3	3
Spring, Gravity Distribution,	200	8	7	11	4	4	4
Groundwater							
Dug Well with Handpump	10	2	6	2	1	1	1
Dug Well with Handpump	5	4	13	3	2	5	2
Borehole with Handpump	10	9	16	4	3	7	3
Borehole with Motorpump, Distr.	70	10	9	13	4	2	8
Dug well with Windmill	(35)	11	14	5	5	6	4
3 Boreholes with Motorpump, Distr.	200	13	10	18	6	3	10
Borehole with Motorpump, Distr.	35	14	12	16	7	4	9
Borehole with Windmill	(35)	15	17	6	8	8	5
Borehole with Windmill	(20)	18	20	9	9	10	7
Borehole with Motorpump, Ltd. Distr.	20	19	18	19	10	9	11
Borehole with handpump	5	20	21	7	11	11	6
Surfacewater							
Surface Water, Weir, Gravity Distr.	35	6	3	12	1	1	1
Surface Water, Weir, Gravity Distr.	70	7	4	14	2	2	2
Pan (5000 m3, 6 months with water)	(25)	12	8	15	3	3	3
Dam (25000 m3) Handpump and Trough	50	16	15	17	4	5	4
Surface Water, Weir, Distribution	200	17	11	20	5	4	5
Surface Water, Dam, Distribution	200	21	19	21	6	6	6

Note: (1) - Cost/m^3 is Cost per cubic meter capacity
(2) - Supply capacity between brackets indicates that supply is not guaranteed all year around

Cost recovery will be the major focus of pricing policy in Samburu. This issue is closely linked to choice of technology (supply), and affordability/willingness to pay (demand). Choice of an expensive technology will not be appropriate if full cost recovery is applied and the recipients have a limited income. The people of the Samburu District, particularly those in the areas outside Maralal, have a limited money income and low willingness to pay. Low cost technologies are thus essential.

As stated in Paragraph 3.5 above, cost recovery policies are not yet firmly established. Thus, three approaches to cost recovery will be used in this study. Based on each of these approaches different investment packages are generated (Chapter 6). The three approaches to cost recovery are:

1. **Recovery of full capital and operation and maintenance costs** - this is the ideal situation with respect to the government's cost sharing and district focus policy, and appears feasible for urban schemes. Technologies will be selected such that the total cost will be minimised in order to maximise affordability under this cost sharing arrangement.

2. **Recovery of operation and maintenance costs only - partial capital subsidy and hand over to community** - the next best outcome in terms of the cost recovery of objective. The district focus policy is also satisfied. It is likely that this approach will be used for smaller schemes. Technologies will be selected such that operations and maintenance costs are minimised in order to maximise affordability for the recipient community.

3. **Full capital subsidy from government and hand over to community** - Technologies will be selected such that capital costs are minimised. The costs of O/M are not taken into account in selecting technologies. This policy will minimise the cost to the government.

The various technologies identified in Table 3.1 have been ranked according to the three approaches described above and are shown in Table 4.1.

The other objective of pricing policy, demand management, does not apply with any real force to Samburu District. Only where unplanned exploitation of water resources threatens efficient economic development should pricing policy be used to ration scarce resources between users. In the sparsely settled, pastoral Samburu District this is not yet a pressing issue, as it is in other areas of Kenya, and will not be considered in this report. It should be noted however, that issues of demand management do exist in the district. The possible overgrazing of some areas and the impact of shifting wheat cultivation may become serious issues as more information is gathered on the impact of these activities.

5 GUIDELINES FOR APPRAISAL OF INVESTMENT PACKAGES

5.1 Overview

This chapter will attempt to bring together the considerations discussed above and set out a methodology for the assessment of investment packages. This methodology is intended for use by the DDC and DEC (in conjunction with District MoWD) in assessing investments put to it for approval.

The analysis will be divided into three parts. The first part will outline a methodology to assess the economic/financial viability of the water supply systems in the most general terms. The same methodology may, however, be applied in feasibility studies when more detailed data will be available. The second part will set out a process of appraisal of investment proposals so as to help ensure that they are in conformity with the District Development Plan and the DWDP as prepared by the district. The third part indicates how prioritisation of proposals may be achieved based on a policy of cost sharing.

The following chapter will develop indicative investment packages which meet the criteria established in this chapter.

5.2 Economic and Financial Analysis

5.2.1 Introduction

Analysis of water supply systems can be divided into financial and economic parts. The financial part approaches the system from an individual's (e.g. the "water undertaker", the community) point of view, whereas the economic part looks at the implications of the system for the nation as a whole. The financial approach thus typically considers revenues and expenditures (cash flow accounting), in the context of cost recovery. Economic analysis estimates costs and benefits to the nation, in which items like time savings, health improvement and indirect benefits/disbenefits accruing from the water supply system are considered.

Appraisal of investments in the water sector should include economic and financial analysis of each project/system. Any proposal to utilise water resources should include simple cost/benefit analysis indicating that the proposal is viable. For larger investments, a more sophisticated analysis should be undertaken, based on detailed demand surveys. Cost-effectiveness analysis is second best and most appropriate if a decision to go ahead with a scheme of a particular capacity has already been taken, but there are alternative solutions with technical specifications and different costs possible (benefits are often presumed the same for all alternatives).

The methodology used distinguishes between a) small urban areas and b) rural market centres. For each area a description of benefits and costs is given. Examples valuing and comparing the described benefits and costs are set out in Appendices 1 and 2.

Cost/benefit analysis of water supply systems in urban centres differs considerably from that of water supply in rural areas. In small urban centres (e.g. Maralal, Wamba

and Baragoi, population >2,000) the analysis is done by comparing revenues (amount of distributed water at an affordable tariff) with expenditures (capital and O&M costs). Actual revenue/projected revenue at affordable tariff levels is seen as a proxy of benefits expressed as willingness to pay for water. The methodology to be used for analysis of water supply systems in market centres (population < 2,000) and in other rural areas in Samburu district relies on estimates and valuation of time savings as a result of new supply, other cost savings where applicable (e.g. reduced costs of boiling); health improvements and indirect economic benefits need to be considered. Total benefits are compared with costs and economic disbenefits.

Financial cost analysis is based on market prices, whereas economic analysis generally uses shadow prices. The economic analysis set out below uses market prices. This is because the distinction between tradebles and non-tradebles is difficult to make in rural water supply systems and because conversion factors could not be determined within the scope of this report (ref: The Value of Time Spent on Collecting Water: Some Estimates for Ukunda, Kenya; Whittington et al, 1989).

Capital costs and operation and maintenance costs vary between different systems. The relation between these costs and the cost sharing policy, and the effect of both on the choice of systems is discussed in paragraph 5.2.4 on financial analysis. That paragraph also discusses these items in relation to possible sources of funding of projects.

5.2.2 Economic Analysis of Water Supply in Small Urban Areas

a) Benefits

In urban water supply systems benefits of supply of water are reflected in the consumers willingness to pay for the service. This does not necessarily translate into collected revenue, however. Due to inefficient revenue collection, broken down meters and insufficient meter readers etc., revenue collected does not always match with revenue billed (assuming all water distributed is billed). Furthermore, people often are not disconnected after non-payment and therefore have no incentive to pay.
In estimating the benefit of a water supply system it is therefore better to look at the quantities of water produced and distributed. Differences in these figures are caused by leakages in the distribution system. If possible, the quantity of water actually consumed is to be considered. The quantity of water consumed, valued at an affordable tariff, is the best indication of direct benefits of water supply to small urban centres. The affordable tariff is derived from the fact that people spend from 3% - 5% of their income on water (Whittington et al, 1989).

b) Costs

Costs of water supply systems can be split into capital costs (e.g. materials, equipment) and operation and maintenance costs (e.g. fuel/electricity, salaries of staff, chemicals, transport, spare parts, tools, costs of repair). Costs are related to water production/distribution and are expressed in Shs./m3 per year. A ranking according to cost effectiveness per m3 is shown in Table 3.1. This ranking was based on total discounted cost/m3 for various systems.

c) Comparing Benefits and Costs

When discounted benefits (value of water consumed) are large enough to cover discounted costs, the system is viable from an economic point of view.

See Appendix 1 for example of economic (and financial) analysis of urban water supply.

5.2.3 Economic Analysis of Water Supply in Rural Areas

a) Benefits

Considerations such as willingness to pay, limited money economy, cultural and traditional use of water etc. make it more difficult to consider revenue as a justification for a water supply system in rural areas including market centre. Time savings, health improvement, savings in cost of boiling water and other indirect economic benefits are therefore major benefits of these water schemes.

Time Savings

A water supply system (or an improved distribution system) enables people to get water from a supply point, which is closer/more reliable than the source they originally used. If they spend less time hauling water in the new situation, compared to the old 'without project' situation, the time they save may (and often can) be valued. Women usually collect water and therefore their time savings have to be considered. The time they save can be used for extra care for children, activities in the house, milking and processing of dairy and income generating casual work.

Valuation of time savings by women due to an improved or new water supply system will be based on rural-female income level. Total time saved will be calculated by estimating the number of households, their water needs and time saved as compared to existing sources.

Health Improvement

Though health improvement resulting from improved or new water supply is difficult to prove and even more difficult to value, the situation in Samburu offers possibilities to do so. At present, in large rural areas in Samburu, it is possible to value the health benefits of water supply as it is the only effective sanitation intervention in the area. People have no access to sanitation facilities, they have no electricity. In some rural market centres people use water from boreholes. In the dry season young men move with the cattle in search of pastures and therefore have to rely on other water sources (e.g. wells, springs). In the rainy season they return to their homeland. The increased percentage of skin diseases reported in the dry season may provide insight in the effect of water use from other sources, given the fact that other masking variables (improved sanitation, electricity etc.) are not present.

Other Economic Benefits

Indirect benefits from water supply in Samburu District in the long run are a result of possible economic development of the district due to better water availability. Because of the more regular supply of (clean) water, population and livestock may grow, agricultural production may increase, and small scale industry may develop. Since the main source of income for Samburu people is livestock, development in quantity and quality of livestock, is very important for their income/wealth. At this stage, such future developments are difficult to estimate without detailed study which is beyond the scope of the present study.

b) Costs

The costs of rural water supply systems can also be split in capital costs and O&M costs. These costs are however, unlike costs of urban water supply systems, not the only costs which are to be taken into account. Supply of water to rural areas brings some economic costs with it. For example, in a community-run scheme, people have to participate in operation and maintenance activities and co-ordination meetings. This

requires time which they could not have spent on income producing activities in a 'without project' situation. People have to pay for water consumption and they often have to walk considerable distances in order to pay their monthly bills.

c) Comparing Benefits and Costs

Health and time savings benefits accruing from water supply justify a certain cost range of water supply systems. Additional economic benefits enlarge the range of viable systems.

Further selection of systems will include technical aspects (not discussed in this chapter) and cost recovery aspects (discussed below). As in urban water supply benefits should cover costs.

See Appendix 2 for example of economic (and financial) analysis of rural water supply.

5.2.4 Financial Analysis

Financial analysis is carried out from the viewpoint of an individual entity, usually either from the viewpoint of the community or of the government. It uses projections of money expenditures and incomes over time. Inflation must be considered in these projections. The extent to which expenditures, like capital and O&M costs, are matched by incomes or revenues, such as payments by the community, is the basis of the analysis. The difference between revenues and expenditures is the net cash flow. At the most basic level, a project is viable from a financial point of view if net cash flow remains positive.

a) Community's viewpoint

In the perspective of a community, the cash flow is largely determined by:

- the government policy on cost sharing (i.e how much of expenditures are to be met by the community), and
- the amount the community can afford/is willing to contribute (i.e how much revenue can be collected).

Capital expenditures of a water supply system can be met by:

- grants and/or loans sourced from one or more donors (usually channelled through the government), or from the government itself
- money contributions from the community, and
- labour and/or material contributions from the community.

When capital contributions of the community are insufficient to meet cost sharing requirements, additional expenditures may be paid for by a loan which will have to be paid back by the community through charges levied for use of the water (i.e the revenue of the system).

System revenues must cover expenditures on O&M as government policies require this level of cost sharing as a minimum. Such expenditures include operators, chemicals, fuel, electricity, and periodic replacement of parts.

Viable projects, from the point of view of a community, are projects where the system revenues can meet the required level of cost sharing. Depending on the components of that cost sharing, different strategies will be adopted. If the community must bear the cost of both capital and O&M expenditures, then systems which are most cost effective with respect to total costs should be chosen (see Table 4.1 and Investment Package 1 in Paragraph 6.3). If the community must bear the cost O&M expenditures only, then systems which are most cost effective with respect to O&M costs should be chosen (see Table 4.1 and Investment Package 2 in Paragraph 6.3).

Feasibility studies of future investments should focus on the cash flow of the community scheme. Sources and applications of funds should be identified over the life of the investment. Revenue projections should carefully consider issues of affordability/ willingness to pay.

b) Government's viewpoint

As the institutional structure of the MoWD stands at the present time, cost recovery policy cannot be made coherent. As the funds expended on schemes and the revenues from them flow through different and multi-layered channels, matching expenditures to revenues is difficult. This situation will change in the future, when the enforcement of cost sharing policies, such as set out above, will be possible as the District offices of the MoWD are strengthened.

At present, severe limits on MoWD capital works budgets requires that capital expenditures be minimised. Such investment is often not recommended as economically efficient or as financially affordable for the recipient community, but is a possible short term strategy in the present context (see Table 4.1 and Investment Package 3 in Paragraph 6.3).

Current recommendations for institutional strengthening provide the possibility that the accounts of the District will give a clear picture of the trading, profit and balance sheet position of the systems under MoWD control. Investment decisions can then be made in this context. Feasibility studies of future investments should consider the impact of proposed schemes on the viability of the District MoWD as an entity. Investments, particularly in small urban areas, should obtain an acceptable financial rate of return. Investments which cannot meet such criteria should receive a subsidy specific to each scheme.

5.3 Appraisal Methodology

5.3.1 General

The purpose of developing a methodology for investment appraisal is to ensure that any proposed investments will be consistent with, in the first instance, the DWDP, and secondly, with the District Development Plan. It is intended for use by the DDC or DEC, supported by the District MoWD, in order to give these institutions the central role they merit under the District Focus policy.

For this reason the criteria used in the appraisal include factors which are not strictly water resources issues. The methodology developed is intended to provide basic assessment of investment proposals which will be neither too time consuming or skill-intensive for use in the district. Nevertheless, districts will need some strengthening before this methodology can be fully applied.

It should be noted that each project or supply system should be assessed individually. These projects can be aggregated into a package, but appraisal remains primarily at the level of the individual project as conditions vary so much between locations.

Criteria will be established for appraisal of investment projects in the following categories:

- water resources
- land use planning/environmental impact
- social impact
- institutional/community participation
- economic
- affordability
- financial.

Simple checklists will be established to test a project against each of these sets of criteria. The checklists ask "plain English" questions which will trigger consideration of major issues. If there is any doubt as to the answers to the questions, technical support can be sought from the MoWD, Ministry of Planning and National Development and other ministries.

The checklist, as amended by the district organisations, should be included in the DWDP. For those proposing to use water, it will provide a guide to the major factors which they must consider, and on which their proposal will be judged.

For those investments that the district proposes to initiate, a process for prioritisation of projects will also be described. Establishing priority for projects is useful in the event that insufficient funds are available at a given time to carry out all viable projects, or where some projects in a programme of implementation of a given investment package cannot proceed. Decisions can then be made as to which projects should be delayed or brought forward. The methodology used is tailored to the existing and potentially achievable levels of appraisal skills in the District.

5.3.2 Development of Criteria

a) Water Resources

The basis for these criteria is the Water Resources Assessment Study by WRAP. This study contains all the existing basic data on the availability and quality of both surfacewater and groundwater. The basic questions to be answered are:

Can the required present and future water supply be met from the indicated water source throughout the year?

> e.g if a surfacewater reservoir is proposed, how will siltation affects its capacity?
> or if a groundwater source is proposed, how will groundwater levels develop in future.

Can the required water supply be maintained during drought periods?

Does the proposed technology make optimum use of the available water source?

e.g if a groundwater source is proposed, does the pump capacity match the well yield?

Is there an alternative water source and has it been considered? Maybe to serve as alternative if the first source is out of order?

i.e a system using two different sources is more reliable (e.g Wamba water supply)

Is the quality of the water suitable for its intended use?

e.g for livestock water supply quality criteria are less than for domestic water supply

b) Land Use/Environmental Impact

The basis for these criteria are the District Development Plan and documents on land resources, such as the Livestock Rangeland Management Handbook. The basic questions to be answered are:

Does the project supply water to activities consistent with the District Development Plan?

e.g is water for livestock provided near settlements in order to encourage nomads to settle?

Are the facilities/plant of the project consistent with the existing land carrying capacity?

e.g. can the rangeland sustain the number of livestock which will be attracted by the new water supply?

Are the facilities/plant of the project consistent with plans for urban/rural development?

e.g the proposed siting of the reservoir will not sterilise mineral deposits, or block the most appropriate route for an upgraded access road?

Will the facilities/plant of the project, or their construction, have an adverse environmental impact?

The major forms of impact to be considered in the Samburu District are:

- the degradation of vegetation cover and soils from overgrazing, in particular the extensive damage occurring around water points in droughts
- the impact of dams which intercept surface water causing downstream wet lands to dry up - this may have a significant impact on some wildlife
- heavy pumping of ground water may cause springs to dry up, affecting animals and sometimes people.

c) Social Impact

It is difficult to discuss appropriate criteria for social assessment in the absence of a socio-economic study of the district which is designed to develop such criteria. However, some significant issues have been raised in consultation with local people. These are:

Where traditional groups are affected by the scheme, does the proposed scheme work within the cultural context of those groups?

This issue should be balanced against development goals in so far as sub-groups, such as women, within these groups should be given the opportunity to develop their talents

Does the proposed scheme improve the welfare of the people of the district, particularly lower income groups and/or women?

i.e. does it provide employment, or does it provide opportunities for people to earn income from conditions created by the scheme?

d) Institutional/Community Participation Issues

- Institutions

The major tasks which must be addressed with respect to institutional issues are design, construction and operation/maintenance of the systems. The organisation, or grouping of organisations must be able to carry out these tasks effectively. One organisation should be in charge of co-ordinating these tasks, and, preferably, this organisation should be that which will operate and maintain the project. The key issues are thus:

Which organisation is co-ordinating the project?

Does it have a realistic project organisational structure and implementation schedule?

Which organisations have responsibility for design, construction and operation of the schemes?

Are skills and financial resources available for each of these organisations to undertake their tasks?

If not, who is to supply training/funds to achieve the required levels of performance?

Are there written agreements with the co-ordinating organisation to support the above statements?

- Community Participation

Community participation can occur in any of the above tasks. In small scale water supply projects, it is likely that it will occur in all of these tasks. The organisation of this participation is thus a key element in the successful implementation of the project. The main issues involved are:

Are the leaders of the community organisation representative of the community?

- i.e are the ones promising resource inputs capable of organising the delivery of those inputs?

Can they deliver the promised labour and money inputs to the project on time?

- i.e does the community have the resources?

Can the community organisation effectively carry out the liaison activities that are required to implement the project?

- e.g with government, contractors etc.

Is the organisation recognised by the local government agencies and will/can they provide the organisational and logistic support required?

e) Economic Issues

The methodology required to undertake an economic assessment of the project is set out in Paragraph 5.2 above. For small scale projects which are to be implemented and paid for by the community, it may be assumed that the economic benefit is proven by the level of commitment shown. Where substantial levels of government or donor funds are to be used, a feasibility study of the project should include an assessment of economic viability, and the average/indicative values used in the above analysis should be replaced with those applicable to the specific project.

f) Affordability Issues

Based on the above analysis, the issue of affordability can be addressed. Particularly with respect to water supplies for the partly nomadic peoples, the issues of affordability and willingness to pay are complex, and bound up with slowly changing traditional beliefs and priorities. If the community is to implement and pay for the water scheme, there is little need to assess willingness to pay. Only confirmation of this must be obtained in feasibility studies. Where government and/or donor involvement is envisaged, the feasibility studies must address this issue in some detail.

In the latter case, the main consideration is the level of cost sharing required by the government or donor agency. This will determine the fee or tariff set in the scheme. General guidelines which are likely to be adopted require full cost recovery in urban schemes, and, outside urban areas, recovery of operation and maintenance costs. The basic questions are:

Does the sum involved in cost recovery constitute more than 5% of the income of, say, the poorest 20% of the population?

- if so, use another technology or review level of cost sharing

If not, what is the community attitude to paying this amount of money?

- if negative, as it often is, then additional questions are required

Is there an acceptable alternative source and what is the cost?

- if there is no alternative, or if it is more expensive than the proposed scheme, then there is a good prospect of achieving a sufficient level of willingness to pay given adequate institutional systems and political support

- if there is an alternative which is acceptable to the people, even if the water is technically inferior, another technology should be considered, or the level of cost recovery should be reviewed.

g) Financial Issues

The key financial issue is the sustainability of the project. With the above analysis complete, and concurrently with the determination of affordability, it is possible to project likely demand for (see Paragraphs 4.3 and 5.2), and the costs of, the scheme over time. The feasibility study must identify the sources of funds for design,

construction and operation/maintenance. The projection of the expenditure of these funds must be realistic. A basic cash flow analysis can then be carried out to identify potential liquidity problems, and measures developed to overcome them. The financial return on the project can also be calculated.

Financial systems for revenue collection and recording financial flows (simple records of costs and receipts) have been developed, and could be applied to even the smallest schemes. For larger schemes, simple procedures for capital budgeting and funding of preventative maintenance schemes could be developed based on experience in some NGO projects. These types of procedures will take some time to establish, however.

The key criteria are thus:

Does the cash flow show that expenditures are covered by revenues through the life of the project?

Are procedures for revenue collection and monitoring of revenues and expenditures described and realistic?

5.3.3 Prioritisation

Usually there are several projects competing for available funds. Often these funds are insufficient to implement all of the projects. A method must be found to rank these projects for access to available funds. That is, they must be given a priority ranking.

The prioritisation process is a difficult one because it involves judgements as to the value of performance in one criterion against performance in another. This weighting process is contentious. Unless extensive resources are available to carry out a valid Multi-Criteria Analysis, it is better to assess a project as to whether it achieves an acceptable level of performance in all criteria, and then prioritise on one. This one is often financial.

The suggested method of prioritisation focuses on the sustainability of the project. Basically, it consists of ensuring that all of the questions set out above in each of the criteria categories have a satisfactory answer. Then, priority is assessed according to how well projects meet the cost sharing policy.

Revenue from the system and its expenditures will be estimated in the financial analysis as set out in 5.3.2 g) above. The extent to which this revenue covers costs will thus determine the extent to which the cost sharing policy is being implemented.

First priority projects will recover both capital and operation and maintenance (O&M) costs. Second priority projects will recover O&M costs. Third priority projects will be economically viable and be ranked according to the extent of recovery of O&M costs. Other projects should not be implemented.

An indication of the priorities which exist with the various government departments in the District may be found in Appendix 12. This appendix contains the report of the WRAP Planning Mission which was undertaken at the beginning of the WRAP studies in Samburu District. The report describes the priorities as provided by the departments and therefore does not attempt to present a priority ranking.

6 EXAMPLES OF INVESTMENT PACKAGES

6.1 Introduction

In the context of the above chapters and using the information in the other parts of this study, this chapter will set out examples of district investment packages. These investment packages will be designed to be appropriate for various physical and settlement situations in Samburu, and for the possible types of cost recovery policy applicable. The main situations covered will take into account:

- the potential of surface water and groundwater resources in the District by sub-location, based on the findings of the Water Resources Assessment Study
- the current water supply coverage by existing supply facilities
- the different water qualities required for domestic supply and non-domestic supply
- the four types of domestic water supply schemes which cover five of the six social groups for which government participation in the provision of water supplies is necessary in some form. These are:
  - urban systems with mainly service and small scale industry demand in addition to residential demand,
  - market centre systems with some service demand, small permanent residential demand, increasing demand from semi-permanent residents, and for cattle
  - systems for nomadic pastoralists and for sedentary rural population, and
  - systems for independent institutions (schools, health centres, etc.) located outside centres
- the non-domestic water supply, which in this study covers supply for livestock
- the selection of technologies according the three cost recovery approaches set out in Paragraph 4.4, which yield three different rankings, presented here in tables 6.1, 6.2 and 6.3.

The three approaches proposed are:

Approach 1 : selection of technologies according minimal discounted total cost per m^3 produced giving possibility for recovery of full capital and operation and maintenance costs

Approach 2 : selection of technologies according minimal operation and maintenance costs per m^3 produced, which will maximise the affordability to the community.

Approach 3 : selection of technologies according minimal capital costs per m^3 produced which will minimise the capital cost to the government and/or donor.

Table 6.1. Technologies Ranked by Minimum Discounted Total Cost

Ranking Number	Technology	Yield (m^3/day)	Capital Costs (Shs)	Total O&M Costs (Shs)
1	Spring	10	25,000	10,500
2	Dug Well with Handpump	10	187,500	10,500
3	Spring, 35 m3 Storage	35	293,750	627,375
4	Dug Well with Handpump	5	187,500	10,500
5	Spring, Gravity Distribution, 70 m3	70	1,281,250	2,050,125
6	Surface Water, Weir, Gravity Distr.	35	487,500	1,572,375
7	Surface Water, Weir, Gravity Distr.	70	1,150,000	3,181,500
8	Spring, Gravity Distribution, 200 m3	200	4,800,000	6,216,000
9	Borehole with Handpump	10	450,000	73,500
10	Borehole with Motorpump, Distribution	70	1,925,000	3,176,250
11	Dug well with Windmill	35	1,175,000	283,500
12	Pan (5000 m3, 6 months with water)	25	312,500	580,125
13	3 Boreholes with Motorpump, Distrib.	200	6,218,750	10,976,427
14	Borehole with Motorpump, Distribution	35	1,275,000	1,811,250
15	Borehole with Windmill	35	1,425,000	336,000
16	Dam (25000 m3) with Handpump and Trough	50	2,137,500	2,669,625
17	Surface Water, Weir, Distribution	200	7,250,000	16,012,500
18	Borehole with Windmill	20	1,131,250	336,000
19	Borehole with Motorpump, Limited Distr.	20	1,093,750	1,563,240
20	Borehole with handpump	5	450,000	73,500
21	Surface Water, Dam, Distribution	200	13,250,000	17,272,500

Notes: 1. Windmill supply estimated at only 300 days per year.
2. Pan supply estimated at only 180 days per year

Table 6.2. Technologies Ranked by Minimum Operation and Maintenance Cost per m3 Yielded.

Ranking Number	Technology	Yield (m^3/day)	Capital Costs (Shs)	Total O&M Costs (Shs)
1	Spring	10	25,000	10,500
2	Dug Well with Handpump	10	187,500	10,500
3	Dug Well with Handpump	5	187,500	10,500
4	Borehole with Handpump	10	450,000	73,500
5	Dug well with Windmill	35	1,175,000	283,500
6	Borehole with Windmill	35	1,425,000	336,000
7	Borehole with handpump	5	450,000	73,500
8	Spring, 35 m3 Storage	35	293,750	627,375
9	Borehole with Windmill	20	1,131,250	336,000
10	Spring, Gravity Distribution, 70 m3	70	1,281,250	2,050,125
11	Spring, Gravity Distribution, 200 m3	200	4,800,000	6,216,000
12	Surface Water, Weir, Gravity Distr.	35	487,500	1,572,375
13	Borehole with Motorpump, Distribution	70	1,925,000	3,176,250
14	Surface Water, Weir, Gravity Distr.	70	1,150,000	3,181,500
15	Pan (5000 m3, 6 months with water)	25	312,500	580,125
16	Borehole with Motorpump, Distribution	35	1,275,000	1,811,250
17	Dam (25000 m3) with Handpump and Trough	50	2,137,500	2,669,625
18	3 Boreholes with Motorpump, Distrib.	200	6,218,750	10,976,427
19	Borehole with Motorpump, Limited Distr.	20	1,093,750	1,563,240
20	Surface Water, Weir, Distribution	200	7,250,000	16,012,500
21	Surface Water, Dam, Distribution	200	13,250,000	17,272,500

Notes: 1. Windmill supply estimated at only 300 days per year.
2. Pan supply estimated at only 180 days per year

Table 6.3. Technologies Ranked by Minimum Capital Cost per m3 Yielded

Ranking Number	Technology	Total Yield (m^3/day)	Capital Costs (Shs)	Total O&M Costs (Shs)
1	Spring	10	25,000	10,500
2	Spring, 35 m3 Storage	35	293,750	627,375
3	Surface Water, Weir, Gravity Distr.	35	487,500	1,572,375
4	Surface Water, Weir, Gravity Distr.	70	1,150,000	3,181,500
5	Spring, Gravity Distribution, 70 m3	70	1,281,250	2,050,125
6	Dug Well with Handpump	10	187,500	10,500
7	Spring, Gravity Distribution, 200 m3	200	4,800,000	6,216,000
8	Pan (5000 m3, 6 months with water)	25	312,500	580,125
9	Borehole with Motorpump, Distribution	70	1,925,000	3,176,250
10	3 Boreholes with Motorpump, Distrib	200	6,218,750	10,976,427
11	Surface Water, Weir, Distribution	200	7,250,000	16,012,500
12	Borehole with Motorpump, Distribution	35	1,275,000	1,811,250
13	Dug Well with Handpump	5	187,500	10,500
14	Dug well with Windmill	35	1,175,000	283,500
15	Dam (25000 m3) with Handpump and Trough	50	2,137,500	2,669,625
16	Borehole with Handpump	10	450,000	73,500
17	Borehole with Windmill	35	1,425,000	336,000
18	Borehole with Motorpump, Limited Distr.	20	1,093,750	1,563,240
19	Surface Water, Dam, Distribution	200	13,250,000	17,272,500
20	Borehole with Windmill	20	1,131,250	336,000
21	Borehole with handpump	5	450,000	73,500

Notes: 1. Windmill supply estimated at only 300 days per year.
2. Pan supply estimated at only 180 days per year

Because of uncertainty, or simple unavailability, of data, the resulting investment packages must be taken as indicative, and feasibility studies must confirm the viability of specific systems/projects.

6.2 Overview of Methodology

For each sub-location the required type and number of water supply facilities are determined according the following steps:

1. Specify water demand - determine the scenario and the year for which the investment package is to be prepared; the water demand will be provided by the Database Management System (see Part 1).

2. Differentiate the water demand in five different supply areas:
   - urban water supply (population > 2000)
   - market centre water supply (population < 2000)
   - rural water supply
   - water supply independent institutions
   - non-domestic water supply

3. Select the supply technology by choosing the least cost option for the required water supply quantity for each of three approaches:
   - minimal discounted total costs per m^3 produced (see table 6.1)
   - minimal operation and maintenance costs per m^3 produced (see table 6.2)
   - minimal capital costs per m^3 produced (see table 6.3)

   and by considering the water resources potential in the sub-location as described in the Water Resources Summaries (see Part 1).

4. Determine required supply development per sub-location by subtracting existing supply capacity (from Part 2) from water demand. Then determine the number of facilities separately for each supply area.

5. Specify the capital costs (or investment costs) and O&M costs of each facility. Distinguish between domestic supply and non-domestic supply.

6. Calculate total investment costs and total O&M costs for each supply area in the sub-location. Analyze for each supply area the number of people served per facility and the average costs per capita.

7. Aggregate the total costs per Sub-location to Locational, Divisional and District level.

The investment packages for rural and urban supplies are presented separately. The water development for urban supplies still need detailed feasibility studies and therefore this study only provides a preliminary cost estimate. This is described in paragraph 6.6.

The investment packages for the rural areas are worked out already much more in detail. A description of the results is included in paragraphs 6.4 and 6.5. The costs and proposed supply technologies are presented in the form of tables and maps:

- costs per supply area for each sub-location are included in tables in Appendices 6,7,8,9,10 and 11

- costs per supply area and per supply technology for each Division are included in tables in Appendix 5.

- costs per supply area for each Location and Division are included in tables in Appendix 4.

- the proposed supply technologies are presented on a map of the District on Plates 1, 2 and 3; the locations of the supplies are preliminary and need to be confirmed from feasibility studies.

An outline of a Project Document for an Example Investment Package is included in Appendix 3. This Project Document follows a format acceptable to UN agencies and once prepared in detail may be used for submitting to potential donors.

6.3 Indicative Investment Packages

The investment packages provide a cost estimate of the required water supply development. This development should be based on the water demand, which has been determined in Part 1 for the years 1993, 2003 and 2013 using three different scenarios.

Scenario 3, described in Part 1 of this study, will give the base level of investment as it includes the minimum growth which may occur in the District. An investment package based on scenario 3 may be seen as giving the investment level required for the first phase of development.

Scenario 2 corresponds more with the growth rates as envisaged by the District in the DDP 1989-1993, which, to be achieved, require changes in social, cultural and institutional conditions. An investment package based on scenario 2 therefore gives the investment level required for the next phase of development after scenario 3.

Scenario 1 is the high growth scenario, which at this stage is not likely to be realised, because the development potential is restricted by the limited rangeland potential for livestock and because concrete economic development proposals are absent in other sectors. Therefore investments required for water development have not (yet) been determined for scenario 1.

The indicative investment packages prepared for this study cover the investments required for the "initial" year of the Plan, 1993 and for the "future" year 2003. The investments which would be required for the development of the water supply covering the water demand in the "ultimate" year 2013 of the Plan were not determined in this study. It was considered that this may be done more realistically after definite plans for the first phase of water development have been made.

The DWDS contains a restricted number of investment packages for which cost estimates have been worked out. The contents of the investment packages are determined according the selection requirements as described in paragraph 6.1. Other combinations of technologies are also possible and it should be possible to work out cost estimates for these with the basic data provided in this study.

The investment packages presented here indicatively have been determined for the following situations:

Approach 1: Technology Selection based on Recovery of Capital and O & M Costs

* Investment Package 1A - Scenario 3 - Demand year 1993 and 2003

* Investment Package 1B - Scenario 2 - Demand year 1993 and 2003

  Technology selection from table 6.1.

Approach 2: Technology Selection based on Recovery of O & M Costs

* Investment Package 2A - Scenario 3 - Demand year 1993 and 2003

* Investment Package 2B - Scenario 2 - Demand year 1993 and 2003

  Technology selection from table 6.2

Approach 3: Technology Selection based on Minimization of Capital Costs

* Investment Package 3A - Scenario 3 - Demand year 1993 and 2003

* Investment Package 3B - Scenario 2 - Demand year 1993 and 2003

  Technology selection from table 6.3

Summaries of the results of the investment packages are included in Appendices 4, 5, 6, 7, 8, 9, 10 and 11.

The Investment Packages presented show the following:

1. The choice of technology is restricted in many sub-locations to only one or two options due to the limited available resources (groundwater or surface water), leaving little room for selection of different technologies under the financial criteria of the three approaches. The main difference between the three approaches is the selection of the type of pumps on boreholes, where:

   - both windmills and motorpumps are selected for Approach 1
   - only windmills are selected for Approach 2
   - only motorpumps are selected for Approach 3

2. The total capital costs do not show large differences between the three approaches, which is because:

   - the dug well with handpump option is selected for small demands in all three approaches because it is the cheapest under each approach
   - the borehole with windmill option has similar capital costs as borehole with motorpump option and both are commonly selected as most appropriate technology.

3. The Operation and Maintenance costs show significant differences for each of the three approaches.

4. The difference in water demand calculated for scenario 2 and 3 for the years 1993 and 2003 results:

   - in an insignificant difference between the scenarios in capital and O & M costs for 1993 and only a 10% difference in both costs for 2003.
   - in an additional four supply units only for scenario 3 for 2003 and an additional ten supply units (10% costs increase) for scenario 2 for 2003.

Considering the above the following conclusions may be made:

1. the three different cost recovery approaches imply significantly different O & M cost levels for the recommended technologies.

2. the three different cost recovery approaches imply large differences in capital costs for the recommended technologies which will meet water demands until 2003.

3. It is sufficient to present for the whole District only the investment packages 1B, 2B and 3B for the water demand in the year 2003 under scenario 2; investment packages based on water demand calculated for other years or other scenarios can easily be derived from the presented investment package.

Only for one Division: Baragoi, all six investment packages are presented (Table 6.4). The table shows the small differences in capital costs and the significant differences in O & M costs.

The investment packages for rural water supply in all four Divisions are presented and discussed in paragraphs 6.4 and 6.5. The investment packages for the urban water supplies in Samburu District are presented in paragraph 6.6.

Table 6.4 Investment Packages - Total Costs Rural Supply - Baragoi Division

INVESTMENT PACKAGE	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Demand year 1993, Scenario 3									
1A	552	62	26,987,500	14,634,375	1898	17822	287	1,514	821
2A	552	62	26,706,250	8,733,375	1898	17822	287	1,498	490
3A	552	61	25,987,500	27,108,585	1898	17822	292	1,458	1,521
Demand year 2003, Scenario 3									
1A	576	66	27,737,500	14,371,875	1797	16184	245	1,714	888
2A	576	66	27,750,000	8,470,875	1797	16184	245	1,715	523
3A	576	65	27,062,500	27,129,585	1797	16184	249	1,672	1,676
Demand year 1993, Scenario 2									
1B	581	64	27,362,500	14,655,375	1942	18798	294	1,456	780
2B	581	64	27,375,000	8,754,375	1942	18798	294	1,456	466
3B	581	63	26,725,000	27,625,605	1942	18798	298	1,422	1,470
Demand year 2003, Scenario 2									
1B	683	74	30,406,250	16,376,115	1945	18961	256	1,604	864
2B	683	74	30,750,000	9,247,875	1945	18961	256	1,622	488
3B	683	74	30,137,500	29,604,855	1945	18961	256	1,589	1,561

Note: O & M costs are total costs over 20-year period

6.4 Investment Packages per Rural Supply Areas

The water supply to the rural areas distinguishes four different water users as explained in paragraph 6.1: rural market centres, rural institutions, rural dispersed population and non-domestic water supply. The non-domestic (livestock) water supply is included here because the livestock cannot be considered separate from the rural population and also because sometimes water supplies can serve both domestic and non-domestic water users (Table 6.5).

The total capital costs of the rural supplies varies between 107-120 million Shs, depending on the cost recovery approach. O & M costs show a bigger spread from 38 - 117 million Shs.

The non-domestic (livestock) supply is generally about half the total capital costs of the rural domestic supplies. The O & M costs of the non-domestic supply is relatively more expensive.

The costs are also presented per head of population. People served by presently existing supplies are not included. No population estimate was made for the institutions, as it was considered that those using institutions are already included as part of the rural population in the centres or rural areas. In the total costs per capita also the costs for non-domestic supply are included, because these costs also have to be born by the population.

The total capital costs per capita are about 1,600 - 1,800 Shs, which covers all new supplies needed until the year 2003. The related O & M costs vary between 600-1,800 Shs per capita, but this covers a 20 year period of operation, therefore O & M costs are 30 - 90 Shs per capita per year.

Comparison between the Divisions shows that Waso Division has the highest capital costs per capita and Wamba the lowest. Total capital costs per capita: Baragoi 1,600 Shs, Lorroki 1,800 - 2,100 Shs, Wamba 1,100 Shs and Waso 2,650 - 2,850 Shs. The high cost at Waso are due to the relatively large number of boreholes with motorpumps (Appendix 5).

The O & M costs per capita are: Baragoi 500 - 1,600 Shs, Lorroki 750 - 2,250 Shs, Wamba 220 - 650 Shs and Waso 1,000 - 2,780 Shs. The low costs in Wamba Division are due to the large numbers of dug wells with handpumps. O & M costs per capita per year are for the four Divisions respectively: 25 - 80 Shs, 38 - 110 Shs, 11 - 32 Shs and 50 - 139 Shs.

Table 6.5 Investment Packages - Total Costs Rural Supply - Samburu District

Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2							**Cost Recovery: Approach 1**		
Rural Centre	314	19	14,023,750	16,252,700	3835	4554	240	3,079	3,569
Rural Institution	208	33	10,950,000	6,137,250	0	0			
Rural Area	1119	122	48,742,500	27,226,740	1650	61203	502	796	445
Rural Domestic	1641	174	73,716,250	49,616,690	5485	65757	378	1,121	755
Non-domestic	868	58	34,006,250	29,498,490	0	0			
Total	2509	232	107,722,500	79,115,180	5485	65757	283	1,638	1,203
INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2							**Cost Recovery: Approach 2**		
Rural Centre	314	20	15,512,500	5,538,000	3835	4554	228	3,406	1,216
Rural Institution	208	34	12,237,500	2,047,500	0	0			
Rural Area	1119	123	50,543,750	11,094,250	1650	61203	498	826	181
Rural Domestic	1641	177	78,293,750	18,679,750	5485	65757	372	1,191	284
Non-domestic	868	65	42,068,750	19,971,000	0	0			
Total	2509	242	120,362,500	38,650,750	5485	65757	272	1,830	588
INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2							**Cost Recovery: Approach 3**		
Rural Centre	314	19	14,042,500	19,060,190	3835	4554	240	3,083	4,185
Rural Institution	208	33	10,618,750	7,364,490	0	0			
Rural Area	1119	122	47,636,250	43,145,160	1650	61203	502	778	705
Rural Domestic	1641	174	72,297,500	69,569,840	5485	65757	378	1,099	1,058
Non-domestic	868	58	35,025,000	47,583,480	0	0			
Total	2509	232	107,322,500	117,153,320	5485	65757	283	1,632	1,782

6.5 Investment Packages per Water Supply Technology

The largest number of units selected are dug wells with a handpump. This option is cheapest for all used approaches and is also applicable at many locations, due to the small water demands. In total 147 dug wells with handpumps are planned (Table 6.6).

In locations where dug wells are not feasible, because of hydrogeological considerations, boreholes are proposed. At present the number of boreholes with handpumps planned is only three. However it might be that the subsequent feasibility studies may prove that a larger number of boreholes is required.

Windmills or motorpumps are planned at locations where demand is about 20 m^3/day or more. The choice between dug wells and boreholes again depends on the hydrogeological conditions, with dug wells where rocks are soft and groundwater shallow, and boreholes where rocks are harder and groundwater deeper.

Table 6.6 Investment Packages - Technologies and Total Costs Rural Supply

Supply Technology	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)
INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2			
Dug Well with Handpump	147	27,562,500	1,543,500
Dug Well with Windmill	24	28,200,000	6,804,000
Borehole with Handpump	3	1,350,000	220,500
Borehole with Windmill	4	4,818,750	1,344,000
Borehole with Motorpump	31	38,816,250	55,390,180
Spring Supply	2	225,000	410,500
Dam with Pumped Supply	1	500,000	1,800,000
Pan (5000 m3)	20	6,250,000	11,602,500
Total	232	107,722,500	79,115,180
INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2			
Dug Well with Handpump	148	27,750,000	1,554,000
Dug Well with Windmill	24	28,200,000	6,804,000
Borehole with Handpump	3	1,350,000	220,500
Borehole with Windmill	43	54,812,500	14,448,000
Borehole with Motorpump	1	1,275,000	1,811,250
Spring Supply	2	225,000	410,500
Dam with Pumped Supply	1	500,000	1,800,000
Pan (5000 m3)	20	6,250,000	11,602,500
Total	242	120,362,500	38,650,750
INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2			
Dug Well with Handpump	148	27,750,000	1,554,000
Dug Well with Windmill	0	0	0
Borehole with Handpump	3	1,350,000	220,500
Borehole with Windmill	0	0	0
Borehole with Motorpump	58	71,247,500	101,565,820
Spring Supply	2	225,000	410,500
Dam with Pumped Supply	1	500,000	1,800,000
Pan (5000 m3)	20	6,250,000	11,602,500
Total	232	107,322,500	117,153,320

The main difference between the investment packages is the selection of windmills or motorpumps. IP 1B comprises both, but IP 2B selects windmills exclusively and IP 3B selects motorpumps. The selection of windmills or motorpumps does not lead to main differences in capital costs, but it results in significant differences in O & M costs.

The supply units for livestock are generally pans, sometimes in combination with a dug well with a windmill, or a borehole. In case of small livestock water demands, a dug well with a handpump is proposed.

6.6 Urban Water Supply

The planning of the water supply for the four urban centres: Maralal, Sukuta Marmar, Baragoi and Wamba, is based on:

- the results of the detailed site investigations (geophysics, drilling) carried out at each centre, as described in the WRAP Water Resources Assessment Report of Samburu District (1990).
- the water demand calculated under scenario 2 for the year 2003
- the supply technology considered most appropriate, using the cost estimates as derived for the rural area.

The planning of the urban water supplies may be considered as a separate investment package, because it distinguishes itself from the rural supplies by the large size of supply required for a small area. Feasibility studies carried out on the basis of the presented investment packages will have to follow and may comprise for each urban centre a further detailing of the water demand and it's projection and a thorough study of the supply technology, including siting of boreholes. The here presented urban investment package must be considered as a preliminary proposal, designed to indicate the investment required to meet the water demand until 2003.

Each urban centre is described separately. The preliminary cost estimates are summarized in table 6.7.

Maralal: The town is currently supplied from Nundoto Dam (since 1986) and the supply capacity is 1200 m^3/day. The total 2003 demand is 3819 m^3/day. The additional required supply capacity may be obtained from groundwater, because this will make the town supply more reliable in terms of quantity (drought periods) and quality (surfacewater pollution).
An estimated number of 24 boreholes will be required. 6 at Loikas and 18 in the volcanic and Basement area around Maralal.

Sukuta Marmar: The present supply uses the spring, but is insufficient to cater for the 2003 demand of 212 m^3/day. A complete new supply system will be required which uses both the spring (maximum 80 m^3/day) and groundwater.

Baragoi: The existing supply from one old borehole is outdated. A new supply is needed to cover the 2003 demand of 508 m^3/day, which

includes the supply of the Baragoi Secondary School. The supply will be from nine boreholes.

Wamba: The recently rehabilitated supply from the spring is assumed to supply 100 m³/day. The total 2003 demand is 535 m³/day. The balance will be supplied from nine new boreholes.

Table 6.7 Investment Package - Urban Supplies

Urban Centre	2003 Population		Capital Costs (Shs)	Total [1] O & M Costs (Shs)	Costs/Head	
	Total	To be Supplied			Capital (Shs/Cap)	O & M [1] (Shs/Cap)
Maralal	36,666	25,145	49,750,000	87,811,416	1,979	3,492
Sukuta Marmar	3,114	3,114	5,131,250	8,402,625	1,648	2,698
Baragoi	7,920[2]	7,920	18,656,250	32,929,281	2,356	4,158
Wamba	10,697	8,698	18,656,250	32,929,281	2,145	3,786

Notes: [1] O & M costs are total costs over 20-year period
[2] Includes 1109 rural population

The capital costs of the urban supplies per capita range from 1,648 - 2,356 Shs. Costs at Baragoi are highest because of the low capacity of the boreholes.

The O & M cost per year per capita range from 135 Shs at Sukuta Marmar to 208 Shs at Baragoi.

7 RECOMMENDATIONS FOR IMPLEMENTATION OF PACKAGES

7.1 General Institutional Aspects

7.1.1 Introduction

The packages described in Chapter 6 represent groups of physical investments. In order to implement these investments significant institutional strengthening measures will be necessary. The costings of the packages include an indicative allowance for institution building and this institution building is described below. As set out in Paragraph 3.4, different approaches are possible with respect to the choice of roles for different organisations. These different roles imply different institutional strengthening measures.

It is necessary, then, to specify the roles each institution will play in any implementation of District Focus Policy in the Samburu District. The roles chosen reflect the existing capacities and "orientation" of these organisations. In summary, they are:

- overall co-ordination with DDC, administration of project appraisal - DDO
- water resources planning - central MoWD
- water project appraisal and water supply for urban centres - district MoWD
- water supply for market centres and rural areas - community, assisted by district MoWD and NGOs

Given these roles, the organisational strengthening required can be described.

7.1.2 Organisations

a) Central Ministry of Water Development (MoWD)

Water resources assessment and planning will remain a central MoWD function for the immediate future. The skills and facilities required will only be available, and the activity is better co-ordinated from, Nairobi. Despite significant progress in institutionalising this process, additional steps remain to be implemented. These are:

- additional formal and on-the-job training of MoWD staff in the Resources Assessment Section in techniques required, this training must be given to officers who will remain within the section for a sufficient time to train replacements

- additional and replacement equipment (to be determined)

- additional (given existing zero capability) capacity and systems to strengthen district MoWD offices in their role as semi-autonomous water supply agencies, specifically the ability to execute training in resources assessment, preparation of the DWDP, O&M procedures, financial systems management and techniques of community mobilisation; this activity should be supported by improved information linkages between central office and district

- improve internal co-ordination between the RA Section and other sections of the MoWD, and

- improve links with other ministries and NGOs with respect to usage of water resources.

b) District Ministry of Water Development

The aim of the institutional strengthening of the district MoWD is to create, as far as is practical, an autonomous water agency focused on the district's needs. The key roles of the district MoWD will be:

- with central MoWD support, preparation of DWDP

- support to DDO in appraisal of proposals for utilisation of water resources, and in preparing proposals for investment packages in conformity with the DWDP

- efficient construction and/or operation and maintenance of "urban" water supply systems, i.e Maralal and Wamba

- support to all other types of water supply systems through Local Government, Community groups and Water Associations in assessment, planning, project appraisal, community participation (through NGOs too) and financial systems

- training of trainers/training of Local Government/Community groups/Water Associations.

In order to fulfil these roles District MoWD will require:

- training in appraisal of proposals for utilisation of water resources

- training in methodology for the preparation of the DWDP

- training in support to all other types of water supply systems in assessment, planning, project appraisal, community participation and financial systems

- training to train members of Local Government/Community groups/Water Associations in these skills.

- legislation and/or regulations under the Water Act and possible revenue acts to enable the district office to carry out the above roles

The efficient construction and/or operation and maintenance of "urban" water supply systems is constrained by two factors. These are:

1) Districts do not have control of revenue collected from their systems. This provides no incentive for efficient operation of these systems at district level. The appropriation in aid policy has had no significant impact on this situation.

2) As a consequence, district offices are over-staffed, under skilled, and under equipped.

The systems for giving the district such financial and administrative control are currently being developed. Support for their implementation is thus important.

c) District Development Office

Current staffing of the District office is inadequate for all but liaison activities. In order to strengthen the co-ordination role of the DDO, increased staffing is required. An assistant DDO with specific responsibility for water matters may be required in ASAL areas such as Samburu. The many issues related to water, and the liaison between the line Ministries they involve, would seem to justify such a role. In this case, training in Water Resources Planning would be an asset, but such training should be part of a programme which would result in the officers trained remaining in positions where they could utilise such training, at least until they had a chance to train replacements.

In addition, some revision of the legal and/or administrative base for the DDC's oversight of water matters may be necessary.

d) Community Groups

While community participation in design, construction, operation and maintenance is possible within the cultural context of the Samburu people, it is difficult to initiate. Education and community awareness campaigns initiated through the chiefs and sub-chiefs will be necessary to prepare the ground. Initially, full cost recovery (ie including capital costs) and autonomous administration of water systems, will not be possible. However, such policies should be objectives, and progressively introduced as the community moves towards a formal, money economy.

7.2 Investment Funding

Implementation of an investment programme requires the acquisition of a source of funds for feasibility studies and for capital investment. This source may be, in addition to local or GOK funds, such agencies as the World Bank, the African Development Bank, NGOs, the EC, and many different bi-lateral donors.

Each of these organisations have different criteria for assessment of funding proposals, but there are many aspects of their assessment process in common. Appendix 3 sets out an example of such a proposal prepared for the indicative investment packages set out in Chapter 6. It contains some of the major topics which funding agencies wish to see addressed in such a proposal.

7.3 Feasibility Studies

7.3.1 Introduction

Once the institutional strengthening arrangements are resolved in outline, and a likely source of funding identified, a detailed feasibility study must be undertaken for projects and programmes. This may, in many cases, encompass the design for the new water supply, enabling an efficient transition to implementation. Although detailed requirements of funding agencies will differ, the feasibility study should incorporate all

the appraisal criteria set out in Paragraph 5.3 above. Each project within a package should be studied individually, and the institutional and financial impact of the whole programme on the organisations involved should be detailed separately.

7.3.2 Key Implementation Requirements

The study of alternative approaches to implementation of the project/programme should address several key issues. These are:

- technical soundness,
- social impact,
- institutional arrangements, including source of funds,
- financial/economic viability, including phasing of the project and
- recommended project priority where there is more than one project.

The basic methodologies for appraisal are set out in Chapter 5 above.

Additional institutional strengthening activities required for implementation but not covered in Paragraph 7.1 will include training counterpart staff of the MoWD to undertake their responsibilities in the feasibility study phase.

In addition to participation in the studies themselves, significant community strengthening activities in preparation for implementation are also required at feasibility phase. This entails information of and discussion with the population and assistance in the formation of (water) committees by the population.

7.4 Implementation

Implementation from feasibility phase onwards includes detailed design, construction and setting up routine operations. These phases contain many activities, each of which should be detailed in a project proposal (see Appendix 3). These activities must be funded and monitored, and the structure of the organisation which is to co-ordinate the project package must be capable of:

- disbursing capital funds to recipients according to established procedures, and
- gathering and processing the required data for monitoring.

This will require training of staff, and additional equipment and resources if the MoWD is to take on this co-ordinating role.

Effective community participation in construction and operation will require a flexible approach to implementation on the part of the support organisations, principally the MoWD. Where local communities are not familiar with the requirements for management of formal sector organisations, such as a water supply, close contact over a prolonged period of time will be required to develop and refine workable systems. Adequate skills and resources for such an approach must be identified at feasibility phase and be in place for construction and operation phases.

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APPENDIX 1

MARALAL

ECONOMIC AND FINANCIAL ANALYSIS OF URBAN WATER SUPPLY

APPENDIX 1 - Maralal: Economic and Financial Analysis of Urban Water Supply

Calculations in this example are based on data and estimates which could not always be verified. The conclusions are therefore indicative. The main purpose of the example is to increase understanding of the approach used.

Maralal is the main urbanized area in Samburu District, with a total urban population of around 18,000 persons. The water source is the Nundoto dam, built in 1986. Water is pumped from the source to the treatment plant by electric pumps. From there the water flows to Maralal by gravity. Production of water is 190,000 m3 per year. In Maralal an estimated 10,000 persons are served by 347 individual connections.

a) Benefits:

The benefits of the Maralal supply, in the "without project" situation, are estimated based on an affordable level of charges, which is assumed to be 3% of income (this not necessarily reflect willingness to pay). Assuming that the supply could serve the 2000 households and average consumption (based on current consumption per connection) is 6.84 m3. Three percent of the money household income is Shs. 39.5. This means that a rate of Shs. 5.78 per m3 would be affordable (Shs. 39.5 / 6.84 m3 average monthly household consumption). Benefits accruing to 2000 households over 12 months would be Shs. 948,759/- per year.

Such benefits can be compared to revenue actually collected in Maralal. This amounts to Shs. 301,550/- per annum.

b) Costs

The project was commissioned in 1986 at a cost of Shs. 33,000,000/-. Given the annual increase in construction costs between 1986 and 1988 this is Shs. 39,000,000 in 1989 prices. Operation costs amount to Shs. 429,000/- per year (staffing expenditures appear high). Maintenance costs are around Shs. 96,000/- (estimation based on 6 months' data). O&M costs therefore totals Shs. 525,000/- per year.

c) Comparing Costs and Benefits

An economic comparison of costs and benefits over a 20 year period shows that, even undiscounted, benefits do not cover costs. The investment is thus a considerable overinvestment given the population served.

From the financial viewpoint, the benefit calculation indicates that the scheme could achieve recovery of operating costs if:

- capacity was fully utilised and leakages were minimised
- tariffs were raised to approximately Shs 6 per cu meter, and
- revenue billing and collection was efficient.

APPENDIX 2

MARTI

ECONOMIC AND FINANCIAL ANALYSIS

OF A RURAL MARKET CENTRE WATER SUPPLY

APPENDIX 2 - Marti: Economic and Financial Analysis of a Rural Market Centre Water Supply

Calculations in this example are based on data and estimations which could not be verified. The conclusions presented here are therefore indicative. The main purpose of the example is to increase understanding of the approach used.

Marti is one of the small market centres in Samburu district. Marti trade centre (Marti T.C.) has 170 inhabitants (34 households). At present Marti T.C. and the area around it (Manyattas, around 100 households and 1,200 livestock, 200 square km) are supplied with water by a borehole (commissioned in the fifties) at 2 kilometres from Marti T.C. Pumping (diesel pump) is done 8 hours a day.

Plans exist to bring water through a pipeline from the borehole to a kiosk in Marti T.C. (pump and pipelines are already in place, but not operational). The economic implications of this project are evaluated here. The new situation, with kiosk, is compared with the old situation, without kiosk.

a) Benefits:

People living in Marti T.C. will accrue time savings since they no longer have to walk 2 kilometres (or more) to the borehole. Some people living in the area around Marti may accrue time savings, since they can chose between taking water from the borehole or taking it from the kiosk (at Shs. 0.05 per 20 litres).

The standard water consumption rates per capita per day are 20 liters for small urban centres and around 10 liters for rural areas, although actual consumption may be lower. In practice, a woman will go to the borehole once a day, maybe accompanied by a child (whose time is hard to value). Women from Marti T.C. are therefore likely to daily spend 1 to 2 hours collecting water. If they were to spend this time in a productive way in case they obtain water from a borehole (time saving), they would earn Shs. 1.05 per hour per day (based on a rural-female ranchers income). Yearly a total of Shs. 13,030.50 (= Shs. 1.05 x 1 hour x 365 days x 34 households) is accrued by time savings in Marti T.C.

A woman from the rural area spends 2 hours a day collecting water. Around 25% of the households in the area can save time by collecting water from the kiosk. On average they spend 1 hour less (the kiosk is 2 kilometres nearer). The value of time savings over the year is Shs. 9,581.25 (= Shs. 1.05 x 1 hour x 365 days x 25 households). The total yearly benefits from time savings amounts to Shs. 22,611.75.

Since health improvement is at this stage hard to value, it suffices to indicate the effect of water on health. The following information is obtained through discussions with the Public Health Technician in the Marti dispensary during the field visit. Over the total year an average of 30 to 40 patients daily visited the dispensary. In the rainy season 5 out of 50 patients who came to the dispensary had water related skin diseases. During the dry season was 20 patients visited the dispensary on average, of which 5 had skin diseases. This increased incidence of water related skin diseases at a time when a smaller proportion of the population has access to clean water suggests a possible measurable correlation between water and health.

Additional, indirect economic benefits as a result of a water supply system may lead to further development in the area (see also Part 1). This may influence aspects like number of livestock, income, health etc. Given the restricted data it is, at this stage, not possible to analyze these effects.

b) Costs:

Capital costs of the existing scheme are Shs. 600,000/- (price updated to 1989 from original capital costs of 270,000 in 1952), operation and maintenance costs are Shs. 26,550/- per year. These costs can be considered to be 'sunk costs', because they are not relevant in comparing benefits of the distribution through the kiosk (the new situation) with the costs of it.

The capital costs of the new situation (= project capital costs) consist of kiosk of Shs. 20,000/-, the storage tank of Shs. 84,000/-, the pipelines of Shs. 50,000/- (2 km. at Shs. 250 per metre) and the pump of Shs. 150,000/-. Project O&M costs are made up of two components: diesel (average Shs. 800/- per month) Shs. 9,600/- and wage of the kiosk operator Shs. 10,000/-. Total O&M costs of the new situation are Shs. 19,600/-.

c) Comparing benefits and costs:

1) From an economic viewpoint the following conclusions can be made:

- Quantified benefits are not sufficient to cover both capital and O&M costs of the new distribution; only O&M costs are covered. Since benefits do not cover total costs, the project is not viable from an economic point of view, unless additional benefits are included.

2) Conclusions following the financial approach are:

- Financial viability will depend on the community's willingness to pay for the water produced, and the additional amount consumed. The resultant revenue can then be compared to capital and O&M costs. Recovery of O&M costs appears feasible.

APPENDIX 3

PROJECT PROPOSAL - INDICATIVE INVESTMENT PACKAGES

APPENDIX 3

PROJECT PROPOSAL - INDICATIVE INVESTMENT PACKAGES

CONTENTS

1. INTRODUCTION

2. BACKGROUND

- 2.1 Policy context
- 2.2 Previous Assistance
- 2.3 District Profile
- 2.4 Institutional Setting
  - 2.4.1 Context
  - 2.4.2 Implementation of District Focus in the Water Sector
  - 2.4.3 Community Involvement in the Water Sector

3. PROJECT DESCRIPTION

- 3.1 Project Objectives and Scope
- 3.2 Project Description
  - 3.2.1 Overview
  - 3.2.2 Feasibility Studies
  - 3.2.3 Detailed Design
  - 3.2.4 Implementation
  - 3.2.5 Project Duration
  - 3.2.6 Project Location
- 3.3 Project Justification
  - 3.3.1 General
  - 3.3.2 Detailed Justification
  - 3.3.3 Prioritisation

4. PROJECT IMPLEMENTATION

- 4.1 Scope of Work and Activities
  - 4.1.1 Feasibility Study Phase
  - 4.1.2 Detailed Design Phase
  - 4.1.3 Implementation Phase
- 4.2 Inputs
- 4.3 Outputs
  - 4.3.1 Outputs of Project Preparation TA
  - 4.3.2 Outputs of the Feasibility Study TA
  - 4.3.3 Implementation of Design, Construction and Operation
  - 4.3.4 Investments

5. COSTING AND COUNTERPART RESOURCES

- 5.1 Costing
- 5.2 Counterpart Resources
  - 5.2.1 Implementing Agency
  - 5.2.2 Counterpart Contribution

Appendix 3 PROJECT PROPOSAL - INDICATIVE INVESTMENT PACKAGES

1 INTRODUCTION

This appendix is intended to provide the basic structure of a proposal to a funding agency for funds to implement a rural water supply project. The requirements and emphasis of these agencies will differ, but many key aspects of these proposals are common to most. The major topics covered in the proposal are:

1) Summary of Project

2) Background

- policy context
- previous assistance
- pattern of settlement
- institutional setting

3) Project description

- objectives and scope
- description
- justification

4) Implementation Arrangements

- scope of work and activities
- inputs
- outputs

5) Costing and Counterpart Resources

- costing
- counterpart resources

The proposal will describe and justify funding of the programme implied by the investment packages developed in Chapter 5 of Part 3. The description will be set out in terms of the technical, social, institutional and financial/economic aspects of the programme.

The project will implement water supply systems over the Samburu district, in accordance with the District Water Development Plan (DWDP). This plan takes into account previous and continuing activity in the water sector the district.

The overall objective of the project is to implement sustainable rural water supply systems, focusing on ASAL areas. In order to achieve this objective several lower level objectives are required. It requires extensive strengthening of institutional procedures and structures to implement such an objective. Specifically:

- development of a viable systems of designing, funding, implementing, operating and maintaining water supply systems at DISTRICT level

- such systems are to include mechanisms of COST SHARING in order to ensure the systems are viable in the long run, and

- the systems should utilise technologies which are appropriate to the physical, cultural and affordability contexts of the communities in which they are used.

It must be realised that the responsibility for submitting a project proposal to a funding agency lies with the District Development Committee. This proposal should thus be seen as an example which may have to be revised to include additional issues raised by the District. This revision could cover aspects of technology choice, project area, time schedule, etc. The investments described in the proposal could also be broken into smaller packages.

2 BACKGROUND

2.1 Policy context

Four major policies shape the development of rural water supply in Kenya. The primary policy is a general one set out in the National Development Plan 1989-1993. This sets the target of providing every household with a potable water source within 4 kilometres.

The other three objectives have a determining role in the way this policy is achieved. They are:

- the District focus policy,
- the policy of cost sharing, and
- the policy of ensuring access to lower income groups (affordability).

These policies can, in some institutional contexts, be contradictory. However, the task of the proposed project is to develop an institutional system in which such objectives can be met.

In addition, consideration should be given to the priority accorded to development of Arid and Semi-Arid Lands (ASAL). Many of the areas where water supply is a central issue are ASAL.

2.2 Previous Assistance

Previous assistance to Kenya in the water sector has been extensive. Bi-laterals, multi-laterals, NGOs and others have been active in the sector. However, no major water supply projects focusing on the Samburu District have been implemented. The two key projects, currently being implemented, which form the basis of the proposed project are:

- the Water Resources Assessment and Planning (WRAP) Project, and
- the Swedish International Development Agency (SIDA) Water Use Test Project / Water and Finance Management Project (henceforth referred to as "the SIDA project".

The WRAP project, and the Samburu District Water Development Study (SDWDS) produced by the project, form the basis of the proposed project. The SDWDS identifies the water resources and projected demand for these resources in the District. It also suggests, in general terms, the level of investment required to satisfy this demand. The proposed project provides a mechanism to implement this investment.

Both the WRAP and SIDA projects make recommendations for institutional strengthening which are also incorporated in this proposal. The SIDA project focuses on the administrative and financial systems required by the District Office of the MoWD.

Also incorporated into the proposal is the experience of the Embu Meru Isiolo (EMI) ASAL Programme with respect to the development of water resources for livestock.

2.3 District Profile

The "rural" district of Samburu is composed of four types of settlement for which water supply is required. These are:

- small urban areas such as Maralal and Wamba (population > 2,000), which serve as major market centres for livestock and as service centres for government, small scale repair facilities, consumer goods and agricultural inputs (but do NOT have a formal agricultural market), they are surrounded by an increasingly permanent low density housing (manyattas) of the Samburu people (the majority population comprising an estimated 70% of the district's inhabitants) and others

- market centres such as Marti and Lodungokwe (population < 2,000), in which the permanent, formal sector structures are ranged along one street (shops selling basic consumer goods, a livestock purchasing agency, a dispensary, etc.), this area is surrounded by an area of very low density housing (manyattas) as above, in addition encampments for poor/ displaced people (kijiji) may be found adjacent the formal sector structures in some areas

- manyattas (encampments) in rural areas, usually temporary, and

- "independent" facilities such as tourist lodges, missions, schools and health centres.

Nomadic peoples are not well represented in the formal urban sector.

In addition water is required for several different uses, some of which must be associated with these settlements. The most important is the demand for water for livestock. The manyattas surrounding the small urban and market centres have many associated herds which constitute a substantial demand. When the cattle move to better pasture, the manyattas sometimes also move. Water is thus required along the routes used by livestock. Tourist facilities have associated demand from wildlife. Other demand from shifting wheat farms and small-scale agriculture (supplying small urban centres) is not yet significant.

Tourist lodges, and large scale agriculture (wheat farming, ranches) are formal sector activities carried out by the private sector. Investments for water supply in these industries can thus be left to the private sector, given that the projected investments are in line with the DWDP. Nomadic pastoralism is the main traditional economic activity and is substantially outside the formal economy. This activity combined with urban demand, cover the majority of the population who will have difficulty in obtaining water without government intervention. They are thus the legitimate focus of government activity in the water sector and of this project. However, it should be noted that the approach adopted for these two groups will be, of necessity, quite different.

The average income in the district was estimated at Shs 2,168 per month in 1987. The average income per farmer from the sales of livestock, hides and skins was estimated at Shs 628 in 1987. This low income indicates that selling of animals is not used to obtain a regular income. In fact animals are generally only sold by the pastoralists in case they need money for a specific purpose.

Apart from water, the main constraints to District economic development are limitations on livestock grazing capacity, poor transport links/access to markets and underdeveloped market structure.

Considering the technical options available and the settlement pattern, water will thus be delivered to people and industries in four groupings, which require support of government. These are:

- urban systems with mainly service and small scale industry demand in addition to residential demand,

- market centre systems with some service demand, a small permanent residential demand (sometimes very poor as in the case of people in the "kijijis"), increasing demand from semi-permanent residents, who may require water supply for cattle

- rural supplies for nomadic pastoralists and sedentary rural population, and

- supplies to "independent" facilities in the formal sector. Independent commercial facilities (tourist lodges) or missions do not require government support.

Within these groupings there are social groups which have differing cultural requirements and income levels which will effect their effective demand for the various technical options. This is, these different groups can afford different amounts for their water and have different priorities with respect to availability/quality/use. The result is that they will often demand different things from water supply systems. In order to resolve these competing demands strong institutional systems are required and it is these systems which will now be examined.

2.4 Institutional Setting

2.4.1 Context

The existing network of organisations involved in the water sector is complex. With the District Focus Policy, the district is expected to co-ordinate all investment, including investment in water supplies. However, this policy has yet to move fully from one of "deconcentration", i.e. placing implementation activities of line Ministries at local level while retaining centralised control of staff and budgeting, to one of true "decentralisation", i.e. giving staffing and finance control to the local institutions. This process requires extensive support, especially by providing systems and funding for effective district co-ordination and implementation of investment in the water sector. As will be seen below, providing this support is a major objective of this project.

Four key activities are required to implement a water supply. It must be planned, designed, constructed and operated. Overall water policy planning, and technical (design) support is the responsibility of the Ministry of Water Development (MoWD). Responsibility for construction and operation is fragmented however. When undertaken by the MoWD, local offices of the MoWD, have considerable autonomy in design and construction of water supply schemes. Other ministries also design and construct water supplies.

Private formal sector organisations, missions and other entities may obtain permits as "water undertakers", to exploit local water resources. The appointment of a water undertaker is done by the Minister of Water Development under the powers of the Water Act (cap.372).

Local Water Associations are legal entities which have a Water Permit. They are being formed in some districts to become responsible for existing water systems or to undertake new ones. Permission to utilise water resources under the Water Act is presently given by a committee of the MoWD meeting in Nairobi, but is usually decided on the recommendation of the District Office of the MoWD. The lowest level institutions are the informal water committees. There is only one example of such committee in the Samburu District at South Horr.

In general, the District Office of the MoWD implements urban/market centre supplies and smaller schemes are undertaken by communities sometimes assisted by an NGO. Co-ordination of these activities is to be achieved by the District Water Development Plan, based on the SDWDS.

2.4.2 Implementation of District Focus in the Water Sector

The existing institutional base of future water investment in the district is limited. In the context of the District Focus policy, the District Development Committee (DDC), assisted by the District Executive Committee, is expected to co-ordinate investment in the water sector. This includes expenditures by the County Council (under the Ministry of Local Government). As stated above, the instrument used to achieve this co-ordination is the District Water Development Plan (DWDP). This plan is prepared by the DWE. While the structure for implementation of the plan is in place, the resources to carry out the required project appraisal, prioritisation and implementation are very limited. It is this situation that the project is intended to address.

The three key aspects of implementation which require strengthening are:

1) The administrative and financial systems of the District Offices of the MoWD.
   The MoWD District offices are being strengthened as part of the "deconcentration" of Ministry activity. The policy of "appropriations in aid" has been instituted which will link future recurrent expenditure funds allocated to districts to their performance in meeting revenue targets established by Treasury. Wages for lower levels of staff are now the responsibility of the district to pay. This may have a considerable impact on efficiency as there are indications that district level staff are under skilled, and that, compared to the resources available to work with, there may be significant over staffing.

2) The support systems both the District Offices and to community groups provided by central MoWD.
   The head office of the Ministry in Nairobi will now concentrate on providing policy, training and technical support, especially as key implementation activity has also been taken over by the

National Water Conservation and Pipeline Corporation. In this role, it has begun to institutionalise the assessment and planning process developed, to a great extent, through the WRAP project. The water assessment studies and planning reports are now an important resource for the MoWD, and its staff are being trained in the techniques of assessment. The Planning Unit within the Water Resources Assessment Section is responsible for carrying out these studies and assessments.

3) Co-ordination of the organisations which will implement the plan.
Currently, there is no clear policy on which organisation(s) should implement projects at district level. There are several options. These include the District office of the MoWD, the County Councils, NGO's and local Water Associations. The choice of institution will depend on the existing strength of these institutions, and potential for future strengthening.

One apparently successful method has been adopted in the Baringo District. It has been developed with assistance from UNICEF. A district water coordination group has been formed led by an inter-ministerial team and supported by every operational NGO in the district. The inter-ministerial team has representatives of MoWD, MoH and MCSS as well as the DDO and it is to be in contact with all operating organizations in the district who have an interest in water. It has been agreed in Baringo that this group meets every three months for information sharing, decision making, etc.

Thus, the responsibility for development and implementation of the district plan for water development is shared by all concerned groups. Individual groups become the "lead" agency for community mobilization and implementation in their division. Such matters as overlapping and duplication are worked out. Once plans are agreed it is up to each group to implement in their own way. With this approach it will be possible to implement water programmes by different organizations within the overall district strategy.

2.4.3 Community Involvement in the Water Sector

It is expected that the communities involved will play a central role in planning, implementing and maintaining the water supplies identified as viable under the proposed project. This is particularly the case for the small scale rural schemes. However, these communities require significant support over a considerable period in order to take on this role. The proposed project should identify and provide such support.

Water Associations or committees, in theory ideal for the implementation and/or operation of small community schemes, also have a weak base in the Samburu District. While various community leaders are present on the Divisional Development Committees and are represented on the DDC by the Divisional Officer, there is no formal structure of community participation, although the informal links through chiefs and sub-chiefs to the elders are said to be effective. Such participation is fundamental to the success of water supply projects in rural areas. No Water Associations have been formed as yet, but community water committees have functioned effectively in some self-help projects.

The institutional base will also play a key role in the type of system chosen. Systems which require complex or expensive operations and maintenance support will not be easily handled by district institutions. This is particularly important in the choice of system where local communities will have a major role in implementing the systems.

3 PROJECT DESCRIPTION

3.1 Project Objectives and Scope

The goal of project activity in the water sector in the ASAL areas of Kenya is to support environmentally sustainable development in order to provide for an equitable distribution of the nation's economic growth. Such activity is necessary in view of the increasing population and livestock pressure on, and the sensitive nature of the environment in, these areas.

The overall objective of the project is:

- to implement sustainable rural water supply systems, focusing on ASAL areas.

In order to achieve this objective several lower level objectives are required. It requires extensive strengthening of institutional procedures and structures to implement such an objective. Specifically:

- development of a viable systems of designing, funding, implementing, operating and maintaining water supply systems at DISTRICT level
- such systems are to include mechanisms of COST SHARING in order to ensure the systems are viable in the long run, and
- the systems should utilise technologies which are appropriate to the physical, cultural and affordability contexts of the communities in which they are used.

The project will implement water supply systems over the Samburu district, in accordance with the District Water Development Plan (DWDP). This plan takes into account previous and continuing activity in the water sector by the district. An indicative level of physical investment was estimated by the SDWDS. The total amount of required investment for rural supplies was some Kshs 118 million (approximately US$ 5.4 million), and Kshs 92 million (approximately US$ 4.2 million) for urban supplies.

The distribution of this investment over the various divisions in the district is shown in Appendix ...

3.2 Project Description

3.2.1 Overview

The project will be divided into three phases. The first phase will consist of feasibility studies. The second phase will carry out detailed design in consultation with the community where appropriate, and commence the institutional strengthening activities identified in the Feasibility studies. The third phase will consist of implementing the remaining institutional strengthening activities and construction of the water supply systems. These phases are described in detail below in Section 3.2.

Briefly, the roles each institution will play in any implementation of the project in Samburu district reflect the existing capacities and "orientation" of these organisations, government objectives, and potential of these organisations. In summary, they are:

- overall co-ordination with DDC - DDO
- water resources planning - central MoWD
- water project appraisal and water supply for urban centres - district MoWD
- water supply for market centres and rural areas- community, assisted by district MoWD, DDO, other ministries and NGOs.

3.2.2 Feasibility Studies

In the context of the DWDP, the major activities required to prepare the feasibility studies are:

- detail survey - physical and socio-economic of potential sites identified in the DWDP
- preliminary design and costing of water systems and institutional/community structures for implementation
- liaison with community groups on self help aspects

- assessment of proposed designs on the following criteria:

  . water resources
  . land use planning/environmental impact
  . social impact
  . institutional/community participation
  . economic
  . affordability
  . financial.

3.2.3 Detailed Design

Major activities involved in this phase are:

- physical survey of feasible sites
- design and documentation of water systems and implementation of first round of institutional strengthening (training in planning, design, community participation, and construction supervision; implementation of financial systems) and structures for community participation
- liaison with community groups on self help aspects

3.2.4 Implementation

The major activities are:

- land acquisition, if any
- tender of construction
- construction of systems and supervision thereof
- second round institutional strengthening (training in community participation, operation & maintenance)
- operation and maintenance systems

3.2.5 Project Duration

It is difficult to determine accurately the duration of the project, as much depends on bringing the rural communities involved along with the planning process and involving them in it. As such this process will proceed from one step to the next, and the design of the approach to the next step will depend on the experience in the proceeding step. This is so-called "process planning". Other parts of the studies, the surveys and the planning and design of the urban supplies can be implemented in a more programmed manner. This being said, it is expected that initial commitment to the project will be for three years. Projected date of commencement is July 1991.

It is estimated that the feasibility study phase will last 24 months, the detailed design phase 12 months, and the implementation phase 24 months.

The project will have a formal mid-term and final review in addition to reports will be completed at the end of each phase and bi-monthly progress reports which will be required throughout the project.

3.2.6 Project Location

The project will be based in MoWD headoffice, the office of the District Water Engineer in Maralal, and in project sites throughout the district as identified in the feasibility study phase. Preliminary identification of investments are shown in Plate 1.

3.3 Project Justification

3.3.1 General

In the DWDS for Samburu District, criteria for appraisal of investment options were established in the following categories:

- water resources
- land use planning/environmental impact
- social impact
- institutional/community participation
- economic
- affordability
- financial.

Simple checklists were established to test a project against each of these sets of criteria. These will be used in Section 3.3.2 below to assess the proposed project in general terms.

A prioritisation of projects will also be carried out using the methodology described in the DWDP. The methodology used is tailored to the existing and potentially achievable levels of assessment skills in the District.

3.3.2 Detailed Justification

a) Water Resources

The project will use the water resources identified in the SDWDS to meet demand in an efficient manner, rather than in a haphazard and potentially environmentally damaging way.

The yield of the proposed project water source has been analysed and it was found that the required quantity of water can be supplied during the lifetime of the project. The variation of the yield during the year is such that at minimum flow periods the water demand can be sufficiently met.

The occurrence of droughts was studied and it may be possible that during droughts the water available is insufficient to supply the full demand. However it is expected that livestock will leave the area during drought periods, because of shortage of fodder, which will reduce the water demand. Domestic water demand can be supplied always during drought periods. The frequency of the droughts could not be determined due to insufficient data.

The traditional water sources are springs and shallow groundwater. It is expected that the use of these sources will decline, because the project provides water closer to the homes of the people. The importance of a better water quality provided by the project needs to be explained to the population to be really appreciated. This will have to be done in combination with a campaign on improved sanitation measures.

b) Land Use/Environmental Impact

The project is intended to foster sustainable economic development in the District. It supplies water to activities consistent with the District Development Plan. In particular:

- water for livestock is provided near settlements in order to encourage nomads to settle
- sufficient investment is planned to allow for increase in ranching and small scale irrigation.

The facilities/plant of the project are consistent with plans for urban/rural development.

- the systems are sized to cater for projected rural and urban growth
- no significant physical constraints appear to limit siting or sizing of systems.

Neither the facilities/plant of the project, nor their construction, are likely to have an adverse environmental impact. The major forms of impact to be considered in the Samburu district are:

- the degradation of vegetation cover and soils from overgrazing, in particular the extensive damage occurs around water points in droughts - the project will alleviate this by dispersing watering points along grazing routes
- the impact of dams which intercept surface water causing downstream wetlands to dry up - this may have a significant impact on some wildlife, and dams are not proposed in the project
- heavy pumping of ground water may cause springs to dry up, effecting animals and sometimes people - at this stage this is not expected to be a problem for the proposed sites

c) Social Impact

The project is intended to foster inter-regional equity and to support community development in one of the poorest areas of Kenya.

Traditional groups are affected by projects, but the programme is designed to work within the cultural context of those groups. Developed within this context, the mechanisms for community participation in design, implementation, operation and maintenance will be central to the project.

The proposed project will improve the welfare of the people of the district, particularly lower income groups and women. The self-help components of the project provide employment for women in particular. Additional water provides opportunities for small scale agriculture and, possibly, additional cash income.

d) Institutional/Community Participation Issues

The project will strengthen government and community institutions in line with the District Focus policy.

Institutions

The major tasks which must be addressed with respect to institutional issues are design, construction and operation/maintenance of the systems. The organisation, or grouping of organisations must be able to carry out these tasks effectively.

As set out in the project description above, the roles each institution will play in any implementation of the project reflect the existing capacities and "orientation" of these organisations, government objectives, and potential of these organisations. In summary, they are:

- overall co-ordination - DDO
- water resources planning - central MoWD
- water project appraisal and water supply for urban centres - district MoWD
- water supply for market centres and rural areas- community, assisted by district MoWD and NGOs.

Design and construction supervision will be supported by the project which will also strengthen MoWD counterparts at head office and district levels in these roles. The MoWD has agreed to provide the required staff and facilities for the project as set out in Section 5.

This appears to be a realistic project organisational structure and the implementation schedule set out in Section 4 also appears viable.

Community Participation

Community participation will occur in many aspects of the project. In small scale water supply projects, it is likely that it will occur in design, construction and operation activities. The organisation of this participation is thus a key element in the successful implementation of the project.

Community committees are to be formed with the support of the chiefs and elders in each area. If insufficient support exists for the formation of the committee, no project will be attempted. Local DDO and MoWD staff will assess whether the leaders of the community organisation representative of the community in order to ensure that the promised community inputs will be delivered.

Socio-economic surveys will check if the communities can they deliver the promised labour and money inputs to the project on time.

This approach has been effective in ensuring community participation in the Samburu in the past. Local government agencies were prepared, given project support, to provide the organisational and logistic support required for such activity.

e) Economic and Financial Issues

The project will assess the economic viability of each sub-project. The methodology required to undertake an economic assessment of the project is set out in the DWDP. The feasibility study phase of the project will include such an assessment for each scheme.

Affordability

Particularly with respect to water supplies for the partly nomadic peoples, the issues of affordability and willingness to pay are complex, and bound up with slowly changing traditional beliefs and priorities. Feasibility studies will address this issue in some detail.

The main consideration is the level of cost sharing required. This will determine the fee or tariff set in the scheme. In general, the guidelines which will apply in respect to urban schemes are that full recovery of capital and all operation and maintenance costs is to be achieved over a period of ten years. Outside urban areas, full recovery of operations and maintenance costs will be required, and community contribution to capital works will also be a factor in deciding the priority of the scheme - the more contribution the higher the priority.

Basic affordability criteria are:

- the sum involved in cost recovery should not constitute more than 5% of the income of the poorest 20% of the population
- if there is no alternative water source, or if it is more expensive than the proposed scheme, then there is a good prospect of achieving a sufficient level of willingness to pay given adequate institutional systems and political support
- if there is an alternative which is acceptable to the people, even if the water is technically inferior, a new technology should be considered, or the level of cost recovery should be reviewed.

Financial Issues

The key financial issue is the sustainability of the project. With the above analysis complete, and concurrently with the determination of affordability, it is possible to project likely demand, and the costs of each sub-project over time. The feasibility study must identify the sources of funds for design, construction and operation/maintenance. The projection of the expenditure of these funds must be realistic. A basic cashflow analysis can then be carried out to identify potential liquidity problems, and measures developed to overcome them. The financial return on the project can also be calculated.

Financial systems for revenue collection and recording financial flows (simple records of costs and receipts) have been developed, and could be applied to even the smallest schemes. For larger schemes, simple procedures for capital budgeting and funding of preventative maintenance schemes could be developed based on experience in some NGO projects. These types of procedures will be designed in the feasibility study phase and implemented during subsequent phases of the project.

3.3.3 Prioritisation

The project will prioritise the investments (sub-projects) identified in the feasibility studies. The suggested method of prioritisation focuses on the sustainability of the project. Basically, it consists of ensuring that all of the questions set out above in each of the criteria categories have a satisfactory answer. Then, priority is assessed according to how well projects meet the cost sharing policy.

First priority projects will recover both capital and operation and maintenance (O&M) costs. Second priority projects will recover O&M costs. Third priority projects will be economically viable and be ranked according to the extent of recovery of O&M costs. Other projects should not be implemented.

Tables 3.1 and 3.2 set out the total required investments for urban and rural supplies as estimated from preliminary data. Detailed sub-project ranking will be confirmed by the feasibility phase of the project.

The proposed projects for the different supply areas were based on:

- rural centres - recovery of both capital and O&M costs
- rural institutions - recovery of both capital and O&M costs
- rural areas - recovery of O&M costs only
- non-domestic - recovery of O&M costs only

Table 3.1 Investment Package - Rural Supplies

Supply Area	Supply Dev. (m3/day)	Number of Units	Capital Costs (Shs)	O & M Costs (Shs)	Costs/Head	
					Capital (Shs/Cap)	O & M (Shs/Cap)
Rural Centre	314	20	15,512,500	5,538,000	3,406	1,216
Rural Institution	208	34	12,237,500	2,047,500		
Rural Area	1119	123	50,543,750	11,094,250	826	181
Rural Domestic	1641	177	78,293,750	18,679,750	1,191	284
Non-domestic	868	65	42,068,750	19,971,000		
Total	2509	242	120,362,500	38,650,750	1,830	588

Note: 1) Technology choice based on recovery of O&M costs only

Table 3.2 Investment Package - Urban Supplies

Urban Centre	2003 Population		Capital Costs (Shs)	Total [1] O & M Costs (Shs)	Costs/Head	
	Total	To be Supplied			Capital (Shs/Cap)	O & M [1] (Shs/Cap)
Maralal	36,666	25,145	49,750,000	87,811,416	1,979	3,492
Sukuta Marmar	3,114	3,114	5,131,250	8,402,625	1,648	2,698
Baragoi	7,920[2])	7,920	18,656,250	32,929,281	2,356	4,158
Wamba	10,697	8,698	18,656,250	32,929,281	2,145	3,786

Notes: 1) O & M costs are total costs over 20-year period
2) Includes 1109 rural population

Figure 4.1 Personnel Inputs and Outputs

ACTIVITY	MONTHS 1 12 | 13 24 | 25 36	TOTAL MONTHS	COST	TRAVEL COST Extern.Local
Activity 1 **DWDP Support TA**				
Inputs:				
1) Foreign Personnel				
Team Leader	********** **********	24		
Planner/Engineer	** ** * * ***	9		
Volunteer	********** **********	24		
2) Government Personnel				
Project Manager	********** **********	24		
DWE	********** **********	24		
HO Engineer	********** **********	24		
Hydrologist	********** **********	24		
etc				
3) Support Staff				
Secretary	********** **********	24		
Assistant	********** **********	24		
Outputs:	Draft DWDP Draft Institution Rpt | Final DWDP & Institution Rpts			
Activity 2 **FS Support TA**				
Inputs:				
1) Foreign Personnel				
Team Leader	****** ********** **********	30		
Planner/Engineer	****** ********** **********	30		
Sociologist	****** ********** **********	30		
Engineer (Water Supply)	********** **********	24		
Surveyor	******	6		
Economist/Finance	** ** ** ** ** **	12		
Environmental	** ** ** ** ** **	12		
Institutional	** ** ** ** ** **	12		
2) Local Consultants				
Deputy Team Leader	****** ********** **********	30		
Planner/Engineer	****** ********** **********	30		
Sociologist	****** ********** **********	30		
Engineer (Water Supply)	********** **********	24		
Surveyor	******	6		
Economist/Finance	** ** ** ** ** **	12		
etc				
3) Government Personnel				
Project Manager	****** ********** **********	30		
Engineer Counterp. x 4	****** ********** **********	120		
4) Support Staff				
Office Manager	****** ********** **********	30		
Secretary x 2	****** ********** **********	60		
Assistant	****** ********** **********	30		
Drivers x 4	****** ********** **********	120		
Cleaner	****** ********** **********	30		
Outputs:	Draft Physical & Social Rpts | Draft FS Rpt Final Physical & Social Rpts | Final FS Rpt			

4 PROJECT IMPLEMENTATION

4.1 Scope of Work and Activities

4.1.1 Feasibility Study Phase

Two separate streams of Technical Assistance (TA) are required. The first is required to support the MoWD in its project preparation activity. The second is to carry out the detailed feasibility study activity. Thus the two main activities involved in this phase of the project are:

1) TA support to the MoWD in Project Preparation.

The main tasks are:

- liaison with various concerned agencies for input to the DWDP
- finalise the DWDP
- conduct on-the-job training in parallel with TA for feasibility studies.

2) TA support for Feasibility studies.

The main tasks are:

- detail survey, physical and socio-economic of potential sites identified in the DWDP
- preliminary design of water systems and institutional/community structures for implementation
- liaison with community groups on self help aspects
- assessment of proposed designs on the following criteria.

4.1.2 Detailed Design Phase

The division of the responsibility for the various activities involved in the detailed design phase between MoWD and TA resources will be determined at the mid-term review of the project. However, the main activities involved in this phase of the project are:

- physical survey of feasible sites
- design and documentation of water systems and implementation of first round of institutional strengthening (training in planning, design, community participation, and construction supervision; implementation of financial systems) and structures for community participation
- liaison with community groups on self help aspects

4.1.3 Implementation Phase

Again, the division of the responsibility for the various activities involved in the implementation phase between MoWD and TA resources will be determined towards the end of the design phase. However, the main activities involved in this phase of the project are:

- land acquisition, if any
- tender of construction
- construction of systems and supervision thereof
- second round institutional strengthening (training in community participation, operation & maintenance)
- operation and maintenance systems

4.2 Inputs

Key personnel inputs to each key activity in the feasibility phase of the project are described in Figure 4.1. Equipment and other inputs to the project are described in Figure 4.2. These inputs are to be supplied by donor and government funding as described in section 5 below.

Figure 4.2 Non-personnel Inputs

ACTIVITY	MONTHS 1 12 | 13 24 | 25 36	ITEMS (OUTPUT)	COST
Activity 1 **DWDP Support TA**			
Inputs:			
1) Foreign			
Procurement	******	Photocopier?	
Training	****** **********	Community Participation - KWAHO?	
	****** **********	Planning & Assessment - TNO?	
	****** **********	Economics/Finance - Rotterdam/IHS?	
Office	********** **********	Consumables	
2) Local			
Office	********** **********	Space & Equipment	
Activity 2 **FS Support TA**			
Inputs:			
1) Foreign			
Procurement			
- Vehicles	******	4WD x 4	
- Major Equipment	******	photocopier & computers	
Training	**********	?	
Office	****** ********** **********		
2) Local			
Information	****** ********** **********		
Counterparts?	****** ********** **********		

4.3 Outputs

4.3.1 Outputs of Project Preparation TA

Institutional Outputs

a) Central Ministry of Water Development (MoWD)

The outputs are:

- additional formal and on-the-job training of MoWD staff in the Resources Assessment (RA) Section in techniques required, this training must be given to officers who will remain within the section for a sufficient time to train replacements
- additional equipment (to be determined)
- additional (given existing zero capability) capacity and systems to strengthen district MoWD offices in their role as semi-autonomous water supply agencies, specifically the ability to train in resources assessment, preparation of the DWDP, O&M procedures, financial systems management and techniques of community mobilisation; this activity will be supported by improved in information linkages between central office and district
- improved internal co-ordination between the RA Section and other sections of the MoWD, and
- improved links with other ministries with respect to usage of water resources.

b) District Ministry of Water Development

Outputs are:

- training in appraisal of proposals for utilisation of water resources
- training in methodology for the preparation of the DWDP
- improved construction and operation and maintenance of "urban" water supply systems through implementation of financial and administrative systems giving effective control these activities at district level
- training in support to all other types of water supply systems in assessment, planning, project appraisal, community participation and financial systems
- training to train members of Local Government/Community groups/Water Associations in these skills
- legislation and/or regulations under the Water Act and possible revenue acts to enable the district office to carry out the above roles

c) District Development Office

Outputs are:

- an assistant DDO with specific responsibility for water matters
- training in Water Resources Planning for this person
- revision of the legal and/or administrative base for the DDC's oversight of water matters.

d) Community Groups

Outputs are:

- education and community awareness campaigns initiated through the chiefs and sub-chiefs
- strengthen cost recovery and administration of water systems.

Reports

Outputs are:

- inception report (first bi-monthly report)
- bi-monthly reports
- mid-term institutional report
- final institutional report
- the DWDP for the Samburu District.

4.3.2 Outputs of the Feasibility Study TA

Major reporting outputs are described and scheduled in Figure 4.1. The major reporting requirements are:

- inception report (first bi-monthly report)
- bi-monthly reports
- physical and social survey report
- mid-term draft feasibility report
- final feasibility report.

The feasibility report will assess each sub-project identified on the criteria established in the DWDP. In addition, the institutional and financial requirements for design and implementation of the sub-projects assess as viable will be detailed.

4.3.3 Implementation of Design, Construction and Operation

Implementation from feasibility phase onwards includes outputs of detailed design and implementation phases. These phases involve many activities, which are be detailed by the feasibility studies. These activities require:

- resources (money, staff and equipment) for design activity
- systems for disbursing capital funds to recipients according to established procedures
- systems for gathering and processing the required data for monitoring, and
- additional training for MoWD and other organisations involved in implementation.

Outputs will thus be:

- detailed designs and documentation for sub-projects
- completed water supply projects as detailed in Table 3.1
- adequate administration, resource planning and financial systems in place in order to operate these projects efficiently and on a sustainable basis, and
- trained staff in place where required.
- additional equipment and resources.

Effective community participation in construction and operation will require a flexible approach to implementation on the part of the support organisations, principally the MoWD. Where local communities are not familiar with the requirements for management of formal sector organisations, such as a water supply, close contact over a prolonged period of time will be required to develop and refine workable systems. Adequate skills and resources for such an approach must be identified at feasibility phase and be in place for construction and operation phases.

5. COSTING AND COUNTERPART RESOURCES

5.1 Costing

by inputs by activity/overheads in section 4.2

5.2 Counterpart Resources

5.2.1 Implementing Agency

Ministry of Water Development:

- Planning Unit, Resource Assessment Section
- District Water Engineer, Samburu District

5.2.2 Counterpart Contribution

by inputs by activity/overheads in section 4.2

APPENDIX 4

INVESTMENT PACKAGES

SUMMARIES PER LOCATION AND SUPPLY AREA

APPENDIX 4

INVESTMENT PACKAGES

SUMMARIES PER LOCATION AND SUPPLY AREA

1. Baragoi Division - IP 1A - Demand 1993, Scenario 3
2. Baragoi Division - IP 1A - Demand 2003, Scenario 3
3. Baragoi Division - IP 2A - Demand 1993, Scenario 3
4. Baragoi Division - IP 2A - Demand 1993, Scenario 3
5. Baragoi Division - IP 2A - Demand 2003, Scenario 3
6. Baragoi Division - IP 3A - Demand 2003, Scenario 3
7. Baragoi Division - IP 1B - Demand 2003, Scenario 2
8. Baragoi Division - IP 2B - Demand 1993, Scenario 2
9. Baragoi Division - IP 3B - Demand 2003, Scenario 2
10. Lorroki Division - IP 1B - Demand 2003, Scenario 2
11. Lorroki Division - IP 1B - Demand 2003, Scenario 2
12. Lorroki Division - IP 2B - Demand 2003, Scenario 2
13. Lorroki Division - IP 3B - Demand 2003, Scenario 2
14. Wamba Division - IP 1B - Demand 2003, Scenario 2
15. Wamba Division - IP 2B - Demand 2003, Scenario 2
16. Wamba Division - IP 3B - Demand 2003, Scenario 2
17. Waso Division - IP 1B - Demand 2003, Scenario 2
18. Waso Division - IP 2B - Demand 2003, Scenario 2
19. Waso Division - IP 3B - Demand 2003, Scenario 2

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 1A : Demand year 1993, Scenario 3

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Exist.	Population New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	0	0	0	0	985	0			
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	32	5	937,500	52,500	0	2496	499	376	21
	Non-domestic	27	2	1,487,500	863,625	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	0	0	0	0	0	0			
	Rural Area	43	5	1,925,000	325,500	0	3747	749	514	87
	Non-domestic	46	3	2,037,500	2,464,875	0	0			
Ndoto	Rural Centre	0	0	0	0	250	44		0	0
	Rural Institution	17	2	1,462,500	1,821,750	0	0			
	Rural Area	64	6	4,187,500	2,409,750	0	4259	710	983	566
	Non-domestic	44	2	1,487,500	863,625	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	4	1	187,500	10,500	0	0			
	Rural Area	15	4	750,000	42,000	400	709	177	1,058	59
	Non-domestic	11	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	9	2	375,000	21,000	0	0			
	Rural Area	24	3	1,550,000	304,500	0	2129	710	728	143
	Non-domestic	35	3	1,675,000	874,125	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	13	1	1,275,000	1,811,250	0	0			
	Rural Area	29	6	1,125,000	63,000	0	2504	417	449	25
	Non-domestic	55	4	2,975,000	1,727,250	0	0			
ELbarta	Rural Centre	2	0	0	0	163	0			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	25	5	937,500	52,500	100	1934	387	485	27
	Non-domestic	41	4	1,862,500	884,625	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	11	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total	Rural Centre	2	0	0	0	1398	44		0	0
Total	Rural Institution	47	9	3,862,500	3,696,000	0	0			
Total	Rural Area	243	34	11,412,500	3,249,750	500	17778	523	642	183
Total	Rural Domestic	292	43	15,275,000	6,945,750	1898	17822	414	857	390
Total	Non-domestic	260	19	11,712,500	7,688,625	0	0			
BARAGOI DIVISION	Total	552	62	26,987,500	14,634,375	1898	17822	287	1,514	821

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 1A : Demand year 2003, Scenario 3

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	0	0	0	0	947	0			
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	34	7	1,312,500	73,500	0	2293	328	572	32
	Non-domestic	27	2	1,487,500	863,625	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	0	1	187,500	10,500	0	0			
	Rural Area	44	5	1,925,000	21,000	0	3389	678	568	6
	Non-domestic	46	3	2,037,500	2,464,875	0	0			
Ndoto	Rural Centre	3	0	0	0	250	46	ERR	0	0
	Rural Institution	21	2	1,462,500	1,821,750	0	0			
	Rural Area	70	6	4,187,500	2,409,750	0	3850	642	1,088	626
	Non-domestic	44	2	1,487,500	863,625	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	4	1	187,500	10,500	0	0			
	Rural Area	13	4	750,000	42,000	400	603	151	1,244	70
	Non-domestic	11	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	11	2	375,000	21,000	0	0			
	Rural Area	26	3	1,550,000	304,500	0	1926	642	805	158
	Non-domestic	35	3	1,675,000	874,125	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	14	1	1,275,000	1,811,250	0	0			
	Rural Area	30	6	1,125,000	63,000	0	2265	378	497	28
	Non-domestic	55	4	2,975,000	1,727,250	0	0			
ELbarta	Rural Centre	4	1	187,500	10,500	100	61			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	27	5	937,500	52,500	100	1751	350	535	30
	Non-domestic	41	4	1,862,500	884,625	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	11	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total	Rural Centre	7	1	187,500	10,500	1297	107	107	1,752	98
Total	Rural Institution	54	10	4,050,000	3,706,500	0	0			
Total	Rural Area	255	36	11,787,500	2,966,250	500	16077	447	733	185
Total	Rural Domestic	316	47	16,025,000	6,683,250	1797	16184	344	990	413
Total	Non-domestic	260	19	11,712,500	7,688,625	0	0			
BARAGOI DIVISION	Total	576	66	27,737,500	14,371,875	1797	16184	245	1,714	888

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 2A : Demand year 1993, Scenario 3

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	0	0	0	0	985	0			
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	32	5	937,500	52,500	0	2496	499	376	21
	Non-domestic	27	2	1,487,500	863,625	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	0	0	0	0	0	0			
	Rural Area	43	5	1,925,000	325,500	0	3747	749	514	87
	Non-domestic	46	3	2,187,500	989,625	0	0			
Ndoto	Rural Centre	0	0	0	0	250	44		0	0
	Rural Institution	17	2	1,318,750	346,500	0	0			
	Rural Area	64	6	4,043,750	934,500	0	4259	710	949	219
	Non-domestic	44	2	1,487,500	863,625	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	4	1	187,500	10,500	0	0			
	Rural Area	15	4	750,000	42,000	400	709	177	1,058	59
	Non-domestic	11	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	9	2	375,000	21,000	0	0			
	Rural Area	24	3	1,550,000	304,500	0	2129	710	728	143
	Non-domestic	35	3	1,675,000	874,125	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	13	1	1,131,250	336,000	0	0			
	Rural Area	29	6	1,125,000	63,000	0	2504	417	449	25
	Non-domestic	55	4	2,975,000	1,727,250	0	0			
ELbarta	Rural Centre	2	0	0	0	163	0			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	25	5	937,500	52,500	100	1934	387	485	27
	Non-domestic	41	4	1,862,500	884,625	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	11	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total Rural Centre		2	0	0	0	1398	44		0	0
Total Rural Institution		47	9	3,575,000	745,500	0	0			
Total Rural Area		243	34	11,268,750	1,774,500	500	17778	523	634	100
Total Rural Domestic		292	43	14,843,750	2,520,000	1898	17822	414	833	141
Total Non-domestic		260	19	11,862,500	6,213,375	0	0			
BARAGOI DIVISION	Total	552	62	26,706,250	8,733,375	1898	17822	287	1,498	490

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 2A : Demand year 2003, Scenario 3

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	0	0	0	0	947	0			
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	34	7	1,312,500	73,500	0	2293	328	572	32
	Non-domestic	27	2	1,487,500	863,625	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	0	1	187,500	10,500	0	0			
	Rural Area	44	5	1,925,000	21,000	0	3389	678	568	6
	Non-domestic	46	3	2,187,500	989,625	0	0			
Ndoto	Rural Centre	3	0	0	0	250	46	ERR	0	0
	Rural Institution	21	2	1,318,750	346,500	0	0			
	Rural Area	70	6	4,337,500	934,500	0	3850	642	1,127	243
	Non-domestic	44	2	1,487,500	863,625	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	4	1	187,500	10,500	0	0			
	Rural Area	13	4	750,000	42,000	400	603	151	1,244	70
	Non-domestic	11	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	11	2	375,000	21,000	0	0			
	Rural Area	26	3	1,550,000	304,500	0	1926	642	805	158
	Non-domestic	35	3	1,675,000	874,125	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	14	1	1,131,250	336,000	0	0			
	Rural Area	30	6	1,125,000	63,000	0	2265	378	497	28
	Non-domestic	55	4	2,975,000	1,727,250	0	0			
ELbarta	Rural Centre	4	1	187,500	10,500	100	61			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	27	5	937,500	52,500	100	1751	350	535	30
	Non-domestic	41	4	1,862,500	884,625	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	11	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total Rural Centre		7	1	187,500	10,500	1297	107	107	1,752	98
Total Rural Institution		54	10	3,762,500	756,000	0	0			
Total Rural Area		255	36	11,937,500	1,491,000	500	16077	447	743	93
Total Rural Domestic		316	47	15,887,500	2,257,500	1797	16184	344	982	139
Total Non-domestic		260	19	11,862,500	6,213,375	0	0			
BARAGOI DIVISION	Total	576	66	27,750,000	8,470,875	1797	16184	245	1,715	523

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 3A : Demand year 1993, Scenario 3

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	0	0	0	0	985	0			
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	32	5	937,500	52,500	0	2496	499	376	21
	Non-domestic	27	2	1,406,250	2,143,365	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	0	0	0	0	0	0			
	Rural Area	43	5	1,843,750	1,605,240	0	3747	749	492	428
	Non-domestic	46	3	2,037,500	2,464,875	0	0			
Ndoto	Rural Centre	0	0	0	0	250	44		0	0
	Rural Institution	17	2	1,462,500	1,821,750	0	0			
	Rural Area	64	5	3,112,500	3,654,000	0	4259	852	731	858
	Non-domestic	44	2	1,587,500	2,391,375	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	4	1	187,500	10,500	0	0			
	Rural Area	15	4	750,000	42,000	400	709	177	1,058	59
	Non-domestic	11	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	9	2	375,000	21,000	0	0			
	Rural Area	24	3	1,468,750	1,584,240	0	2129	710	690	744
	Non-domestic	35	3	1,775,000	2,401,875	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	13	1	1,275,000	1,811,250	0	0			
	Rural Area	29	6	1,125,000	63,000	0	2504	417	449	25
	Non-domestic	55	4	2,993,750	4,534,740	0	0			
ELbarta	Rural Centre	2	0	0	0	163	0			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	25	5	937,500	52,500	100	1934	387	485	27
	Non-domestic	41	4	1,962,500	2,412,375	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	11	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total Rural Centre		2	0	0	0	1398	44		0	0
Total Rural Institution		47	9	3,862,500	3,696,000	0	0			
Total Rural Area		243	33	10,175,000	7,053,480	500	17778	539	572	397
Total Rural Domestic		292	42	14,037,500	10,749,480	1898	17822	424	788	603
Total Non-domestic		260	19	11,950,000	16,359,105	0	0			
BARAGOI DIVISION	Total	552	61	25,987,500	27,108,585	1898	17822	292	1,458	1,521

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 3A : Demand year 2003, Scenario 3

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	0	0	0	0	947	0			
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	34	7	1,312,500	73,500	0	2293	328	572	32
	Non-domestic	27	2	1,487,500	2,143,365	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	0	1	187,500	10,500	0	0			
	Rural Area	44	5	2,025,000	1,832,250	0	3389	678	598	541
	Non-domestic	46	3	2,037,500	2,464,875	0	0			
Ndoto	Rural Centre	3	0	0	0	250	46	ERR	0	0
	Rural Institution	21	2	1,462,500	1,821,750	0	0			
	Rural Area	70	5	3,112,500	3,654,000	0	3850	770	808	949
	Non-domestic	44	2	1,587,500	2,391,375	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	4	1	187,500	10,500	0	0			
	Rural Area	13	4	750,000	42,000	400	603	151	1,244	70
	Non-domestic	11	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	11	2	375,000	21,000	0	0			
	Rural Area	26	3	1,550,000	1,584,240	0	1926	642	805	823
	Non-domestic	35	3	1,675,000	2,153,865	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	14	1	1,275,000	1,811,250	0	0			
	Rural Area	30	6	1,125,000	63,000	0	2265	378	497	28
	Non-domestic	55	4	3,075,000	4,534,740	0	0			
ELbarta	Rural Centre	4	1	187,500	10,500	100	61			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	27	5	937,500	52,500	100	1751	350	535	30
	Non-domestic	41	4	1,962,500	2,412,375	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	11	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total	Rural Centre	7	1	187,500	10,500	1297	107	107	1,752	98
Total	Rural Institution	54	10	4,050,000	3,706,500	0	0			
Total	Rural Area	255	35	10,812,500	7,301,490	500	16077	459	673	454
Total	Rural Domestic	316	46	15,050,000	11,018,490	1797	16184	352	930	681
Total	Non-domestic	260	19	12,012,500	16,111,095	0	0			
BARAGOI DIVISION	Total	576	65	27,062,500	27,129,585	1797	16184	249	1,672	1,676

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	7	1	187,500	10,500	1095	0	0		
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	39	8	1,500,000	84,000	0	2671	334	562	31
	Non-domestic	29	2	1,487,500	863,625	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	1	1	187,500	10,500	0	0			
	Rural Area	50	6	2,112,500	336,000	0	3940	657	536	85
	Non-domestic	50	3	2,037,500	2,464,875	0	0			
Ndoto	Rural Centre	12	1	450,000	73,500	250	94	94	4,787	782
	Rural Institution	30	2	1,462,500	1,821,750	0	0			
	Rural Area	81	7	4,375,000	2,420,250	0	4478	640	977	540
	Non-domestic	47	2	1,487,500	863,625	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	5	1	187,500	10,500	0	0			
	Rural Area	22	6	1,125,000	63,000	400	766	128	1,469	82
	Non-domestic	12	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	16	2	375,000	21,000	0	0			
	Rural Area	29	3	1,550,000	304,500	0	2239	746	692	136
	Non-domestic	38	3	1,675,000	874,125	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	16	1	1,275,000	1,811,250	0	0			
	Rural Area	34	6	1,125,000	63,000	0	2633	439	427	24
	Non-domestic	59	4	2,975,000	1,727,250	0	0			
ELbarta	Rural Centre	10	1	1,093,750	1,563,240	100	99			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	34	6	1,125,000	63,000	100	2041	340	551	31
	Non-domestic	44	4	1,862,500	884,625	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	13	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total Rural Centre		29	3	1,731,250	1,647,240	1445	193	64	8,970	8,535
Total Rural Institution		72	10	4,050,000	3,706,500	0	0			
Total Rural Area		302	42	12,912,500	3,333,750	500	18768	447	688	178
Total Rural Domestic		403	55	18,693,750	8,687,490	1945	18961	345	986	458
Total Non-domestic		280	19	11,712,500	7,688,625	0	0			
BARAGOI DIVISION	Total	683	74	30,406,250	16,376,115	1945	18961	256	1,604	864

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	7	1	187,500	10,500	1095	0			
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	39	8	1,500,000	84,000	0	2671	334	562	31
	Non-domestic	29	2	1,487,500	863,625	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	1	1	187,500	10,500	0	0			
	Rural Area	50	6	2,112,500	336,000	0	3940	657	536	85
	Non-domestic	50	3	2,187,500	989,625	0	0			
Ndoto	Rural Centre	12	1	450,000	73,500	250	94	94	4,787	782
	Rural Institution	30	2	1,612,500	346,500	0	0			
	Rural Area	81	7	4,525,000	945,000	0	4478	640	1,010	211
	Non-domestic	47	2	1,487,500	863,625	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	5	1	187,500	10,500	0	0			
	Rural Area	22	6	1,125,000	63,000	400	766	128	1,469	82
	Non-domestic	12	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	16	2	375,000	21,000	0	0			
	Rural Area	29	3	1,550,000	304,500	0	2239	746	692	136
	Non-domestic	38	3	1,675,000	874,125	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	16	1	1,131,250	336,000	0	0			
	Rural Area	34	6	1,125,000	63,000	0	2633	439	427	24
	Non-domestic	59	4	2,975,000	1,727,250	0	0			
ELbarta	Rural Centre	10	1	1,131,250	336,000	100	99			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	34	6	1,125,000	63,000	100	2041	340	551	31
	Non-domestic	44	4	1,862,500	884,625	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	13	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total	Rural Centre	29	3	1,768,750	420,000	1445	193	64	9,165	2,176
Total	Rural Institution	72	10	4,056,250	756,000	0	0			
Total	Rural Area	302	42	13,062,500	1,858,500	500	18768	447	696	99
Total	Rural Domestic	403	55	18,887,500	3,034,500	1945	18961	345	996	160
Total	Non-domestic	280	19	11,862,500	6,213,375	0	0			
BARAGOI DIVISION	Total	683	74	30,750,000	9,247,875	1945	18961	256	1,622	488

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Nyiro	Rural Centre	7	1	187,500	10,500	1095	0	0		
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	39	8	1,500,000	84,000	0	2671	334	562	31
	Non-domestic	29	2	1,587,500	2,391,375	0	0			
Kawop	Rural Centre	0	0	0	0	0	0			
	Rural Institution	1	1	187,500	10,500	0	0			
	Rural Area	50	6	2,212,500	1,863,750	0	3940	657	562	473
	Non-domestic	50	3	2,037,500	2,464,875	0	0			
Ndoto	Rural Centre	12	1	450,000	73,500	250	94	94	4,787	782
	Rural Institution	30	2	1,462,500	1,821,750	0	0			
	Rural Area	81	7	3,487,500	3,675,000	0	4478	640	779	821
	Non-domestic	47	2	1,587,500	2,391,375	0	0			
Arsim	Rural Centre	0	0	0	0	0	0			
	Rural Institution	5	1	187,500	10,500	0	0			
	Rural Area	22	6	1,125,000	63,000	400	766	128	1,469	82
	Non-domestic	12	1	187,500	10,500	0	0			
Nachola	Rural Centre	0	0	0	0	0	0			
	Rural Institution	16	2	375,000	21,000	0	0			
	Rural Area	29	3	1,468,750	1,584,240	0	2239	746	656	708
	Non-domestic	38	3	1,775,000	2,401,875	0	0			
Marti	Rural Centre	0	0	0	0	0	0			
	Rural Institution	16	1	1,275,000	1,811,250	0	0			
	Rural Area	34	6	1,125,000	63,000	0	2633	439	427	24
	Non-domestic	59	4	3,175,000	4,782,750	0	0			
ELbarta	Rural Centre	10	1	1,093,750	1,563,240	100	99			
	Rural Institution	2	1	187,500	10,500	0	0			
	Rural Area	34	6	1,125,000	63,000	100	2041	340	551	31
	Non-domestic	44	4	1,962,500	2,412,375	0	0			
Baragoi	Rural Centre	0	-	0	0	0	0			
	Rural Institution	0	-	0	0	0	0			
	Rural Area	13	-	0	0	0	0			
	Non-domestic	1	-	0	0	0	0			
Total Rural Centre		29	3	1,731,250	1,647,240	1445	193	64	8,970	8,535
Total Rural Institution		72	10	4,050,000	3,706,500	0	0			
Total Rural Area		302	42	12,043,750	7,395,990	500	18768	447	642	394
Total Rural Domestic		403	55	17,825,000	12,749,730	1945	18961	345	940	672
Total Non-domestic		280	19	12,312,500	16,855,125	0	0			
BARAGOI DIVISION	Total	683	74	30,137,500	29,604,855	1945	18961	256	1,589	1,561

Summary per Location and Supply Area

SUMMARY LORROKI DIVISION Rural Area INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Poro	Rural Centre	33	1	500,000	1,800,000	250	350	350	1,429	5,143
	Rural Institution	17	2	375,000	21,000	0	0			
	Rural Area	44	6	2,212,500	1,863,750	300	1896	316	1,167	983
	Non-domestic	0	0	0	0	0	0			
Angata Nanyukie	Rural Centre	31	1	1,175,000	283,500	0	583	583	2,015	486
	Rural Institution	11	3	562,500	31,500	0	0			
	Rural Area	37	3	1,550,000	304,500	0	1691	564	917	180
	Non-domestic	0	0	0	0	0	0			
Opiroi	Rural Centre	45	2	1,300,000	1,821,750	0	761	381	1,708	2,394
	Rural Institution	0	0	0	0	0	0			
	Rural Area	49	5	2,025,000	1,853,250	0	2866	573	707	647
	Non-domestic	1	1	187,500	10,500	0	0			
Loosuk	Rural Centre	48	1	1,555,000	2,300,000	0	494	494	3,148	4,656
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	51	4	2,925,000	3,643,500	0	2251	563	1,299	1,619
	Non-domestic	64	4	2,975,000	1,727,250	0	0			
Sukuta Marmar	Rural Centre	10	2	375,000	21,000	125	125	63	3,000	168
	Rural Institution	14	1	450,000	73,500	0	0			
	Rural Area	118	5	5,280,000	4,793,750	0	5562	1112	949	862
	Non-domestic	200	8	6,350,000	9,565,500	0	0			
Kisima	Rural Centre	15	1	1,093,750	1,563,240	200	285	285	3,838	5,485
	Rural Institution	29	3	1,650,000	1,832,250	0	0			
	Rural Area	83	4	4,618,750	2,413,740	500	3568	892	1,294	676
	Non-domestic	103	4	3,175,000	4,782,750	0	0			
Lodokejek	Rural Centre	26	2	2,187,500	3,126,480	250	406	203	5,388	7,701
	Rural Institution	5	1	187,500	10,500	0	0			
	Rural Area	93	4	4,756,250	2,714,250	0	4613	1153	1,031	588
	Non-domestic	27	3	1,593,750	2,153,865	0	0			
Maralal	Rural Centre	0	0	0	0	0	0			
	Rural Institution	13	2	375,000	21,000	0	0			
	Rural Area	123	11	4,237,500	3,717,000	0	5088	463	833	731
	Non-domestic	0	0	0	0	0	0			
Total	Rural Centre	208	10	8,186,250	10,915,970	825	3004	300	2,725	3,634
Total	Rural Institution	91	14	3,975,000	2,010,750	0	0			
Total	Rural Area	598	42	27,605,000	21,303,740	800	27535	656	1,003	774
Total	Rural Domestic	897	66	39,766,250	34,230,460	1625	30539	463	1,302	1,121
Total	Non-domestic	395	20	14,281,250	18,239,865	0	0			
LORROKI DIVISION	Total	1292	86	54,047,500	52,470,325	1625	30539	355	1,770	1,718

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY LORROKI DIVISION Rural Area INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Exist.	Population New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Poro	Rural Centre	33	1	500,000	1,800,000	250	350	350	1,429	5,143
	Rural Institution	17	2	375,000	21,000	0	0			
	Rural Area	44	6	2,068,750	388,500	300	1896	316	1,091	205
	Non-domestic	0	0	0	0	0	0			
Angata Nanyukie	Rural Centre	31	1	1,175,000	283,500	0	583	583	2,015	486
	Rural Institution	11	3	562,500	31,500	0	0			
	Rural Area	37	3	1,550,000	304,500	0	1691	564	917	180
	Non-domestic	0	0	0	0	0	0			
Opiroi	Rural Centre	45	2	1,450,000	346,500	0	761	381	1,905	455
	Rural Institution	0	0	0	0	0	0			
	Rural Area	49	5	2,175,000	378,000	0	2866	573	759	132
	Non-domestic	1	1	187,500	10,500	0	0			
Loosuk	Rural Centre	48	2	2,850,000	672,000	0	494	247	5,769	1,360
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	51	4	2,637,500	693,000	0	2251	563	1,172	308
	Non-domestic	64	4	2,975,000	1,727,250	0	0			
Sukuta Marmar	Rural Centre	10	2	375,000	21,000	125	125	63	3,000	168
	Rural Institution	14	1	450,000	73,500	0	0			
	Rural Area	118	6	6,575,000	3,165,750	0	5562	927	1,182	569
	Non-domestic	200	12	11,475,000	5,008,500	0	0			
Kisima	Rural Centre	15	1	1,131,250	336,000	200	285	285	3,969	1,179
	Rural Institution	29	3	1,800,000	357,000	0	0			
	Rural Area	83	4	4,656,250	1,186,500	500	3568	892	1,305	333
	Non-domestic	103	6	5,737,500	2,504,250	0	0			
Lodokejek	Rural Centre	26	2	2,262,500	672,000	250	406	203	5,573	1,655
	Rural Institution	5	1	187,500	10,500	0	0			
	Rural Area	93	4	4,906,250	1,239,000	0	4613	1153	1,064	269
	Non-domestic	27	4	1,818,750	937,125	0	0			
Maralal	Rural Centre	0	0	0	0	0	0			
	Rural Institution	13	2	375,000	21,000	0	0			
	Rural Area	123	11	4,537,500	766,500	0	5088	463	892	151
	Non-domestic	0	0	0	0	0	0			
Total Rural Centre		208	11	9,743,750	4,131,000	825	3004	273	3,244	1,375
Total Rural Institution		91	14	4,125,000	535,500	0	0			
Total Rural Area		598	43	29,106,250	8,121,750	800	27535	640	1,057	295
Total Rural Domestic		897	68	42,975,000	12,788,250	1625	30539	449	1,407	419
Total Non-domestic		395	27	22,193,750	10,187,625	0	0			
LORROKI DIVISION	Total	1292	95	65,168,750	22,975,875	1625	30539	321	2,134	752

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY LORROKI DIVISION Rural Area INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Poro	Rural Centre	33	1	500,000	1,800,000	250	350	350	1,429	5,143
	Rural Institution	17	2	375,000	21,000	0	0			
	Rural Area	44	6	2,212,500	1,863,750	300	1896	316	1,167	983
	Non-domestic	0	0	0	0	0	0			
Angata Nanyukie	Rural Centre	31	1	1,275,000	1,811,250	0	583	583	2,187	3,107
	Rural Institution	11	3	562,500	31,500	0	0			
	Rural Area	37	3	1,650,000	1,832,250	0	1691	564	976	1,084
	Non-domestic	0	0	0	0	0	0			
Opiroi	Rural Centre	45	2	1,300,000	1,821,750	0	761	381	1,708	2,394
	Rural Institution	0	0	0	0	0	0			
	Rural Area	49	5	2,025,000	1,853,250	0	2866	573	707	647
	Non-domestic	1	1	187,500	10,500	0	0			
Loosuk	Rural Centre	48	1	1,555,000	2,300,000	0	494	494	3,148	4,656
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	51	4	2,925,000	3,643,500	0	2251	563	1,299	1,619
	Non-domestic	64	4	3,175,000	4,782,750	0	0			
Sukuta Marmar	Rural Centre	10	2	375,000	21,000	125	125	63	3,000	168
	Rural Institution	14	1	450,000	73,500	0	0			
	Rural Area	118	5	5,205,000	7,248,230	0	5562	1112	936	1,303
	Non-domestic	200	8	6,350,000	9,565,500	0	0			
Kisima	Rural Centre	15	1	1,093,750	1,563,240	200	285	285	3,838	5,485
	Rural Institution	29	3	1,650,000	1,832,250	0	0			
	Rural Area	83	4	4,556,250	6,500,970	500	3568	892	1,277	1,822
	Non-domestic	103	4	3,175,000	4,782,750	0	0			
Lodokejek	Rural Centre	26	2	2,187,500	3,126,480	250	406	203	5,388	7,701
	Rural Institution	5	1	187,500	10,500	0	0			
	Rural Area	93	4	4,556,250	6,500,970	0	4613	1153	988	1,409
	Non-domestic	27	3	1,593,750	2,153,865	0	0			
Maralal	Rural Centre	0	0	0	0	0	0			
	Rural Institution	13	2	375,000	21,000	0	0			
	Rural Area	123	11	4,237,500	3,717,000	0	5088	463	833	731
	Non-domestic	0	0	0	0	0	0			
Total	Rural Centre	208	10	8,286,250	12,443,720	825	3004	300	2,758	4,142
Total	Rural Institution	91	14	3,975,000	2,010,750	0	0			
Total	Rural Area	598	42	27,367,500	33,159,920	800	27535	656	994	1,204
Total	Rural Domestic	897	66	39,628,750	47,614,390	1625	30539	463	1,298	1,559
Total	Non-domestic	395	20	14,481,250	21,295,365	0	0			
LORROKI DIVISION	Total	1292	86	54,110,000	68,909,755	1625	30539	355	1,772	2,256

Summary per Location and Supply Area

SUMMARY WAMBA DIVISION Rural Area INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Ngilai	Rural Centre	15	3	562,500	31,500	0 /	369	123	1,526	85
	Rural Institution	28	4	1,987,500	367,500	0	0			
	Rural Area	96	14	3,725,000	2,337,250	0	5926	423	629	394
	Non-domestic	63	6	2,237,500	905,625	0	0			
Lodungokwe	Rural Centre	18	1	1,093,750	1,563,240	200	395	395	2,768	3,956
	Rural Institution	4	2	375,000	21,000	0	0			
	Rural Area	46	8	1,500,000	84,000	0	3435	429	437	24
	Non-domestic	2	0	0	0	0	0			
Wamba	Rural Centre	0	0	0	0	0	0			
	Rural Institution	1	1	187,500	10,500	0	0			
	Rural Area	39	7	1,312,500	73,500	0	2367	338	555	31
	Non-domestic	8	2	375,000	21,000	0	0			
Total	Rural Centre	33	4	1,656,250	1,594,740	200	764	191	2,168	2,088
Total	Rural Institution	33	7	2,550,000	399,000	0	0			
Total	Rural Area	181	29	6,537,500	2,494,750	0	11728	404	557	213
Total	Rural Domestic	247	40	10,743,750	4,488,490	200	12492	312	860	359
Total	Non-domestic	73	8	2,612,500	926,625	0	0			
WAMBA DIVISION	Total	320	48	13,356,250	5,415,115	200	12492	260	1,069	434

SUMMARY WAMBA DIVISION Rural Area INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Ngilai	Rural Centre	15	3	562,500	31,500	0	369	123	1,526	85
	Rural Institution	28	4	1,987,500	367,500	0	0			
	Rural Area	96	14	3,875,000	862,000	0	5926	423	654	145
	Non-domestic	63	6	2,237,500	905,625	0	0			
Lodungokwe	Rural Centre	18	1	1,131,250	336,000	200	395	395	2,863	850
	Rural Institution	4	2	375,000	21,000	0	0			
	Rural Area	46	8	1,500,000	84,000	0	3435	429	437	24
	Non-domestic	2	0	0	0	0	0			
Wamba	Rural Centre	0	0	0	0	0	0			
	Rural Institution	1	1	187,500	10,500	0	0			
	Rural Area	39	7	1,312,500	73,500	0	2367	338	555	31
	Non-domestic	8	2	375,000	21,000	0	0			
Total	Rural Centre	33	4	1,693,750	367,500	200	764	191	2,217	481
Total	Rural Institution	33	7	2,550,000	399,000	0	0			
Total	Rural Area	181	29	6,687,500	1,019,500	0	11728	404	570	87
Total	Rural Domestic	247	40	10,931,250	1,786,000	200	12492	312	875	143
Total	Non-domestic	73	8	2,612,500	926,625	0	0			
WAMBA DIVISION	Total	320	48	13,543,750	2,712,625	200	12492	260	1,084	217

Summary per Location and Supply Area

SUMMARY WAMBA DIVISION Rural Area INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Exist.	Population New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Ngilai	Rural Centre	15	3	562,500	31,500	0	369	123	1,526	85
	Rural Institution	28	4	1,656,250	1,594,740	0	0			
	Rural Area	96	14	3,725,000	2,337,250	0	5926	423	629	394
	Non-domestic	63	6	2,337,500	2,433,375	0	0			
Lodungokwe	Rural Centre	18	1	1,093,750	1,563,240	200	395	395	2,768	3,956
	Rural Institution	4	2	375,000	21,000	0	0			
	Rural Area	46	8	1,500,000	84,000	0	3435	429	437	24
	Non-domestic	2	0	0	0	0	0			
Wamba	Rural Centre	0	0	0	0	0	0			
	Rural Institution	1	1	187,500	10,500	0	0			
	Rural Area	39	7	1,312,500	73,500	0	2367	338	555	31
	Non-domestic	8	2	375,000	21,000	0	0			
Total	Rural Centre	33	4	1,656,250	1,594,740	200	764	191	2,168	2,088
Total	Rural Institution	33	7	2,218,750	1,626,240	0	0			
Total	Rural Area	181	29	6,537,500	2,494,750	0	11728	404	557	213
Total	Rural Domestic	247	40	10,412,500	5,715,730	200	12492	312	834	458
Total	Non-domestic	73	8	2,712,500	2,454,375	0	0			
WAMBA DIVISION	Total	320	48	13,125,000	8,170,105	200	12492	260	1,051	654

Investment Package

Appendix 4

Summary per Location and Supply Area

SUMMARY WASO DIVISION Rural Area INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Waso	Rural Centre	20	1	1,175,000	283,500	1165	292	292	4,021	970
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	32	7	1,312,500	73,500	350	2691	384	488	27
	Non-domestic	32	6	1,250,000	632,625	0	0			
Serolipi	Rural Centre	24	1	1,275,000	1,811,250	200	301	301	4,234	6,015
	Rural Institution	10	0	0	0	0	0			
	Rural Area	6	2	375,000	21,000	0	481	240	780	44
	Non-domestic	88	5	4,150,000	2,010,750	0	0			
Total	Rural Centre	44	2	2,450,000	2,094,750	1365	593	297	4,129	3,530
Total	Rural Institution	12	2	375,000	21,000	0	0			
Total	Rural Area	38	9	1,687,500	94,500	350	3172	352	532	30
Total	Rural Domestic	94	13	4,512,500	2,210,250	1715	3766	290	1,198	587
Total	Non-domestic	120	11	5,400,000	2,643,375	0	0			
WASO DIVISION	Total	214	24	9,912,500	4,853,625	1715	3766	157	2,632	1,289

SUMMARY WASO DIVISION Rural Area INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Waso	Rural Centre	20	1	1,175,000	283,500	1165	292	292	4,021	970
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	32	7	1,312,500	73,500	350	2691	384	488	27
	Non-domestic	32	6	1,250,000	632,625	0	0			
Serolipi	Rural Centre	24	1	1,131,250	336,000	200	301	301	3,757	1,116
	Rural Institution	10	1	1,131,250	336,000	0	0			
	Rural Area	6	2	375,000	21,000	0	481	240	780	44
	Non-domestic	88	5	4,150,000	2,010,750	0	0			
Total	Rural Centre	44	2	2,306,250	619,500	1365	593	297	3,887	1,044
Total	Rural Institution	12	3	1,506,250	357,000	0	0			
Total	Rural Area	38	9	1,687,500	94,500	350	3172	352	532	30
Total	Rural Domestic	94	14	5,500,000	1,071,000	1715	3766	269	1,461	284
Total	Non-domestic	120	11	5,400,000	2,643,375	0	0			
WASO DIVISION	Total	214	25	10,900,000	3,714,375	1715	3766	151	2,895	986

Investment Package

Summary per Location and Supply Area

SUMMARY WASO DIVISION Rural Area INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2

Location	Supply Area	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Population Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Waso	Rural Centre	20	1	1,093,750	1,563,240	1165	292	292	3,743	5,350
	Rural Institution	2	2	375,000	21,000	0	0			
	Rural Area	32	7	1,312,500	73,500	350	2691	384	488	27
	Non-domestic	32	6	1,250,000	632,625	0	0			
Serolipi	Rural Centre	24	1	1,275,000	1,811,250	200	301	301	4,234	6,015
	Rural Institution	10	0	0	0	0	0			
	Rural Area	6	2	375,000	21,000	0	481	240	780	44
	Non-domestic	88	5	4,268,750	6,345,990	0	0			
Total	Rural Centre	44	2	2,368,750	3,374,490	1365	593	297	3,992	5,687
Total	Rural Institution	12	2	375,000	21,000	0	0			
Total	Rural Area	38	9	1,687,500	94,500	350	3172	352	532	30
Total	Rural Domestic	94	13	4,431,250	3,489,990	1715	3766	290	1,177	927
Total	Non-domestic	120	11	5,518,750	6,978,615	0	0			
WASO DIVISION	Total	214	24	9,950,000	10,468,605	1715	3766	157	2,642	2,780

APPENDIX 5

INVESTMENT PACKAGES

SUMMARIES PER SUPPLY AREA AND SUPPLY TECHNOLOGIES

APPENDIX 5

INVESTMENT PACKAGES

SUMMARIES PER SUPPLY AREA AND SUPPLY TECHNOLOGIES

DEMAND YEAR 2003 - SCENARIO 2

1. Baragoi Division - IP 1B
2. Baragoi Division - IP 2B
3. Baragoi Division - IP 3B
4. Lorroki Division - IP 4B
5. Lorroki Division - IP 2B
6. Lorroki Division - IP 3B
7. Wamba Division - IP 1B
8. Wamba Division - IP 2B
9. Wamba Division - IP 3B
10. Waso Division - IP 1B
11. Waso Division - IP 2B
12. Waso Division - IP 3B

Investment Package

Appendix 5

Summary per Supply Area and Supply Technology

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	Est. Coverage Rural Pop. New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	COSTS/HEAD O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	7	1	187,500	10,500	250	0	0		
	Borehole with Handpump	12	1	450,000	73,500	250	94	94	4,787	782
	Borehole with Motorpump	10	1	1,093,750	1,563,240	100	99	99	11,048	15,790
		29	3	1,731,250	1,647,240	1445	193	64	8,970	8,535
Rural Institution	Dug Well with Handpump	26	8	1,500,000	84,000	-	-			
	Borehole with Motorpump	45	2	2,550,000	3,622,500	-	-			
		72	10	4,050,000	3,706,500	-	-			
Rural Area	Dug Well with Handpump	154	37	6,937,500	388,500	500	10152	274	683	38
	Dug Well with Windmill	103	4	4,700,000	1,134,000	0	6922	1731	679	164
	Borehole with Motorpump	32	1	1,275,000	1,811,250	0	1694	1694	753	1,069
		302	42	12,912,500	3,333,750	500	18768	447	688	178
Non-domestic	Dug Well with Handpump	26	4	750,000	42,000	-	-			
	Dug Well with Windmill	0	6	7,050,000	1,701,000	-	-			
	Borehole with Handpump	8	1	450,000	73,500	-	-			
	Borehole with Motorpump	0	1	1,275,000	1,811,250	-	-			
	Pan (5000 m3)	241	7	2,187,500	4,060,875	-	-			
		280	19	11,712,500	7,688,625	-	-			
Total	Dug Well with Handpump	213	50	9,375,000	525,000	750	10152	203	923	52
	Dug Well with Windmill	103	10	11,750,000	2,835,000	0	6922	692	1,697	410
	Borehole with Handpump	20	2	900,000	147,000	250	94	47	9,574	1,564
	Borehole with Motorpump	87	5	6,193,750	8,808,240	100	1793	359	3,454	4,913
	Pan (5000 m3)	241	7	2,187,500	4,060,875	-	-			
	Grand Total	683	74	30,406,250	16,376,115	1945	18961	256	1,604	864

Summary per Supply Area and Supply Technology

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	7	1	187,500	10,500	250	0	0		
	Borehole with Handpump	12	1	450,000	73,500	250	94	94	4,787	782
	Borehole with Windmill	10	1	1,131,250	336,000	100	99	99	11,427	3,394
		29	3	1,768,750	420,000	1445	193	64	9,165	2,176
Rural Institution	Dug Well with Handpump	26	8	1,500,000	84,000	-	-			
	Borehole with Windmill	45	2	2,556,250	672,000	-	-			
		72	10	4,056,250	756,000	-	-			
Rural Area	Dug Well with Handpump	154	37	6,937,500	388,500	500	10152	274	683	38
	Dug Well with Windmill	103	4	4,700,000	1,134,000	0	6922	1731	679	164
	Borehole with Windmill	32	1	1,425,000	336,000	0	1694	1694	841	198
		302	42	13,062,500	1,858,500	500	18768	447	696	99
Non-domestic	Dug Well with Handpump	26	4	750,000	42,000	-	-			
	Dug Well with Windmill	0	6	7,050,000	1,701,000	-	-			
	Borehole with Handpump	8	1	450,000	73,500	-	-			
	Borehole with Windmill	0	1	1,425,000	336,000	-	-			
	Pan (5000 m3)	241	7	2,187,500	4,060,875	-	-			
		280	19	11,862,500	6,213,375	-	-			
Total	Dug Well with Handpump	213	50	9,375,000	525,000	750	10152	203	923	52
	Dug Well with Windmill	103	10	11,750,000	2,835,000	0	6922	692	1,697	410
	Borehole with Handpump	20	2	900,000	147,000	250	94	47	9,574	1,564
	Borehole with Windmill	87	5	6,537,500	1,680,000	100	1793	359	3,646	937
	Pan (5000 m3)	241	7	2,187,500	4,060,875	-	-			
	Grand Total	683	74	30,750,000	9,247,875	1945	18961	256	1,622	488

Investment Package

Appendix 5

Summary per Supply Area and Supply Technology

SUMMARY BARAGOI DIVISION Rural Area INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	Est. Coverage Rural Pop. New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	COSTS/HEAD O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	7	1	187,500	10,500	250	0	0		
	Borehole with Handpump	12	1	450,000	73,500	250	94	94	4,787	782
	Borehole with Motorpump	10	1	1,093,750	1,563,240	100	99	99	11,048	15,790
		29	3	1,731,250	1,647,240	1445	193	64	8,970	8,535
Rural Institution	Dug Well with Handpump	26	8	1,500,000	84,000	-	-			
	Borehole with Motorpump	45	2	2,550,000	3,622,500	-	-			
		72	10	4,050,000	3,706,500	-	-			
Rural Area	Dug Well with Handpump	154	38	7,125,000	399,000	500	10152	267	702	39
	Borehole with Motorpump	135	4	4,918,750	6,996,990	0	8616	2154	571	812
		302	42	12,043,750	7,395,990	500	18768	447	642	394
Non-domestic	Dug Well with Handpump	26	4	750,000	42,000	-	-			
	Borehole with Motorpump	0	7	8,925,000	12,678,750	-	-			
	Borehole with Handpump	8	1	450,000	73,500	-	-			
	Pan (5000 m3)	241	7	2,187,500	4,060,875	-	-			
		280	19	12,312,500	16,855,125	-	-			
Total	Dug Well with Handpump	213	51	9,562,500	535,500	750	10152	199	942	53
	Borehole with Handpump	20	2	900,000	147,000	250	94	47	9,574	1,564
	Borehole with Motorpump	190	14	17,487,500	24,861,480	100	8715	623	2,007	2,853
	Pan (5000 m3)	241	7	2,187,500	4,060,875	-	-			
	Grand Total	683	74	30,137,500	29,604,855	1945	18961	256	1,589	1,561

Investment Package

Summary per Supply Area and Supply Technology

SUMMARY LORROKI DIVISION Rural Area INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	Est. Coverage Rural Pop. New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	COSTS/HEAD O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	10	2	375,000	21,000	125	125	63	3,000	168
	Dug Well with Windmill	31	1	1,175,000	283,500	0	583	583	2,015	486
	Borehole with Motorpump	124	5	6,111,250	8,800,970	450	1185	237	5,157	7,427
	Spring supply	10	1	25,000	10,500	0	761	761	33	14
	Dam,pumped supply	33	1	500,000	1,800,000	250	350	350	1,429	5,143
		208	10	8,186,250	10,915,970	825	3004	300	2,725	3,634
Rural Institution	Dug Well with Handpump	33	12	2,250,000	126,000	-	-			
	Borehole with Handpump	3	1	450,000	73,500	-	-			
	Borehole with Motorpump	26	1	1,275,000	1,811,250	-	-			
		91	14	3,975,000	2,010,750	-	-			
Rural Area	Dug Well with Handpump	196	23	4,312,500	241,500	0	9257	402	466	26
	Dug Well with Windmill	134	6	7,050,000	1,701,000	0	5673	946	1,243	300
	Borehole with Windmill	52	3	3,393,750	1,008,000	0	2416	805	1,405	417
	Borehole with Motorpump	216	10	12,848,750	18,353,240	800	10189	1019	1,261	1,801
		598	42	27,605,000	21,303,740	800	27535	656	1,003	774
Non-domestic	Dug Well with Handpump	8	2	375,000	21,000	-	-			
	Dug Well with Windmill	23	2	2,350,000	567,000	-	-			
	Borehole with Motorpump	0	7	8,743,750	12,430,740	-	-			
	Pan (5000 m3)	341	9	2,812,500	5,221,125	-	-			
		395	20	14,281,250	18,239,865	-	-			
Total	Dug Well with Handpump	247	39	7,312,500	409,500	125	9382	241	779	44
	Dug Well with Windmill	188	9	10,575,000	2,551,500	0	6256	695	1,690	408
	Borehole with Handpump	3	1	450,000	73,500	-	-			
	Borehole with Windmill	52	3	3,393,750	1,008,000	0	2416	805	1,405	417
	Borehole with Motorpump	366	23	28,978,750	41,396,200	1250	11374	495	2,548	3,640
	Spring supply	10	1	25,000	10,500	0	761	761	33	14
	Dam,pumped supply	33	1	500,000	1,800,000	250	350	350	1,429	5,143
	Pan (5000 m3)	341	9	2,812,500	5,221,125	-	-			
	Grand Total	1292	86	54,047,500	52,470,325	1625	30539	355	1,770	1,718

Investment Package

Appendix 5

Summary per Supply Area and Supply Technology

SUMMARY LORROKI DIVISION Rural Area INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	Est. Coverage Rural Pop. New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	COSTS/HEAD O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	10	2	375,000	21,000	125	125	63	3,000	168
	Dug Well with Windmill	31	1	1,175,000	283,500	0	583	583	2,015	486
	Borehole with Windmill	124	6	7,668,750	2,016,000	450	1185	198	6,472	1,701
	Spring supply	10	1	25,000	10,500	0	761	761	33	14
	Dam,pumped supply	33	1	500,000	1,800,000	250	350	350	1,429	5,143
		208	11	9,743,750	4,131,000	825	3004	273	3,244	1,375
Rural Institution	Dug Well with Handpump	33	12	2,250,000	126,000	-	-			
	Borehole with Handpump	3	1	450,000	73,500	-	-			
	Borehole with Windmill	26	1	1,425,000	336,000	-	-			
		91	14	4,125,000	535,500	-	-			
Rural Area	Dug Well with Handpump	196	23	4,312,500	241,500	0	9257	402	466	26
	Dug Well with Windmill	134	6	7,050,000	1,701,000	0	5673	946	1,243	300
	Borehole with Windmill	268	14	17,743,750	6,179,250	800	12605	805	1,405	417
		598	43	29,106,250	8,121,750	800	27535	640	1,057	295
Non-domestic	Dug Well with Handpump	13	3	562,500	31,500	-	-			
	Dug Well with Windmill	23	2	2,350,000	567,000	-	-			
	Borehole with Windmill	0	13	16,468,750	4,368,000	-	-			
	Pan (5000 m3)	341	9	2,812,500	5,221,125	-	-			
		395	27	22,193,750	10,187,625	-	-			
Total	Dug Well with Handpump	252	40	7,500,000	420,000	125	9382	235	799	45
	Dug Well with Windmill	188	9	10,575,000	2,551,500	0	6256	695	1,690	408
	Borehole with Handpump	3	1	450,000	73,500	-	-			
	Borehole with Windmill	418	34	43,306,250	12,899,250	1250	13790	406	3,140	935
	Spring supply	10	1	25,000	10,500	0	761	761	33	14
	Dam,pumped supply	33	1	500,000	1,800,000	250	350	350	1,429	5,143
	Pan (5000 m3)	341	9	2,812,500	5,221,125	-	-			
	Grand Total	1292	95	65,168,750	22,975,875	1625	30539	321	2,134	752

Investment Package

Summary per Supply Area and Supply Technology

SUMMARY LORROKI DIVISION Rural Area INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	Est. Coverage Rural Pop. New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	COSTS/HEAD O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	10	2	375,000	21,000	125	125	63	3,000	168
	Borehole with Motorpump	155	6	7,386,250	10,612,220	450	1768	295	4,178	6,002
	Spring supply	10	1	25,000	10,500	0	761	761	33	14
	Dam,pumped supply	33	1	500,000	1,800,000	250	350	350	1,429	5,143
		208	10	8,286,250	12,443,720	825	3004	300	2,758	4,142
Rural Institution	Dug Well with Handpump	33	12	2,250,000	126,000	-	-			
	Borehole with Handpump	3	1	450,000	73,500	-	-			
	Borehole with Motorpump	26	1	1,275,000	1,811,250	-	-			
		91	14	3,975,000	2,010,750	-	-			
Rural Area	Dug Well with Handpump	196	23	4,312,500	241,500	0	9257	402	466	26
	Borehole with Motorpump	402	19	23,055,000	32,918,420	800	18278	946	1,221	1,741
		598	42	27,367,500	33,159,920	800	27535	656	994	1,204
Non-domestic	Dug Well with Handpump	8	2	375,000	21,000	-	-			
	Borehole with Motorpump	23	9	11,293,750	16,053,240	-	-			
	Pan (5000 m3)	341	9	2,812,500	5,221,125	-	-			
		395	20	14,481,250	21,295,365	-	-			
Total	Dug Well with Handpump	247	39	7,312,500	409,500	125	9382	241	779	44
	Borehole with Handpump	3	1	450,000	73,500	-	-			
	Borehole with Motorpump	606	35	43,010,000	61,395,130	1250	20046	573	2,146	3,063
	Spring supply	10	1	25,000	10,500	0	761	761	33	14
	Dam,pumped supply	33	1	500,000	1,800,000	250	350	350	1,429	5,143
	Pan (5000 m3)	341	9	2,812,500	5,221,125	-	-			
	Grand Total	1292	86	54,110,000	68,909,755	1625	30539	355	1,772	2,256

Investment Package

Appendix 5

Summary per Supply Area and Supply Technology

SUMMARY WAMBA DIVISION Rural Area INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	Coverage Rural Pop. New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	COSTS/HEAD O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	15	3	562,500	31,500	0	369	123	1,526	85
	Borehole with Motorpump	18	1	1,093,750	1,563,240	200	395	395	2,768	3,956
		33	4	1,656,250	1,594,740	200	764	191	2,168	2,088
Rural Institution	Dug Well with Handpump	7	6	1,125,000	63,000	-	-			
	Borehole with Windmill	24	1	1,425,000	336,000	-	-			
		33	7	2,550,000	399,000	-	-			
Rural Area	Dug Well with Handpump	156	27	5,062,500	283,500	0	10151	376	499	28
	Borehole with Motorpump	25	1	1,275,000	1,811,250	0	1577	1577	808	1,149
	Spring Supply	0	1	200,000	400,000	0	0	0		
		181	29	6,537,500	2,494,750	0	11728	404	557	213
Non-domestic	Dug Well with Handpump	29	6	1,125,000	63,000	-	-			
	Dug Well with Windmill	42	1	1,175,000	283,500	-	-			
	Pan (5000 m3)	0	1	312,500	580,125	-	-			
		73	8	2,612,500	926,625	-	-			
Total	Dug Well with Handpump	207	42	7,875,000	441,000	0	10519	250	749	42
	Dug Well with Windmill	42	1	1,175,000	283,500	-	-			
	Borehole with Windmill	24	1	1,425,000	336,000	-	-			
	Borehole with Motorpump	43	2	2,368,750	3,374,490	200	1972	986	1,201	1,711
	Spring Supply	0	1	200,000	400,000	0	0	0		
	Pan (5000 m3)	0	1	312,500	580,125	-	-			
	Grand Total	320	48	13,356,250	5,415,115	200	12492	260	1,069	434

Summary per Supply Area and Supply Technology

SUMMARY WAMBA DIVISION Rural Area INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	15	3	562,500	31,500	0	369	123	1,526	85
	Borehole with Windmill	18	1	1,131,250	336,000	200	395	395	2,863	850
		33	4	1,693,750	367,500	200	763.84	191	2,217	481
Rural Institution	Dug Well with Handpump	7	6	1,125,000	63,000	-	-			
	Borehole with Windmill	24	1	1,425,000	336,000	-	-			
		33	7	2,550,000	399,000	-	-			
Rural Area	Dug Well with Handpump	156	27	5,062,500	283,500	0	10151	376	499	28
	Borehole with Windmill	25	1	1,425,000	336,000	0	1577	1577	904	213
	Spring Supply	0	1	200,000	400,000	0	0	0		
		181	29	6,687,500	1,019,500	0	11728	404	570	87
Non-domestic	Dug Well with Handpump	29	6	1,125,000	63,000	-	-			
	Dug Well with Windmill	42	1	1,175,000	283,500	-	-			
	Pan (5000 m3)	0	1	312,500	580,125	-	-			
		73	8	2,612,500	926,625	-	-			
Total	Dug Well with Handpump	207	42	7,875,000	441,000	0	10519	250	749	42
	Dug Well with Windmill	42	1	1,175,000	283,500	-	-			
	Borehole with Windmill	67	3	3,981,250	1,008,000	200	1972	657	2,019	511
	Spring Supply	0	1	200,000	400,000	0	0			
	Pan (5000 m3)	0	1	312,500	580,125	-	-			
	Grand Total	320	48	13,543,750	2,712,625	200	12492	260	1,084	217

Investment Package

Appendix 5

Summary per Supply Area and Supply Technology

SUMMARY WAMBA DIVISION Rural Area INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	Est. Coverage Rural Pop. New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	COSTS/HEAD O & M (Shs/Cap)
Rural Centre	Dug Well with Handpump	15	3	562,500	31,500	0	369	123	1,526	85
	Borehole with Motorpump	18	1	1,093,750	1,563,240	200	395	395	2,768	3,956
		33	4	1,656,250	1,594,740	200	763.84	191	2,168	2,088
Rural Institution	Dug Well with Handpump	7	6	1,125,000	63,000	-	-			
	Borehole with Motorpump	24	1	1,093,750	1,563,240	-	-			
		33	7	2,218,750	1,626,240	-	-			
Rural Area	Dug Well with Handpump	156	27	5,062,500	283,500	0	10151	376	499	28
	Borehole with Motorpump	25	1	1,275,000	1,811,250	0	1577	1577	808	1,149
	Spring Supply	0	1	200,000	400,000	0	0	0		
		181	29	6,537,500	2,494,750	0	11728	404	557	213
Non-domestic	Dug Well with Handpump	29	6	1,125,000	63,000	-	-			
	Borehole with Motorpump	42	1	1,275,000	1,811,250	-	-			
	Pan (5000 m3)	0	1	312,500	580,125	-	-			
		73	8	2,712,500	2,454,375	-	-			
Total	Dug Well with Handpump	207	42	7,875,000	441,000	0	10519	250	749	42
	Borehole with Motorpump	109	4	4,737,500	6,748,980	200	1972	493	2,402	3,422
	Spring Supply	0	1	200,000	400,000	0	0	0		
	Pan (5000 m3)	0	1	312,500	580,125	-	-			
	Grand Total	320	48	13,125,000	8,170,105	200	12492	260	1,051	654

Investment Package

Appendix 5

Summary per Supply Area and Supply Technology

SUMMARY WASO DIVISION Rural Area INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Rural Centre	Dug Well with Windmill	20	1	1,175,000	283,500	0	292	292	4,021	970
	Borehole with Motorpump	24	1	1,275,000	1,811,250	200	301	301	4,234	6,015
		44	2	2,450,000	2,094,750	1365	593	297	4,129	3,530
Rural Institution	Dug Well with Handpump	2	2	375,000	21,000	-	-			
		12	2	375,000	21,000	-	-			
Rural Area	Dug Well with Handpump	38	9	1,687,500	94,500	0	2803	311	602	34
		38	9	1,687,500	94,500	350	3172	352	532	30
Non-domestic	Dug Well with Handpump	32	5	937,500	52,500	-	-			
	Dug Well with Windmill	88	3	3,525,000	850,500	-	-			
	Pan (5000 m3)	0	3	937,500	1,740,375	-	-			
		120	11	5,400,000	2,643,375	-	-			
Total	Dug Well with Handpump	72	16	3,000,000	168,000	0	2803	175	1,070	60
	Dug Well with Windmill	108	4	4,700,000	1,134,000	0	292	73	16,084	3,881
	Borehole with Motorpump	24	1	1,275,000	1,811,250	200	301	301	4,234	6,015
	Pan (5000 m3)	0	3	937,500	1,740,375	-	-			
	Grand Total	214	24	9,912,500	4,853,625	1715	3766	157	2,632	1,289

Investment Package

Appendix 5

Summary per Supply Area and Supply Technology

SUMMARY WASO DIVISION Rural Area INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	Est. Coverage Rural Pop. New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	COSTS/HEAD O & M (Shs/Cap)
Rural Centre	Dug Well with Windmill	20	1	1,175,000	283,500	0	292	292	4,021	970
	Borehole with Windmill	24	1	1,131,250	336,000	200	301	301	3,757	1,116
		44	2	2,306,250	619,500	1365	593	297	3,887	1,044
Rural Institution	Dug Well with Handpump	2	2	375,000	21,000	-	-			
	Borehole with Windmill	9	1	1,131,250	336,000					
		12	3	1,506,250	357,000	-	-			
Rural Area	Dug Well with Handpump	38	9	1,687,500	94,500	0	2803	311	602	34
		38	9	1,687,500	94,500	350	3172	352	532	30
Non-domestic	Dug Well with Handpump	32	5	937,500	52,500	-	-			
	Dug Well with Windmill	88	3	3,525,000	850,500	-	-			
	Pan (5000 m3)	0	3	937,500	1,740,375	-	-			
		120	11	5,400,000	2,643,375	-	-			
Total	Dug Well with Handpump	72	16	3,000,000	168,000	0	2803	175	1,070	60
	Dug Well with Windmill	108	4	4,700,000	1,134,000	0	292	73	16,084	3,881
	Borehole with Windmill	33	2	2,262,500	672,000	200	301	151	7,514	2,232
	Pan (5000 m3)	0	3	937,500	1,740,375	-	-			
	Grand Total	214	25	10,900,000	3,714,375	1715	3766	151	2,895	986

Investment Package

Summary per Supply Area and Supply Technology

SUMMARY WASO DIVISION Rural Area INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2

Supply Area	Supply Technology	Supply Dev. (m3/day)	Number of Units	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Est. Coverage Rural Pop. Exist.	New	People/ Unit	COSTS/HEAD CAPITAL (Shs/Cap)	O & M (Shs/Cap)
Rural Centre	Borehole with Motorpump	44	2	2,368,750	3,374,490	200	593	297	3,992	5,687
		44	2	2,368,750	3,374,490	1365	593	297	3,992	5,687
Rural Institution	Dug Well with Handpump	2	2	375,000	21,000	-	-			
		12	2	375,000	21,000	-	-			
Rural Area	Dug Well with Handpump	38	9	1,687,500	94,500	0	2803	311	602	34
		38	9	1,687,500	94,500	350	3172	352	532	30
Non-domestic	Dug Well with Handpump	32	5	937,500	52,500	-	-			
	Borehole with Motorpump	88	3	3,643,750	5,185,740	-	-			
	Pan (5000 m3)	0	3	937,500	1,740,375	-	-			
		120	11	5,518,750	6,978,615	-	-			
Total	Dug Well with Handpump	72	16	3,000,000	168,000	0	2803	175	1,070	60
	Borehole with Motorpump	132	5	6,012,500	8,560,230	200	593	119	10,133	14,427
	Pan (5000 m3)	0	3	937,500	1,740,375	-	-			
	Grand Total	214	24	9,950,000	10,468,605	1715	3766	157	2,642	2,780

APPENDIX 6

INVESTMENT PACKAGE 1A

APPENDIX 6

INVESTMENT PACKAGE 1A

1. Baragoi Division - IP 1A - Demand 1993, Scenario 3
2. Baragoi Division - IP 1A - Demand 2002, Scenario 3

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Nyiro	South Horr	Rural Centre	39	39	0	-		0	0	735	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	15	-	15	2	Dug Well with Handpump	375,000	21,000		1057
		Non-domestic	11	11	0	-		0	0		
Nyiro	Tuum	Rural Centre	13	13	0	-		0	0	250	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		281
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		580
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	7	-	7	1	Dug Well with Handpump	187,500	10,500		578
		Non-domestic	27	0	27	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		1030
		Non-domestic	39	0	39	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	31	-	31	1	Dug Well with Windmill	1,175,000	283,500		2717
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	7	0	7	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	23	-	23	1	Borehole with Motorpump	1,275,000	1,811,250		1610
						1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ndoto	Lesirikan	Rural Centre	14	14	0	-		0	0	250	44
		Rural Institution	16	-	16	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	41	-	41	2	Dug Well with Windmill	2,350,000	567,000		2649
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	43	0	43	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		219
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		350
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	9	0	1	Dug Well with Handpump	187,500	10,500	400	140
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	9	-	9	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	14	-	14	1	Dug Well with Windmill	1,175,000	283,500		1218
		Non-domestic	29	0	29	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		911
		Non-domestic	6	-	6	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	-		0	0		
		Non-domestic	1	-	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Marti	Kalele	Rural Centre	-	-	0	-					
		Rural Institution	13	-	13	1	Borehole with Motorpump	0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	1,275,000	1,811,250		
		Non-domestic	30	0	30	1	Pan (5000 m3)	375,000	21,000		848
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Marti	Lokorkor	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	-	9	2	Dug Well with Handpump	0	0		
		Non-domestic	25	0	25	1	Pan (5000 m3)	375,000	21,000		825
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Marti	Moru-Akiring	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	0	0		
		Non-domestic	0	-	0	-		375,000	21,000		831
								0	0		
Elbarta	Marti	Rural Centre	12	10	2	-					
		Rural Institution	-	-	-	-		0	0	163	
		Rural Area	11	-	11	2	Dug Well with Handpump	0	0		
		Non-domestic	31	0	31	1	Pan (5000 m3)	375,000	21,000	100	754
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Elbarta	Ngilai	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		384
								187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	0	0		
		Non-domestic	5	-	5	1	Dug Well with Handpump	375,000	21,000		796
								187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	377	85	292	43		15,275,000	6,945,750	1898	17822
		Total Non-domestic	280	20	260	19		11,712,500	7,688,625	0	0
		Total	657	105	552	62		26,987,500	14,634,375	1898	17822

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Nyiro	South Horr	Rural Centre	47	47	0	-		0	0	727	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	15	-	15	3	Dug Well with Handpump	562,500	31,500		964
		Non-domestic	11	11	0	-		0	0		
Nyiro	Tuum	Rural Centre	15	15	0	-		0	0	220	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		281
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		525
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	8	-	8	2	Dug Well with Handpump	375,000	21,000		523
		Non-domestic	27	0	27	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		932
		Non-domestic	39	0	39	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-			0		
		Rural Area	32	-	32	1	Dug Well with Windmill	1,175,000	0		2457
						2	Dug Well with Handpump	375,000	0		
		Non-domestic	7	0	7	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	27	-	27	1	Borehole with Motorpump	1,275,000	1,811,250		1456
						1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Ndoto	Lesirikan	Rural Centre	18	15	3	-		0	0	250	46
		Rural Institution	20	-	20	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	43	-	43	2	Dug Well with Windmill	2,350,000	567,000		2394
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	43	0	43	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		198
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		317
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	11	-2	1	Dug Well with Handpump	187,500	10,500	400	88
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	11	-	11	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	15	-	15	1	Dug Well with Windmill	1,175,000	283,500		1102
		Non-domestic	29	0	29	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		824
		Non-domestic	6	0	6	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	-		0	0		
		Non-domestic	1	0	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-		0	0		
		Rural Institution	14	-	14	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		767
		Non-domestic	30	0	30	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		746
		Non-domestic	25	0	25	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		752
		Non-domestic	0	0	0	-		0	0		
Elbarta	Marti	Rural Centre	14	10	4	1	Dug Well with Handpump	187,500	10,500	100	61
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000	100	684
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		347
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		720
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	414	98	316	47		16,025,000	6,683,250	1797	16184
		Total Non-domestic	280	20	260	19		11,712,500	7,688,625	0	0
		Total	694	118	576	66		27,737,500	14,371,875	1797	16184

APPENDIX 7

INVESTMENT PACKAGE 1B

APPENDIX 7

INVESTMENT PACKAGE 1B

1. Baragoi Division - IP 1B - Demand 1993, Scenario 2
2. Baragoi Division - IP 1B - Demand 2003, Scenario 2

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Nyiro	South Horr	Rural Centre	45	45	0	-		0	0	772	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		1112
		Non-domestic	11	11	0	-		0	0		
Nyiro	Tuum	Rural Centre	13	13	0	-		0	0	250	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		309
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		610
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	8	-	8	2	Dug Well with Handpump	375,000	21,000		608
		Non-domestic	28	0	28	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		1083
		Non-domestic	40	0	40	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	33	-	33	1	Dug Well with Windmill	1,175,000	283,500		2857
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	7	0	7	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	27	-	27	1	Borehole with Motorpump	1,275,000	1,811,250		1694
						1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ndoto	Lesirikan	Rural Centre	15	15	0	-		0	0	250	60
		Rural Institution	18	-	18	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	43	-	43	2	Dug Well with Windmill	2,350,000	567,000		2786
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	44	0	44	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		230
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		368
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	9	0	1	Dug Well with Handpump	187,500	10,500	400	168
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	10	-	10	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	15	-	15	1	Dug Well with Windmill	1,175,000	283,500		1281
		Non-domestic	30	0	30	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		958
		Non-domestic	6	-	6	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	-		0	0		
		Non-domestic	1	-	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-		0	0		
		Rural Institution	15	-	15	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		892
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		867
		Non-domestic	26	0	26	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		874
		Non-domestic	0	-	0	-		0	0		
Elbarta	Marti	Rural Centre	12	10	2	-		0	0	170	
		Rural Institution	-	-	-	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000	100	800
		Non-domestic	32	0	32	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		404
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		837
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	406	92	314	45		15,650,000	6,966,750	1942	18798
		Total Non-domestic	287	20	267	19		11,712,500	7,688,625	0	0
		Total	693	112	581	64		27,362,500	14,655,375	1942	18798

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Nyiro	South Horr	Rural Centre	60	60	0	-		0	0	845	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	18	-	18	3	Dug Well with Handpump	562,500	31,500		1120
		Non-domestic	12	12	0	-		0	0		
Nyiro	Tuum	Rural Centre	23	16	7	1	Dug Well with Handpump	187,500	10,500	250	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		333
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	7	-	7	2	Dug Well with Handpump	375,000	21,000		610
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		608
		Non-domestic	29	0	29	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	3	Dug Well with Handpump	562,500	31,500		1083
		Non-domestic	42	0	42	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-			0		
		Rural Area	37	-	37	1	Dug Well with Windmill	1,175,000	283,500		2857
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	8	0	8	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	32	-	32	1	Borehole with Motorpump	1,275,000	1,811,250		1694
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Ndoto	Lesirikan	Rural Centre	27	15	12	1	Borehole with Handpump	450,000	73,500	250	94
		Rural Institution	29	-	29	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	49	-	49	2	Dug Well with Windmill	2,350,000	567,000		2784
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	46	0	46	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Arsim	Illaut	Rural Centre	-	-	0	-					
		Rural Institution	5	-	5	1	Dug Well with Handpump	0	0		
		Rural Area	15	-	15	3	Dug Well with Handpump	187,500	10,500		
		Non-domestic	3	0	3	-		562,500	31,500		230
								0	0		
Arsim	Arsim	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	0	0		
		Non-domestic	9	0	9	1	Dug Well with Handpump	375,000	21,000		368
								187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	11	0	1	Dug Well with Handpump	0	0		
		Non-domestic	9	9	0	-		187,500	10,500	400	168
								0	0		
Nachola	Nachola	Rural Centre	-	-	0	-					
		Rural Institution	16	-	16	2	Dug Well with Handpump	0	0		
		Rural Area	17	-	17	1	Dug Well with Windmill	375,000	21,000		
		Non-domestic	31	0	31	1	Pan (5000 m3)	1,175,000	283,500		1281
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Nachola	Terter	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	0	0		
		Non-domestic	7	0	7	1	Dug Well with Handpump	375,000	21,000		958
								187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	13	-	13	-		0	0		
		Non-domestic	1	0	1	-		0	0		
								0	0		
Marti	Kalele	Rural Centre	-	-	0	-					
		Rural Institution	16	-	16	1	Borehole with Motorpump	0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	1,275,000	1,811,250		
		Non-domestic	32	0	32	1	Pan (5000 m3)	375,000	21,000		892
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		867
		Non-domestic	27	0	27	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		874
		Non-domestic	0	0	0	-		0	0		
Elbarta	Marti	Rural Centre	20	10	10	1	Borehole with Motorpump	1,093,750	1,563,240	100	99
		Rural Institution	-	-	0	-		0	0		
		Rural Area	14	-	14	2	Dug Well with Handpump	375,000	21,000	100	800
		Non-domestic	34	0	34	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		404
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	14	-	14	3	Dug Well with Handpump	562,500	31,500		837
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	515	112	403	55		18,693,750	8,687,490	1945	18961
		Total Non-domestic	301	21	280	19		11,712,500	7,688,625	0	0
		Total	816	133	683	74		30,406,250	16,376,115	1945	18961

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Poro	Siambu	Rural Centre	33	?	33	1	Dam,pumped supply (in constr.)	500,000	1,800,000	250	350
		Rural Institution	-	-	0	-		0	0		
		Rural Area	8	-	8	2	Dug Well with Handpump	375,000	21,000		530
		Non-domestic	-	-	0	-		0	0		
Poro	Seketet	Rural Centre	-	-	0	-					
		Rural Institution	2	-	2	1	Dug Well with Handpump	0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	187,500	10,500		
		Non-domestic	32	32	0	-		375,000	21,000		457
								0	0		
Poro	Sirata Oirobi	Rural Centre	-	-	0	-					
		Rural Institution	14	-	14	-		0	0		
		Rural Area	30	10	20	1	Borehole with Motorpump	0	0		
		Non-domestic	25	25	0	-		1,275,000	1,811,250	300	615
								0	0		
Poro	Nkejemueny	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	20	20	0	-		187,500	10,500		294
								0	0		
Angata Nanyukie	Angata Nanyukie	Rural Centre	-	-	0	-					
		Rural Institution	10	-	10	2	Dug Well with Handpump	0	0		
		Rural Area	27	-	27	1	Dug Well with Windmill	375,000	21,000		
		Non-domestic	3	3	0	-		1,175,000	283,500		1171
								0	0		
Angata Nanyukie	Loibashai	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	10	10	0	-		187,500	10,500		304
								0	0		
Angata Nanyukie	Barsaloi	Rural Centre	31	-	31	1	Dug Well with Windmill	1,175,000	283,500		583
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		216
		Non-domestic	5	5	0	-		0	0		
Opiroi	Opiroi	Rural Centre	45	-	10	1	Spring supply	25,000	10,500		761
				-	35	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	29	-	29	1	Borehole with Motorpump	1,275,000	1,811,250		1546
		Non-domestic	-	0	0	-		0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Opiroi	Mabati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	375,000	21,000		434
		Non-domestic	-	0	0	-		0	0		
Opiroi	Mbukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		886
		Non-domestic	1	0	1	1	Dug Well with Handpump	187,500	10,500		
Loosuk	Malaso	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		718
		Non-domestic	57	25	32	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Loosuk	Tinga	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	19	-	19	1	Borehole with Motorpump	1,275,000	1,811,250		1094
		Non-domestic	48	25	23	1	Dug Well with Windmill	1,175,000	283,500		
						1	Pan (5000 m3)	312,500	580,125		
Loosuk	Loosuk	Rural Centre	48	-	48	1	Borehole with Motorpump	1,555,000	2,300,000		494
		Rural Institution	-	-	0	-		0	0		
		Rural Area	19	-	19	1	Borehole with Motorpump	1,275,000	1,811,250		439
		Non-domestic	59	50	9	-		0	0		
Maralal	Ledero	Rural Centre	-	-	0	-		0	0		
		Rural Institution	8	-	8	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	35	-	35	5	Dug Well with Handpump	937,500	52,500		1258
		Non-domestic	-	0	0	-		0	0		
Maralal	Township	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	44	-	44	2	Dug Well with Handpump	375,000	21,000		1841
						1	Borehole with Motorpump	1,275,000	1,811,250		
		Non-domestic	-	0	0	-		0	0		
Maralal	Lpartuk	Rural Centre	-	-	0	-		0	0		
		Rural Institution	5	-	5	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	44	-	44	2	Dug Well with Handpump	375,000	21,000		1989
						1	Borehole with Motorpump	1,275,000	1,811,250		
		Non-domestic	-	0	0	-		0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Sukuta Marmar	Lolmolok	Rural Centre	-	-	0	-					
		Rural Institution	3	-	3	1	Borehole with Handpump	0	0		
		Rural Area	30	-	30	1	Borehole with Motorpump	450,000	73,500		
		Non-domestic	85	25	60	1	Pan (5000 m3)	1,275,000	1,811,250		1488
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Sukuta Marmar	Amaiya	Rural Centre	20	10	10	2	Dug Well with Handpump	375,000	21,000	125	125
		Rural Institution	-	-	0	-					
		Rural Area	6	-	6	1	Dug Well with Handpump	0	0		
		Non-domestic	-	0	0	-		187,500	10,500		330
								0	0		
Sukuta Marmar	Longewan	Rural Centre	-	-	0	-					
		Rural Institution	9	-	9	-		0	0		
		Rural Area	12	-	12	1	Borehole with Windmill	0	0		
		Non-domestic	70	25	45	1	Pan (5000 m3)	1,131,250	336,000		512
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Sukuta Marmar	Logorate	Rural Centre	-	-	0	-					
		Rural Institution	2	-	2	-		0	0		
		Rural Area	21	-	21	1	Borehole with Windmill	0	0		
		Non-domestic	66	25	41	1	Pan (5000 m3)	1,131,250	336,000		977
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Sukuta Marmar	Sukuta Marmar	Rural Centre	-	-	0						
		Rural Institution	-	-	0			0	0		
		Rural Area	49	-	49	1	Borehole with Motorpump	0	0		
		Non-domestic	94	40	54	1	Pan (5000 m3)	1,555,000	2,300,000		2255
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Kisima	Nauneri	Rural Centre	-	-	0						
		Rural Institution	2	-	2	1	Dug Well with Handpump	0	0		
		Rural Area	31	-	31	1	Dug Well with Windmill	187,500	10,500		
		Non-domestic	67	25	42	1	Pan (5000 m3)	1,175,000	283,500		836
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Kisima	Lmisigiyoi	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	14	-	14	1	Dug Well with Windmill	187,500	10,500		
		Non-domestic	26	26	0	-		1,175,000	283,500		644
								0	0		
Kisima	Lkilorit	Rural Centre	-	-	0	-					
		Rural Institution	26	-	26	1	Borehole with Motorpump	0	0		
		Rural Area	36	20	16	1	Borehole with Motorpump	1,275,000	1,811,250		
		Non-domestic	49	40	9	-		1,093,750	1,563,240	500	1104
								0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Kisima	Mbaringon	Rural Centre	20	5	15	1	Borehole with Motorpump	1,093,750	1,563,240	200	285
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	1	Dug Well with Windmill	1,175,000	283,500		984
		Non-domestic	92	40	52	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Lodokejek	Moru	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	21	-	21	1	Dug Well with Windmill	1,175,000	283,500		1068
		Non-domestic	7	0	7	1	Dug Well with Handpump	187,500	10,500		
Lodokejek	Nonkeek	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	19	-	19	1	Dug Well with Windmill	1,175,000	283,500		970
		Non-domestic	-	0	0	-		0	0		
Lodokejek	Lodokejek	Rural Centre	11	-	11	1	Borehole with Motorpump	1,093,750	1,563,240		200
		Rural Institution	2	-	2	-		0	0		
		Rural Area	34	-	34	1	Borehole with Motorpump	1,275,000	1,811,250		1648
		Non-domestic	55	40	15	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,093,750	1,563,240		
Lodokejek	Kirimun	Rural Centre	35	20	15	1	Borehole with Motorpump	1,093,750	1,563,240	250	206
		Rural Institution	2	-	2	-		0	0		
		Rural Area	19	-	19	1	Borehole with Windmill	1,131,250	336,000		927
		Non-domestic	55	50	5	-		0	0		
LORROKI DIVISION		Total Rural Supply	962	65	897	66		39,766,250	34,230,460	1625	30539
		Total Non-domestic	926	531	395	20		14,281,250	18,239,865	0	0
		Total	1888	596	1292	86		54,047,500	52,470,325	1625	30539

WAMBA DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ngilai	Swari	Rural Centre	-	-	0	-		0	0		
		Rural Institution	24	-	24	1	Borehole with Windmill	1,425,000	336,000		
		Rural Area	25	-	25	1	Borehole with Motorpump	1,275,000	1,811,250		1577
		Non-domestic	3	-	3	1	Dug Well with Handpump	187,500	10,500		
Ngilai	Ngare narok	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	4	Dug Well with Handpump	750,000	42,000		1476
		Non-domestic	42	-	42	1	Dug Well with Windmill	1,175,000	283,500		
						1	Pan (5000 m3)	312,500	580,125		
Ngilai	Ngilai	Rural Centre	15	-	15	3	Dug Well with Handpump	562,500	31,500		369
		Rural Institution	2	-	2	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	22	-	22	3	Dug Well with Handpump	562,500	31,500		1307
						1	Spring Supply	200,000	400,000		
		Non-domestic	8	-	8	1	Dug Well with Handpump	187,500	10,500		
Ngilai	Lkisin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		700
		Non-domestic	-	-	0	-		0	0		
Ngilai	Ngogoltin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	15	-	15	3	Dug Well with Handpump	562,500	31,500		866
		Non-domestic	10	-	10	2	Dug Well with Handpump	375,000	21,000		
Lodungokwe	Nkaroni	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		492
		Non-domestic	-	-	0	-		0	0		
Lodungokwe	Lpus	Rural Centre	28	10	18	1	Borehole with Motorpump	1,093,750	1,563,240	200	395
		Rural Institution	2	-	2	-		0	0		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		789
		Non-domestic	-	-	0	-		0	0		
Lodungokwe	Litrimin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	20	-	20	3	Dug Well with Handpump	562,500	31,500		1333
		Non-domestic	-	-	0	-		0	0		

WAMBA DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Lodungokwe	Sesia	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		821
		Non-domestic	2	-	2	-		0	0		
Wamba	Matakwen	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		325
		Non-domestic	8	-	8	2	Dug Well with Handpump	375,000	21,000		
Wamba	Kolting	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		853
		Non-domestic	-	-	0	-		0	0		
Wamba	Wamba	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	4	Dug Well with Handpump	750,000	42,000		1189
		Non-domestic	-	-	0	-		0	0		
WAMBA DIVISION		Total Rural Supply	257	10	247	40		10,743,750	4,488,490	200	12492
		Total Non-domestic	73	0	73	8		2,612,500	926,625	0	0
		Total	330	10	320	48		13,356,250	5,415,115	200	12492

WASO DIVISION — Rural Area — INVESTMENT PACKAGE 1B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 1

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Waso	Lerata	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	5	5	0	-		187,500	10,500		
		Non-domestic	-	-	0	-		0	0	350	369
								0	0		
Waso	Lengusaka	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	0	0		
		Non-domestic	10	-	10	2	Dug Well with Handpump	375,000	21,000		498
								375,000	21,000		
Waso	Remote	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	0	0		
		Non-domestic	4	4	0	-		187,500	10,500		319
								0	0		
Waso	Ngutuk Ongiron	Rural Centre	20	-	20	1	Dug Well with Windmill	1,175,000	283,500		292
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		477
		Non-domestic	23	23	0	-		0	0		
Waso	Archer's Post	Rural Centre	98	98	0	-					
		Rural Institution	33	33	0	-		0	0	1165	0
		Rural Area	10	-	10	2	Dug Well with Handpump	0	0		
		Non-domestic	31	25	6	1	Dug Well with Handpump	375,000	21,000		685
								187,500	10,500		
Waso	Losesia	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	0	0		
		Non-domestic	31	15	16	2	Dug Well with Handpump	187,500	10,500		344
						1	Pan (5000 m3)	375,000	21,000		
								312,500	580,125		
Serolipi	Donyo Uasin	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	-		0	0		
		Rural Area	1	-	1	1	Dug Well with Handpump	0	0		
		Non-domestic	23	-	23	1	Dug Well with Windmill	187,500	10,500		118
						1	Pan (5000 m3)	1,175,000	283,500		
								312,500	580,125		
Serolipi	Serolipi	Rural Centre	39	15	24	1	Borehole with Motorpump	1,275,000	1,811,250	200	301
		Rural Institution	9	-	9	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		363
		Non-domestic	65	-	65	2	Dug Well with Windmill	2,350,000	567,000		
						1	Pan (5000 m3)	312,500	580,125		
WASO DIVISION		Total Rural Supply	245	151	94	13		4,512,500	2,210,250	1715	3766
		Total Non-domestic	187	67	120	11		5,400,000	2,643,375	0	0
		Total	432	218	214	24		9,912,500	4,853,625	1715	3766

APPENDIX 8

INVESTMENT PACKAGE 2A

APPENDIX 8

INVESTMENT PACKAGE 2A

1. Baragoi Divison - IP 2A - Demand 1993, Scenairo 3
2. Baragoi Division - IP 2A - Demand 2003, Scenario 3

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Nyiro	South Horr	Rural Centre	39	39	0	-		0	0	735	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	15	-	15	2	Dug Well with Handpump	375,000	21,000		1057
		Non-domestic	11	11	0	-		0	0		
Nyiro	Tuum	Rural Centre	13	13	0	-		0	0	250	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		281
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		580
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	7	-	7	1	Dug Well with Handpump	187,500	10,500		578
		Non-domestic	27	0	27	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		1030
		Non-domestic	39	0	39	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Windmill	1,425,000	336,000		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	31	-	31	1	Dug Well with Windmill	1,175,000	283,500		2717
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	7	0	7	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	23	-	23	1	Borehole with Windmill	1,131,250	336,000		1610
						1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ndoto	Lesirikan	Rural Centre	14	14	0	-		0	0	250	44
		Rural Institution	16	-	16	1	Borehole with Windmill	1,131,250	336,000		
		Rural Area	41	-	41	2	Dug Well with Windmill	2,350,000	567,000		2649
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	43	0	43	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		219
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		350
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	9	0	1	Dug Well with Handpump	187,500	10,500	400	140
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	9	-	9	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	14	-	14	1	Dug Well with Windmill	1,175,000	283,500		1218
		Non-domestic	29	0	29	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		911
		Non-domestic	6	-	6	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	-		0	0		
		Non-domestic	1	-	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-		0	0		
		Rural Institution	13	-	13	1	Borehole with Windmill	1,131,250	336,000		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		848
		Non-domestic	30	0	30	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Existing (m3/day)	Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		825
		Non-domestic	25	0	25	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		831
		Non-domestic	0	-	0	-		0	0		
Elbarta	Marti	Rural Centre	12	10	2	-		0	0	163	
		Rural Institution	-	-	-	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000	100	754
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		384
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		796
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	377	85	292	43		14,843,750	2,520,000	1898	17822
		Total Non-domestic	280	20	260	19		11,862,500	6,213,375	0	0
		Total	657	105	552	62		26,706,250	8,733,375	1898	17822

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Nyiro	South Horr	Rural Centre	47	47	0	-		0	0	727	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	15	-	15	3	Dug Well with Handpump	562,500	31,500		964
		Non-domestic	11	11	0	-		0	0		
Nyiro	Tuum	Rural Centre	15	15	0	-		0	0	220	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		281
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		525
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	8	-	8	2	Dug Well with Handpump	375,000	21,000		523
		Non-domestic	27	0	27	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		932
		Non-domestic	39	0	39	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Windmill	1,425,000	336,000		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-			0		
		Rural Area	32	-	32	1	Dug Well with Windmill	1,175,000	0		2457
						2	Dug Well with Handpump	375,000	0		
		Non-domestic	7	0	7	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	27	-	27	1	Borehole with Windmill	1,425,000	336,000		1456
						1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Ndoto	Lesirikan	Rural Centre	18	15	3	-					
		Rural Institution	20	-	20	1	Borehole with Windmill	0	0	250	46
		Rural Area	43	-	43	2	Dug Well with Windmill	1,131,250	336,000		
						2	Dug Well with Handpump	2,350,000	567,000		2394
		Non-domestic	43	0	43	1	Pan (5000 m3)	375,000	21,000		
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Arsim	Illaut	Rural Centre	-	-	0	-					
		Rural Institution	4	-	4	1	Dug Well with Handpump	0	0		
		Rural Area	9	-	9	2	Dug Well with Handpump	187,500	10,500		
		Non-domestic	3	0	3	-		375,000	21,000		198
								0	0		
Arsim	Arsim	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	0	0		
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		317
								187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	11	-2	1	Dug Well with Handpump	0	0		
		Non-domestic	9	9	0	-		187,500	10,500	400	88
								0	0		
Nachola	Nachola	Rural Centre	-	-	0	-					
		Rural Institution	11	-	11	2	Dug Well with Handpump	0	0		
		Rural Area	15	-	15	1	Dug Well with Windmill	375,000	21,000		
		Non-domestic	29	0	29	1	Pan (5000 m3)	1,175,000	283,500		1102
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Nachola	Terter	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	0	0		
		Non-domestic	6	0	6	1	Dug Well with Handpump	375,000	21,000		824
								187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	-		0	0		
		Non-domestic	1	0	1	-		0	0		
								0	0		
Marti	Kalele	Rural Centre	-	-	0	-					
		Rural Institution	14	-	14	1	Borehole with Windmill	0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	1,131,250	336,000		
		Non-domestic	30	0	30	1	Pan (5000 m3)	375,000	21,000		767
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		746
		Non-domestic	25	0	25	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		752
		Non-domestic	0	0	0	-		0	0		
Elbarta	Marti	Rural Centre	14	10	4	1	Dug Well with Handpump	187,500	10,500	100	61
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000	100	684
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		347
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		720
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	414	98	316	47		15,887,500	2,257,500	1797	16184
		Total Non-domestic	280	20	260	19		11,862,500	6,213,375	0	0
		Total	694	118	576	66		27,750,000	8,470,875	1797	16184

APPENDIX 9

INVESTMENT PACKAGE 2B

APPENDIX 9

INVESTMENT PACKAGE 2B

1. Baragoi Division - IP 2B - Demand 1993, Scenario 2
2. Baragoi Division - IP 2B - Demand 2003, Scenario 2
3. Lorroki Division - IP 2B - Demand 2003, Scenario 2
4. Wamba Division - IP 2B - Demand 2003, Scenario 2
5. Waso Division - IP 2B - Demand 2003, Scenario 2

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Nyiro	South Horr	Rural Centre	45	45	0	-					
		Rural Institution	-	-	0	-		0	0	772	
		Rural Area	12	-	12	2	Dug Well with Handpump	0	0		
		Non-domestic	11	11	0	-		375,000	21,000		1112
								0	0		
Nyiro	Tuum	Rural Centre	13	13	0	-					
		Rural Institution	-	-	0	-		0	0	250	
		Rural Area	5	-	5	1	Dug Well with Handpump	0	0		
		Non-domestic	0	0	0	-		187,500	10,500		309
								0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	0	-	0	-		187,500	10,500		610
								0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	8	-	8	2	Dug Well with Handpump	187,500	10,500		
		Non-domestic	28	0	28	1	Pan (5000 m3)	375,000	21,000		608
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Kawop	Losurukoi	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	187,500	10,500		
		Non-domestic	40	0	40	1	Pan (5000 m3)	375,000	21,000		1083
						1	Borehole with Windmill	312,500	580,125		
								1,425,000	336,000		
Kawop	Lonyangaten	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	33	-	33	1	Dug Well with Windmill	0	0		
						2	Dug Well with Handpump	1,175,000	283,500		2857
		Non-domestic	7	0	7	1	Borehole with Handpump	375,000	21,000		
								450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	27	-	27	1	Borehole with Windmill	187,500	10,500		
						1	Dug Well with Handpump	1,425,000	336,000		1694
		Non-domestic	1	0	1	-		187,500	10,500		
								0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ndoto	Lesirikan	Rural Centre	15	15	0	-		0	0	250	60
		Rural Institution	18	-	18	1	Borehole with Windmill	1,131,250	336,000		
		Rural Area	43	-	43	2	Dug Well with Windmill	2,350,000	567,000		2786
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	44	0	44	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		230
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		368
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	9	0	1	Dug Well with Handpump	187,500	10,500	400	168
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	10	-	10	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	15	-	15	1	Dug Well with Windmill	1,175,000	283,500		1281
		Non-domestic	30	0	30	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		958
		Non-domestic	6	-	6	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	-		0	0		
		Non-domestic	1	-	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-		0	0		
		Rural Institution	15	-	15	1	Borehole with Windmill	1,131,250	336,000		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		892
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Marti	Lokorkor	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	0	0		
		Non-domestic	26	0	26	1	Pan (5000 m3)	375,000	21,000		867
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Marti	Moru-Akiring	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	0	0		
		Non-domestic	0	-	0	-		375,000	21,000		874
								0	0		
Elbarta	Marti	Rural Centre	12	10	2	-					
		Rural Institution	-	-	-	-		0	0	170	
		Rural Area	12	-	12	2	Dug Well with Handpump	0	0		
		Non-domestic	32	0	32	1	Pan (5000 m3)	375,000	21,000	100	800
						1	Dug Well with Windmill	312,500	580,125		
								1,175,000	283,500		
Elbarta	Ngilai	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		404
								187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	0	0		
		Non-domestic	5	-	5	1	Dug Well with Handpump	375,000	21,000		837
								187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	406	92	314	45		15,512,500	2,541,000	1942	18798
		Total Non-domestic	287	20	267	19		11,862,500	6,213,375	0	0
		Total	693	112	581	64		27,375,000	8,754,375	1942	18798

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Nyiro	South Horr	Rural Centre	60	60	0	-		0	0	845	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	18	-	18	3	Dug Well with Handpump	562,500	31,500		1120
		Non-domestic	12	12	0	-		0	0		
Nyiro	Tuum	Rural Centre	23	16	7	1	Dug Well with Handpump	187,500	10,500	250	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		333
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	7	-	7	2	Dug Well with Handpump	375,000	21,000		610
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		608
		Non-domestic	29	0	29	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	3	Dug Well with Handpump	562,500	31,500		1083
		Non-domestic	42	0	42	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Windmill	1,425,000	336,000		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-			0		
		Rural Area	37	-	37	1	Dug Well with Windmill	1,175,000	283,500		2857
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	8	0	8	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	32	-	32	1	Borehole with Windmill	1,425,000	336,000		1694
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ndoto	Lesirikan	Rural Centre	27	15	12	1	Borehole with Handpump	450,000	73,500	250	94
		Rural Institution	29	-	29	1	Borehole with Windmill	1,425,000	336,000		
		Rural Area	49	-	49	2	Dug Well with Windmill	2,350,000	567,000		2784
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	46	0	46	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	5	-	5	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	15	-	15	3	Dug Well with Handpump	562,500	31,500		230
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	375,000	21,000		368
		Non-domestic	9	0	9	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	11	0	1	Dug Well with Handpump	187,500	10,500	400	168
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	16	-	16	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	17	-	17	1	Dug Well with Windmill	1,175,000	283,500		1281
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		958
		Non-domestic	7	0	7	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	13	-	13	-		0	0		
		Non-domestic	1	0	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-		0	0		
		Rural Institution	16	-	16	1	Borehole with Windmill	1,131,250	336,000		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		892
		Non-domestic	32	0	32	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		867
		Non-domestic	27	0	27	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		874
		Non-domestic	0	0	0	-		0	0		
Elbarta	Marti	Rural Centre	20	10	10	1	Borehole with Windmill	1,131,250	336,000	100	99
		Rural Institution	-	-	0	-		0	0		
		Rural Area	14	-	14	2	Dug Well with Handpump	375,000	21,000	100	800
		Non-domestic	34	0	34	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		404
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	14	-	14	3	Dug Well with Handpump	562,500	31,500		837
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	515	112	403	55		18,887,500	3,034,500	1945	18961
		Total Non-domestic	301	21	280	19		11,862,500	6,213,375	0	0
		Total	816	133	683	74		30,750,000	9,247,875	1945	18961

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Poro	Siambu	Rural Centre	33	?	33	1	Dam,pumped supply (in constr.)	500,000	1,800,000	250	350
		Rural Institution	-	-	0	-		0	0		
		Rural Area	8	-	8	2	Dug Well with Handpump	375,000	21,000		530
		Non-domestic	-	-	0	-		0	0		
Poro	Seketet	Rural Centre	-	-	0	-		0	0		
		Rural Institution	2	-	2	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		457
		Non-domestic	32	32	0	-		0	0		
Poro	Sirata Oirobi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	14	-	14	-		0	0		
		Rural Area	30	10	20	1	Borehole with Windmill	1,131,250	336,000	300	615
		Non-domestic	25	25	0	-		0	0		
Poro	Nkejemueny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		294
		Non-domestic	20	20	0	-		0	0		
Angata Nanyukie	Angata Nanyukie	Rural Centre	-	-	0	-		0	0		
		Rural Institution	10	-	10	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	27	-	27	1	Dug Well with Windmill	1,175,000	283,500		1171
		Non-domestic	3	3	0	-		0	0		
Angata Nanyukie	Loibashai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		304
		Non-domestic	10	10	0	-		0	0		
Angata Nanyukie	Barsaloi	Rural Centre	31	-	31	1	Dug Well with Windmill	1,175,000	283,500		583
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		216
		Non-domestic	5	5	0	-		0	0		
Opiroi	Opiroi	Rural Centre	45	-	10	1	Spring supply	25,000	10,500		761
				-	35	1	Borehole with Windmill	1,425,000	336,000		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	29	-	29	1	Borehole with Windmill	1,425,000	336,000		1546
		Non-domestic	-	0	0	-		0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Opiroi	Mabati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	375,000	21,000		434
		Non-domestic	-	0	0	-		0	0		
Opiroi	Mbukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		886
		Non-domestic	1	0	1	1	Dug Well with Handpump	187,500	10,500		
Loosuk	Malaso	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		718
		Non-domestic	57	25	32	1	Pan (5000 m3)	312,500	580,125		
						1	Dug Well with Windmill	1,175,000	283,500		
Loosuk	Tinga	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	19	-	19	1	Borehole with Windmill	1,131,250	336,000		1094
		Non-domestic	48	25	23	1	Dug Well with Windmill	1,175,000	283,500		
						1	Pan (5000 m3)	312,500	580,125		
Loosuk	Loosuk	Rural Centre	48	-	48	2	Borehole with Windmill	2,850,000	672,000		494
		Rural Institution	-	-	0	-		0	0		
		Rural Area	19	-	19	1	Borehole with Windmill	1,131,250	336,000		439
		Non-domestic	59	50	9	-		0	0		
Maralal	Ledero	Rural Centre	-	-	0	-		0	0		
		Rural Institution	8	-	8	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	35	-	35	5	Dug Well with Handpump	937,500	52,500		1258
		Non-domestic	-	0	0	-		0	0		
Maralal	Township	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	44	-	44	2	Dug Well with Handpump	375,000	21,000		1841
						1	Borehole with Windmill	1,425,000	336,000		
		Non-domestic	-	0	0	-		0	0		
Maralal	Lpartuk	Rural Centre	-	-	0	-		0	0		
		Rural Institution	5	-	5	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	44	-	44	2	Dug Well with Handpump	375,000	21,000		1989
						1	Borehole with Windmill	1,425,000	336,000		
		Non-domestic	-	0	0	-		0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Sukuta Marmar	Lolmolok	Rural Centre	-	-	0	-		0	0		
		Rural Institution	3	-	3	1	Borehole with Handpump	450,000	73,500		
		Rural Area	30	-	30	1	Borehole with Motorpump	1,275,000	1,811,250		1488
		Non-domestic	85	25	60	1	Pan (5000 m3)	312,500	580,125		
						2	Borehole with Windmill	2,850,000	672,000		
Sukuta Marmar	Amaiya	Rural Centre	20	10	10	2	Dug Well with Handpump	375,000	21,000	125	125
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		330
		Non-domestic	-	0	0	-		0	0		
Sukuta Marmar	Longewan	Rural Centre	-	-	0	-		0	0		
		Rural Institution	9	-	9	-		0	0		
		Rural Area	12	-	12	1	Borehole with Windmill	1,131,250	336,000		512
		Non-domestic	70	25	45	1	Pan (5000 m3)	312,500	580,125		
						2	Borehole with Windmill	2,262,500	672,000		
Sukuta Marmar	Logorate	Rural Centre	-	-	0	-		0	0		
		Rural Institution	2	-	2	-		0	0		
		Rural Area	21	-	21	1	Borehole with Windmill	1,131,250	336,000		977
		Non-domestic	66	25	41	1	Pan (5000 m3)	312,500	580,125		
						2	Borehole with Windmill	2,262,500	672,000		
Sukuta Marmar	Sukuta Marmar	Rural Centre	-	-	0			0	0		
		Rural Institution	-	-	0			0	0		
		Rural Area	49	-	49	2	Borehole with Windmill	2,850,000	672,000		2255
		Non-domestic	94	40	54	1	Pan (5000 m3)	312,500	580,125		
						2	Borehole with Windmill	2,850,000	672,000		
Kisima	Nauneri	Rural Centre	-	-	0			0	0		
		Rural Institution	2	-	2	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	31	-	31	1	Dug Well with Windmill	1,175,000	283,500		836
		Non-domestic	67	25	42	1	Pan (5000 m3)	312,500	580,125		
						2	Borehole with Windmill	2,262,500	672,000		
Kisima	Lmisigiyoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	14	-	14	1	Dug Well with Windmill	1,175,000	283,500		644
		Non-domestic	26	26	0	-		0	0		
Kisima	Lkilorit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	26	-	26	1	Borehole with Windmill	1,425,000	336,000		
		Rural Area	36	20	16	1	Borehole with Windmill	1,131,250	336,000	500	1104
		Non-domestic	49	40	9	-		0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Kisima	Mbaringon	Rural Centre	20	5	15	1	Borehole with Windmill	1,131,250	336,000	200	285
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	1	Dug Well with Windmill	1,175,000	283,500		984
		Non-domestic	92	40	52	1	Pan (5000 m3)	312,500	580,125		
						2	Borehole with Windmill	2,850,000	672,000		
Lodokejek	Moru	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	21	-	21	1	Dug Well with Windmill	1,175,000	283,500		1068
		Non-domestic	7	0	7	1	Dug Well with Handpump	187,500	10,500		
Lodokejek	Nonkeek	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	19	-	19	1	Dug Well with Windmill	1,175,000	283,500		970
		Non-domestic	-	0	0	-		0	0		
Lodokejek	Lodokejek	Rural Centre	11	-	11	1	Borehole with Windmill	1,131,250	336,000		200
		Rural Institution	2	-	2	-		0	0		
		Rural Area	34	-	34	1	Borehole with Windmill	1,425,000	336,000		1648
		Non-domestic	55	40	15	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Windmill	1,131,250	336,000		
Lodokejek	Kirimun	Rural Centre	35	20	15	1	Borehole with Windmill	1,131,250	336,000	250	206
		Rural Institution	2	-	2	-		0	0		
		Rural Area	19	-	19	1	Borehole with Windmill	1,131,250	336,000		927
		Non-domestic	55	50	5	1	Dug Well with Handpump	187,500	10,500		
LORROKI DIVISION		Total Rural Supply	962	65	897	68		42,975,000	12,788,250	1625	30539
		Total Non-domestic	926	531	395	27		22,193,750	10,187,625	0	0
		Total	1888	596	1292	95		65,168,750	22,975,875	1625	30539

WAMBA DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ngilai	Swari	Rural Centre	-	-	0	-		0	0		
		Rural Institution	24	-	24	1	Borehole with Windmill	1,425,000	336,000		
		Rural Area	25	-	25	1	Borehole with Windmill	1,425,000	336,000		1577
		Non-domestic	3	-	3	1	Dug Well with Handpump	187,500	10,500		
Ngilai	Ngare narok	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	4	Dug Well with Handpump	750,000	42,000		1476
		Non-domestic	42	-	42	1	Dug Well with Windmill	1,175,000	283,500		
						1	Pan (5000 m3)	312,500	580,125		
Ngilai	Ngilai	Rural Centre	15	-	15	3	Dug Well with Handpump	562,500	31,500		369
		Rural Institution	2	-	2	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	22	-	22	3	Dug Well with Handpump	562,500	31,500		1307
						1	Spring Supply	200,000	400,000		
		Non-domestic	8	-	8	1	Dug Well with Handpump	187,500	10,500		
Ngilai	Lkisin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		700
		Non-domestic	-	-	0	-		0	0		
Ngilai	Ngogoltin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	15	-	15	3	Dug Well with Handpump	562,500	31,500		866
		Non-domestic	10	-	10	2	Dug Well with Handpump	375,000	21,000		
Lodungokwe	Nkaroni	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		492
		Non-domestic	-	-	0	-		0	0		
Lodungokwe	Lpus	Rural Centre	28	10	18	1	Borehole with Windmill	1,131,250	336,000	200	395
		Rural Institution	2	-	2	-		0	0		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		789
		Non-domestic	-	-	0	-		0	0		
Lodungokwe	Litrimin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	20	-	20	3	Dug Well with Handpump	562,500	31,500		1333
		Non-domestic	-	-	0	-		0	0		

WAMBA DIVISION | Rural Area | INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 | Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Existing (m3/day)	Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Lodungokwe	Sesia	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		821
		Non-domestic	2	-	2	-		0	0		
Wamba	Matakwen	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		325
		Non-domestic	8	-	8	2	Dug Well with Handpump	375,000	21,000		
Wamba	Kolting	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		853
		Non-domestic	-	-	0	-		0	0		
Wamba	Wamba	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	4	Dug Well with Handpump	750,000	42,000		1189
		Non-domestic	-	-	0	-		0	0		
WAMBA DIVISION		Total Rural Supply	257	10	247	40		10,931,250	1,786,000	200	12492
		Total Non-domestic	73	0	73	8		2,612,500	926,625	0	0
		Total	330	10	320	48		13,543,750	2,712,625	200	12492

WASO DIVISION — Rural Area — INVESTMENT PACKAGE 2B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 2

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Existing (m3/day)	Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Waso	Lerata	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	5	5	0	-		187,500	10,500		
		Non-domestic	-	-	0	-		0	0	350	369
								0	0		
Waso	Lengusaka	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	0	0		
		Non-domestic	10	-	10	2	Dug Well with Handpump	375,000	21,000		498
								375,000	21,000		
Waso	Remote	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	0	0		
		Non-domestic	4	4	0	-		187,500	10,500		319
								0	0		
Waso	Ngutuk Ongiron	Rural Centre	20	-	20	1	Dug Well with Windmill	1,175,000	283,500		292
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		477
		Non-domestic	23	23	0	-		0	0		
Waso	Archer's Post	Rural Centre	98	98	0	-					
		Rural Institution	33	33	0	-		0	0	1165	0
		Rural Area	10	-	10	2	Dug Well with Handpump	0	0		
		Non-domestic	31	25	6	1	Dug Well with Handpump	375,000	21,000		685
								187,500	10,500		
Waso	Losesia	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	0	0		
		Non-domestic	31	15	16	2	Dug Well with Handpump	187,500	10,500		344
						1	Pan (5000 m3)	375,000	21,000		
								312,500	580,125		
Serolipi	Donyo Uasin	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	-		0	0		
		Rural Area	1	-	1	1	Dug Well with Handpump	0	0		
		Non-domestic	23	-	23	1	Dug Well with Windmill	187,500	10,500		118
						1	Pan (5000 m3)	1,175,000	283,500		
								312,500	580,125		
Serolipi	Serolipi	Rural Centre	39	15	24	1	Borehole with Windmill	1,131,250	336,000	200	301
		Rural Institution	9	-	9	1	Borehole with Windmill	1,131,250	336,000		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		363
		Non-domestic	65	-	65	2	Dug Well with Windmill	2,350,000	567,000		
						1	Pan (5000 m3)	312,500	580,125		
WASO DIVISION		Total Rural Supply	245	151	94	14		5,500,000	1,071,000	1715	3766
		Total Non-domestic	187	67	120	11		5,400,000	2,643,375	0	0
		Total	432	218	214	25		10,900,000	3,714,375	1715	3766

APPENDIX 10

INVESTMENT PACKAGES 3A

APPENDIX 10

INVESTMENT PACKAGES 3A

1. Baragoi Division - IP 3A - Demand 1993, Scenario 3
2. Baragoi Division - IP 3A - Demand 2003, Scenario 3

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Existing (m3/day)	Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Nyiro	South Horr	Rural Centre	39	39	0	-					
		Rural Institution	-	-	0	-		0	0	735	
		Rural Area	15	-	15	2	Dug Well with Handpump	0	0		
		Non-domestic	11	11	0	-		375,000	21,000		1057
								0	0		
Nyiro	Tuum	Rural Centre	13	13	0	-					
		Rural Institution	-	-	0	-		0	0	250	
		Rural Area	4	-	4	1	Dug Well with Handpump	0	0		
		Non-domestic	0	0	0	-		187,500	10,500		281
								0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	0	-	0	-		187,500	10,500		580
								0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	7	-	7	1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	27	0	27	1	Pan (5000 m3)	187,500	10,500		578
						1	Borehole with Motorpump	312,500	580,125		
								1,093,750	1,563,240		
Kawop	Losurukoi	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	0	0		
		Non-domestic	39	0	39	1	Pan (5000 m3)	375,000	21,000		1030
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Kawop	Lonyangaten	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	31	-	31	1	Borehole with Motorpump	0	0		
						2	Dug Well with Handpump	1,093,750	1,563,240		2717
		Non-domestic	7	0	7	1	Borehole with Handpump	375,000	21,000		
								450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	23	-	23	1	Borehole with Motorpump	187,500	10,500		
						1	Dug Well with Handpump	1,275,000	1,811,250		1610
		Non-domestic	1	0	1	-		187,500	10,500		
								0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ndoto	Lesirikan	Rural Centre	14	14	0	-		0	0	250	44
		Rural Institution	16	-	16	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	41	-	41	1	Borehole with Motorpump	1,275,000	1,811,250		2649
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	43	0	43	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		219
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		350
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	9	0	1	Dug Well with Handpump	187,500	10,500	400	140
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	9	-	9	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	14	-	14	1	Borehole with Motorpump	1,093,750	1,563,240		1218
		Non-domestic	29	0	29	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		911
		Non-domestic	6	-	6	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	-		0	0		
		Non-domestic	1	-	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-		0	0		
		Rural Institution	13	-	13	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		848
		Non-domestic	30	0	30	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3A : Demand year 1993, Scenario 3 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		825
		Non-domestic	25	0	25	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,093,750	1,563,240		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		831
		Non-domestic	0	-	0	-		0	0		
Elbarta	Marti	Rural Centre	12	10	2	-		0	0	163	
		Rural Institution	-	-	-	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000	100	754
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		384
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		796
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	377	85	292	42		14,037,500	10,749,480	1898	17822
		Total Non-domestic	280	20	260	19		11,950,000	16,359,105	0	0
		Total	657	105	552	61		25,987,500	27,108,585	1898	17822

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Nyiro	South Horr	Rural Centre	47	47	0	-		0	0	727	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	15	-	15	3	Dug Well with Handpump	562,500	31,500		964
		Non-domestic	11	11	0	-		0	0		
Nyiro	Tuum	Rural Centre	15	15	0	-		0	0	220	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		281
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		525
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	8	-	8	2	Dug Well with Handpump	375,000	21,000		523
		Non-domestic	27	0	27	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,175,000	1,563,240		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		932
		Non-domestic	39	0	39	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-			0		
		Rural Area	32	-	32	1	Borehole with Motorpump	1,275,000	1,811,250		2457
						2	Dug Well with Handpump	375,000	0		
		Non-domestic	7	0	7	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	27	-	27	1	Borehole with Motorpump	1,275,000	1,811,250		1456
						1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Ndoto	Lesirikan	Rural Centre	18	15	3	-		0	0	250	46
		Rural Institution	20	-	20	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	43	-	43	1	Borehole with Motorpump	1,275,000	1,811,250		2394
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	43	0	43	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		198
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		317
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	9	2	1	Dug Well with Handpump	187,500	10,500	400	88
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	11	-	11	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	15	-	15	1	Borehole with Motorpump	1,175,000	1,563,240		1102
		Non-domestic	29	0	29	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,175,000	1,563,240		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		824
		Non-domestic	6	0	6	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	-		0	0		
		Non-domestic	1	0	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-		0	0		
		Rural Institution	14	-	14	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		767
		Non-domestic	30	0	30	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3A : Demand year 2003, Scenario 3 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		746
		Non-domestic	25	0	25	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,175,000	1,563,240		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		752
		Non-domestic	0	0	0	-		0	0		
Elbarta	Marti	Rural Centre	14	10	4	1	Dug Well with Handpump	187,500	10,500	100	61
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000	100	684
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		347
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		720
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	414	98	316	46		15,050,000	11,018,490	1797	16184
		Total Non-domestic	280	20	260	19		12,012,500	16,111,095	0	0
		Total	694	118	576	65		27,062,500	27,129,585	1797	16184

APPENDIX 11

INVESTMENT PACKAGE 3B

APPENDIX 11

INVESTMENT PACKAGE 3B

1. Baragoi Division - IP 3B - Demand 1993, Scenario 2
2. Baragoi Division - IP 3B - Demand 2003, Scenario 2
3. Baragoi Division - IP 3B - Demand 2003, Scenario 2
4. Baragoi Division - IP 3B - Demand 2003, Scenario 2
5. Baragoi Division - IP 3B - Demand 2003, Scenario 2

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Nyiro	South Horr	Rural Centre	45	45	0	-		0	0	772	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		1112
		Non-domestic	11	11	0	-		0	0		
Nyiro	Tuum	Rural Centre	13	13	0	-		0	0	250	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		309
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		610
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	8	-	8	2	Dug Well with Handpump	375,000	21,000		608
		Non-domestic	28	0	28	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		1083
		Non-domestic	40	0	40	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	33	-	33	1	Borehole with Motorpump	1,093,750	1,563,240		2857
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	7	0	7	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	27	-	27	1	Borehole with Motorpump	1,275,000	1,811,250		1694
						1	Dug Well with Handpump	187,500	10,500		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Ndoto	Lesirikan	Rural Centre	15	15	0	-		0	0	250	60
		Rural Institution	18	-	18	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	43	-	43	1	Borehole with Motorpump	1,275,000	1,811,250		2786
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	44	0	44	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Arsim	Illaut	Rural Centre	-	-	0	-		0	0		
		Rural Institution	4	-	4	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		230
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		368
		Non-domestic	8	0	8	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	9	9	0	1	Dug Well with Handpump	187,500	10,500	400	168
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-		0	0		
		Rural Institution	10	-	10	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	15	-	15	1	Borehole with Motorpump	1,093,750	1,563,240		1281
		Non-domestic	30	0	30	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Nachola	Terter	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		958
		Non-domestic	6	-	6	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	-		0	0		
		Non-domestic	1	-	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-		0	0		
		Rural Institution	15	-	15	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		892
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 1993, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		867
		Non-domestic	26	0	26	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		874
		Non-domestic	0	-	0	-		0	0		
Elbarta	Marti	Rural Centre	12	10	2	-		0	0	170	
		Rural Institution	-	-	-	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000	100	800
		Non-domestic	32	0	32	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		404
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		837
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	406	92	314	44		14,412,500	10,770,480	1942	18798
		Total Non-domestic	287	20	267	19		12,312,500	16,855,125	0	0
		Total	693	112	581	63		26,725,000	27,625,605	1942	18798

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Nyiro	South Horr	Rural Centre	60	60	0	-		0	0	845	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	18	-	18	3	Dug Well with Handpump	562,500	31,500		1120
		Non-domestic	12	12	0	-		0	0		
Nyiro	Tuum	Rural Centre	23	16	7	1	Dug Well with Handpump	187,500	10,500	250	
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		333
		Non-domestic	0	0	0	-		0	0		
Nyiro	Parkati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	7	-	7	2	Dug Well with Handpump	375,000	21,000		610
		Non-domestic	0	-	0	-		0	0		
Nyiro	Uaso Rongai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		608
		Non-domestic	29	0	29	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Losurukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	3	Dug Well with Handpump	562,500	31,500		1083
		Non-domestic	42	0	42	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Kawop	Lonyangaten	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-			0		
		Rural Area	37	-	37	1	Borehole with Motorpump	1,275,000	1,811,250		2857
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	8	0	8	1	Borehole with Handpump	450,000	73,500		
Ndoto	Latakweny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	32	-	32	1	Borehole with Motorpump	1,275,000	1,811,250		1694
						2	Dug Well with Handpump	375,000	21,000		
		Non-domestic	1	0	1	-		0	0		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Ndoto	Lesirikan	Rural Centre	27	15	12	1	Borehole with Handpump	450,000	73,500	250	94
		Rural Institution	29	-	29	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	49	-	49	1	Borehole with Motorpump	1,275,000	1,811,250		2784
						3	Dug Well with Handpump	562,500	31,500		
		Non-domestic	46	0	46	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Arsim	Illaut	Rural Centre	-	-	0	-					
		Rural Institution	5	-	5	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	15	-	15	3	Dug Well with Handpump	562,500	31,500		230
		Non-domestic	3	0	3	-		0	0		
Arsim	Arsim	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	375,000	21,000		368
		Non-domestic	9	0	9	1	Dug Well with Handpump	187,500	10,500		
Arsim	Nguronit	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	11	0	1	Dug Well with Handpump	187,500	10,500	400	168
		Non-domestic	9	9	0	-		0	0		
Nachola	Nachola	Rural Centre	-	-	0	-					
		Rural Institution	16	-	16	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	17	-	17	1	Borehole with Motorpump	1,093,750	1,563,240		1281
		Non-domestic	31	0	31	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Nachola	Terter	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		958
		Non-domestic	7	0	7	1	Dug Well with Handpump	187,500	10,500		
Baragoi	Baragoi	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	13	-	13	-		0	0		
		Non-domestic	1	0	1	-		0	0		
Marti	Kalele	Rural Centre	-	-	0	-					
		Rural Institution	16	-	16	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		892
		Non-domestic	32	0	32	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		

BARAGOI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Marti	Lokorkor	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		867
		Non-domestic	27	0	27	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Marti	Moru-Akiring	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		874
		Non-domestic	0	0	0	-		0	0		
Elbarta	Marti	Rural Centre	20	10	10	1	Borehole with Motorpump	1,093,750	1,563,240	100	99
		Rural Institution	-	-	0	-		0	0		
		Rural Area	14	-	14	2	Dug Well with Handpump	375,000	21,000	100	800
		Non-domestic	34	0	34	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Elbarta	Ngilai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		404
		Non-domestic	5	0	5	1	Dug Well with Handpump	187,500	10,500		
Elbarta	Masikita	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	-		0	0		
		Rural Area	14	-	14	3	Dug Well with Handpump	562,500	31,500		837
		Non-domestic	5	-	5	1	Dug Well with Handpump	187,500	10,500		
BARAGOI DIVISION		Total Rural Supply	515	112	403	55		17,825,000	12,749,730	1945	18961
		Total Non-domestic	301	21	280	19		12,312,500	16,855,125	0	0
		Total	816	133	683	74		30,137,500	29,604,855	1945	18961

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Poro	Siambu	Rural Centre	33	?	33	1	Dam,pumped supply (in constr.)	500,000	1,800,000	250	350
		Rural Institution	-	-	0	-		0	0		
		Rural Area	8	-	8	2	Dug Well with Handpump	375,000	21,000		530
		Non-domestic	-	-	0	-		0	0		
Poro	Seketet	Rural Centre	-	-	0	-		0	0		
		Rural Institution	2	-	2	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	10	-	10	2	Dug Well with Handpump	375,000	21,000		457
		Non-domestic	32	32	0	-		0	0		
Poro	Sirata Oirobi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	14	-	14	-		0	0		
		Rural Area	30	10	20	1	Borehole with Motorpump	1,275,000	1,811,250	300	615
		Non-domestic	25	25	0	-		0	0		
Poro	Nkejemueny	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		294
		Non-domestic	20	20	0	-		0	0		
Angata Nanyukie	Angata Nanyukie	Rural Centre	-	-	0	-		0	0		
		Rural Institution	10	-	10	2	Dug Well with Handpump	375,000	21,000		
		Rural Area	27	-	27	1	Borehole with Motorpump	1,275,000	1,811,250		1171
		Non-domestic	3	3	0	-		0	0		
Angata Nanyukie	Loibashai	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		304
		Non-domestic	10	10	0	-		0	0		
Angata Nanyukie	Barsaloi	Rural Centre	31	-	31	1	Borehole with Motorpump	1,275,000	1,811,250		583
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		216
		Non-domestic	5	5	0	-		0	0		
Opiroi	Opiroi	Rural Centre	45	-	10	1	Spring supply	25,000	10,500		761
				-	35	1	Borehole with Motorpump	1,275,000	1,811,250		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	29	-	29	1	Borehole with Motorpump	1,275,000	1,811,250		1546
		Non-domestic	-	0	0	-		0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Existing (m3/day)	Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Opiroi	Mabati	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	375,000	21,000		434
		Non-domestic	-	0	0	-		0	0		
Opiroi	Mbukoi	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		886
		Non-domestic	1	0	1	1	Dug Well with Handpump	187,500	10,500		
Loosuk	Malaso	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		718
		Non-domestic	57	25	32	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Loosuk	Tinga	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	19	-	19	1	Borehole with Motorpump	1,275,000	1,811,250		1094
		Non-domestic	48	25	23	1	Borehole with Motorpump	1,275,000	1,811,250		
						1	Pan (5000 m3)	312,500	580,125		
Loosuk	Loosuk	Rural Centre	48	-	48	1	Borehole with Motorpump	1,555,000	2,300,000		494
		Rural Institution	-	-	0	-		0	0		
		Rural Area	19	-	19	1	Borehole with Motorpump	1,275,000	1,811,250		439
		Non-domestic	59	50	9	-		0	0		
Maralal	Ledero	Rural Centre	-	-	0	-		0	0		
		Rural Institution	8	-	8	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	35	-	35	5	Dug Well with Handpump	937,500	52,500		1258
		Non-domestic	-	0	0	-		0	0		
Maralal	Township	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	44	-	44	2	Dug Well with Handpump	375,000	21,000		1841
						1	Borehole with Motorpump	1,275,000	1,811,250		
		Non-domestic	-	0	0	-		0	0		
Maralal	Lpartuk	Rural Centre	-	-	0	-		0	0		
		Rural Institution	5	-	5	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	44	-	44	2	Dug Well with Handpump	375,000	21,000		1989
						1	Borehole with Motorpump	1,275,000	1,811,250		
		Non-domestic	-	0	0	-		0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Sukuta Marmar	Lolmolok	Rural Centre	-	-	0	-					
		Rural Institution	3	-	3	1	Borehole with Handpump	0	0		
		Rural Area	30	-	30	1	Borehole with Motorpump	450,000	73,500		
		Non-domestic	85	25	60	1	Pan (5000 m3)	1,275,000	1,811,250		1488
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Sukuta Marmar	Amaiya	Rural Centre	20	10	10	2	Dug Well with Handpump	375,000	21,000	125	125
		Rural Institution	-	-	0	-					
		Rural Area	6	-	6	1	Dug Well with Handpump	0	0		
		Non-domestic	-	0	0	-		187,500	10,500		330
								0	0		
Sukuta Marmar	Longewan	Rural Centre	-	-	0	-					
		Rural Institution	9	-	9	-		0	0		
		Rural Area	12	-	12	1	Borehole with Motorpump	0	0		
		Non-domestic	70	25	45	1	Pan (5000 m3)	1,093,750	1,563,240		512
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Sukuta Marmar	Logorate	Rural Centre	-	-	0	-					
		Rural Institution	2	-	2	-		0	0		
		Rural Area	21	-	21	1	Borehole with Motorpump	0	0		
		Non-domestic	66	25	41	1	Pan (5000 m3)	1,093,750	1,563,240		977
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Sukuta Marmar	Sukuta Marmar	Rural Centre	-	-	0						
		Rural Institution	-	-	0			0	0		
		Rural Area	49	-	49	1	Borehole with Motorpump	0	0		
		Non-domestic	94	40	54	1	Pan (5000 m3)	1,555,000	2,300,000		2255
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Kisima	Nauneri	Rural Centre	-	-	0						
		Rural Institution	2	-	2	1	Dug Well with Handpump	0	0		
		Rural Area	31	-	31	1	Borehole with Motorpump	187,500	10,500		
		Non-domestic	67	25	42	1	Pan (5000 m3)	1,275,000	1,811,250		836
						1	Borehole with Motorpump	312,500	580,125		
								1,275,000	1,811,250		
Kisima	Lmisigiyoi	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	14	-	14	1	Borehole with Motorpump	187,500	10,500		
		Non-domestic	26	26	0	-		1,093,750	1,563,240		644
								0	0		
Kisima	Lkilorit	Rural Centre	-	-	0	-					
		Rural Institution	26	-	26	1	Borehole with Motorpump	0	0		
		Rural Area	36	20	16	1	Borehole with Motorpump	1,275,000	1,811,250		
		Non-domestic	49	40	9	-		1,093,750	1,563,240	500	1104
								0	0		

LORROKI DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Kisima	Mbaringon	Rural Centre	20	5	15	1	Borehole with Motorpump	1,093,750	1,563,240	200	285
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	1	Borehole with Motorpump	1,093,750	1,563,240		984
		Non-domestic	92	40	52	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,275,000	1,811,250		
Lodokejek	Moru	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	21	-	21	1	Borehole with Motorpump	1,093,750	1,563,240		1068
		Non-domestic	7	0	7	1	Dug Well with Handpump	187,500	10,500		
Lodokejek	Nonkeek	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	19	-	19	1	Borehole with Motorpump	1,093,750	1,563,240		970
		Non-domestic	-	0	0	-		0	0		
Lodokejek	Lodokejek	Rural Centre	11	-	11	1	Borehole with Motorpump	1,093,750	1,563,240		200
		Rural Institution	2	-	2	-		0	0		
		Rural Area	34	-	34	1	Borehole with Motorpump	1,275,000	1,811,250		1648
		Non-domestic	55	40	15	1	Pan (5000 m3)	312,500	580,125		
						1	Borehole with Motorpump	1,093,750	1,563,240		
Lodokejek	Kirimun	Rural Centre	35	20	15	1	Borehole with Motorpump	1,093,750	1,563,240	250	206
		Rural Institution	2	-	2	-		0	0		
		Rural Area	19	-	19	1	Borehole with Motorpump	1,093,750	1,563,240		927
		Non-domestic	55	50	5	-		0	0		
LORROKI DIVISION		Total Rural Supply	962	65	897	66		39,628,750	47,614,390	1625	30539
		Total Non-domestic	926	531	395	20		14,481,250	21,295,365	0	0
		Total	1888	596	1292	86		54,110,000	68,909,755	1625	30539

WAMBA DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	New
Ngilai	Swari	Rural Centre	-	-	0	-		0	0		
		Rural Institution	24	-	24	1	Borehole with Motorpump	1,093,750	1,563,240		
		Rural Area	25	-	25	1	Borehole with Motorpump	1,275,000	1,811,250		1577
		Non-domestic	3	-	3	1	Dug Well with Handpump	187,500	10,500		
Ngilai	Ngare narok	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	4	Dug Well with Handpump	750,000	42,000		1476
		Non-domestic	42	-	42	1	Borehole with Motorpump	1,275,000	1,811,250		
						1	Pan (5000 m3)	312,500	580,125		
Ngilai	Ngilai	Rural Centre	15	-	15	3	Dug Well with Handpump	562,500	31,500		369
		Rural Institution	2	-	2	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	22	-	22	3	Dug Well with Handpump	562,500	31,500		1307
						1	Spring Supply	200,000	400,000		
		Non-domestic	8	-	8	1	Dug Well with Handpump	187,500	10,500		
Ngilai	Lkisin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	12	-	12	2	Dug Well with Handpump	375,000	21,000		700
		Non-domestic	-	-	0	-		0	0		
Ngilai	Ngogoltin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	15	-	15	3	Dug Well with Handpump	562,500	31,500		866
		Non-domestic	10	-	10	2	Dug Well with Handpump	375,000	21,000		
Lodungokwe	Nkaroni	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		492
		Non-domestic	-	-	0	-		0	0		
Lodungokwe	Lpus	Rural Centre	28	10	18	1	Borehole with Motorpump	1,093,750	1,563,240	200	395
		Rural Institution	2	-	2	-		0	0		
		Rural Area	9	-	9	2	Dug Well with Handpump	375,000	21,000		789
		Non-domestic	-	-	0	-		0	0		
Lodungokwe	Litrimin	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	20	-	20	3	Dug Well with Handpump	562,500	31,500		1333
		Non-domestic	-	-	0	-		0	0		

WAMBA DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Lodungokwe	Sesia	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	11	-	11	2	Dug Well with Handpump	375,000	21,000		821
		Non-domestic	2	-	2	-		0	0		
Wamba	Matakwen	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	187,500	10,500		325
		Non-domestic	8	-	8	2	Dug Well with Handpump	375,000	21,000		
Wamba	Kolting	Rural Centre	-	-	0	-		0	0		
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	13	-	13	2	Dug Well with Handpump	375,000	21,000		853
		Non-domestic	-	-	0	-		0	0		
Wamba	Wamba	Rural Centre	-	-	0	-		0	0		
		Rural Institution	-	-	0	-		0	0		
		Rural Area	22	-	22	4	Dug Well with Handpump	750,000	42,000		1189
		Non-domestic	-	-	0	-		0	0		
WAMBA DIVISION		Total Rural Supply	257	10	247	40		10,412,500	5,715,730	200	12492
		Total Non-domestic	73	0	73	8		2,712,500	2,454,375	0	0
		Total	330	10	320	48		13,125,000	8,170,105	200	12492

WASO DIVISION — Rural Area — INVESTMENT PACKAGE 3B : Demand year 2003, Scenario 2 — Cost Recovery: Approach 3

Location	Sub Location	Supply Area	Water Demand (m3/day)	Supply Development Existing (m3/day)	Supply Development New (m3/day)	Number of Units	WATER SUPPLY TECHNOLOGY	CAPITAL COSTS (Shs)	O & M COSTS (Shs)	Estimated Coverage Rural Population Existing	Estimated Coverage Rural Population New
Waso	Lerata	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	1	Dug Well with Handpump	0	0		
		Rural Area	5	5	0	-		187,500	10,500		
		Non-domestic	-	-	0	-		0	0	350	369
								0	0		
Waso	Lengusaka	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	7	-	7	2	Dug Well with Handpump	0	0		
		Non-domestic	10	-	10	2	Dug Well with Handpump	375,000	21,000		498
								375,000	21,000		
Waso	Remote	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	0	0		
		Non-domestic	4	4	0	-		187,500	10,500		319
								0	0		
Waso	Ngutuk Ongiron	Rural Centre	20	-	20	1	Borehole with Motorpump	1,093,750	1,563,240		292
		Rural Institution	1	-	1	1	Dug Well with Handpump	187,500	10,500		
		Rural Area	6	-	6	1	Dug Well with Handpump	187,500	10,500		477
		Non-domestic	23	23	0	-		0	0		
Waso	Archer's Post	Rural Centre	98	98	0	-					
		Rural Institution	33	33	0	-		0	0	1165	0
		Rural Area	10	-	10	2	Dug Well with Handpump	0	0		
		Non-domestic	31	25	6	1	Dug Well with Handpump	375,000	21,000		685
								187,500	10,500		
Waso	Losesia	Rural Centre	-	-	0	-					
		Rural Institution	-	-	0	-		0	0		
		Rural Area	4	-	4	1	Dug Well with Handpump	0	0		
		Non-domestic	31	15	16	2	Dug Well with Handpump	187,500	10,500		344
						1	Pan (5000 m3)	375,000	21,000		
								312,500	580,125		
Serolipi	Donyo Uasin	Rural Centre	-	-	0	-					
		Rural Institution	1	-	1	-		0	0		
		Rural Area	1	-	1	1	Dug Well with Handpump	0	0		
		Non-domestic	23	-	23	1	Borehole with Motorpump	187,500	10,500		118
						1	Pan (5000 m3)	1,093,750	1,563,240		
								312,500	580,125		
Serolipi	Serolipi	Rural Centre	39	15	24	1	Borehole with Motorpump	1,275,000	1,811,250	200	301
		Rural Institution	9	-	9	-		0	0		
		Rural Area	5	-	5	1	Dug Well with Handpump	187,500	10,500		363
		Non-domestic	65	-	65	2	Borehole with Motorpump	2,550,000	3,622,500		
						1	Pan (5000 m3)	312,500	580,125		
WASO DIVISION		Total Rural Supply	245	151	94	13		4,431,250	3,489,990	1715	3766
		Total Non-domestic	187	67	120	11		5,518,750	6,978,615	0	0
		Total	432	218	214	24		9,950,000	10,468,605	1715	3766

APPENDIX 12

REPORT OF PLANNING MISSION TO SAMBURU DISTRICT

PLANNING MISSION TO SAMBURU DISTRICT: 25/1/88 - 29/1/88

Present Officers:

Dr. J.L.J. de Sonneville	- CTA/WRAP
L.M. Musyoka	- Head Planning/Division
V.Y. Jani	- Planning Engineer / WRAP
P.K. Gitau	- Head Planning Section / WRAD

The above named officers went on a planning mission to Samburu district on the above dates. The primary objective of the safari was obtain the Districts priorities in water resources development and to brief the DEC on the activities the project intended to embark on within the district in the next 12 months.

A meeting was held with the DWE/MoWD representative in the district. During the meeting the DWE Samburu, Mr. G.M. Mburugu, was briefed on the various aspects of the mission and the project requirements in the district. Present were Messrs. Kariuki (Geologist), Thoya (water bailiff) and visiting team from Head/Quarters.

Afterwards a meeting was held with the DEC and Headquarters team in the D.C's office at 10.30 am, 26th January 1988. Most of the government departments were represented.

Those present were:

Mr. Z.O. Ogongo	- District Commissioner/Chairman DEC
Mr. B.K. Kaberere	- DDO
Mr. G.M. Mburugu	- District Water Engineer/secretary
Dr. T.M. Wangai	- District Livestock Officer
Mr. I.M. Hussein	- District Education
Dr. P. Mugwe	- Medical of Health
Mr. G. Okello	- Game Warden
Mr. C.M. Gacharia	- Prison Warden
Mr. E.K. Ambune	- District Forest Officer
Mr. A.M. Ndambuki	- District Agricultural Officer
Mr. M.M. Lenairoshi	- Clerk to the Council
Mr. J.N. Nyaga	- OCPD
Mr. I.M. Nyabera	- District Accountant

During the meeting the DC introduced all the members and welcomed the MoWD team to the District.

The CTA introduced the MoWD/WRAP team to the meeting and thereafter informed the meeting on the objective of the mission. The meeting was informed that WRAP is a Research Project whose main objectives are to assess the water resources within the Districts and to assist in formulating a District Water Development Plan. The project has a drilling rig which will be used for exploratory and production purposes.

The meeting was informed that any borehole that was found suitable or could be adapted for production would not be equipped by the project. The meeting was informed that the District, Department or NGO would have to equip it themselves because implementation, operation and maintenance of completed boreholes is beyond the scope of the project. The CTA informed the meeting that the drilling rig would be available in the district for 12 months and that the development funds available would enable the drilling of 15-20 boreholes.
More boreholes could be drilled in the remaining period but must be financed, at cost basis, by the District through other funds.

The meeting was further informed that the team was visiting the district in order to obtain and locate the priority areas in order to harmonise project activities in the best possible way, keeping the interest of the District in mind.

The meeting was informed that the geophysical, hydrogeological and hydrological field work was progressing well and that the rig would shortly arrive.
The MoWD team informed the meeting that to effectively conduct the exercise it would wish to meet all the departments at separate times. The DC pledged full co-operation from his office and all the departments in the district. A tentative schedule for meeting all the departments was arranged covering the rest of the week.

The MoWD team met with all the departments at the scheduled times. The team was able to obtain a lot of information on the issues it addressed itself to, thanks to the co-operation from all the departments.

On the last day (Friday) the team paid a courtesy call to the DC. Other issues were discussed during this occasion and included:

(a) Requisition of list of contracted items to be used by the rig namely; fuel, steel and pvc casing, filtersand, oils, and other materials.

(b) Available funds at the District Treasury

(c) Logistics of drilling operations, where the team expressed the need to test the rig at Maralal before moving to Wamba. The DC expressed the urgent need in opening up the interior so as to avoid the congestion of people at Trading Centres. The DC advised that most activities should be concentrated in both Wamba and Baragoi Division which were least developed as compared to Lorroki Division which is mostly in the highland area where there is more rainfall. It was agreed that the rig could be tested at Ledero, where a conflict exists between the prison farm, human, livestock and wild game needs. The dam water was said to be not enough for the prison farm. The borehole was to be drilled outside the prison farm for use by the local people, livestock and wild game.

The team expressed their thanks and appreciation for the co-operation and courtesy accorded to them by the DC and his staff in the district.

1. SAMBURU COUNTY COUNCIL

Present:

M.M. Lenairoshi:	Clerk to Samburu County Council
E. Mayore:	District Social Development Officer

All Marketing and Trading Centres are operated under the County Council. In March, opening of the new Trading Centres is going to be discussed.

The Council has its own water supplies but has decided to hand them over to the government. Suguta Marmar (spring) currently remains under the Council.

About 75% of the population of Samburu are pastoralists.

Most of the area of Samburu is divided into Group Ranches.

A Group Ranch consist of a group of people living on a given area of land. The people are given a Title Deed with their names on it. The Group Ranch is generally for a sub-location. Only if all members of a group ranch agree to it, an individual may use part of that land for farming.

In the dry season, water and grazing are found only in the forests. Only livestock and Morans go into the forest with the permission of the Forestry people, at a charge of 50 cts/cow/month. Foresters do not like this arrangement but they must compromise. Manyattas (Homes) are outside the forest.

Normal practice is that women, children and household move with the men and livestock. In the more developed division (Lorroki) the women and children do not move any more, only the young people move with the cattle. The resistance however in the other divisions (Wamba and Baragoi) is great.

Government policy is to provide education and health in order to settle the population on a more permanent basis.

Social Development Assistants are Government people who live with the communities. Their function is to prevent misunderstanding, inform and create harmony for implementation of any project. Currently, there are only four such officers. They are hampered by lack of transport but generally they get help from other government departments.

A total of 178 Women Groups exist of which 37 are active. They are generally volunteer groups formed to improve family welfare. Catholic Diocese of Marsabit operating in the District has a borehole at every one of its institutions. At Archer's Post, the institution has a borehole which is equipped with a windmill.

GTZ (Wamba Food Security) is in Wamba Town and wishes to come under ASAL. The impression is that their policy emphasises the construction of small dams and ponds as opposed to construction of boreholes which may cause desertification around the site. Investigations are necessary to find the technologies most suited for the district areas.

PRIORITIES

Wamba Division

1. **Wamba Town:** Small Water Source, very small dam, overgrazing, lot of people, institutions. Lot of wind. Market proposed. Present water supply is not enough.
2. **Kauro:** Former Trading Centre demolished by shifta. People were then forced to move out. Plenty of grazing but little water available by digging from laggas at considerable depths.
3. **Kom:** As above, opening up of area would help both Isiolo and Samburu.
4. **Sera:** As above, people concentrating in Wamba due to security problems in the past
5. **Donyo Uasin:** School, Vermiculite Factory, Trading Centre,
6. **Namanyarabo:** Far from any water supply, however water from laggas is used.
7. **Larisoro:** no water available
8. **Barsalinga:** Old borehole but destroyed; potential for grazing is good.
9. **Ngilai:** Trading centre, School, Health Centre, large population, water from Lagga
10. **Nairimirimo:** School but no water available
11. **Lengei:** Large population but no water nearby, only source is Uaso Nyiro River
12. **Swuari:** Trading Centre, School, no water, only source is Seiya River which is far away.
13. **Noolkuniyani:** School, Trading Centre is planned.

Lorroki Division

1. **Losuk:** Trading Centre, School, Dispensary, Chiefs Camp, high potential area, Game Department, some springs.
2. **Mbaringon:** Permanent settlement, School, large population, formerly handpump by mission (not now); nearest water at Kisima (centre) which gets water from Dam at Ngare Narok.
3. **Opiroi:** School, Trading Centre, Chiefs Camp
4. **Lemisigiyoi:** Anywhere in this sub-location water is a problem
5. **Ongata Nanyuki:** Trading Centre, Chiefs Camp, large population, no water in whole location
6. **Morijo:** Trading Centre, School, Administrative Police, Catholic Mission
7. **Sura Adoru:** School, Trading Centre proposed
8. **Nonkeek:** School, Trading Centre proposed
9. **Raraita:** Trading Centre, school proposed, population quite high. Rock catchment used.
10. **Pura:** Proposed to open new Trading Centre, School, Administrative Police; Former Trading Centre was abandoned due to Ngoroko activity.
11. **Logorati:** School
12. **Ledero:** School, New Trading Centre to be opened
13. **Ongata Naiborkeju:** Manyattas exist, County Council proposes to open a Trading Centre.

Baragoi Division

1. **Kowop:** Former Trading Centre, anywhere in location water is scarce, School proposed.
2. **Maseketa:** Trading Centre School, water only from laggas
3. **Lesirikan:** Big Trading Centre, Chiefs Camp, School, Forest Department get water from spring in mountains (rock catchment)
4. **Mpatpat:** Open area - intention to develop (Arsim Location)
5. **Illaut:** School, Trading centre
6. **Latakweny:** School, Dispensary, Trading Centre, water from laggas
7. **Nachola:** School, Trading Centre,
8. **Soito Ol Payani:** Trading Centre, large population, Dam nearby, Trading Centre proposed
9. **Naiseecho:** Trading Centre proposed, School existing in Wase Mogai will be moved to here.
10. **Embukoi:** Former Centre. Proposal to reopen. No water between Morijo and Marti.

2. MINISTRY OF HEALTH

Present:

Dr. P. Mugwe	- Medical Officer of Health
Mr. R. Njeru	- Public Health Officer
Mr. E. Ndungu	- Health Education Officer
Dr. A. Kutwa	- Medical Officer
Mr. S. Thuku	- District Public Health Nurse
Mrs. Mugania	- Sister in charge

According to the 6th Development Plan 1988-93 of the Ministry of Health, Samburu District, there are twenty one health facilities in operation. These include two Hospitals, two Health Centres and seventeen Dispensaries. Three other health facilities have been proposed to be constructed in the period 1991-93.

Of these twenty one facilities thirteen have no water problem while the other eight need to be taken care of for optimum utilization of the facilities.

Those with adequate water supply have piped water whose source is either dams, river, spring or borehole. The centres with inadequate water supply and which need more attention include:

(i) **Wamba Health Centre:** This location has no storage facilities.

(ii) **Lesirikan Dispensary:** There is a non-functioning borehole. May be it could be rehabilitated.

(iii) **Marti Dispensary:** Here water is carried by people and tankers for money.

(iv) **Barsaloi Dispensary:** There is a mission borehole but it does not supply the dispensary.

(v) **Sirata Oirobi Dispensary:** The dispensary gets its water from roof catchment. Since the rains are unreliable there is an acute water shortage.

(vi) **Losuk Dispensary:** This dispensary has an acute shortage of water although there is a borehole nearby. It gets its water from springs about 1 1/2 km away.

(vii) **Serolevi Dispensary** has a roof catchment with storage tanks; capacity not enough.

(viii) **West Gate Dispensary:** It has no piped water. People have to carry water from the river (Uaso Nyiro) to the dispensary.

Proposed health centres or dispensaries where a water supply is to be constructed include:

(ix) **Tuum Dispensary:** The nearest health facility is Baragoi Health Centre which is some 80 km away. The construction of this dispensary could start anytime as some money has been set aside by RDF for its construction. Hence this should be considered as one of the priority areas if there is no water source already available.

(x) **Lodungokwe Health Centre:** Here there is no existing health facility in its environs, the nearest being some 50 km away. Taking into account that the area is fairly populated, with a school, Chiefs Camp and a Church this could be a priority watering place if none exists already. Borehole may be present but must be verified.

(xi) **Poro Dispensary:** Being an agriculturally viable area where wheat and subsistence crops are grown, the area is relatively highly populated and a suitable place for a dispensary.

(xii) **Latakweny Dispensary:** Here again the nearest health facility is Baragoi Health Centre which is 100 km away. The area is fairly populated and should therefore be considered. There is a dam but quality water is poor.

According to the Ministry of Health, 6% of the households of Samburu have easy access to safe water, 15.4% have latrines and use them, while 4% have adequate and safe housing.

3. MINISTRY OF LIVESTOCK

Present:

Dr. Marete	- District Veterinary Officer (Outgoing)
Dr. T.M. Wangai	- District Veterinary Officer (incoming)
Mr. W.O. Omtsani	- District Livestock Development Officer

Livestock is the mainstay of the people in the District. Samburu district has a high potential for livestock production as rangeland predominates. Lorroki Division is suitable for dairy and beef cattle, sheep, and goats in addition to crop production. Baragoi is best suited for goats and camels because the area is dry, rocky and has little, and in some parts, no suitable pasture for cattle. However there are parts with pasture suitable for beef cattle. Wamba division is best suited for goats and moderate numbers of cattle and sheep because of the lack of sufficient cattle pasture compared to the qualities of browsing vegetation.

For livestock production to succeed, an increased number of watering places for human and livestock are required. Cattle provide milk, blood and meat on which the Samburu live, and which are also used to pay for bride wealth (pride-price). Goats and sheep are eaten at home or sold locally especially during the dry season. The Samburu people mainly keep cattle, camels, donkeys, goats and sheep. The livestock figures below show the great influence of Samburu on the population figures.

Livestock population figures are only estimates based on annual vaccinations.

Samburu Livestock Census 1978

Division	Cattle	Sheep/Goats	Camels	Donkeys	Total	LU
Baragoi	70,910	90,097	6,856	4,590	172,453	80,840
Lorroki	68,691	32,130	248	1,196	102,265	60,464
Wamba	81,145	74,883	429	4,240	160,707	79,033
Total	221,145	197,110	7,533	10,026	435,425	220,337

In 1981 livestock population figures were put at over 300,000 cattle, 560,000 goats and 12,000 camels for a total of 872,000, or 325,000 LU, but no hard figures are available.

Samburu Livestock Census 1983 (before drought)

Division	Cattle	Goats	Sheep	Camels	Donkeys	Total	LU
Baragoi	35,795	48,070	18,779	6,863	2,444	111,951	37,563
Lorroki	54,171	46,111	49,749	749	1,455	152,280	47,912
Wamba	68,708	83,286	41,014	3,670	4,328	200,016	63,177
Total	158,674	177,467	109,587	10,282	8,227	464,237	148,652

Samburu Livestock Census 1985 (post-drought)

Division	Cattle	Goats	Sheep	Camels	Donkeys	Total	LU
Baragoi	34,684	66,641	19,815	5,074	2,382	128,596	47,024
Lorroki	40,105	45,322	63,524	1,260	1,818	152,029	49,041
Wamba	22,670	37,614	12,795	1,719	1,975	76,773	28,474
Total	97,459	149,577	96,134	8,053	6,175	357,398	124,519

Projected Livestock Population end of 1987

Division	Cattle	Goats	Sheep	Camels	Donkeys	Total	LU
Baragoi	58,617	112,624	33,487	8,574	4,026	217,328	79,514
Lorroki	67,778	76,595	107,356	2,129	3,072	256,930	82,853
Wamba	28,257	63,568	21,624	2,906	3,338	119,693	40,094
Total	154,652	252,787	162,467	13,609	10,436	593,951	202,461

The projected 1987 livestock data assumes no major calamities such as diseases or drought. It shows that the present population is out at 90% of that of 10 years ago (1978)

The livestock data versus people indicate an index of about two livestock units per individual. This may not be adequate for survival as the cost of living is increasing rapidly. There is therefore need to increase this figure by restocking and improving the rangelands in Samburu so that more animals can be accommodated. For instance, Narok with similar range trends has an index that is five times that of Samburu.

However, data from the drought of 1984 showed that lack of fodder, and not lack of water led to the decimation of livestock. Water in times of drought is not the only constraining factor.

Constraints in Livestock Development

1. Less resources for livestock production in Samburu.
2. Recurrence of droughts and animal diseases.
3. Shortage of watering points with sufficient grazing
4. Underdeveloped rural infrastructure in Samburu leading to poor delivery of animal health care.
5. Absence of research-tested information in very important aspects of livestock production.

According to the report from the District Livestock Officer, rapid development of the livestock sector to provide additional meat and milk for the population is major objective, in accordance with the latest government policy on livestock development, contained in Session Paper Number 1 of 1986, which stresses the importance of renewed and rapid economic growth to accommodate the population with increased productivity in agriculture as the major provider of jobs and food. However the exact development potential is unknown.

Water in Samburu must be seen as both an economic input in livestock development and a basic need for livestock producers. In Samburu, no adequate water supply for livestock exists, particulary in areas where adequate grazing is available. In addition, where adequate grazing is available, no roads exist for proper servicing of livestock development programmes.

Strategies to increase livestock production and alleviate the drought effects include:

(i) Improvement of water supplies in strategic areas like Suguta Valley, Kauro and Kom areas. These are extensive areas which in the past have been neglected and abandoned due to security constraints. Now that security has been restored, there is an urgent need to have these facilities so that the livestock numbers can be increased to raise the off-take levels.

(ii) Provision of suitable infrastructure to facilitate programmes like diseases control, surveillance and extension services.

(iii) An investigation should be undertaken to determine the maximum stocking rate in relation to water supply and availability of fodder during significant droughts.

Priorities for the Department of Livestock Development

The department of livestock development has indicated the following areas as suitable for livestock development, where enough grazing is available.

(i) Suguta valley
(ii) Kauro area
(iii) Kom area

To improve livestock production, watering points should be provided at adequate spacings in order to stop livestock travelling long distances in search for water. Ideally watering places should be provided at average spacing of 10 km to prevent overgrazing (desertification) at these points. A conflict may arise if a development programme would provide less than the required number. In that case desertification could take place which most times is irreversible. Availability of fodder during drought is also a constraining factor.

The department plans to establish livestock dip facilities in the following areas where water is needed:

(i) **Baragoi Division**: Lesirikan, Marti, S. Horr, Illaut, and Tum.

(ii) **Wamba Division**: Ngilai, Lodungokwe, Logotim

(iii) **Lorroki Division**: Opiroi, Ledero, Amaiya, Barsaloi, Malaso, Longewan and Ngukon.

Other areas which requires establishment of water points are:

(i) **Wamba Division**: Lesisia, Chapulo, Barsalinga, Lodosoit, Kilerra, Noolkuniyani.

(ii) **Baragoi Division**: Naiseecho, Kowop, Nachola, Nkoriche, Lokorkor, Suiyan, Latakweny, Arsim, Maseketa, Morijo.

(iii) **Lorroki Division**: Ongata Nanyukie, Losuk, Mbaringon, Logarati, Pura, Kirimun, Opiroi.

Comparing the 1978, 1983 (before drought) and 1985 (after drought) figure, it is apparent that the drought dealt a very big blow to the livestock population. Establishment of watering points strategically placed would improve the situation considerably, however during this drought fodder was also lacking for livestock to feed on.

Through good management the livestock carrying capacity of the land may be increased from the present level (1 LU per 20 ha) although recurring drought may limit this increase, not so much due to a lack of water but due to a lack of fodder on parched lands. More information is necessary.

4. DEPARTMENT OF EDUCATION

Present:

Mr. I.M. Hussein	- District Educational Officer (DEO)
Mr. Z.S. Matere	- Education Officer
Mr. E.C.M. Lekuchula	- District Primary School Inspector

Samburu District has a total of 77 Primary Schools of which 19 are low cost boarding Primary Schools where the children do not pay any fees. the District has 5 secondary schools. Two are in Lorroki, one in Baragoi and two in Wamba. (one Harambee and another missionary school for girls). According to the DEO, 40% of school age children attend the schools (14,252 children). The districts target in 1989 is to increase the figure to 50%.

The reasons given for the low enrolment as compared to other districts is the lack of adequate water supply. Children often go very far in search of water. In some cases the schools have had to be closed due to this water shortage. Another reason is the cultural conflict with the Samburu concerning economic viability of the children.

The Ministry of Education is running a School Feeding Programme where the children get one meal a day in the school (maize, beans vegetable oil).

The department has proposed to have 10 more boarding schools in order to increase the enrolment. This will have the advantage of having the children stay in schools while the parents are left free to migrate elsewhere looking for water and grazing for their livestock during the dry periods.

The Ministry of Education, through aid from the World Bank, has proposed to build a boarding Primary School in Barsaloi to cater for 600 pupils. Construction date is set for June 1988.

The Ministry has been able to construct water tanks in some schools so as to store rainwater (roof catchment) from Rural Development Funds whenever available.

The district has proposed the following strategies in order to increase the enrolment and reduce children absenteeism and drop-out rate, which are very high.

(i) Construct more boarding schools

(ii) Extend already existing schools with boarding facilities

(iii) Intensify the School Feeding Programme.

The main sources of water for schools are roof catchment, laggas, springs, and boreholes.

PRIORITIES:

Wamba Division

1. **Ndonyo-Uasin:** Presently local wells are used which do not supply adequate water during the dry season. Hence, a borehole and/or a dam should solve the problem of water.

2. **Swuari:** Currently local wells are used from Seiya (seasonal) river. A dam is necessary at this place since Seiya cannot provide a permanent solution to the water problem in the locality.

3. (i) **Ngutuk-Ongiron:** They use the permanent Ewaso Nyiro river. Hence, water is available
(ii) **Ngutuk-Elmuget:** } Reservoirs and a piping system to provide water
(iii) **Lpus-Leluai:** } can serve the three places well.

4. **Lkisin:** Only seasonal river wells are available. A borehole may be a better solution.

5. **Ngolgotim:** A far away rock-water catchment from Lorroki is used. A borehole may reduce the problem of water at that place.

6. **Lenkuasaka:** Local wells are used from Lenkuasaka seasonal river. A borehole may be a better solution.

7. **Nagor-Owuru:** Local wells are used from Nagor-Owuru seasonal river. Hence, a borehole will be better.

8. **Sere-Olipi:** The Police borehole is used but water is inadequate. An additional borehole with a water reservoir may reduce the problem.

9. **Oromodei:** Seasonal river wells are used. Establishment of a dam is required.

10. **Ndonyo-Elowarak:** Currently Lowarak dam is being used but an additional borehole would be better. Rehabilitation of Barsalinga borehole would help considerably.

11. **Engilae:** Water from Kichich river is used. However, a pump and water reservoir may improve the situation for the school and the community around.

12. **Nairimirimo:** A local pan is used and a quite far away local wells from seasonal streams. The expansion of the present pan to a dam will help greatly.

13. (i) **Barsaloi:** Well from Barsaloi seasonal river are used.
(ii) **Barati:** Boreholes can help these two institutions as well as the community around.

14. **Mbukoi:** New Proposal: - Supply can be improved by establishing a dam. At the moment they are relying on wells from seasonal streams.

Baragoi Division

1. **Illaut:** Presently local wells from the nearby river are used. A dam or a borehole may be better. Also water treatment should be introduced.

2. **Maseketa:** Currently local wells from Masikital seasonal river are used which are quite far. Hence, suggested establishment of dam.

3. **Latakweny:** Local wells from Latakweny seasonal stream are used. Hence, a borehole can serve a better purpose.

4. **Nalingangor:** Local wells from Baragoi river (seasonal). A borehole can serve the school and the community around.

5. **Ngilai:** A pan exists which is quite far away. It requires both scooping and expansion. A piping system should be constructed to take water to the primary school, including treatment.

6. **Marti:** Water from a nearby borehole is used. However, construction of water reservoir and improvement of piping system should increase supply considerably.

7. **Tuum:** Uses piped water from Mt. Nyiro. The piping system and the water source require improvements for adequate water supply to both the school and the Trading Centre.

8. **Lesirikan:** Uses Lesirikan solar propelled borehole which is quite salty. The school requires a water reservoir for water to be piped to it from the borehole. Rock water catchment is also possible in this area.

9. **Baragoi:** Uses the main town borehole however, the piping system requires some improvement to supply the school with adequate water.

Lorroki Division

1. **Morijo:** Unreliable local wells are used. A borehole or a dam is required.

2. **Suiyan:** Requires a borehole. Presently people travel great distances looking for water points, mostly local wells.

3. **Logorate:** Requires a borehole. Currently they are using local wells which do not provide sufficient water, especially during the dry season.

4. **Lpartuk (lower):** It requires a borehole. Presently the population fetches water from a far away seasonal river.

5. **Nonkeek:** Requires a borehole.

6. **Sura-Adoru:** Improvement of Sura-Adoru dam (scooping) and piping of water to the nearby primary school.

7. **Naiborkeju:** Improvement of the present borehole is required.

8. **Lorrok-Lolmongo:** Currently, they are getting water from Kisiaingud river which is quite far. Hence, a dam or a borehole would be required.

9. **Opiroi:** Require water rock catchment and/or a borehole.

10. (i) **Lemisigiyo:** }
(ii) **Seketet:** } All of them can be served by one big dam since
(iii) **Sawan:** } they are all in the same region.
(iv) **Lowa-oiting:** }

11. **Loosuk:** Currently, local wells from a seasonal stream are used. A dam and piping system with water reservoirs would be necessary.

12. **Loibornkare:** The present pan need be scooped for sufficient supply of water to the school and the community around, including construction of piping system.

13. **Tinga:** New Proposal - Use of water of the Tinga river is proposed for the community which settle in the area. The area has a high potential for crop production.

14. **Lolkunono:** Ngare-Narok river can be used by construction of intake pumps and piping system. Water needs to be treated.

15. **Nkopeliani:** Local wells are currently in use. A borehole or a dam is required.

16. (i) **Ngejuemuny** } Both require piped connection from Maralal Water
(ii) **Lkuroto** } Supply.

17. **Bauwa:** Has a borehole nearby. However, piping system need to be introduced.

18. **Lolmolog**: Requires a borehole. The local well which is currently used by the school and the community around requires a pump.

19. **Lorrok**: Require piping system using Lorrok dam including treatment of water.

20. **Kirimon**: There is adequate water source, only proper piping system and treatment is required.

21. **Nkorika**: Presently some local wells from their seasonal river is used. A dam is required.

22. **Ongata-Nanyuki**: Presently some reliable local wells are used which require improvements and pumps.

23. **Lonkewan**: It has a borehole which only requires proper maintenance. Also Lesiwo Borehole need to be revived.

24. **Lpus**: New Proposal - A dam is required using the Lketuloui river.

25. **Amaiya**: A river is nearby; piping and pumping systems are required. Water should also be treated.

26. **Lodokejek**: Piping system needs to be improved.

27. (i) **Loikas** :
    (ii) **Milimani** : All of them are town schools which use piped water
    (iii) **Muslim** : From Maralal water supply.

28. (i) **Ledero** : Both require a dam and piped water to the two primary
    (ii) **Morijoi** : schools

29. (i) **Loruk** : Both require piped water from Maralal Water Supply.
    (ii) **Ngari** :

30. **Kitobor**: Requires a borehole. Currently the school and the community around use local wells from the nearby seasonal river.

31. **Mugur**: Currently the locals are using river wells which are quite far. Hence, establishment of a dam is required.

32. **Nontoto**: There is a dam nearby which requires proper maintenance. Water to be piped to the nearby school - (Nontoto Primary).

33. **Moru**: Requires a borehole or a dam.

The above school locations are, for each District, listed in order of priority.

5. FORESTRY

Present:

E.K. Ambune - District Forest Officer
S.G. Ihure - Assistant D.F.O

Gazetted Forests of Kenya: Survey Section Forest Department, Karura, Nairobi, (maps 1:100,000, 1:50,000) from Survey of Kenya

Samburu has a large forest area: 328,806.5 ha (Nyiro 45,931; Ndoto 97,1649; Lorroki 91,944; Mathews 93,765) which represents about 15% of the District.

Forests are the main source of permanent water - Mathews Range (Kichich), South Horr Spring).

The main purpose of forests is for water catchment of rainfall. Forests also include grasslands. Forests are more for conservation rather than exploitation (including game). Wood production has recently been limited for conservation purposes. District demand should be satisfied.

There are 3 forest stations:

- Maralal looking after Lorroki
- South Horr looking after Ndoto and Nyiru
- Wamba looking after Mathews Range

Main Tasks: (Forest Extension Officer)

- Boundary clearing
- Fire protection (fire breaks)
- Access Roads

Reopening of Substations

2 sub-stations - Under Maralal: Poro (Borehole, water)
: Lodokojek (no water)

2 sub-stations - Under Wamba (not enough water) : Kichich (water)

2 sub-stations - Under South Horr (not enough water): Tuum

- Ndoto (not decided)

Where no borehole is available D.F.O. intends to use roof catchments.

Forest boundaries are marked by beacons. Grazing is only allowed by permission and people pay for it. In Poro area 10 ha. have been planted. Rural Afforestation Extension Service consists of involving people, Chiefs, schools etc. in conservation measures (afforestation, nurseries etc) for water protection in critical areas outside forests.

Nurseries often fail due to lack of water, labour and funds.

Some degradation of forests occur due to man-made fires. Reasons: Destruction of trees to create more grassland (grazing undermines forests), Beekeeping, Money collection.

6. MINISTRY OF TOURISM AND WILDLIFE

Present:

G. Okelo - Game Warden
J.K. Kimani - Assistant Warden

Development Plan

Priority

1 a) Poro: Stagnant surface water. Borehole recommended for Game Camp.

b) Losuk (Loosuk): Game camp. Borehole more suitable as existing wells get contaminated easily. Springs available.

c) Baawa: Has pump, borehole, dam. o.k

2. Lodungokwe: Pan, Borehole, piped supply. ASAL project. Old Game Camp. New camp proposed.

Barsaloi: Sub-surface Dam in river (lagga). Diocese of Marsabit is drilling in Serolevi, Londungukwe, Westgate, Lodorojak.

3. Illaut: Temporary camp, Administrative Police, lagga, needs subsurface dam or borehole.

South Horr: Permanent river exists, SIDA has financed the piping of the water supply

Maralal } water supply ok
Suguta Marmar } permanent spring

Serolevi: 4 boreholes, 1 for mission, 2 for NYS and the last one for Police

Wamba: Dam in forest near Game Camp. Water catchment destroyed by livestock, situation can be improved by another borehole, more tanks and preventing cattle from going near source. Dam in Town.

Samburu Lodge: 1 borehole existing at Westgate of Samburu Reserve and 1 borehole existing at Maralal Lodge which is also in supplied from Dam.

Areas to open for tourism in next 5 years:

Baawa - water available

Arsim - Dug well, mission uses solar power

Poro - Tented Camps

Ngilai - Ngeny river (permanent)

Baragoi - Borehole for Town (MoWD)

Nkoromit - Water from Ndoto mountains at South Horr through gravity

All new Tented Camps are to be next to Game or Forest Reserves: Samburu Game Reserve, Maralal

Malacie Valley: Proposed Game Reserve, state land reserved for military purposes

Kenya Rhino Rescue Project

Ngilai - Tented Camp - Rhinos concentrated in Kichich and 3 other locations Boreholes are proposed at perimeter (Ngeny Valley) to ease livestock and human migration to this area to protect Rhinos.

Organisations developing water are Diocese of Marsabit, World Vision etc.

Game is willing to look for funds from various donor agencies if they are given estimates for construction of boreholes.

Rough Estimate: Kshs. 3000/- to 3500/- per metre depth in remote areas by private contractor (boreholes only). Handpump is Ksh 50,000/-. In some areas drilling at cost price is Ksh. 1200/- p.m (Foster Parents - borehole driller)

Samburu District lodges - 200 l/person/day maximum 40 beds for game lodges.

Kenya has opened bird hunting (Game birds)

7. PRISONS

Present:

Mr. C.M. Gacharia (Chief Officer I) - Officer in charge (G.K. Prison)

Mr. J.K. Mugo (Chief Officer II) - Deputy Officer in charge

The Maralal Prison is the only one in the District.

The prison has a 500 acre shamba about 10 km south of Maralal. 4.5 acres are used to grow fruits (700 citrus trees). 5 Acres of the farm are under irrigation, growing horticultural crops.

700 citrus trees x 8 litres/tree/day = 5.6 m^3/day.

It is important to train prisoners in farming and food sufficiency.

In future the prison plans to move to the farm.

DCU5 built the present dam on the farm. During the dry season it has very little water. The problem is further compounded by animals also consuming the water. Another dam (Mulamula) exists near Kisima.

The prison would like another dam and a borehole.

8. POLICE

Present:

Mr. J.N. Nyaga - Officer Commander Police Division (OCPD) in Samburu

District Police Plan

7 police units under 2 major police stations

1. Maralal Police Station:
   - i) Kirimun (spring)
   - ii) Suguta Marmar (springs)
   - iii) Marti (water problem)
   - iv) Baragoi (no problem)

   Marti (Police Post) - Trading Centre. Water tankers used to alienate the acute water problem.

2. Wamba Police station:
   - i) Serolevi (Sere Olipi), water problem
   - ii) Archer's Post

Additional information:

Serolevi borehole next to a lagga. Pump breaks down often. Water tankers are used when pump breaks down, although the water available is not enough.

Archers Post: Water available, piping requires funds. Engine break-down occurs quite often.

9. AGRICULTURE

Present:

Mr. A.M. Ndambuki - District Agricultural Officer
Mr. P.M. Kimwelle - District Crops Officer

According to Agriculture, Samburu has 26,000 ha of arable land. This only accounts for 1% of the district. The areas with high agricultural potential are located in Lorroki Division. Elsewhere in the district the soils are fragile, infertile and are likely to be destroyed by cropping.

The following areas have high potential for rainfed agriculture.

Area	Acreage (Ha)	Rainfall
Poro	6,000	over 1,000 mm
Losuk	6,000	over 1,000 mm
Lonkewan	8,000	800 -1,000 mm
Baawa	5,000	700 mm
Ongata Nanyuki	1,000	over 1,000 mm

Another source (tourism and wildlife) gives as arable land (high potential) 14,000 ha and low potential 16,200 ha (Lorroki Division)

Small scale irrigation is done in Amaya (20 Ha) and South Horr.

Land is owned by Group Ranches and any one wishing to go into farming must get authority from all members of group. Generally the group ranch owners feel that farming destroys the grass for livestock.

There are about 650 local farmers, whose plots average between 1-2 ha. Sorghum and millet which are drought-resistant crops can be grown but animals and bird destruction is very high. During the dry season, grazing is done in the areas which have high agricultural potential which creates a conflict between farms and livestock. The district is putting much emphasis on the growing of subsistence crops for food.

Rainfed wheat growing is practised in the highland area. The staple food for the Samburu are maize and beans. Local farmers have very small plots under agriculture mainly due to:

(i) Animal and bird destruction
(ii) Lack of agricultural machinery
(iii) Lack of strong fencing on their plots
(iv) Lack of inputs (fertilizers, seeds etc)
(v) Land ownership
(vi) Lack of modern agricultural technology

The department intends to use irrigation as a way of increasing food production but due to the large amounts of water required for irrigation (l litre/sec/ha), use of ground water becomes virtually impossible.

The department has also requested boreholes downstream of Amaiya irrigation scheme which can be used by the people and livestock during low flows, and also in the high potential areas for human and livestock use.

Ewaso Ngiro and Amaya are the two major rivers which can be used for irrigation in the district.

10. MINISTRY OF WATER DEVELOPMENT

Present:

Mr. G.M. Mburugu - District Water Engineer, DWE
Mr. Kariuki - Deputy
Mr. Kariuki - Geologist

A survey was executed by DWE in the locations and sub-locations. The following list are the priorities as registered from the Chiefs on the locations in the District.

They include:

Baragoi Division	Lorroki Division	Wamba Division
1. Kowop	1. Losuk Trading Centre	1. Wamba Town
2. Loenti	2. Off Losuk Springs	2. Namanyarobo
3. Nkoriche	3. Opiroi	3. Nairimirimo
4. Loigurio	4. Pura	4. Noolkuniyani
5. Maseketa	5. Suguta Marmar	5. Serolevi
6. Nakamario	6. Mbaringon	6. Merille
7. Morulan	7. Raraita	7. Donyo-Uasin
8. Kongold	8. Morijo	8. Barsalinga
9. Soitogokuyu	9. Barsaloi	9. Kipsing
10. Nachola	10. Ongata-Nanyuki	10. Naisunyai
11. Nkoromit	11. Kirimun	11. Lengei
12. Latakweny	12. Lemisigiyoi	12. Nagoruoguru
	13. Ledero	

These are the requested water points. The type of source available or possible is dependant on subsequent surveys.

Table A12.1 Priorities for improvement of water supplies (compiled from information provided by the District administration)

BARAGOI DIVISION

LOCALITY	Department priorities	Conclusions from WRAP reconnaissance survey
Latakweny	clweh	Dam, poor water quality; laga; bad access
Lesirikan	cleh	Borehole, saline water; dam; Forest Dept. uses spring
Illaut	clge	Masonry wells in laga
Masiketa	clwe	Laga, low potential
Tuum	lehf	Spring, good supply
Marti	lehp	Borehole
Barsaloi	lweh	(Mission) abandoned borehole, laga
Embukoi	cwe	Abandoned, proposal for a dam
South Horr	lgf	Spring, adequate supply
Kowop	clw	Borehole, abandoned
Nachola	clw	Laga
Nkoriche	lw	Dam
Suiyian	le	Laga, low potential
Arsim	lg	Laga, good supply
Naiseecho	cl	Natural sub-surface dam, saline water
Baragoi	ep	Town borehole functioning, but inadequate in future
Soito Elkokoyo	w	Dam
Loigurio	w	No access
Mpatpat	c	Abandoned, lagas are far
Soito ol Payani	c	Laga; dam, but often dry
Lokorkor	l	No source of water
Nalingongor	e	
Ngilai	e	Pan exists, but far; new dam
Nkoromit	g	Springs
Morulan	w	Laga, low potential
Loenti	w	Laga, bad access (near Latakweny)
Sharda		No priorities given; dam; abandoned borehole
Ntipaku		No priorities given, but no water source
Longolol		No priorities given; laga
Kongold	w	Location not known
Nakamario	w	Location not known
Ilkerrai		No priorities given
Ntiil		No priorities given

Explanation:

c = County Council
l = Livestock
w = Water
e = Education
h = Health
f = Forestry
a = Agriculture
g = Tourism and Wildlife
p = Police / Prisons

Table A12.1 (Cont.) Priorities for improvement of water supplies (compiled from information provided by the District administration)

LORROKI DIVISION

LOCALITY	Department priorities	Conclusions from WRAP reconnaissance survey
Losuk	clwgeh	High potential area, springs
Morijo	clweh	Dug wells
Ledero	clwep	Proposed centre
Ongata Nanyuki	clwe	Large population, dug wells (no access)
Opiroi	clwe	Springs (?)
Kirimun	lwep	Sufficient water available
Logorati	cle	Dug wells, dam (quality problem)
Mbaringon	clw	Large population (?), handpump not working
Pura	clw	Proposed centre, bad access
Lemisigiyo	cwe	Water problem
Poror	ghf	Surface water (dam, quality problem)
Lodungokwe	lgh	Pan, borehole (ASAL)
Nonkeek	ce	Proposed centre, bad access
Sora Adoru	ce	Proposed centre, dam exists
Ongata Naibor Keju	ce	Proposed centre, borehole exists
Lodo Kejek	ef	Sufficient water available (borehole, river)
Bauwa	ge	Dam silted, borehole
Amaya	le	Sufficient water available
Lonkewan	le	Borehole, needs maintenance
Sukuta Marmar	wp	Spring
Sirata Oirobi	h	Borehole
Malaro	l	
Ngukon	l	
Lorrok-Lolmongo	e	Kisiaingud river, but far
Lorrok	e	Dam
Lpus	e	Lketuloui river
Enkeju Muny/Lkuroto	e	Near Maralal
Mugur	e	Dug wells, far
Lpartuk	e	River, but far
Nontoto	e	Dam
Moru	e	
Nkopeliani	e	Dug wells
Nkorika	e	Dug wells
Tinga	e	New centre, Tinga river
Lolmolog	e	Dug well
Loruk/Ngari	e	Near Maralal
Lolkunono	e	Ngare-Narok river
Loibornkare	e	Pan
Kitobor	e	Dug wells
Maralal	District Capital	
Kisima	Water supply under construction	

Explanation:

c = County Council
l = Livestock
w = Water
e = Education
h = Health
f = Forestry
a = Agriculture
g = Tourism and Wildlife
p = Police / Prisons

Table A12.1 (Cont.) Priorities for improvement of water supplies (compiled from information provided by the District administration)

WAMBA DIVISION

LOCALITY	Department priorities	Conclusions from WRAP reconnaissance survey
Ngilai	clge	Faults
Nairimirimo	cwe	Thick overburden
Noolkuniyani	clw	Site with varying conditions
Barsalinga	clw	Ewaso Nyiro
Wamba	cwh	Major faults
Lengei	cw	Faults, graben
Raraita	cw	
Swuari	ce	Lagas, few faults
Logotim	l	
Kilerra	l	
Kipsing	w	Location not known
Ngare Narok	g	Not accessible
Kichich	g	Inside forest
Engilae	e	
Ngolgotim	e	
Ndonyo-Elowarak	e	
Lkisin	e	
Oromodei	e	

WASO DIVISION

LOCALITY	Department priorities	Conclusions from WRAP reconnaissance survey
Serolevi	wgehp	One borehole for police
Doinyo Uasin	cwe	Major faults, existing borehole
Namanyarobo	cw	Dam, faults
Kauro	cl	Big laga
Kom	cl	No access (not visited)
Larisoro	c	Lagas, some faulting
Lodosoit	l	no access
Chapulo	l	Faults
Losesia	l	Laga, few manyattas
Naisunyai	w	Big dam, faults
Merille	w	Laga, 4 abandoned boreholes
Murit	g	
Sera	c	
Naguruoguru	we	(Ngotogongoron?) Ewaso Nyiro
Lenkuasaka	e	
West Gate	h	
Lerata		Working borehole

Explanation:

c = County Council
l = Livestock
w = Water
e = Education
h = Health
f = Forestry
a = Agriculture
g = Tourism and Wildlife
p = Police / Prisons