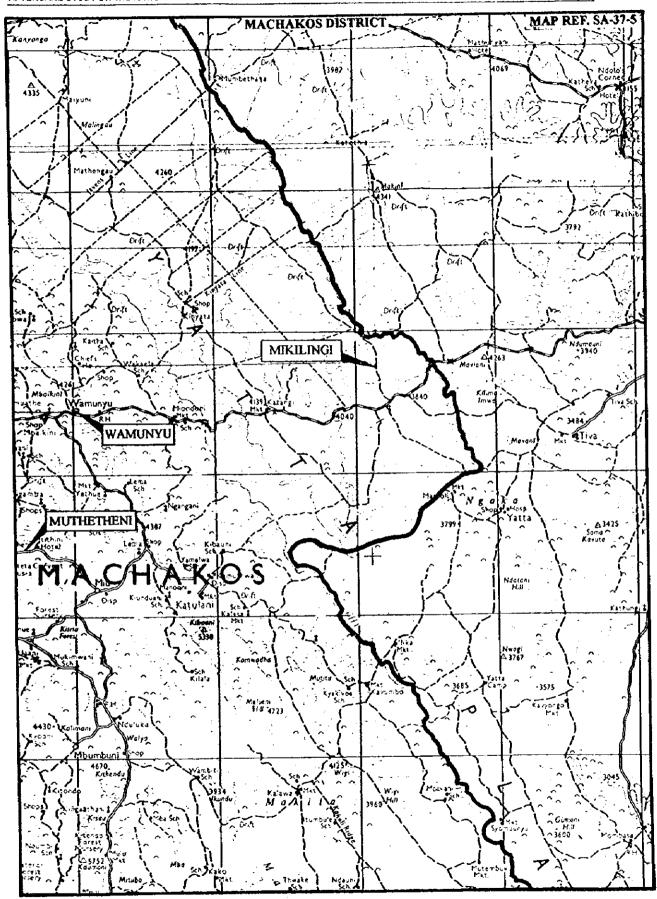
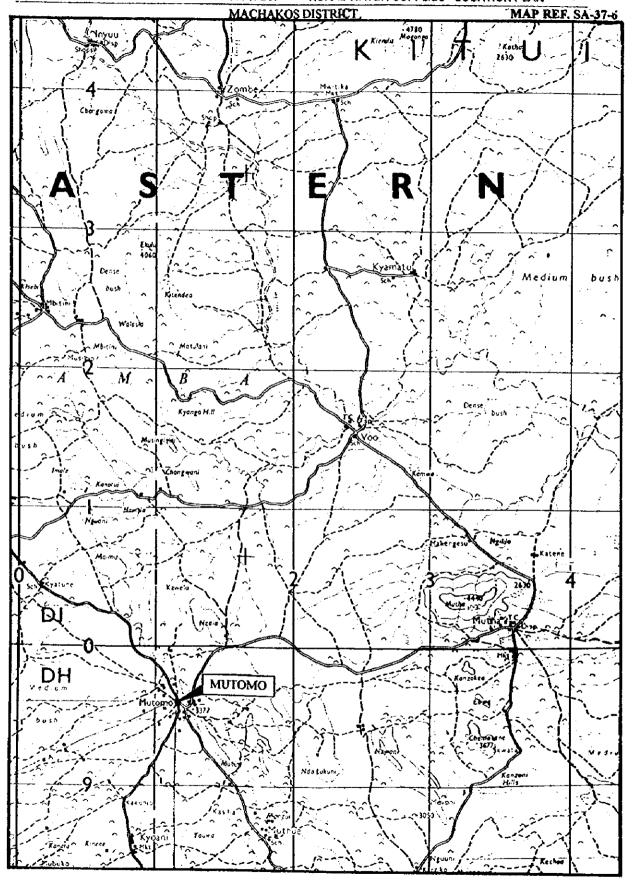
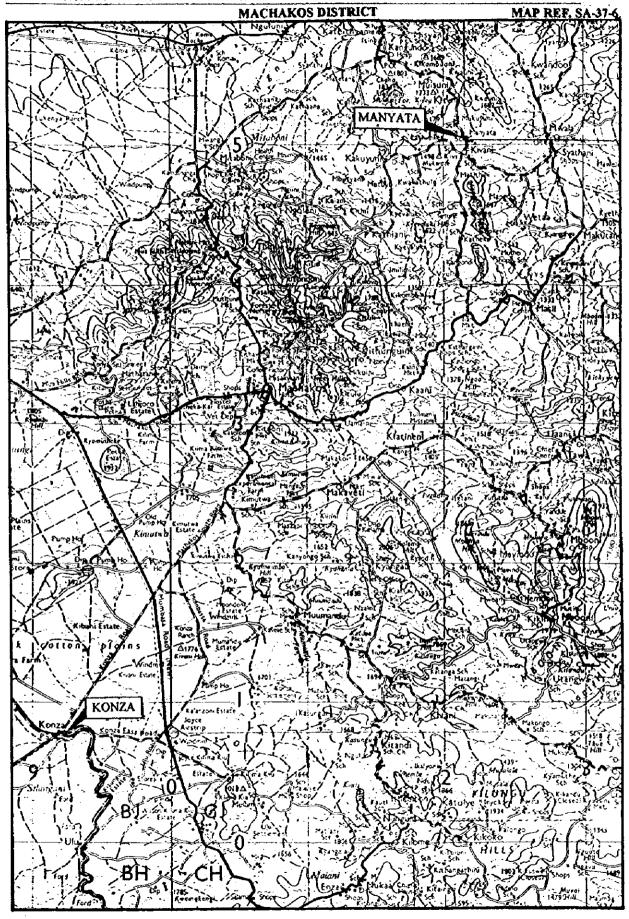


BARATON (1/1)

Name of Rural water Supply:	Baraton		Location / D	istrict:	Nandi	
Control of the contro						
Organisation / Water Undertake	r: University of	f EA Baraton		Map Ref		
Drainage Sub Basin				_Co- Ords.	<u>X:</u>	<u>Y:</u>
Construction Details						
Year of Construction	Phase I:	1988	Phase II:	1990	Phase III	1998
Constructed By:	Contract		Funded By:	Seventh D	ay Adv. Miss	ion
Total Construction Cost	N/A					
Year Operation Started:	N/A		***	_		
Existing Facilities						
Water source:	Kimondi river,	Spring and B/I	iole	Inlake Fa	cilities	Weir/B-hole
Raw Water Transmission	Pumping					
Treatment Facilities	1 No. Recevir	ng basin, 1 No.	Mixing chamb	er, 2 No. Se	dimentation b	asins,
	2 No. Rapid	sand filters and	i 1 No. Clear w	vater tanks		
Chemicals Dosed	Chiorine, Alun	n,Soda ash				
Master Meter Details	None					
Distribution Mains	Diameter	100mm				
	Length	1km				
	Materials	UPVC				
		· · · · · · · · · · · · · · · · · · ·		<u> </u>		
Service Reservoirs	1 No.	1200m³ eleva	ted R.C. tank	T		
Pump Details	·	or raw water, Q		,	oumos. 1 No.	borehole
	pump (not op					
Customer Details	Pania Charac					·····
Households Served	Members	Other H.H's	Total	7		
	135		135			
Customers Metered	yes	_	Metered	_	Unmetered	d 85
Costomers Wetered	100	_	Welcica		_ 0111110101010	
Operation & Maintenance		Production	H.H Served	7		
Water Production	1993	300m³/d	127	-1		
TYBIC TIOUCKOT	1"	300m ³ /d	130	ግ		
		350m³/d				
		350m³/d	135	7		
	-	350m ³ /d	135	1		
W. 6			135	+	I	ח
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	-
	Information u	navailable	<u> </u>	J		_]
Problems / Future Expansion						
This ia a University of East Africa, E	laraton institution	nal scheme, bu	t it serves the .	surrounding	communities	also
1. Borehole source is not operational	al due to financia	l constraints				
2. Alum and Chlorine dosing is not L	eing properly do	ne as dosers a	re not working	}		
3. The scheme was adversely affect	ted by the El-Ni	no floods				
· · · · · · · · · · · · · · · · · ·						







WAMUNYU (1/1)

Name of Rural water Supply:	Wamunyu		Location / Di	strict:	Machakos	
Organisation / Water Undertake		MOWR	,	Map Ref		
Drainage Sub Basin		· · · · · · · · · · · · · · · · · · ·		Co- Ords.	X:	Y:
Construction Details						
Year of Construction	Phase I:	1973-75	Phase II:		Phase III	
Constructed By:	MOWR		Funded By:	MOWR	•	
Total Construction Cost	Approx. Ksh 4	15,000,000				
Year Operation Started:	1975			-		
Existing Facilities				-		
Water source:	Athi River at N	ldeini		Intake Fac	odities:	intake bo.
Raw Water Transmission	Pumping 150mm G.S pipe 100m long					
Treatment Facilities	Full treatment					
Chemicals Dosed	Alum, Soda a	sh, Chlorine do	sing as per tes	ts carried ou	ıt on site	
Master Meter Details	Meter in good	d condition	,	,		
Distribution Mains	Diameter	150-37mm	100-37mm	50-37mm	37-25mm	<u> </u>
	Length	8,5 km	11 km	4 km	3.8 km	<u> </u>
	Materials	uPVC	υPVC	uPVC	uPVC	
Service Reservoirs Pump Details	• • • • • • • • • • • • • • • • • • • •	0m ³ and 2x25 pumps each 0				
Customer Details						 -
Households Served	Members	Other H.H's	Total]		
	300	<u> </u>	300]		
Customers Metered	No/Yes	•	Metered	about 150	Unmetered	about 150
Operation & Maintenance		Production	H.H Served	1		
Water Production	1993	300m³/d	N/A	1		
	1	252m³/d	N/A	Service A	rea about 1	2m²
	1995	1542m³/d	N/A	1		
		4310m³/d	N/A	1		
	1997			1		
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	1
·	70%	20%			100%	1
Problems / Future Expansion	n/Remarks					-
Problems include:						
1. Frequent bursts in rising main						
 Frequent bursts in rising main Old pumps require frequent repair 	irs. This affects	the continuity	of supply			
		****		·d		

KONZA (1/1)

General						
Name of Rural water Supply:	Konza		Location / Di		Machako	
Organisation / Water Undertak	e <u>r: (</u>	Community				
Drainage Sub Basin				_Co-Ords	<u>X:</u>	<u>Y:</u>
Construction Details						
Year of Construction	Phase I:	1968-92	Phase II:		Phase III	
Constructed By:	MOWR/ Conta	arctor	Funded By:	MOWR		
Total Construction Cost	Ksh. 724,691,	000				
Year Operation Started:	1968- Boreh	oles; then Ne	ol Turesh afte	er 1992		
Existing Facilitles						
Water source:	Before 1992- l	Borehole, later _i	ojpe off-take	_Intake Facilities: <u>pipe off-tal</u>		
	from Not Ture:					
Raw Water Transmission	Now Gravity					
Treatment Facilities	Nol Turesh Ti	reatment work	\$			
Chemicals Dosed	Chlorinated su	ipply from Not	Turesh			
Master Meter Details	None					
Distribution Mains	Diameter	75mm-63mm			<u> </u>	<u> </u>
• • • • • • • • • • • • • • • • • • • •	Length	7.74 km				
	F	G.I. and uPVC	<u></u> -			
Service Reservoirs	No storage fo	r Nol Turesh s	upply			
Pump Details			adequate press	ure		
) unp betaile	140 80,118 13					
Customer Details						·
Households Served	Members	Other H.H's	Total	7		
Households der red	N/A		N/A	7		
Customers Metered	Yes		Metered	_	Unmete	red
Crizioliteiz Meterer	100	-		nisations a	— nd instituti	ions are meter
Operation & Maintenance		Production	H.H Served			is about 3500
Water Production	1993				y kiosks	
Water Floddotton	1994					out 25m²
	<u> </u>	358m³/d		includin		
	1996			7	3 /	
	1997					
114 to 0	Domestic	Institutional	Irrigation	Others	Tota!	7
Water Consumption				0.11010	100	<u>,</u>
	80%		°	l	100	<u></u>
Problems / Future Expansi		;				
Distribution system needs important						
2. Nol Turesh Supply is not reliab	ile. A standby bo	rehole supply	should therefor	re be develo	ped	<u> </u>
					 -	
				—- — -		

MUTHETHENI DAM W/S (1/1)

General						
Name of Rural water Supply:	<u>Muthetheni Da</u>		Location / D		Machako	\$
Organisation / Water Undertak	(e <u>r:</u>	Muthetheni (Community	•		
Drainage Sub Basin				_Co-Ords.	<u>X:</u>	Y:
Construction Details						
Year of Construction	Phase I:	1984	Phase II:		Phase III	
Constructed By:	MOWRANIDP		Funded By:	MIDP (Mac	hakos Inte	grated
Total Construction Cost	Ksh. 15,000,0	00		Developm	nent Progi	ramme)
Year Operation Started:	1985			_		
Existing Facilities	-					
Water source:	Dam on Kyeth	ivu stream		Intake Fac	cilities:	Chambe
Raw Water Transmission	Pumping 75m	m dia, uPVC 3	km long to ele	valed tank o	n Mbaani F	1iil
Treatment Facilities	None					
Chemicals Dosed	None			<u>. </u>		
Master Meter Details	1 No. located	at pump outlet				
Distribution Mains	Diameter	100mm-60mm	1	}		
	Length	13km				
	Materials	uPVC			<u> </u>	
Service Reservoirs	1 Alo Engilo	nd 4No. 25m ³	tanka	 		Τ
Pump Details				1	<u> </u>	
rump veass	3 No. pumps	coupled to dies	ei Ester engin	es. Only 1 No	o, is operai	ang
Customer Details						
Households Served	Members	Other H.H's	Total			
	9000 people		9000 people a	– and domestic	animals	
Customers Metered	Yes		Metered	_	Unmeter	ed
		•		Informatio	- on not ava	ilable
Operation & Maintenance		Production	H.H Served]		
Water Production	1993			1		
	1994			Service A	vea abou	t 12m²
	1995	100m³/d	N/A	19 No. ki	osks sell i	water
		100m³/d	N/A	to the pul		
		100m³/d	N/A	1		
Water Consumption		Institutional	Irrigation	Others	Total	η
, and a final of the first of t	95%	5%	guillet	10	100%	
Problems / Future Expansion	h	070	4	٠	1 10/	:1
Treatment required						
2. There is lack of trained operator						
3. Engines and pumps need repai	r					
4. The rising main needs augment	lation					

MUTHETHENI GIRLS INSTITUTE (1/1)

<u>General</u>						
Name of Rural water Supply:	Muthetheni Girl	s Institute	Location / Di		Machakos	
Organisation / Water Undertake	er: <i>1</i>	nstitution		Map Ref		
Drainage Sub Basin				Co- Ords.	X:	Y:
Construction Details						
Year of Construction	Phase 1:	1958	Phase II:	1972	Phase III	
Constructed By:	Initially Catholic	c Mission	Funded By:	Catholic fati	her	
Total Construction Cost	Unknown			_		
Year Operation Started:	1958			~		
Existing Facilities						
Water source:	3 No. Borehole	·s	<u> </u>	_Intake Fac	:ilities:	B/Hole
Raw Water Transmission	2 No. pumps o	ne at Institutio	n, one at Siste	rs' residence	<u></u>	
Treatment Facilities	None. Only dri	nking water is	boiled			<u> </u>
Chemicals Dosed	None					
Master Meter Details	None					-γ
Distribution Mains	Diameter	50mm-12mm		<u> </u>		<u> </u>
	Length	750m				
	Materials	G.S	<u> </u>	<u> </u>	<u> </u>	
Service Reservoirs	1 No. elevated	i steel tank 8n	1 No. com	igated and o	ther small do	mestic tanks
Pump Details			y two working:			
· omp Dotters						
Customer Details						
Households Served	Members	Other H.H's	Total	_		
(population)	860		860	students	and staff	
Customers Metered	No		Metered		_Unmetere	d <u>All</u>
Operation & Maintenance		Production	H.H Served]		
Water Production	1993			_		
	1994			No recor	ds of produ	iction
	1995			are kept		
	1996					
	1997					 -
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	
Trater Conscinption	90%		49	% 6%	100	%
Problems / Future Expansion						
The supply is entirely for institut			ontributions fro	m parents of	students	
2. It ios well run but needs at leas				ood tasuame	ent the sunn	
3. The institution is in the course of						
4. There is a separate water supp	oly for the surrou	inding commu	nity - see detai	is under Mul	nemeni pam	·

MEKILINGI W/S (1/1)

General							
Name of Rural water Supply:	.Mekilingi W/S	3	Location / Di	istrict:	Machakos		
Organisation / Water Undertake	e <u>r: </u>	Community	· · · · · · · · · · · · · · · · · · ·	Map Ref			
Drainage Sub Basin				Co- Ords	. <u>X:</u>	<u>Y:</u>	
Construction Details							
Year of Construction	Phase I:	1981	Phase II:	1984	Phase III		
Constructed By:	MIDP(Mach	akos integrat	Funded By:	MOWREE	c		
Total Construction Cost	Ksh 6,950,00	0		MIDP- Ma	achakos In	itegrated	
Year Operation Started:	1983			Development Programme			
Existing Facilities							
Water source:	Mekilingi river	,		Intake Fa	Intake Facilities: Dam		
Raw Water Transmission	Gravity150mi	n UPVC pipe -	4189m long The	e dam has u	iseful storag	e of 100,000m ³	
Treatment Facilities	No treatment	(Partial filtration	n at dam intake	not function	ing due to s	iltation)	
Chemicals Dosed	None						
Master Meter Details	N/A			.	,		
Distribution Mains	Diameter	75mm	63mm	50mm	40mm	32mm	
	Length	3,155.m	21,038m	7,580m	7,193m	5,600m	
	Materials	UPVC/GS	UPVC/GS	UPVC/GS	uPVC 'D'	uPVC E	
Pump Details		iesel engines c broken down				5Vs H=135m	
Customer Details				ו			
Households Served	Members	Other H.H's		1			
(population)	10,000		10,000	J			
Customers Metered	Yes	-	Metered		Unmeter		
Operation 9 Maintenance		In. t. e.	luuo (Informatio 1	on not avai	lable	
Operation & Maintenance		Production	H.H Served				
Water Production		100m³/d	15	1			
		100m ³ /d	16				
		120m³/d	1	1		kiosks- 400 person	
		124m³/d	18	are serve	ď		
Water Canana Can	1997			0.1		1	
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	}	
Problems / Future Expansion	45%	40%	L	15%	100%]	
Problems include:	i nemaiks						
					<u> </u>		
Lack of funds for purchasing of r.			e on e broken d	own beyond	economica	l repair	
2. Lack of funds to overhaul pumps	et currently in t	use					
3. Water quality is very poor. Treats	ment is urgently	required				····	
4. The partial filtration system and o	lam scour are e	ologged. Desilta	ation is necessa	агу			
Future expansion is not envisaged	as the system	is good apart fr	om the problem	ns outlined a	above		

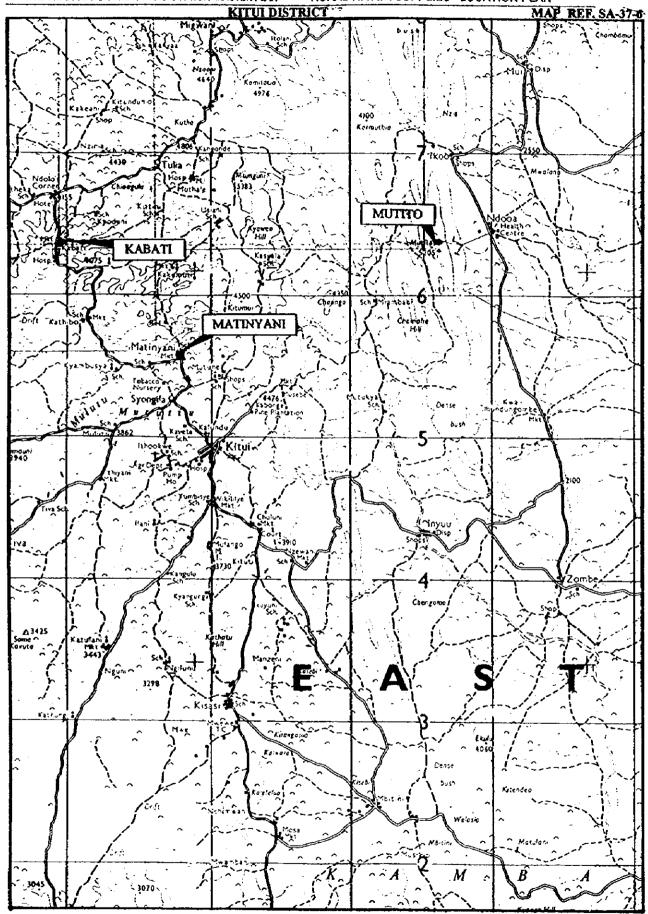
MANYATTA W/S (1/1)

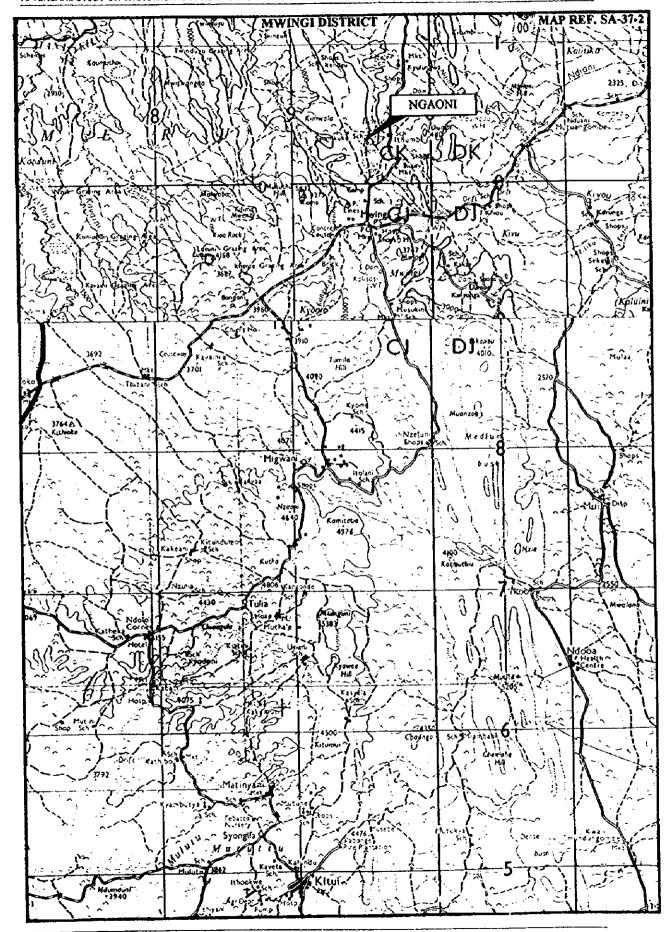
Rural Water Supply System Survey

General							
Name of Rural water Supply:	Manyatta W/S		Location / District: Machakos				
Organisation / Water Undertak	et: Manyatta Se	condary Schoo		Map Ref			
Drainage Sub Basin				Co- Ords.	X:	Y:	
Construction Details							
Year of Construction	Phase I: 1984	-1985	Phase II: 198	8 - Extensio	n to public kio	sk	
Constructed By:	School		Funded By:	MOWD + S	eif Help		
Total Construction Cost	KShs. 1,700,0	00		Originally public were allowed to use			
Year Operation Started:1996	1985			this supply. As they do not share the			
Existing Facilities				expenses, the kiosk supply is cut off			
Water source: Borehole C3066	Borehole at Ky	aana River		Intake Fac	cilities: <i>Boreh</i>	ole	
Raw Water Transmission	Pumping 75mi	n dia uPVC pi	pe about 1 km	long to stora	age tank		
Treatment Facilities	None - only dis	infection					
							
Chemicals Dosed	Only chlorine a	about 2 kg chk	lay				
Master Meter Details							
Distribution Mains	Diameter	50mm					
	Length	150m to Scho	ol				
	Materials	uPVC				<u> </u>	
Service Reservoirs	1 No. 100 m ³	masonny (1 N	lo. + 65 m³ for	rain water c	roflection)		
Pump Details	None on distri						
, -							
Customer Details				_			
Households Served	Members	Other H.H's	Total]			
,,	Only School p	opulation	500	1			
Customers Metered	Yes / No		Metered	No	Unmetered	Yes	
		•					
Operation & Maintenance		Production	H.H Served				
Water Production	1993		Ī	1			
***************************************	1994	100 m³/d					
		100 m³/d	-				
		100 m³/d	1.	1			
		100 m³/d	1.	7			
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	7	
water Consumption	Donneste	100%		1	100%	6	

Problems / Future Expansion / Remarks

- Replacement of generator diesel engine for borehole
 Chlorination required





NGUNI W/S (1/1)

Rural Water Supply System Survey

General					Maril District	
Name of Rural water Supply:	Nguni Water S				Kitul District	A 27 2
Organisation / Water Undertak	er: Ministry of	Nater Resou	rces		1:250,000 - 5	
Drainage Sub Basin				Co- Ords	X: 38° 19 E	Y: 01°48'S
Construction Details			`		A11	
Year of Construction	Phase I:	1981-1983	Phase II:		Phase III	
Constructed By:	MOWR		Funded By:	<u>MOWR</u>		
Total Construction Cost	2.0 million (19)	31)		- .		
Year Operation Started:	1983			_		
Existing Facilities						
Water source:	Hand dug wel	on River En	ziu's bank	_Intake Fa	acilities:	Direct abstract
Raw Water Transmission	Pumping - so	ithern cross j	pump - 5 m³/hr			
Treatment Facilities	None			· · · · · · · · · · · · · · · · · · ·		
Chemicals Dosed	None					
Master Meter Details	No master m	eter				
Distribution Mains	Diameter	40mm			_	_
	Length	5 km			- 	
	Materials	GI				
Service Reservoirs	1 No. 50 m ³	masonry tan	k + 2 No. 7 m³	elevated tar	nks	
Pump Details						
• • • • • • • • • • • • • • • • • • • •						
Customer Details				 7		
Households Served	Members	Other H.I-	i's Total	_		
•••	120 HHs	<u> </u>	80 200 HHs			
Customers Metered	Yes / No		Metered		Unmetere	ed
G G G G G G G G G G						
Operation & Maintenance		Productio	n H.H.Serve	∌ત		
Water Production	199	3				
reater a todactors	199	4				
	199					
	199			_]		
	199					
Water Consumption	Domestic	Institution	nal Irrigation	Others	Total	
Trater Consumption	1-31,1-21,0			- I	1	0%

Problems / Future Expansion / Remarks

Nguni Water Supply was abandoned some time in 1984 due to high sulphide content of the borehole water. The above details were as of when the supply was operational. For future, a new borehole(s) need to be drilled to produce 150 m^3/d

MUTOMO W/\$ (1/1)

Rural Water Supply System Survey

General								
Name of Rural water Supply:	Mutemo Water	r Supply	Location / Di	strict:	Kitui District			
Organisation / Water Undertake	r: Ministry of	Water Resourc	es	Map Ref.	1:250,000 - S.	4-37-6		
Drainage Sub Basin				Co- Ords.	X: 38° 12 E	Y: 01°51'S		
Construction Details								
Year of Construction	Phase I:	1973	Phase II:	1976	Phase III			
Constructed By:	MOWR		Funded By:	MOWR				
Total Construction Cost				_				
Year Operation Started:	1976							
Existing Facilities								
Water source:	Tira Borehole			Intake Fa	cilities:			
Raw Water Transmission	Pumping - 1 N	to, pump - KSB	, 12 m ³ /hr					
Treatment Facilities	None							
Chemicals Dosed	None							
Master Meter Details	Master meter	in poor conditio	רוא	<u> </u>				
Distribution Mains	Diameter	80mm				<u></u>		
	Length	17 km						
	Materials	υPVC		<u> </u>	<u> </u>	<u></u>		
Service Reservoirs	4 No. masonn	y tanks with tol	al capacity of t	146 m ³				
Pump Details	3 No. pumps	within distributio	on at 8 m³/hr					
Customer Details				_				
Households Served	Members	Other H.H's	Total	<u> </u>				
Customers Metered	Yes / No		Metered		_Unmetered			
Operation & Maintenance	1	Production	H.H Served	1				
Water Production	1993			1				
Tutal Floads	1994			1				
	1995			1				
	1996	<u> </u>		1				
	1997			1				
Water Consumption	Domestic	Institutional	Irrigation	Others	Total			
	75%	20%	ļ	5%	100%	.]		

Problems / Future Expansion / Remarks

The borehole yield has dropped considerably. Costs of Operation & Maintenance very high compared to revenue collected. Operations are normally suspended due to delay in repairs. This is caused by inadequate funds

MUTITO W/S (1/1)

Rural Water Supply System Survey

General						
Name of Rural water Supply:	Mutito Water :	Supply	Location / Di	strict:	Kitui District	
Organisation / Water Undertak	er: MOWR			Map Ref.		
Drainage Sub Basin				Co- Ords.	X:	Y:
Construction Details						
Year of Construction	Phase I:	1958-59	Phase II:	1974-75	Phase III	T-1-
Constructed By:	MOWR		Funded By:	Governmer	nt of Kenya	
Total Construction Cost	5,000,000					
Year Operation Started:	1959	····				
Existing Facilities						
Water source:	Ngulini / Muth	ua Springs		Intake Fac	cilities:	Weir
Raw Water Transmission	Gravity - 8 km	75mm diamet	er pipe	.		.
Treatment Facilities	None					
Chemicals Dosed	Chlorination d	one during epic	demics			
Master Meter Details	Master meter	not functioning				
Distribution Mains	Diameter	75mm	75mm			
	Length	4 km	4 km			
	Materials	uPVC	GI			
	The gravity m	ain (8 km - 75n	nm dia.) also ad	cts as the dis	stribution main	
Service Reservoirs	1 No. but aba	ndoned 20 yea	rs ago due to n	usting		
Pump Details	No pumps					
Customer Details				_		
Households Served	Members	Other H.H's	Total			
		500	500]		
Customers Metered	Yes / No		Metered		Unmetered	
Operation & Maintenance		Production	H.H Served]		
Water Production	1993			1		
	1994	11,460	-]		
Not available	1995	17,460	_			
	1996	17,460]		
	1997	17,460	_	1		_
Water Consumption	Domestic	Institutional	Irrigation	Others	Total]
	80%	10%	5%	5%	100%	

Problems / Future Expansion / Remarks

Since the scheme is unmetered, there is a high tendency of leaving taps open and thus heavy wastage. Repairs are delayed largely due to lack of funds.

KABATI W/S (1/1)

Rural Water Supply System Survey

General									
Name of Rural water Supply:	Kabati Waler Su	<i>ipply</i> L	ocation / Dis		Kitui District				
Organisation / Water Undertake	er: Community				1:250,000 - S				
Drainage Sub Basin			<u>-</u>	Co- Ords	X: 37° 55 E	Y: 01° 14 S			
Construction Details									
Year of Construction	Phase I:				Phase III				
Constructed By:	British Army		Funded By:	British/Ken	ya Army and L	DANIDA			
Total Construction Cost									
Year Operation Started:	Before 1940								
Existing Facilities									
Water source:	2 No. Borehole		<u>.</u>	Intake Fa	icilities:				
	(1 No. operation			-					
Raw Water Transmission	Pumping - 8.2 i			ist 1997)					
	Pumping - 4.9 m ³ /hr (abandoned)								
Treatment Facilities	None. DPD tablets are given to residents to sterilise the raw water								
Chemicals Dosed									
Master Meter Details	No master me	ter							
Distribution Mains	Diameter	50mm	38mm						
	Length	1.5 km	4 km	<u> </u>	<u> </u>				
	Materials	uPVC	uPVC			<u> </u>			
Service Reservoirs	3 No. masonr)	tanks of 100	m³,50 m³ ar	nd 50 m³					
Pump Details									
•									
Customer Details		<u> </u>		_					
Households Served	Members	Other H.H's	Total	_					
	1,000	300	1,300	2					
Customers Metered	Yes / No		Metered		Unmetered	d			
Operation & Maintenance		Production	H.H Served	<u>: </u>					
Water Production	1993		<u> </u>	_					
	1994								
Not available	1995								
	1996			_					
	1997			_		_			
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	4			
•	75%	10%	<u>. </u>	20	% 100	%			

Problems / Future Expansion / Remarks

Of the two boreholes, one has been abandoned a long time back. The pump in the operational borehole fell into the borehole and attempts to retrieve have failed to date. The Masinga-Kitui pipeline is the viable source of water for Kabati.

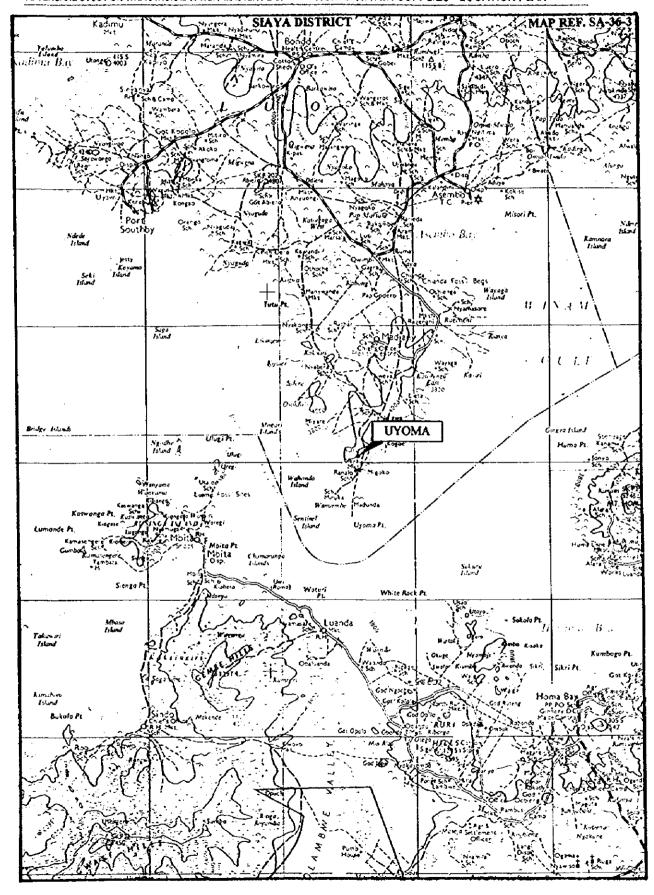
MATINYANI W/S (1/1)

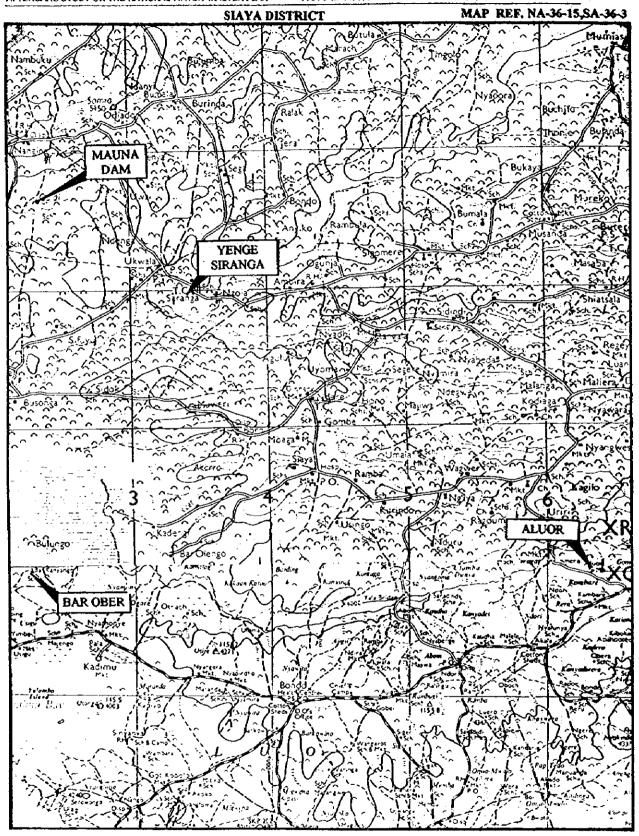
Rural Water Supply System Survey

General								
Name of Rural water Supply.	Matinyani W/	S	Location / Di	strict: <i>Kitui</i>				
Organisation / Water Undertak	(er: Committe	e	- 	Map Ref				
Drainage Sub Basin				Co- Ords.	X:	Y:		
Construction Details								
Year of Construction	Phase I: 199	3-94	Phase II:		Phase III			
Constructed By:	MOWR	<u> </u>	Funded By:	DANIDA				
Total Construction Cost	KShs. 6,400,	000		_				
Year Operation Started:	1994			_				
Existing Facilities								
Water source:	Borehole at K	alia		Intake Fac	cilities: Bore	hole		
Raw Water Transmission	Pumping - 63	Pumping - 63mm dia GS pipe 1.9 km to distribution tank and 12 m ² /h						
Treatment Facilities	Facilities None							
Chemicals Dosed	None							
Master Meter Details	63mm master	r meter in good	condition					
Distribution Mains	Diameter	75mm	63mm	32mm	25mm			
	Length	1.1 km	2.0 km	7.0 km	2.0 km			
	Materials	30% GS, 70%	uPVC	uPVC	uPVC			
Service Reservoirs	1 No.	100m³ m ason	ary tank					
Pump Details	None on distr	ibution						
Customer Details								
Households Served	Members	Other H.H's	Total					
	50	Klosk 19	69					
Customers Metered	Yes / No	_	Metered	Yes	Unmetere	<u>d</u>		
		.		,				
Operation & Maintenance		Production	H.H Served	1				
Water Production	1993]				
	1994]				
	1995	120 m³/d		During day	session			
	1996			12 m³/hx	14 hrs pump	oing = 168 m³/d		
	1997					•		
Water Consumption	Domestic	Institutional	Irrigation	Others	Total			
	80%	10%	10%	1	100%			

Problems / Future Expansion / Remarks

- This is a good example of well run rural scheme making profit
 The supply is also used a lot by other rural centres through kiosks in Matinyani
 Chlorination required





UYOMA (1/1)

Organisation / Water Undertaker: MOWR+Commun Drainage Sub Basin Construction Details Year of Construction Phase I: 1970-1973 Phase Constructed By. MOWR Fund Total Construction Cost N/A Year Operation Started: 1973 Existing Facilities Water source: Lake Victoria Raw Water Transmission Pumping 100mm uPVC pipe 100m Treatment Facilities Filtration and Chlorination Chemicals Dosed Tropical Chloride of Lime (TCL) Master Meter Details None	Co- Ords. X: 38° 18 Y: S00° 2 se II: '988-1989 Phase III led By. MOWR+ Community Intake Facilities: Direct Suctions: 2 No. pumps each 25m° /hr driven by 75mm
Drainage Sub Basin Construction Details Year of Construction Phase I: 1970-1973 Phase Constructed By. MOWR Fund Total Construction Cost N/A Year Operation Started: 1973 Existing Facilities Water source: Lake Victoria Raw Water Transmission Pumping 100mm uPVC pipe 100m Treatment Facilities Filtration and Chlorination Chemicals Dosed Tropical Chloride of Lime (TCL) Master Meter Details None Diameter 200mm-75mm Length 1500m	Co- Ords. X: 38° 18 Y: S00° 2 se II: '988-1989 Phase III led By. MOWR+ Community Intake Facilities: Direct Suction long: 2 No. pumps each 25m³ /hr driven by
Construction Details Year of Construction Constructed By. Total Construction Cost Year Operation Started: Existing Facilities Water source: Raw Water Transmission Treatment Facilities Chemicals Dosed Master Meter Details Distribution Mains Phase I: 1970-1973 Phase Fund N/A Lake Victoria Pumping 100mm uPVC pipe 100m Filtration and Chlorination Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	led By: MOWR+ Community Intake Facilities: Direct Suctions: 2 No. pumps each 25m³ /hr driven by
Year of Construction Constructed By. Total Construction Cost Year Operation Started: Existing Facilities Water source: Raw Water Transmission Treatment Facilities Chemicals Dosed Master Meter Details Distribution Mains Phase I: 1970-1973 Phase Lake Victoria Pumping 100mm uPVC pipe 100m Filtration and Chlorination Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	Ied By. MOWR+ Community Intake Facilities: Direct Suctions: 2 No. pumps each 25m³/hr driven by
Constructed By. Total Construction Cost Year Operation Started: Existing Facilities Water source: Raw Water Transmission Treatment Facilities Chemicals Dosed Master Meter Details Distribution Mains MOWR Fund Fund 1973 Lake Victoria Pumping 100mm uPVC pipe 100m Filtration and Chlorination Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	Ied By. MOWR+ Community Intake Facilities: Direct Suctions: 2 No. pumps each 25m³/hr driven by
Total Construction Cost Year Operation Started: Existing Facilities Water source: Raw Water Transmission Treatment Facilities Chemicals Dosed Master Meter Details Distribution Mains N/A 1973 Lake Victoria Pumping 100mm uPVC pipe 100m Filtration and Chlorination Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	Intake Facilities: Direct Sucti long: 2 No. pumps each 25m³/hr driven by
Year Operation Started: 1973 Existing Facilities Water source: Lake Victoria Raw Water Transmission Pumping 100mm uPVC pipe 100m Treatment Facilities Filtration and Chlorination Chemicals Dosed Tropical Chloride of Lime (TCL) Master Meter Details None Distribution Mains Diameter 200mm-75mm Length 1500m	long: 2 No. pumps each 25m ³ /hr driven by
Existing Facilities Water source: Raw Water Transmission Treatment Facilities Chemicals Dosed Master Meter Details Distribution Mains Lake Victoria Pumping 100mm uPVC pipe 100m Filtration and Chlorination Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	long: 2 No. pumps each 25m ³ /hr driven by
Water source: Raw Water Transmission Treatment Facilities Chemicals Dosed Master Meter Details Distribution Mains Lake Victoria Pumping 100mm uPVC pipe 100m Filtration and Chlorination Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	long: 2 No. pumps each 25m ³ /hr driven by
Raw Water Transmission Treatment Facilities Chemicals Dosed Master Meter Details Distribution Mains Pumping 100mm uPVC pipe 100m Filtration and Chlorination Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	long: 2 No. pumps each 25m ³ /hr driven by
Treatment Facilities Filtration and Chlorination Chemicals Dosed Master Meter Details Distribution Mains Filtration and Chlorination Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	75mm
Chemicals Dosed Master Meter Details Distribution Mains Tropical Chloride of Lime (TCL) None Diameter 200mm-75mm Length 1500m	
Master Meter Details Distribution Mains Diameter 200mm-75mm Length 1500m	
Master Meter Details Distribution Mains Diameter 200mm-75mm Length 1500m	
Distribution Mains Diameter 200mm-75mm Length 1500m	
Length 1500m	
Materials G.I.	22km
	G.L?uPVC
Service Reservoirs 4 No. 80m ⁹ masonry tank	
Pump Details 3 No high lift pumps coupled to 43	nr Lister engines
Customer Details	
Households Served Members Other H.H's Total	
1000	1000
	ered Unmetered
Operation & Maintenance Production H.H	Served
Water Production 1993	
1994 394,200m³	271
1995	Service area 25km²
1996	
1997	1000
Water Consumption Domestic Institutional Irrig	· · · · · · · · · · · · · · · · · · ·
70% 20%	10% 100%
Problems / Future Expansion / Remarks	
Pumping equipment is very old and delipidated	
2. Poor access to the scheme makes diesel delivery difficult	

ALUOR W/S (1/1)

General							
Name of Rural water Supply:	Aluor W/S		Location / D	istrict:	Siaya		
Organisation / Water Undertake	er:	MOWR	_	Map Ref	-	SA-36-3	
Drainage Sub Basin				Co- Ords	X: 34° 28	Y: S00° 00	' 30"
Construction Details				_			•
Year of Construction	Phase I:	1971-1972	Phase II:		Phase III		
Constructed By:	Self help and	MOWR	Funded By:	MOWR			•
Total Construction Cost						-	
Year Operation Started:	1972			_			
Existing Facilities							
Water source:	Ogomo River			Intake Fa	cilities;	Chamber	
Raw Water Transmission	Pumping 37m	m uPVC/G.I. p	oipe 4 km long:	lister engine	driven 12Hi	P, pump 90 n	n head
Treatment Facilities	None						
Chemicals Dosed	None						
Master Meter Details	None				-		
Distribution Mains	Diameter	80mm	50mm				
	Length	6km	4km				
	Materials	G.M.S.	uPVC				
	r	<u> </u>				· · · · · · · · · · · · · · · · · · ·	ı
Service Reservoirs	1 No.	90m³ steel ta		<u> </u>	L		
Pump Delais	1 No. pump C	}≈ 6m³/hr H=9	10m				
Customer Details						···	
Households Served		01 111		1			
Hodselloids Selved	Members	Other H.H's		1			
Customers Metered	2000 people	Ĺ	2000 people	J		ě	
Cosiome's Melered	Yes	-	Meteredi		Unmetere	<u>d</u>	No records available
Operation & Maintenance		Production	H.H Served	1			
Water Production	1993			1			
	1994			2000 peo	ple current	tv.	
	1995			being ser		•	
	1996						
	1997			1			
Water Consumption	Domestic	Institutional	Irrigation	Others	Total		
Barth (B	L			<u> </u>			
Problems / Future Expansion							
1. All pumping equipment needs rep	lacement	<u> </u>		· · · · · · · · · · · · · · · · · · ·			
2. Chlorination is required							
Lack of funds has resulted in scherr	e stopping ope	erations since t	1992				
	_	<u> </u>		· · · · · · · · · · · · · · · · · · ·			
		.					

YENGA SIRANGA (1/1)

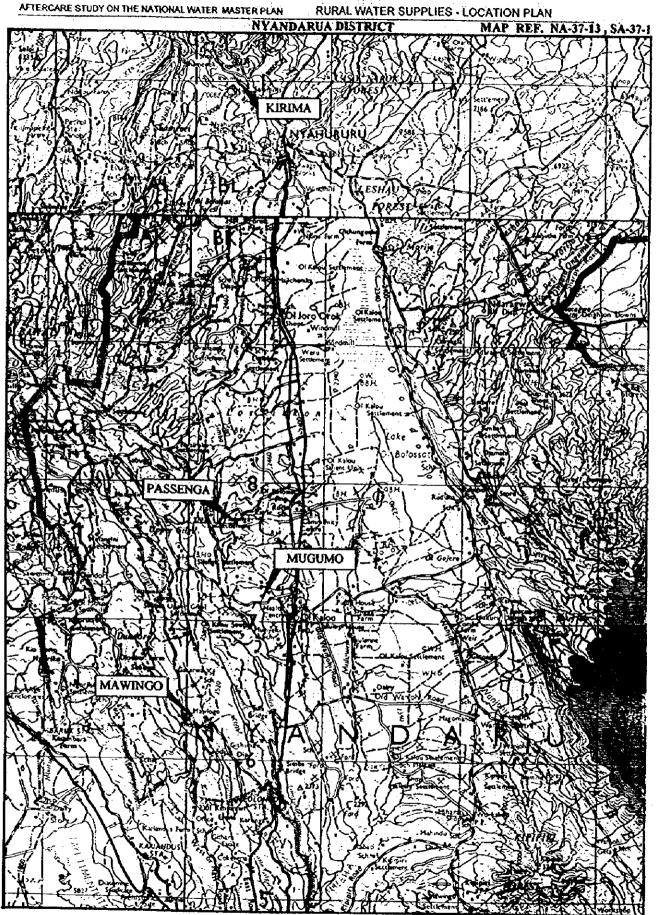
Name of Rural water Supply:	Yenga Siranga		Location / Di	istrict:	Siaya	
Organisation / Water Undertake	er:(Community		Map Ref		
Drainage Sub Basin				_Co- Ords	X: 34° 1	is Y: s 00° 1.
Construction Details						
Year of Construction	Phase I:	1980-1983	Phase II:		Phase II	l
Constructed By:	MOWR + Self	Help	Funded By:	N/A		
Total Construction Cost	Ksh. 1,260,000)		_		
Year Operation Started:	1983			_		
Existing Facilities						
Water source:	Yenga river			_intake Fa	cilities:	Small Dan
Raw Water Transmission	2 No. pumps e	each Q =40m ³ .	/hr, H=122m, 1	00mm G.I./	uPVC pipe	<u> </u>
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None					
Distribution Mains	Diameter	50mm				
	Length	N/A			<u> </u>	
	Materials	uPVC		<u> </u>	ı	
Service Reservoirs	3No. R.C 48n	n³ each	T			
Pump Details	Raw water pu	imps only				
, amp a annua						
Customer Details						
Households Served	Members	Other H.H's	Tota!			
	N/A		N/A	_		
Customers Metered	Yes/No		Metered		_Unmel	ere <u>d</u>
		-		Informat	ion unava	ailable
Operation & Maintenance		Production	H.H Served	ī		
Water Production	1993			7		
Trace i i cassisti	1994			Service	Агеа 36л	n ²
	1995			7		
	1996					
	1997			1		
M. A. Communican		Institutional	trination	Others	Total	
Water Consumption			iii gatori	10		
	100%				1	270]
Problems / Future Expansion						
1. The scheme is not operational of						
2. Chlorination will be required who	en the sheme b	ecomes opera	tional			

MAUNA DAM (1/1)

Name of Rura! water Supply:	Mauna Dam		Location / D	istrict:	Siaya	
Organisation / Water Undertake		MOWR	Loodion, B		NA-36-15	
Drainage Sub Basin	<u> </u>	11/01/11		_	.X: 34° 07'	Y: N:00°
Construction Details				_00.0103	. 71. 04 07	1.100
Year of Construction	Phase I:	1970-1977	Phase II:		Phase III	
Constructed By:	MOWR		Funded 8y:	MOWR	_1 11030 111	
Total Construction Cost	N/A		_,		- 	
Year Operation Started:	1977	···		-		
Existing Facilities				_		
Water source:	Mauna Dan	and Spring		Intake Fa	clities:	sump
Raw Water Transmission	Pumping				- 111100	Samp
Treatment Facilities		tion - At preser	nt no chlorinatio	n is beina d	one as doser	:
	have broker				<u> </u>	
Chemicals Dosed	None current				·····	
Master Meter Details		not functioning				
Distribution Mains	Diameter	100mm	100mm	80mm	50-20mm	50-20mm
	Length	6.8 km	1.4km	2km	14.7 km	22.3km
	Materials	uPVC	G.S.	G.S	G.I.	uPVC
			<u></u>			• • • • • • • • • • • • • • • • • • • •
Service Reservoirs	1 No 136m ³	masonry tank	T		[<u> </u>
Pump Details	2 No pumps-	only one opera	tional when sci	heme last w	orked in 1992	•
Customer Details						
Households Served	Members	Other H.H's	Total]		
	2500		2500	1997		
Customers Metered	Yes		Metered	10	Unmetered	2490
		<u> </u>				
Operation & Maintenance		Production	H.H Served	1		
Water Production	1993			1		
	1994			Area cove	red is about	80km ²
	1995			1		
	1996			i		
	1997			1		
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	
·						
Problems / Future Expansion	/ Remarks	·	I	. 	<u> </u>	,
The scheme has been inoperationa		ue to lack of fu	nds			
Needs replacement of 1 No. pumps						
	- i repuis io s	iviage iains, (. ေပၚ ။ ပပ ္မ ျပန္	i a some pip	сэ.	
		· · · · · · · · · · · · · · · · · · ·				
						·

BAR OBER (1/1)

General						
Name of Rural water Supply:			Location / Di		Siaya	01.000
Organisation / Water Undertake	e <u>r: </u>	Community		_Map Ref		<u>\$A-36-3</u>
Drainage Sub Basin				_Co-Ords	X: 34° 0	7' Y: \$00° 01'
Construction Details						
Year of Construction	Phase I:	1976-1981	Phase II:		Phase II	'
Constructed By:	MOWR		Funded By:	MOWR an	d Commun	nity
Fotal Construction Cost	Ksh.1,200,000)		_		
Year Operation Started:	1981			-		
Existing Facilities						
Water source:	Spring at Bar	Ober		_Intake Fa	clities:	Sump
Raw Water Transmission	Pumping: 60m	ım dia. G.S piç	oe - 2 No. pumj	os t <u>o elevat</u> e	ed tank	
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None					
Distribution Mains	Diameter	80mm]	
	Length	N/A				
	Materials	N/A			T	
			<u> </u>			
Service Reservoirs	1 No.	30m³ elevate	ed tank			
Pump Details	Raw water pu	ımps		. <u></u> _		
Customer Details		T	., 	_		
Households Served	Members	Other H.H's	Tota!	-		
	2000 people	<u> </u>	2000 people	ل		
Customers Metered	No	_	Metered		Unmete	же <u>d</u>
A 11 A M. J. A		Production	H.H Served	ភ		
Operation & Maintenance	4000		In.ii delvec	'		
Water Production	1993	1		3000 ==	onle our	ently
	1994	† <u> </u>	 		ople curre	enay 'ed when ope
	1995		+	- lo be se	veu serv	ea mien ope
	1996	1	 	╣		
	1997	 		Others	Total	7
Water Consumption	Domestic	Institutional	irrigation	Others	Total	
	L	<u> </u>	<u> </u>			J
Problems / Future Expansion						
1. Scheme is not operational due	to lack of funds	- functional				
2. Chlorination required when	ı ine sceme is 	juncuonal			-	
						



HUHIRIO W/S (1/1)

<u>caerterar</u>						
Name of Rural water Supply:						
Organisation / Water Undertak	er: Community			_Map Ret		
Drainage Sub Basin				_Co- Ord:	s. <u>X:</u>	Y:
Construction Details						
Year of Construction	Phase I:	1991-95			_	1998
Constructed By:	Self help and	MOWR	Funded By:	Commun	ty, Red Cros	s 3, Catholic I
Total Construction Cost	Kshs. 1,400,0	00		-		
Year Operation Started:	1996			-		
Existing Facilities						
Water source:	River Malewa			_Intake F	acilities:	Sump
Raw Water Transmission	Gravity 100m	m G.S pipe 200	Om long			
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None					 _
Distribution Mains	Diameter	100mm	80mm	60mm	40mm	
	Length	Total 25km		UPVC		
	Materials	UPVC	UPVC	UPVC	UPVC	
						,
Service Reservoirs	1 No.	300m ³ Reifo	rced concrete	tank		<u> </u>
Pump Details	Gravity		 			
Customer Details			,	- 1		
Households Served	Members	Other H.H's	Total	1	r have to pay rve not paid	3,000/= to cor
	150	30	180		ive not pad	
Customers Metered	Yes / No	_	Metered	No	Unmeter	e Yes
				-1		
Operation & Maintenance		Production	H.H Served	<u> </u>		
Water Production	1993		<u> </u>	_		
	1994		<u> </u>			
	1995					
	1996	44m2/d	<u> </u>	_		
	1997	<u>, </u>				_
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	_
·	70%	30%			100%	<u>6</u>]
Problems / Future Expansi	on / Remarks					
			· · · · · · · · · · · · · · · · · · ·			
				 -		
						· • - · • · · · · · · · · · · · · · · ·
			· · · · · · · · · · · · · · · · · · ·			

PASSENGA W/S (1/1)

<u>General</u>						
Name of Rural water Supply:	Passenga W/	<u>s</u>	Location / Di	strict: Nyad	larua	
Organisation / Water Undertake	er: Passenga S	econdary sch	xol	Map Ref		
Drainage Sub Basin				Co- Ords,	X:	Y:
Construction Details						
Year of Construction	Phase I: 196	7	Phase II:		Phase III	
Constructed By:	Contractor un	der MOWR	Funded By:			
Total Construction Cost						
Year Operation Started:	1968					
Existing Facilities						
Water source:	Nyairoko river			Intake Fa	clities: WE	<u>R</u>
Raw Water Transmission	Pumping, 37n	nm UPVC pipe	for 1km long C	0+ 12.6m3/1	r , head 26	n driven by lister engi
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None but test	s are carried or	A twice a year			
Distribution Mains	Diameter	50mm-25mm			ļ <u>.</u>	
	Length	10kkm total		<u></u>		
	Materials	UPVC		<u> </u>		
Service Reservoirs	1 No.	80m³ mason	ary and 50m3 i	nasonary ta	ınk	
Pump Details	Raw water pu	mps delivery to	o distribution (a	nks		
						
Customer Details						
Households Served	Members	Other H.H's	Total	į		
	Serving only I	Passenga Seco	ondary School	J		
Customers Metered	Yes / No		Metered	No	Unmetere	Yes
						
Operation & Maintenance	<u></u>	Production	H.H Served	1		
Water Production	1993		349			
	1994		547			
	1995		612			
	1996		650			
	1997	8-10m2/d				•
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	
	L	100%	1		100%	<u> </u>
Problems / Future Expansion	n / Remarks					
1). Originally the community was m	anaging the sci	heme tank faile	d to run it effec	iently Curre	ently the sci	oool is running it
water directly						
3) Need full trreatment					<u> </u>	
						····
						<u></u>
	···					

KIRIMA W/S

<u>General</u>						
Name of Rural water Supply:		l				
Organisation / Water Underlak	e <u>r: MOWR</u>		P	vlap Ref		
Drainage Sub Basin			(Co-Ords.	X:	Y:
Construction Details						
Year of Construction	Phase I: 196 <u>8</u>					
Constructed By: MOWR			Funded By: 🤇	Community	<u></u>	
Total Construction Cost						
Year Operation Started:	1968					
Existing Facilities						_
Water source:	River Pesi, Kan					<u>R</u>
Raw Water Transmission	Gravity, 150mr	m- <u>100mm - 8</u> 0	mm UPVC pipe	for 3.5 km	<u>n</u>	
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None but tests	are carried ou	t twice a year		- y	
Distribution Mains	Diameter	80,50mm				
	Length	26k			<u> </u>	<u> </u>
	Materials	UPVC			<u> </u>	<u> </u>
		<u>-</u>				 _
Service Reservoirs	5 No.	100m³ tanks		L	<u> </u>	
Pump Details	distribution by	gravity		<u>.</u>		
-						
Customer Details	<u> </u>	Other H.H's	Tatal	1		
Households Served	Members		Total			
	659	L	Metered	I No	Unmeter	e Ves
Customers Metered	Yes / No	-	Merered	140	_ ~~~	- <u></u>
Operation & Maintenance		Production	H.H Served]		
Water Production	1993	166m²/d	349	j		
	1994	233m2/d	547			
	1995	256m2/d	612	1		
	1996	258m2/d	650	1		
	1997		<u> </u>	<u> </u>		_
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	_
	60%	40%	<u> </u>	<u> </u>	100%	6
Problems / Future Expans	on / Remarks					
1). Treatmnt required						
2) Repairs to burst pipes						
	<u> </u>					
<u></u>						

Final Report - Data Book

Aftercare Study on the National Water Master Plan

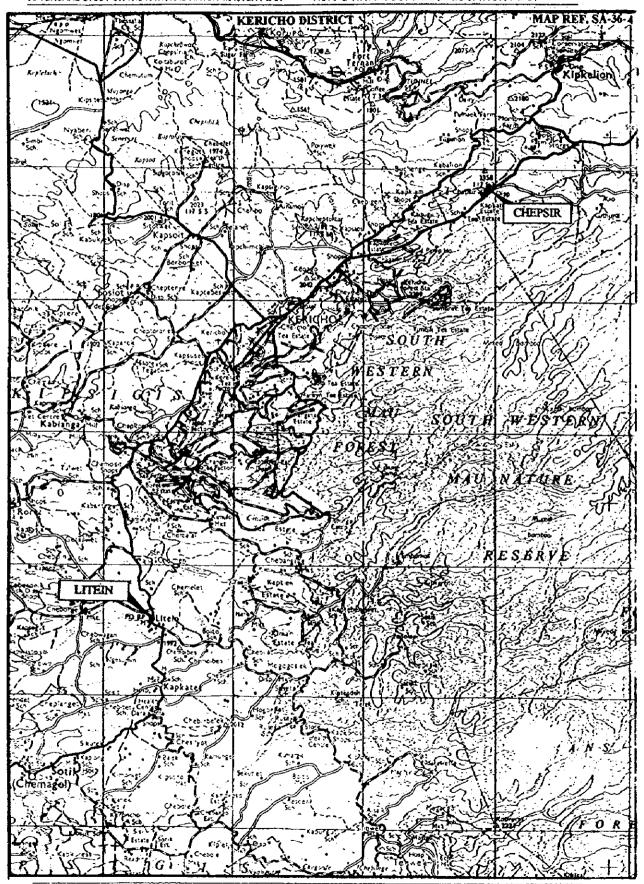
MAWINGO

<u>activity</u>						
Name of Rural water Supply:	Mawin	go	Location / D	istrict: Nya	ndarua	
Organisation / Water Undertake	e <u>r: Commun</u>	ity		Map Ref		
Drainage Sub Basin				Co- Ords	. <u>X</u> :	Y;
Construction Details				_		
Year of Construction	Phase I: 198	88-95	Phase II:		Phase I	11
Constructed By:	Self-help		Funded By:	Communit	y, Rural De	evelopmentlun
Total Construction Cost	3,800,00					
Year Operation Started:	1996			_		
Existing Facilities				_		
Water source: Kiriundu spring				Intake Fa	cilities; D.	âm
Raw Water Transmission	Pumping 100	min, and GS pi	pe 400m long (pump GRUND
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None					
Distribution Mains	Diameter	100mm				
	Length	650m				
	Materials	cs	<u> </u>			
		·	·			
Service Reservoirs	1 No.	100m ³ Maso	nany tank			
Pump Details	Raw water pu	ımp delivers wa	ter to distributi	on tank		
						
Customer Details						
Households Served	Members	Other H.H's	Total	Į		
	L	<u> </u>]		
Customers Metered	Yes / No		Metered		Unmete	red
	г	T	,			
Operation & Maintenance		Production	H.H Served			
Water Production	1993	ļ				
	1994					
	1995			Service	area 0.3	km²
	1996	7m³/d		Į		
	1997	7m³/d				
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	7
		100%			100%	6
Problems / Future Expansion	/ Remarks					→

- 1) The scheme is only serving the dispensary at Mawingo
- 2) Requires chlorination
- 3) Lack of funds prevents supply to public

MUGOMO

General			Leastion / Di	ictrict: Nuan	dania		
Name of Rural water Supply:				Nan Pef	oarua		
Organisation / Water Undertak	er: Community			_Co- Ords.	γ.	y.	÷
Drainage Sub Basin				_CO- Olus.	Λ.	<u>.!:</u>	,
Construction Details	Phase I: Pre i		Obaca It: 406	22.06	Phase iil		
Year of Construction	Phase I: Pre <u>s</u> MOWR+Direct						
Constructed By:	MOWR+Direct	labour	runaea by.	Community	, MOWN,U	DO	-
Total Construction Cost		 		_			
Year Operation Started:1996				-			
Existing Facilities					. 33.		
Water source: Borehole C3066				_Intake ra	Carles: B/H		-
Raw Water Transmission	Pumping 50mi	n pipe 20m ior	ng to tank				
Treatment Facilities	None		_				-
Chemicals Dosed	None						~
Master Meter Details	None				·		7
Distribution Mains	Diameter	75mm	32mm	25mm	<u> </u>	_	4
	Length	1.6km	1.6km	1.65km	<u> </u>	 	
	Materials	GIUPVC	UPVC	UPVC		<u> </u>	ل.
	1 No.	6m³ area	bohole	f00m ³		Reinforced	– tank
Service Reservoirs Pump Details					ioad/200 G		– <u>C</u> R 16 motor 15ki
Customer Details Households Served	Members 29	Other H.H's	Total 3				_
Customers Metered	Yes / No	-	Metered	Yes	Unmeter	e <u>No</u>	_
Operation & Maintenance		Production	H.H Served	d]			-
Water Production	1993	<u> </u>	 	_			
	1994	<u> </u>	ļ	_			
	1995			_			
	1996	53m³/d					
	1997	53m³/d					
Water Consumption	Domestic_	Institutional	Irrigation	Others	Total	-	
	30%	70%	6		1009	%	
Problems / Future Expans	<u>ion / Remarks</u>						
1). Requires chloorination			· · · · · · · · · · · · · · · · · · ·				
2) Repairs to pipes bursts							_
			<u> </u>				_
					 		



+ PARTNERS

MANGAT, I.B. PATEL AND PARTNERS, Consulting Engineers, Nairobi, Kenya. $\ensuremath{\text{IV}}\xspace - 92$

The Aftercare Study on the National Water Master Plan

General

TEGUNOT/NYAKINYUA W/S (1/1)

Name of Rural water Supply:	Tegunot/Nyakir	yua W/S	Location / Di	istrict: <i>Keri</i> d	:ho	
Organisation / Water Undertake				Map Ref	1:250,000	SA-36-4
Drainage Sub Basin				Co- Ords	. <u>X:</u>	Y:
Construction Details						
Year of Construction	Phase I: Before	e 1988-91	Phase II:		Phase III	
Constructed By:	MOWR		Funded By:	District De	velopment C	ommittee
Total Construction Cost	•			Communit	У	
Year Operation Started:	1991			_		
Existing Facilities						
Water source:	Dam			~		ள் <u></u>
Raw Water Transmission	Pumping - 100	mm dia. GS p	pipe 1 km long.	Pump Q =	16 m³/hr	
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None		 		т	
Distribution Mains	Diameter	32mm			_	
	Length	3.6 km		<u> </u>	-	
	Materials	uPVC		<u> </u>		<u> </u>
Service Reservoirs	1 No. 135 m ³	masonry tan	k			
Pump Details	Raw water pu	mp deliver to	distribution tan	k		
Customer Details				_		
Households Served	Members	Other H.H's	s Total	_		
	13			3		
Customers Metered	Yes / No		Metered	No	Unmeter	ed <u>Yes</u>
Operation & Maintenance		Production	H.H Serve	٩		
Water Production	1993					
	1994					
	1995	No records	<u> </u>		Service a	rea 6 km²
	1996					
	1997	,				
Water Consumption	Domestic	Institutiona	al Irrigation	Others	Total	
-						
Problems / Future Expans	on / Remarks	:				
1) Phase II of the scheme	a) New rist b) Storage c) Distribut	tank				

Camaral

LITEIN (1/1)

Rural Water Supply System Survey

detierar						
Name of Rural water Supply:	Litein	-	Location / Dis	strict: Kericho		
Organisation / Water Underlak	er:NWCPC			Map Ref:	SA-36-	4
Drainage Sub Basin				Co-Ords,	X:35° 1	Y: 500° 3:
Construction Details						•
Year of Construction	Phase 1: 1975	9 - 1980	Phase II:		Phase	111
Constructed By:	Zakhim Interna	fional	Funded By:	MOWR		
Total Construction Cost	Kshs. 50 million	1				
Year Operation Started:	1980					
Existing Facilities						
Water source;	Itare River			Intake Faci	ities.	Weir
Raw Water Transmission	Pumping - 2No	s duly, 1No. sla	andby - capacity	70m³/hr each		
Treatment Facilities	Conventional for	di treatment wi	th capacity of 8,0	00 m³/day		
	Flow measurer	nent, mixing, co	pagulation, sedin	entation, filtra	tion & dis	inflection b
Chemicals Dosed	Alum @ 150kg	'd and 100 kg/c	f in wet and dry s	eason respect	ively Soc	ia ash @ 2
Master Meter Details						
Distribution Mains	Diameter	450	400	350	300	250
	Length	1465	4480	1315	2639	7465
	Materials	uPVC	Steel	<u> </u>		
	Diameter	150	100	80	50	
	Length	25210	10172	4480	135	
	Materials	uPVC	Steel			
Service Reservoirs	8 No. with a to:	al capacity of 3	1,455m ³	<u> </u>		
Pump Details	3Nos. raw water	er pumps with a	apacity of 70m ³	In and 5 Nos. 1	realed w	ater
	pumps - capa	city 100m3/hr	each			
Customer Details		··· <u>-</u>		1		
Households Served	Members	Other H.H's	Total	}		
			5639	}		
Customers Metered	Yes / No		Metered	425	Unme	tered
Operation & Maintenance		Production	H.H. Served	Į		
Water Production	1993			Į		
	1994		<u> </u>	Į		
	1995	6850m³/d	5,639]		
	1996					
	1997					_
Water Consumption	Domestic	Institutional	Irrigation	Others	Total)
	<i>65</i> %	20%		15%	100%]

Problems / Future Expansion / Remarks

The existing scheme is managed by NWCPC and is not able to meet the demand in the area of supply due ti various constraints. The constraints are tack of operation and maintenance funds, facilities were constructed to meet the 1988 water demand of 7.940m³/day whereas the present water demand is 17.750m³/day, wastage of water due to taps left open as majority of consumers are on flat rate. Pretiminary design for rehabilitation of existing scheme and expansion including bulk and individual metering has been carried out by a firm of Consulting Engineers.

CHEPSIR ZONE A AND 8 (1/1)

General Name of Rural water Supply:	Chepsir Zone	ARR	Location / Di	strict:	Kericho	
Name of Hural Water Copply. Organisation / Water Undertake		MOWR			SA-36-4	
Organisation / Water Ondertaxe Drainage Sub Basin						Y: S 00° 17'
Construction Details				-		
Year of Construction	Phase I:	1979-1989	Phase II:		Phase III	
	Self Help	1070 1000	Funded By:	GOK (Bur	- al Dev. Fund	0
Constructed By: Total Construction Cost	N/A		,			
	1989			•		
Year Operation Started: Existing Facilities	1503			-		
	Zone A. Smal	LDam: Zana A	.cn/in/	Intake Fa	acilities:	Small Dam/S
Water source:	Zone A and E			- ''		
Raw Water Transmission		S COOPIEG TO G	, o, , , , , , , , , , , , , , , , , ,	<u></u>		
Treatment Facilities	None			· <u>-</u>		
Chemicals Dosed	None			1		
Master Meter Details	None	Zone A	ZoneB	<u> </u>		
Distribution Mains	Diameter	37mm	37mm	1		
	Length	7km	7km			
			UPVC		1	
Service Reservoirs			ne and 225m³ rer untreated w			
Service Reservoirs Pump Details	1 No. 135m ³	^{tank} in each zo				onry 0=27m³/hv each
	1 No. 135m ³	^{terik} in each zo ter pumps deli	ver untrealed v			
Pump Details	1 No. 135m ³	^{tank} in each zo	Total	vater to stor		
Pump Details <u>Customer Details</u>	1 No. 135m ³ 2 No. raw wa	^{terik} in each zo ter pumps deli	Total	vater to stor	rage tanks, C	2=27m ³ /hr each
Pump Details <u>Customer Details</u>	1 No. 135m ³ 2 No. raw wa Members	^{terik} in each zo ter pumps deli	Total	vater to stor	rage tanks, C	
Pump Details <u>Customer Details</u> Households Served	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-8	^{terik} in each zo ter pumps deli	Total Metered	vater to stor	rage tanks, C	2=27m ³ /hr each
Pump Details Customer Details Households Served Customers Metered	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-8	Other H.H's	Total Metered	vater to stor	rage tanks, C	2=27m ³ /hr each
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-8 No	Other H.H's	Total Metered	vater to stor	rage tanks, C	2=27m ³ /hr each
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-8 No.	Other H.H's	Total Metered	Service	rage tanks, C	ed <u>All consume</u> rs
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-B No. 1993	Other H.H's	Total Metered	Service	Unmeter	ed <u>All consume</u> rs
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-B No 1993 1994 1995	Other H.H's	Total Metered	Service	Unmeter	ed <u>All consume</u> rs
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance Water Production	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-8 No 1993 1994 1995	Other H.H's	Total 15 Metered H.H Served	Service	Unmeter	ed <u>All consume</u> rs
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-B No 1993 1994 1995 1996	Other H.H's	Total 15 Metered H.H Served	Service	Unmeter Area 21mition unavai	ed <u>All consume</u> rs
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance Water Production	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-B No 1993 1994 1995 1996 1997 Domestic	Other H.H's Production	Total 15 Metered H.H Served	Service	Unmeter Area 21mition unavai	ed <u>All consume</u> rs
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance Water Production	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-B No 1993 1994 1995 1996 1997 Domestic	Other H.H's Production	Total 15 Metered H.H Serveo	Service Informa Others	Unmeter Area 21mition unavai	ed <u>All consume</u> rs
Pump Details Customer Details Households Served Customers Metered Operation & Maintenance Water Production Water Consumption Problems / Future Expansion	1 No. 135m ³ 2 No. raw wa Members 10-A, 9-B No 1993 1994 1995 1996 1997 Domestic	Other H.H's Production	Total 15 Metered H.H Serveo	Service Informa Others	Unmeter Area 21mition unavai	ed <u>All consume</u> rs

Final Report - Data Book

Aftercare Study on the National Water Plan

NGECHEROK (1/1)

Rural Water Supply System Survey

General								
Name of Rural water Supply:	Ngecherok		Location / Di	strict: Kerio	ho			
Organisation / Water Undertake	er: Communit	/		Map Ref	1:250,000	SA-36-4		
Drainage Sub Basin	3SK			Co- Ords	X:	Y:		
Construction Details								
Year of Construction	Phase I: 1978-87		Phase II:	Phase III				
Constructed By:	Self Help		Funded By:	Rural Development Fund				
Total Construction Cost	-			MOWR				
Year Operation Started:	1987			_				
Existing Facilities								
Water source:	Kiboit River			Intake Facilities: Weir				
Raw Water Transmission	Pumping - 15	Omm dia. PVC	- 24 km long el	ectrically op	erated - Pun	p GRUNDFOS		
				Q = 27 m ³ /h Head 153m				
Treatment Facilities	None							
Chemicals Dosed	None							
Master Meter Details	None							
Distribution Mains	Diameter 75,50,37,25mm		77)	l				
	Length	Total 18 km	Ī	ļ ———				
	Materials	PVC & GS		1				
			<u> </u>	·	·	-l		
Service Reservoirs	1 No. 135 m³ masonry							
Pump Details	Raw water pump deliver to distribution tank .							
Customer Details								
Households Served	Members	Other H.H's	Total]				
	360	-	360]				
Customers Metered	Yes / No	-	Metered	No	Unmetere	d <u>Yes</u>		
Operation & Maintenance		Production	H.H Served]				
Water Production	1993							
	1994	· · · · · · · · · · · · · · · · · · ·		1				
	1995	i						
	1996	ī ————		1				
	1997			1				
Water Consumption	Domestic	Institutional	Irrigation	Others	Total]		
	L	l	<u> </u>	<u>l</u>	1	_}		

Problems / Future Expansion / Remarks

- Storage lank to be rebuilt
 Ireatment required

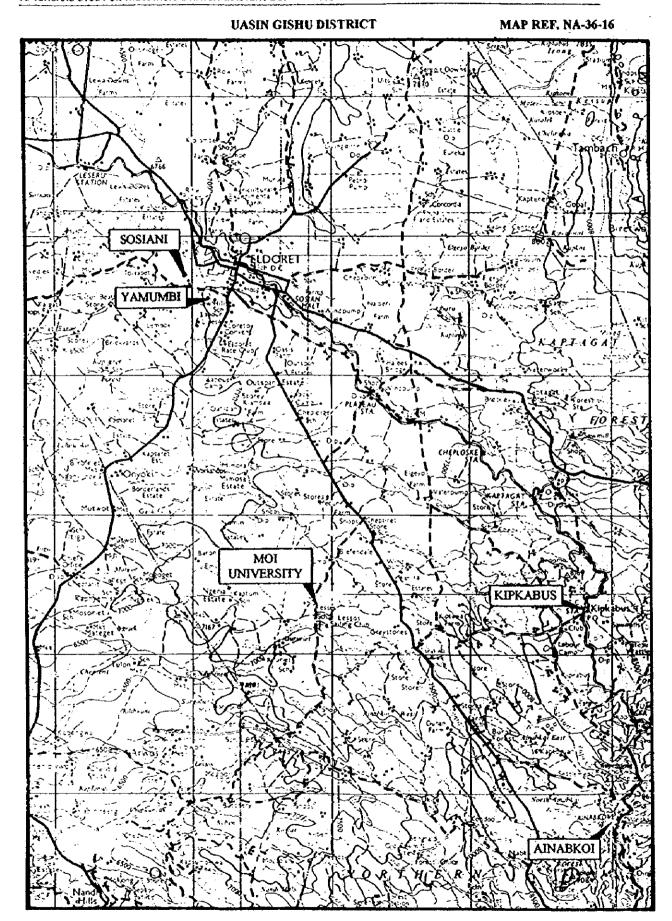
BARGEYWET W/S (1/1)

Rural Water Supply System Survey

General					_	
Name of Rural water Supply:	Bargeywet W/S	<u> </u>	Location / Di			
Organisation / Water Undertak	er: MOWR				1:250,000	
Drainage Sub Basin				Co- Ords	<u>X:</u>	Y :
Construction Details						
Year of Construction	Phase I: 1989		Phase il:		Phase III	
Constructed By:	MOWR		Funded By:	MOWR		
Total Construction Cost						
Year Operation Started:	1989			-		
Existing Facilities						
Water source:	Bargeywet Spr	ring		_intake Fa	cilities: Sump	·
Raw Water Transmission	Gravity 80mm	dia. GVPVC pi	pe - 4 km long	 - -		
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None				· •	- y -
Distribution Mains	Diameter	50,37,20mm			<u> </u>	<u> </u>
	Length	Total 4 km			<u> </u>	ļ
	Materials	uPVC		J		<u> </u>
Service Reservoirs	None					
Pump Details	Gravity					
•	-					
Customer Details				_		
Households Served	Members	Other H.H's	Total	_		
	60	-	60	<u>,</u>		
Customers Metered	Yes / No		Metered	No	Unmetered	Yes
		•				
Operation & Maintenance	[Production	H.H Served	<u>.</u>]		
Water Production	1993			_		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1994					
	}	No records		_		
	1996					
	1997]		
Water Consumption	Domestic	Institutional	Irrigation	Others	Tota!	_
ta este manimum branch	80%		7	<u> </u> -	100	<u>%</u>]
·						_

Problems / Future Expansion / Remarks

- 1) Treatment works required
 2) Protection of intake required
 3) Desilting of the sump area





KIPKABUS (1/1)

General Name of Rural water Supply:	Kipkabus		Location / Di	strict:	Uasin Gis	shu
Organisation / Water Underlak				Map Ref		
Organisation / Water Officertaix Drainage Sub Basin	e. Commenty			• -	X:	Y:
Construction Details						
Year of Construction	Phase I:	1985	Phase II:		Phase III	
	-		Funded By:			<u> </u>
Constructed By: Total Construction Cost	Ksh 13,044,00		1 onaca cy.			
	1988			•		
Year Operation Started: Existing Facilities	1350			-		
 -	Lolgarini Sprin	ac		Intake Fa	clities:	dam
Water source:		42				
Raw Water Transmission	Pumping None. The tree	atmost warks	ara incomplete			
Treatment Facilities	None. The dec	BOTHETIC WOLKS	are incomplete	···		
Chemicals Dosed	None					
Master Meter Details	None installed	·			,	
Distribution Mains	Diameter	100mm	75mm	50mm		<u> </u>
	Length) Total len	gth 10km
	Materials	UPVC	UPVC	UPVC		1
					T	
Service Reservoirs	2 No.Masonn		00m3 o distribution ta	1		
Pump Details Customer Details						
Households Served	Members	Other H.H's	Total			
11000010100	390		390			
Customers Metered	No		Metered		_Unmete	re <u>39</u> 0
Operation & Maintenance		Production	H.H Served	ה		
Water Production	1993					
Water Floodcoor	1994	† · · · · · · · · · · · · · · · · · · ·		_		
	1995			1		
		1397m3	39	,		
	1997			7		
Makes Consumption		Institutional	Irrination	Others	Total	7
Water Consumption	100%		(M) Sparrows		100	%
Problems / Future Expansi	1					
No treatment is being done as th			lete			
The immediate need now is to co	ompiete the treati	nent works				
					_	
						
Prepared by POM			Date: 5/3/9	98		

YAMUMBI (1/1)

Name of Rural water Supply:	Yamumbi		Location / Di	strict:	Uasin Gis	hu
Name of Noral Water Copply. Organisation / Water Undertak				Map Ref		
Organisation / Water Orlocation Drainage Sub Basin	er, rassenga o	econdary sens	νι	Co- Ords.	X:	Y:
Construction Details		.,				
Year of Construction	Phase I:	1981	Phase II:		Phase III	
Constructed By:	MOWR		Funded By:			
Total Construction Cost	Ksh. 2.5 million		, andea by:	220 (11210		
Year Operation Started:	1984	11		•		
Existing Facilities	1904			-		
				Intake Fac	rities: WF	IR
Water source: Raw Water Transmission	river			makera	January, FIL	
	Pumping,					
Treatment Facilities	None					
Chemicals Dosed	None					
Master Meter Details	None					
Distribution Mains	Diameter	160mm-40mm				
	Length	17.5km				
	Materials	UPVC with G.	sections			
Service Reservoirs	1 No.	2m³ elevated	steel tank			
Pump Details	1 No. Lister e	ngine-driven hij	h lift pump Q=	33m3/hr, H	=120m	
Customer Details				_		
Households Served	Members	Other H.H's	Total			
	1500		1500			
Customers Metered	No	_	Metered		Unmeter	e
				-		
Operation & Maintenance		Production	H.H Served	_		
Water Production	1993		<u></u>			
	1994]		
	1995			_		
	1996			_		
	1997					_
Water Consumption	Domestic	Institutional	Irrigation	Others_	Total	_
·	100%				100%	
Problems / Future Expansion	on / Remarks					_
The sceme has no traetment faci	lity, even chlorini	ation!		_		
Eldoret Municipal Council has ag			rom its water s	uply system	but the	
community must supply the nece						
Prepared by POM			Date: 5/3/9	3		
in the property of the control of th						

MOI UNIVERSITY W/S (1/1)

General							
Name of Rural water Supply:	Moi University	W/S	Location / Di	istrict:	Kesses/Uas	in Gishu	
Organisation / Water Undertake	x:	Moi Universit	Y				
Drainage Sub Basin				Co- Ords.	X:	Y:	
Construction Details							
Year of Construction	Old W/S	1985	Phase1A	1988	ዖክ 1B, ll	1990	
Constructed By:	Self help		Funded By:	Local comn	nunity		
Total Construction Cost	Ksh. 86 millin	(original)		-			
Year Operation Started:	1990			_			
Existing Facilities							
Water source:	Samul River			_Intake Fac	dities:	Lesses dam	
Raw Water Transmission	Old W/S - gra	avity/pumping: I	Ph 1A, 18-gra	wity			
Treatment Facilities	Coagulation,	Sedimentation, I	Filtration and C	Chlorination			
Chemicals Dosed	At new T/wor	ks only - Alum, S	Soda Ash, Ch	lorine			
Master Meter Details	Not yet install	ed		· · · · · · · · · · · · · · · · · · ·		1	
Distribution Mains	Diameter	315mm-75mm		<u> </u>		<u> </u>	
	Length	10km		 			
	Materials	UPVC/GI		1	<u> </u>	L	
Service Reservoirs	1 No. 6250m	³ R.C.; 1 No. 32	28m³ elevate	d steel tank			
Pump Details	1 No.raw wat	er pump Q=20V	's H=90m; 2 N	lo. distributio	n pumps at	new T/works	
	Q=125Vs H=	90. (2 No. back	wash pumps i	not yet instal	led)		
Customer Details				_			
Households Served	Members	Other H.H's	Total	_			
(Population)	150		150	<u>)</u>			
Customers Metered	Yes	_	Metered	150	Unmetere	<u>ed</u>	
	Only staff q	uarters are me	etered	- ,			
Operation & Maintenance	<u> </u>	Production	H.H Served				
Water Production	1993	584,000m ³	150 staff hou	<u>is</u> es and 350	0 students		
	1994	584,000m³	150 staff hou	<u>s</u> es and 350	0 students		
	1995	584,000m ³	150 staff hou	<u>ses and 350</u>	0 students		
	1996	584,000m³	150 staff hou	ses and 350	0 students		
	1997	7			- -	1	
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	1	
Problems / Future Expansio	n / Remarks	90%	5%	6 5%	100%	j	
This an institutional water supply s	cheme serving	the University	students and	staff. The to	tal populatio	n served is es	timated to be 4,700
Major problems include:		•				-	
1. Power supply interruptions			<u></u> .				
2. Incomplete Phase 1B and II who							
These problems have resulted in it	nadequate sup	ply and the sche	eme is not ope	erating to opt	irnal design	capacity	

SOSIANI (1/1)

Name of Rural water Supply:	Sosiani		Location / Di	strict:	Uasin Gish	u
Organisation / Water Undertak	er:	MOWR		Map Ref		
Drainage Sub Basin				Co- Ords.	X:	Y:
Construction Details						
Year of Construction	Phase I;	1978	Phase II:		Phase III	
Constructed By:	MOWR Direct	Labour	Funded By:	GOK		
Total Construction Cost	Ksh. 3,209,00	0		_		
Year Operation Started:	1981					
Existing Facilities						
Water source:	2 No. Borehol	es		Intake Fa	cities:	B/Hole
Raw Water Transmission	Pumping					
Treatment Facilities	No treatment					
Chemicals Dosed	None					
Master Meter Details		lia. Kent meter				
Distribution Mains	Diameter	75mm	50mm			
Pictionion mania	Length	Total length 8		<u> </u>		
	Materials	UPVC	UPVC			<u> </u>
	iviates als	0	19. 10	1		4
Service Reservoirs	1No 45m ³ e		nk	1		T
Pump Details		e pumps, each		-190m		
<u>Customer Details</u> Households Served	Members	Other H.H's	Total			
Customers Metered	No/Yes	<u> </u>	Metered	.	Unmeter	ed
				Informati	- on notav	alable
Operation & Maintenance		Production	H.H Served]		
Water Production	1993]		
	1994]		
	1995	1,814m³	104			
	1996	680m³	104	7		
	1997			1		
Water Consumption	Domestic	Institutional	Irrigation	Others	Total]
	100%	,		T	100%	,
Problems / Future Expansion						
Pumps break down very frequent		bly the reason :	for the low prod	duction in f	996	
Chlorination t should be carried or			• • • •			
Unionnation estadio de carred de	or as a priving					
				· — — —		

General

ARANGAI (1/1)

Name of Rural water Supply:	Arangai		Location / Dis	strict:	Ainabkoi/	Uasin Gishu
Organisation / Water Undertake	Community s	elf help		Map Ref		
Orainage Sub Basin				Co- Ords.	X:	Y:
Construction Details						
Year of Construction	Phase I:	1969	Phase II:	1983	Phase III	
Constructed By:	MOWR Direct	ct Labour	Funded By:	GOK		
Total Construction Cost						
Year Operation Started:	1989 (Ph. II)	<u> </u>				
Existing Facilities		·				
Water source:	River Rongai			Intake Fac	cilities: WEA	8
••••	Pumping: 300i	n of 150mm di	a G.I.pipe; 162	Om of 150m	m dia. uPVC	pipe
Treatment Facilities	None			.		
					···	
Chemicals Dosed	None	·				
Master Meter Details	None installed	<u> </u>				
Distribution Mains	Diameter	150mm	100mm	100mm	80mm	
	Length	2400m	3300m	3060m	2830m	
	Materials	υPVC 'B'	uPVC 'C'	υPVC 'B'	uPVC 'B'	
	<u> </u>					
Service Reservoirs	2No. masonry	50m³;	1No. masonry	100m³		
Pump Details		2=50m ⁸ /hr; H=		·		
, dip dound		·				
Customer Details						
Households Served	Members	Other H.H's	Total]		
(persons)	5290		5290	1		
Customers Metered	No		Metered	-	Unmetere	ed
		•			_	
Operation & Maintenance		Production	H.H Served]		
Water Production	1993		1	1	}	
	1994			1	}	
	1995		1	1	}	No records
	1996	T	1	1	}	
	1997			1	3	
Water Consumption	Domestic	Institutional	Irrigation	Others	Total	1
water Consumption		60% KCC		100.0.0	100%	1
Problems / Future Expansion		10070 1100	<u> </u>	1	10070	3
It is noted that no treatment a	l all is being d	one. As an in	nmediate med	asure,chlo	rination sh	ould be carried
The main problems as	re lack of con	munity organ	nisation and r	manageme	ent	
	s one of the 7	shemes und	ler the Ainab <u>l</u>	koi comple	x	
Arangai	sceme is prop					

DATA BOOK V

RESULT OF SURVEY ON EXISTING SEWERAGE SYSTEMS

THE AFTERCARE STUDY ON THE NATIONAL WATER MASTER PLAN

DATA BOOK

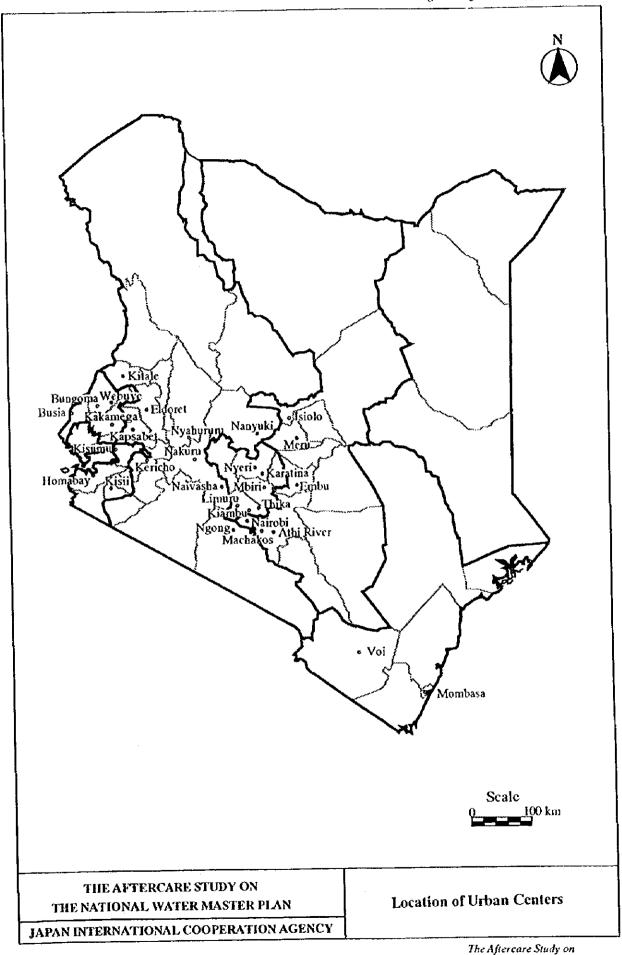
DATA BOOK V: RESULTS OF SURVEY ON EXISTING SEWERAGE SYSTEMS

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Final Report - Data Book

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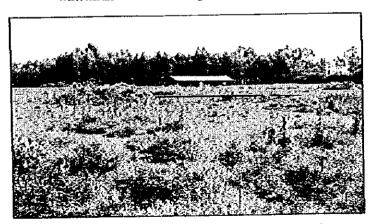
Name of Urban Center	Bungoma	Bungoma x y						
District	Bungoma		Coordinate	s				
Province	Western	r	Elevatio		,405m			
dean Annual Precipitation (mm)		Tempera	ture max & min 0	c				
	1995	1998	2000	2005	2010			
opulation Projections		70,000						
Irban Area (ha)		5,500.0						
Population Density (ppha)		12.7						
		<u> </u>						
Vater Supply	1995	1998	2000	2005	2010			
Domestic water demand (m3/d)	- 	· · · · · · · · · · · · · · · · · · ·						
fotal water consumption (m3/d)		2,620			.			
Vrea served (estimated net (ha))								
law water Source	Borehole							
Sewerage Facilities	1995	1998	2000	2005	2010			
opulation Served		12,600						
Service coverage ratio %		5%						
Area served (estimated net (ha))		275.0						
opulation Density (ppha)		45.8						
Wastewater volumes (m3/d)								
Sewerage connections		260						
	F	<u></u>		F, Focultative M, Maturation				
	·	<u></u>						
Description & dimensions	F	- M	Area		Volume			
Falcultative pond 1	F S 30.0	ive	f	M, Maturation	Volume -			
	F S 30.0	ize 30.0	900.0	M, Maturation	Volume -			
Falcultative pond 1	F S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume - -			
Falcultative pond 1 Falcultative pond 2	S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume -			
Falcultative pond 1 Falcultative pond 2	S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume - -			
Falcultative pond 1 Falcultative pond 2	S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume -			
Falcultative pond 1 Falcultative pond 2	S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume -			
Falcultative pond 1 Falcultative pond 2	S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume - -			
Falcultative pond 1 Falcultative pond 2	S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume			
Falcultative pond 1 Falcultative pond 2	S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume			
Falcultative pond 1 Falcultative pond 2	S 30.0	i/c 30.0 80.0	900.0 2,400.0	M, Maturation	Volume			
Falcultative pond 1 Falcultative pond 2	S 30.0 30.0 30.0	30.0 80.0 30.0	900.0 2,400.0	M, Maturation Depth				
Falcultative pend 2	S 30.0 30.0 30.0 Design	70c 30.0 80.0 30.0 Capacity	900.0 2,400.0 900.0	M, Maturation Depth Actual flow				
Falcultative pond 2 Falcultative pond 2 Maturation Pond 1	S 30.0 30.0 30.0	30.0 80.0 30.0	900.0 2,400.0	M, Maturation Depth				
Falcultative pond 1 Falcultative pond 2 Maturation Pond 1	S 30.0 30.0 30.0 Design	70c 30.0 80.0 30.0 Capacity	900.0 2,400.0 900.0	M, Maturation Depth Actual flow				
Falcultative pond 1 Falcultative pond 2 Maturation Pond 1	S 30.0 30.0 30.0 Design Dry weather	Capacity Population	900.0 2,400.0 900.0	M, Maturation Depth Actual flow Max	Avg			
Falcultative pond 1 Falcultative pond 2 Maturation Pond 1	S 30.0 30.0 30.0 Design Dry weather BOD	Capacity Population COD	900.0 2,400.0 900.0 Min	M, Maturation Depth Actual flow				
Falcultative pond 1 Falcultative pond 2 Maturation Pond 1 BOD Loading Hydrautic loading	S 30.0 30.0 30.0 Design Dry weather	Capacity Population	900.0 2,400.0 900.0	M, Maturation Depth Actual flow Max	Avg			
Falcultative pond 1 Falcultative pond 2 Maturation Pond 1 BOD Loading Hydraulic loading offluent ffluent	S 30.0 30.0 30.0 Design Dry weather BOD	Capacity Population COD	900.0 2,400.0 900.0 Min	M, Maturation Depth Actual flow Max	Avg			
Falcultative pond 1 Falcultative pond 2 Maturation Pond 1 BOD Loading Hydrautic loading	S 30.0 30.0 30.0 Design Dry weather BOD	Capacity Population COD	900.0 2,400.0 900.0 Min	M, Maturation Depth Actual flow Max	Avg			

BUNGOMA (2/3)

	Treatment Method	Disposal
Sludge Processing	No treatment	Municipal garbage dump
Operation & Maintenance	Treatment !	Works
1. Maintenance has been neglected:	the first pond is full of sludge and grass	
	ige in the town all the sewage is directed to the sm	after falcultative pond. There is no
	her two ponds are dry and are fully covered with v	
3. The inlet to the first pond has clo	gged and the sewage overflows overland to the sm	aller falcultative pond
4. Interponds connections, outlet fre	om the maturation pond and outfall are covered wit	th soil and grass.
5. About 2/3rd of the site has been f	fenced out for a school and it was planned that the	new sewage works would have been in
operation by now. However the o	contractor abondoned the site in 1996 and the coun	cil is doing appraisal for retender.
6. Only pond excavation in the new		
	Sewei	8
1. Most of the 100mm diameter sev	vers are permanently blocked due to size and prole	onged water shortage in town.
2. Most truck sewers are small 150	mos dismeter which are prone to frequent blockage	e resulting in overflows onto the streets.
	wn are 150 and 100 mm dia. in size. About one blo	
	ew sewers under the 1996 project have been laid w	
Most sewers discharge into open	drains or nearby fields creating a significant healt	h hazard.



Waste stabilization Pond: note sludge accumulation near outlet pipe

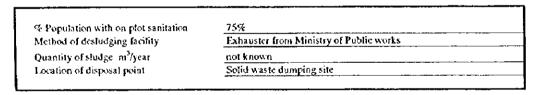


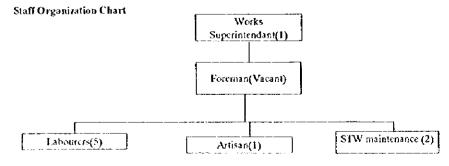
Waste stabilization Pond: pond is dry and area is used for cattle grazing.

Managenent

Staffing				·			
	Skilled	Unskilled					
Sewage works	1	2					
Sewer maintenance	<u>l</u>	5					
Bye-law enforcement	-						
Other							
Resources Available			Comments				
Resources Avanable	1No estina	au ahina	In good condition				
	1No. rodding 1 set of sewer		In good condition				
	Wheelbarrow		In good condition				
	AT DOCUMENT	ACTIONS CITY	in good condition				
Sources of Revenue	Sewer charges						
	Connection fe						
	-						
Annual Cash Flow, kshs.		-1	To 0:	le t			
	Year	Revenue	Expenditure	Surplus (362,240)			
	1995		562,240	(360,040)			
	1996 1997		571,040 607,840	(375,340)			
		2.2,2.00	1	(3.2,6.13)			
Financial Problems	The sewer ch.	arges are corrected	by NWCPC and	are based on flat rate			
	Consumer failure to pay bills						
		sources of revenu	c				
Investment Budget Plan				T2			
	Type of active			Target Year			
	Complete the	work on the new	sewage works	ļ			
				 			
				<u>J </u>			

On - Plot Sanitation









Service Severage Facilities 1995 1998 2000 2005 2010	1-1-1-1				x	yy
testince Western Elecution Spyrox 1,200m Country Country	iliteria)	Busia (South teso) Busia		Coordinates	1	
				Elevation	approx	1,200m
1995 1995 2000 2005 2010 2006 2010	`TILLETI	1,1,7 ° ° <u>1 · · · · · · · · · · · · · · · · · · </u>	Tempera	sture max & min ⁰ C		
Secondary Facultative Pool Secondary Facu		1995				2019
Secondary Seco			48,000	60,049	89,110	102,633
Sepulation Density (pphs) 1995 1996 2000 2005 2010			250,0		l	
Valer Supply			190.0			:
Densitiv water demaid (m3/d) 3,637 2,989 114,	The state of the s					
Description & dimensions	Voter Sunnly	1995	1998	2000	2003	2010
		<u> </u>	2,680		I	14,033
Secondary Facultative Pool Secondary Facu		3,637	2,080	l]	
Description & dimensions Primary Facultative Pond Primary Facultative			360.0	40.0)	60.
Primary Facultative Pond Primary Facultative		Boreholes				ļ
Population Served 2,607 3,9,600 9,000 22,218 41		1995	1998	2000	2005	2010
Service coverage ratio % Several (estimated and (ba)) Several (estimated and (ba))		2,607	9,600	9,00	22,278	41,45
Properties Pro		8%	10%	15%	25%	10'
Per	Area served (estimated net (ha))		25.0			ļ
PF	Population Density (ppha)		390.0	i		
PF	Wastewater volumes (m3/d)	[600			
PF			473	<u> </u>	<u> </u>	<u> </u>
Design Capacity Actual flow		L		J{ <u>\!\</u> }	TF, Trickling Liter	
Primary Facultative Pond 40.0 14.725.0 1.75 230		<u> </u>			TF, Trickling Liter	
Secondary Facultative Pond 7.0 5,600.0 1.75 8.	Desire & dimensions	Retention		J []	TF, Trickling Elter OD, Oxidation ditch	Volume
Maturation Pond 2		- j ·	ntime (days)	Area	TF, Trickling Elter OD, Oxidation disch Depth	-i -
Design Capacity Actual flow		1	n time (days)	Area 0 14,725.0	16, Trickling Elter OD, Oxidation ditch Depth 1.75	23879
Design Capacity Actual flow	Primary Facultative Ponce Secondary Facultative Ponce	3	atime (days) 40.	Area 0 14,725.0 0 5,600.0	16, Trickling Elter OD, Oxidation ditch Depth 1.75 1.75	23875 8400
Dry weather Pepulation Min Max Avg	Primary Facultative Poor Secondary Facultative Poor Maturation Pond	1	40.	Area 0 14,725.0 0 5,600.0 0 6,300.0	Depth 1.75 1.50	23875 8400 8300
Dry weather Pepulation Min Max Avg	Primary Facultative Poor Secondary Facultative Poor Maturation Pond	1	40.	Area 0 14,725.0 0 5,600.0 0 6,300.0	Depth 1.75 1.50	23875 8400 8300
Dry weather Population Min Max Avg	Primory Facultative Poor Secondary Facultative Poor Maturation Pond	1	40.	Area 0 14,725.0 0 5,600.0 0 6,300.0	Depth 1.75 1.50	Volume 2387: 5400 8300 8300
Dry weather Population Min Max Avg	Primory Facultative Poor Secondary Facultative Poor Maturation Pond	1	40.	Area 0 14,725.0 0 5,600.0 0 6,300.0	Depth 1.75 1.50	23875 8400 8300
Dry weather Population Min Max Avg	Primory Facultative Poor Secondary Facultative Poor Maturation Pond	1	40.	Area 0 14,725.0 0 5,600.0 0 6,300.0	Depth 1.75 1.50	23875 8400 8300
Dry weather Population Min Max Avg	Primory Facultative Poor Secondary Facultative Poor Maturation Pond	1	40.	Area 0 14,725.0 0 5,600.0 0 6,300.0	Depth 1.75 1.50	2387 840 830
Hydrautic loading 600 9,600 400 1,200 600	Primory Facultative Poor Secondary Facultative Poor Maturation Pond	3 3 3 4 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	10 (days) 400 7. 7. 7.	Area 0 14,725.0 0 5,600.0 0 6,300.0	## Trickling Elter OB, Oxidation ditch Depth 1.75 1.50	23875 8400 8300
BOD COD SS TN/TP FC	Primary Facultative Poor Secondary Facultative Poor Maturation Pond	Design	atime (days) 40) 7. 7. 7. a Capacity	Area 0 14,725.0 0 5,600.0 0 6,300.0 0 6,300.0	Depth 1.75 1.50 1.50 Actual flow	2387 840 830 830
BOD COD SS 1N/TP FC FC	Primary Facultative Poor Secondary Facultative Poor Maturation Pond Maturation Pond	Design	a Capacity Population	Area 0 14,725.0 0 5,600.0 0 6,300.0 0 6,300.0	16, Trickling Elter OB, Oxidation ditch Depth 1.75 1.75 1.50 1.50 Actual flow Max	2387 840 830 830
influent 200 259 60 effleent 85 105 26 14.4/1.9 Nil	Primary Facultative Pond Secondary Facultative Pond Maturation Pond Maturation Pond Maturation Pond Maturation Pond	Design	a Capacity Population	Area 0 14,725.0 0 5,600.0 0 6,300.0 0 6,300.0	16, Trickling Elter OB, Oxidation ditch Depth 1.75 1.75 1.50 1.50 Actual flow Max	2357 840 830 830 830
eftluent 85 105 20 14.4/3.9 Nil	Primary Facultative Pond Secondary Facultative Pond Maturation Pond Maturation Pond Maturation Pond Maturation Pond	Design	a time (days) 40) 7. 7. 7. a Capacity Population 9,600	Area 0 14,725.0 0 5,600.0 0 6,300.0 0 6,300.0 Min 400	Depth 1.75 1.75 1.50 1.50 Actual flow Max 1.200	2387 840 830 830 Avg 600
Chiacia.	Primary Facultative Poor Secondary Facultative Poor Maturation Pond Maturation Pond Mydrautic loading BOD loading	Design Dey weather 600 BOD	a time (days) 40) 7, 7, 7. Capacity Population 9,600 COD	Area 0 14,725.0 0 5,600.0 0 6,300.0 0 6,300.0 Min 400	Depth 1.75 1.75 1.50 1.50 Actual flow Max 1.200	2387 840 830 830 Avg 600
Learning matter hade n's 5.5 1 to 1 20 1 20 1	Primary Facultative Poor Secondary Facultative Poor Maturation Pond Maturation Pond Hydrautic loading BOD loading	Design Dry weather 600 BOD 200	a Capacity Population 9,600 COD 250	Min 400	## Trickling Elter OD, Oxidation ditch Depth 1.75 1.75 1.50 1.50 Actual flow Max 1.200 TN/TP	2387 840 830 830 830 Avg 600
receiving water body d's 12.5 85 20	Primary Facultative Poor Secondary Facultative Poor Maturation Pond Maturation Pond Hydrautic loading BOD loading influent eftluent	Design Dey weather 600 BOD 200 85	Actime (days) 40. 7. 7. 7. 2. 40. 40. 40. 40. 40. 40. 40. 40. 40. 40	Min 400 SS 60 20	## Trickling Elter OD, Oxidation ditch Depth 1.75 1.75 1.50 1.50 Actual flow Max 1.200 TN/TP	2387 840 830 830 830 Avg 600

Sio River

Receiving water body

BUSIA (2/3)

Sewerage System Survey

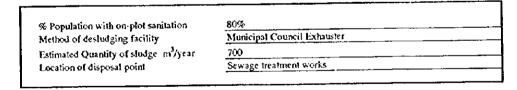
	Treatment Method	Disposal
Sludge Processing	, No treatment	Municipal garbage dump
Operation & Maintenance	Treatment	Works
1. Screens are not attended to and	there is no grit removal facility. The infet chamber i	s full of grit and grass.
2. A section of the embankment b	etween the first and third pond is sceping and needs a	tlention.
3. Slabs lining the second maturat	ion have collapsed	
4. All chambers are full of grit an	d grass. Most chambers do not have covers	
5. Scum floating in the ponds. No	evidence of removal.	
6. Grass is not regularly cut aroun	d the ponds	
	Sever	s
1. Trunk sewer through Zone G h	as a gentle slope thus causing frequent blockages	
2. Approximately 200 blockages	per year and 50 overflows fasting 3 days each	
3. Most manhole covers missing d	ue to vandalism (approx. 150 stolen)	
4		
5		

No Picture Available	

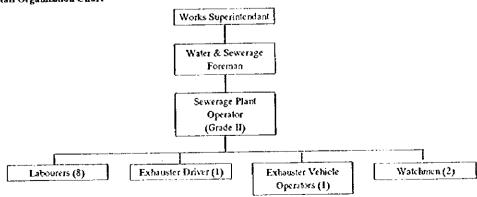
On-going proj	ects	None				
				·	 	
			-		 	
					 	
		,			 	

itaMog				
.amug	Skilled	Unskilled	}	Į.
Sewage works	-	2]	
Sewer maintenance	4	4		
Bye-law enforcement	-	1	_]	
Other (watchmen)	-	2	<u> </u>	
Resources Available			Comments	1
	1 No. Exhaus	ter lorry	Good condition	
	1 No. Hand R		Good condition	v
	38 No. Sewer	<u></u> -	Good condition	
	1 No. Roddin	g machine	Good condition	
Sources of Revenue			•	
	Sewer charge	s		
	Exhauster fee	s		
	Connection for	es		
	Blockages ch	rges		
Annual Cash Flow, Kshs.				
	Year	Revenue	Expenditure	Surplus
•	199.			(421,414)
	1996			
	199	7 323,75	1,127,500	(803,747)
Financial Problems			f service to meters	
		ilure to pay bills		
	Insufficient f	unding to comple	te sewer extensions	
Investment Budget Plan				1- 1
	Type of activ	ity		Target Year
	None			
				
				ļ
				

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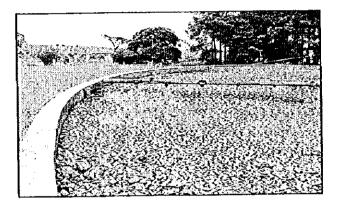


Staff Organization Chart

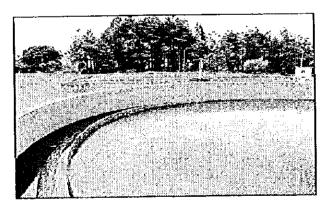


ame of Urban Center	Eldoret			<u> </u>	ΣΣ
)istrict	Uasin Gishu		Coordinates	1	06 33'
rovince	Rift Valley		Flevation	app <u>rox.</u>	2,090m
Jean Annual Precipitation (mm)		Tempera	nture max & min °C		···
	1995	1998	2000	2005	2010
opulation Projections	148,204	220,000	247,489	378,415	450,629
funicipal Area (ha)	858	14700			· • • • • • • • • • • • • • • • • • • •
opulation Density (ppha)	: 	15.0			·
Vater Supply	1995	1998	2000	2005	2010
Domestic water demand (m3/d)					61,096
Total water consumption (m3/J)	35506	25,000			
Area served (estimated net (ha))	843.0		2,035.0)	3,635.6
Raw water source	Twin River dam, F	ligirim dam, Borch	iles		-
Sewerage Facilities	1995	1998	2000	2005	2010
Population Served	16,907	70,400	49,491	113,524	180,25
Service coverage ratio %	11%		209	30%	409
Area served (estimated net (ha))					
Population Density (ppha)					<u> </u>
Wastewater volumes (m3/d)		8,000	<u> </u>	<u> </u>	
No. of sewer connections		5884		<u> </u>	<u> </u>
Treatment process					
FC	ТР	sc		SC, Secondary clarific 1F, Trickling filter	г
PC PC	177	sc			г
LJ	<u> </u>	Size	Area		Volume
Description & dimensions Primary clarifier 1		Size		1F, Trickling filter	Volume
Description & dimensions	die	Size 12.	2 117	1F, Tricking filter Depth	Volume 35
Description & dimensions Primary clarifier 1	S dia:	Size 12.	2 117 5 731	1F, Trickling fiker Depth 3.00	Volume 35
Description & dimensions Primary clarifier I Trickling filter I	S dia:	Size 12. 30.	2 117 5 731 5 731	1F, Trickling filter Depth 3.00 1.75	Volume 33: 12: 12: 12: 12: 12: 12: 12: 12: 12: 12
Description & dimensions Primary clarifier 1 Trickling filter 1	S die: dis: dis: dia: dia:	Size 12. 30. 12. 16. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75	Volume 35 12: 12: 2:
Description & dimensions Primary clarifier I Trickling filter I Trickling filter 2 Secondary Clarifier	dia: dia: dia: dia: dia: dia: dia:	Size 12. 39. 12. 12. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80	Volume 35 12: 12: 2:
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste	dia: dia: dia: dia: dia: dia: dia:	Size 12. 30. 12. 16. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80	Volume 35 12: 12: 2:
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste	dia: dia: dia: dia: dia: dia: dia:	Size 12. 30. 12. 16. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80	Volume 35 12: 12: 2:
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste	dia: dia: dia: dia: dia: dia: dia:	Size 12. 30. 12. 16. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80	Volume 35 12: 12: 2:
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste	dia: dia: dia: dia: dia: dia: dia:	Size 12. 30. 12. 16. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80	Volume 33 12 12 2
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste	dia: dia: dia: dia: dia: dia: dia:	Size 12. 30. 12. 16. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80	Volume 33 12 12 2
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste	dia: dia: dia: dia: dia: dia: dia:	Size 12. 30. 12. 16. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80	Volume 33 12 12 2
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste	S dise dise dise dise dise dise dise dise	Size 12. 30. 12. 16. 16.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80	Volume 33 12 12 2
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste	S dise dise dise dise dise dise dise dise	Size 12. 30. 12.	2 117 5 731 5 731 2 117 5 214	Depth 3.00 1.75 1.80 1.80	Volume 33 12 12 2
Description & dimensions Primary clarifier I Trickling filter I Secondary Clarifier Studge Digester Studge drying beds - 5 No	Desige	Size 12. 30. 12. 16. 16. 12. 16. 12. 16. 17.	2 117 5 731 5 731 2 117 5 214 0 216	Depth 3.00 1.75 1.80 1.80 Actual flow	Volume 33: 12' 12: 2 33:
Description & dimensions Primary clarifier 1 Trickling filter 2 Secondary Clarifier Studge Digeste Studge drying beds - 5 No	Design Dry weather	Size 12. 39. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16.	2 117 5 731 5 731 2 117 5 214 0 216	Depth 3.00 1.75 1.80 1.80	Volume 33 12 12 2 33 Avg
Description & dimensions Primary clarifier I Trickling filter I Secondary Clarifier Studge Digester Studge drying beds - 5 No	Design Dry weather 1.575	Size 12. 39. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16. 12. 16.	2 117 5 731 5 731 2 117 5 214 0 216	Depth 3.00 1.75 1.80 1.80	Volume 33 12 12 2 33 Avg
Description & dimensions Primary clarifier I Trickling filter I Secondary Clarifier Studge Digester Studge drying beds - 5 No	Design Dry weather 1.575	Size	2 117 5 731 5 731 2 117 5 214 0 216 Min 3.150	Depth 3.00 1.75 1.80 1.80	Volume 33 122 12 2 3 3 3 4 4 4 4 4 4 4
Description & dimensions Primary clarifier I Trickling filter I Secondary Clarifier Studge Digester Studge drying beds - 5 No Hydraulic loading BOD loading	Design Dry weather 1.575 435 BOD	Size 12. 30. 30. 12. 16. 12. 16. 12. 16. 12. 16. 17.	2 117 5 731 5 731 2 117 5 214 0 216 Min 3,150 SS	Depth 3.00 1.75 1.80 1.80	Volume 33 12 12 2 3
Description & dimensions Primary clarifier I Trickling filter I Secondary Clarifier Studge Digester Studge drying beds - 5 No Hydraulic loading BOD loading influent	Design Dry weather 1.575 435 BOD 300	Capacity Pepulation 11.000 COD 800	2 117 5 731 5 731 2 117 5 214 0 216 Min 3,150 SS 140	Depth 3.00 1.75 1.80 1.80 1.80	Volume 35 127 127 21 38 3,075 FC FC
Description & dimensions Primary clarifier I Trickling filter I Secondary Clarifier Studge Digester Studge drying beds - 5 No Hydraulic loading ROD loading influent	Design Dry weather 1.575 435 BOD 300 115	Capacity Pepulation 11.000 COD 800 800	2 117 5 731 5 731 2 117 5 214 0 216 Min 3,150 SS 140 20	Depth 3.00 1.75 1.80 1.80 1.80	Volume 35 121 122 123 34 34 34 34 34 34 34

	Treatment Method	Disposal
Sludge Processing	Sludge digestion tack & drying bods	Sold at 15shs/ton
Operation & Maintenance	Treatment Work	<u> </u>
1. Facility treats mostly domestic v	vaste	
2. The facility receives far in excess	s of its design flow (6000 m ³ /d as compared to design fl	ow of 1575 m ³ /d)
3. The inlet works are well maintain		
4. Flow is recorded hourly at the p		
5. Replacement of distribution arm		
6. Replacement of filter media in the	he sludge drying bods	
<u> </u>	Sewers	
1. Existing sewers are in good ope	ration	
2		
3		
4		
5		



Trickling Filter: note rotating arm stalled in one location, rock media is saturated with silt & debris

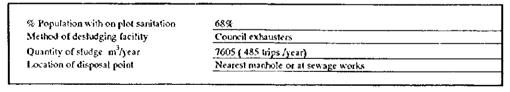


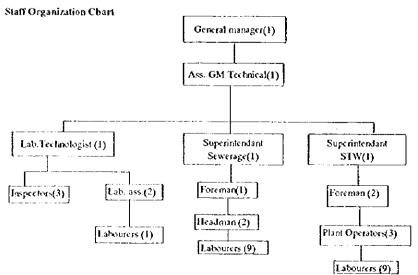
Primary clarifier: note floating chunks of dark soun indicating anaerobic activity and process overloading

On-going projects
New treatment facility proposed at new site, currently under design. Funded by KFW (Germany)
Existing works will be rehabilitated and kept in operation

Staffing			_	
	Skilled	Unskilled]	
Sewage works	8	9]	
Sewer maintenance	5	9	j	
Bye-law enforcement	6	ł	Ì	
Other	l	<u> </u>	<u> </u>	
Resources Available	3 No. Exhaus	ters - 9000 litres		Comments
	Winching mac	hine		In good condition
	Studge pump			In good condition
	Wheelbarrow/	Jembes/ lawn mo	wers etc.	In good condition
Sources of Revenue	Sewer charges			
	Connection for	es		
	Water charges	<u> </u>		
Annual Cash Flow, Rshs.	Year	Revenue	es same for both sy Expenditure	Surplus
	l'ear .	Revenue	Expenditure	Surplus
	1995		656,927,281	(595,751,447)
	1996		+	+
	1997	155,340,595	67,605,203	87,735,392
Financial Problems	Only where co	onnections are not	covered in the blo	ck mapping
		<u> </u>		
Investment Budget Plan				
	Type of activi			Target Year
		plementation of a	new	
	sewage works	<u> </u>		
	}			-
	<u> </u>			<u> </u>

On - Plot Sapitation



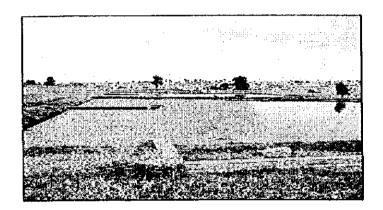


ELDORET (1/3)

Aftercare Study on the National Water Master Plan

ome of Urban Center	Fldoret				<u>X</u>	i	. ¥ }
istrict	Uasin Gishu		.	Coordinates	·	0	
rovince	Rift Valley			Elevation		rox. 2,084m	
lean Annual Precipitation (mm)			Temperature	max & min °C	<u> </u>		
	1995	1998	200	00	2003	2010	
opulation Projections	148,204		220,060	247,286	378.	.415	450,629
Iunicipal Area (ha)	858	, ,	4,700.0		<u> </u>		
opulation Density (ppha)			150				
		L					
Vater Supply	1995	1998	201	00	2005	2010	
Domestic water demand (m3/d)		i			ļ		61,096
otal water consumption (m3/d)	25,000	2000000	25,000			-	
trea served (estimated net (ha))	843.0	200 00000000000000000000000000000000000		2,035.0	<u> </u>		3,635.0
law water source	Twin River dam E	Ilginia Dan	a Boseboles		<u> </u>		
Sewerage Facilities	1995	1998	20	00	2005	2010	
opulation Served	16,907	L	70,400	49,497		3,524	180,252
Service coverage ratio %	11%			20%		30%	40%
Area served (estimated net (ha))	 				 		
Population Density (ppha)		L	-		.	 	
Wastewater volumes (m3/d)	ļ — · · · · · · · · · · · · · · · · ·					 	
No. of sewer Connections						<u></u>	
Treatment process A			}	M	A, Anserobic SF, Secondary 5 T. Tertiary Pond		
A A A A Description & dimensions	SF	T		Area 3,750.0			Volume 11250.0
A A A Description & dimensions Anaerobic pond	SF 61.	Size	61.0	J	SF, Secondary E T, Tertiary Pond M, Maturation Depth		11250.0
Description & dimensions Anaerobic pond Anaerobic pond	ss	Size 0	61.0	Area 3,750.0	SF, Secondary E T, Tertiary Pond M, Maturation Depth 3.60		11250.0 11250.0
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond	55 1 61. 2 61. 3 61.	Size 0 0	61.0	Area 3,750.0 3,750.0	SF, Secondary & T, Tertiary Pond M, Maturation Depth 3.00		11250.0 11250.0 11250.0
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond	5F 61. 3 61. 4 61.	Size 0 0	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0	SF, Secondary & T, Tertiary Pond M, Maturation Depth 3.60 3.00 3.00	·	11250.0 11250.0 11250.0 11250.0
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond	sF	Size 0 0	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0	SF, Secondary E T, Tertiary Pond M, Maturation Depth 3.00 3.00 3.00 3.00	·	11250.0 11250.0 11250.0 11250.0 46375.0
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond	SF S	Size 0 0	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0	SF, Secondary f T, Tertiary Pond M, Maturation Depth 3.00 3.00 3.00 1.75	·	11250.0 11250.0 11250.0 11250.0 46375.0 46375.0
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Facultative pond Tertiary Pond	sF 61. 61. 1 2 1 1 2 1 1	Size 0 0	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0	Depth 3.00 3.00 1.75 1.75	·	11250.0 11250.0 11250.0 11250.0 46375.0 46375.0 20720.0
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Tertiary Pond	55 1 61. 2 61. 3 61. 4 61. 1 2. 1 2.	Size 0 0	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0 11,840.0	Depth 3.60 3.00 3.00 1.75 1.75	·	11250.0 11250.0 11250.0 11250.0 11250.0 46375.0 46375.0 20720.0
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Tertiary Pond Maturation pond	5F 561. 33 61. 4 61. 1 2 1 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Size 0 0	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0	Depth 3.00 3.00 1.75 1.75 1.75 1.75	·	Volume 11250.0 11250.0 11250.0 11250.0 46375.0 46375.0 20720.0 18577.1
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Tertiary Pond	5F 561. 33 61. 4 61. 1 2 1 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Size 0 0	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 14,290.0	Depth 3.00 3.00 1.75 1.75 1.30	·	11250.0 11250.0 11250.0 11250.0 11250.0 46375.0 46375.0 20720.0 18577.
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Tertiary Pond Maturation pond	ss	Size 0 0	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 14,290.0	Depth 3.00 3.00 1.75 1.75 1.30		11250.0 11250.0 11250.0 11250.0 46375.4 46375.1 20720.1 20720.1 18577.1
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Tertiary Pond Maturation pond	ss	Size 0 0 0 0 0 Capacity	61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 14,290.0	Depth 3.60 3.00 3.00 1.75 1.75 1.75 1.30 1.30 Actual fi	low	11250.0 11250.0 11250.0 11250.0 46375.0 46375.0 20720.0 26720.0 18577.
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Tertiary Pond Maturation pond	SF S	Size 0 0 0 0 0 Capacity	61.0 61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 11,840.0 14,290.0	Depth 3.60 3.00 3.00 1.75 1.75 1.75 1.30 1.30 Actual fi	low	11250.0 11250.0 11250.0 11250.0 46375.0 46375.0 20720.0 18577.
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Maturation pond Maturation pond	SF S	Size 0 0 0 0 0 Capacity	61.0 61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 11,840.0 14,290.0 14,290.0 Min 6,544	Depth 3.00 3.00 3.00 1.75 1.75 1.30 1.30 Actual fl Max 8.006	low	11250.0 11250.0 11250.0 11250.0 46375.0 46375.0 20720.0 18577.1 18577.
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Maturation pond Maturation pond	SF SF SF SF SF SF SF SF	Size 0 0 0 0 0 Capacity Pop	61.0 61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 11,840.0 14,290.0 Min 6,514 SS	Depth 3.60 3.00 3.00 1.75 1.75 1.75 1.30 1.30 Actual fi	low	11250.0 11250.0 11250.0 11250.0 46375.0 46375.0 20720.0 20720.0 18577.1
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Maturation pond Maturation pond	SF	Size 0 0 0 0 0 Capacity Population	61.0 61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 14,290.0 14,290.0 Min 6,514 SS 800	Depth 3.60 3.00 3.00 1.75 1.75 1.30 1.30 Max 8.006 N.P	low	11250.0 11250.0 11250.0 11250.0 46375.4 46375.1 20720.0 18577.1 18577.1
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Maturation pond Maturation pond Maturation pond Maturation pond	SF	Size 0 0 0 0 0 Capacity Pop	61.0 61.0 61.0 61.0 00 00 00 00 00 00 00 00 00 00 00 00 0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 14,290.0 14,290.0 Min 6,514 SS 800 650	Depth 3.00 3.00 3.00 1.75 1.75 1.30 1.30 Actual fl Max 8.006	low	11250.0 11250.0 11250.0 11250.0 46375.4 46375.0 20720.0 18577.0 18577.0
Description & dimensions Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Anaerobic pond Facultative pond Facultative pond Tertiary Pond Tertiary Pond Maturation pond Maturation pond Hydraulic loading BOD loading	SF	Size 0 0 0 0 0 Capacity Pop	61.0 61.0 61.0 61.0	Area 3,750.0 3,750.0 3,750.0 3,750.0 26,500.0 26,500.0 11,840.0 14,290.0 14,290.0 Min 6,514 SS 800	Depth 3.60 3.00 3.00 1.75 1.75 1.30 1.30 Max 8.006 N.P	low	11250.0 11250.0 11250.0 11250.0 46375.4 46375.1 20720.0 18577.1 18577.1

	Treatment Method	Disposal
Sludge Processing	No treatment	Municipal garbage dump
Operation & Maintenance		
	of design capacity, and ponds are hydraulically	
	works to one of the secondary facultative ponds,	
3. Peak flows are frequently caused by	industrial discharges and since pre-treatment in	the anaerobic ponds is by-passed
the first facultative pond is severely	overloaded.	
4. Inlet channel and screens are too sm	all resulting in frequent by-pass of anaerobic por	nds.
5. The ponds occasionally receive larg	e amounts of petroleum oil creating seum proble	ms, fouting channels, inlets & outlets.
6. The absence of a grit removal system	n has resulted in sludge accumulation in the ana	erobic ponds.
	Sewers	
1. Sewers are operating satisfactorily		
2		
3		
4		
5		



Anaerobic Pond: note heavy scum and accumulation of sludge & debris at inlet structure



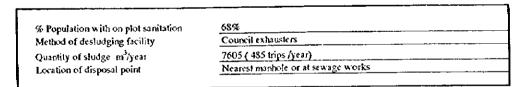
Maturation Pond: note accumulation of debris at inlet & and oily appearance of surface

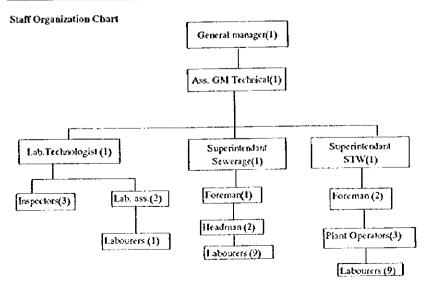
On-going projects
New treatment facility proposed at new site, currently under design. Funded by KFW (Germany)
Existing works will be rehabilitated and kept in operation

Management

staffing		,		
***************************************	Skilled	Unskilled		
Sewage works	8	9		
Sewer maintenance	5	9		
Bye-law enforcement	6	1		
Other		<u>L</u>		
Resources Available	3 No. Exhaus	iters - 9000 titres		Comments
	Winching mac	hine		In good condition
	Studge pump			In good condition
	Wheelbarrow/	Jembes/Jawn mov	vers etc.	In good condition
Sources of Revenue	Sewer charge:			
	Connection fe	es		
	Water charges	s		
Annual Cash How, kshs.			es same for both sy	stems)
•	Year	Revenue	Expenditure	Surplus
	1995		656,927,281	(595,751,44)
	1996			103,601,49
	1997	155,340,595	67,605,203	87,735,39
Financial Problems	Only where o	onnections are not	covered in the blo	ck mapping
		<u> </u>		
	·			
Investment Budget Plan	Type of activ	in		Target Year
	Design and in	mplementation of a	usw.	
	sewage work			

On - Plot Sanitation





Name of Urban Center	Embu							X	L	У
District	Embu				:	Coordinates	37° 27'		<u>0</u> 6 31	
Province	Fastern					Elevation		1,40	00m	
Mean Annual Precipitation (mm)				Tempera	ture ma	x & min ⁶ C				
	1995		1998		2000		2005		2010	
Population Projections	34,	309		45,000		55,102		79,735		92,214
Municipal Area (ha)		95		0.000,8]	
Population Density (ppha)				5.6						
Water Supply	1995		1998		2000		2005		2010	
Domestic water demand (m3/d)							 -			12,511
l'otal water consumption (m3/d)	3,	730		7,303						
Area served (estimated net (ha))	1	7.0				332.0				544.0
Raw water source	Kapingazi Riv	r, F	upingazi l	River						
Sewerage Facilities	1995		1998		2000		2005		2010	-
Population Served	5	052		9,000		8,265	t	15,947	Í	23,653
Service coverage ratio %		5%		5%	1	15%	t	20%	i —	259
Area served (estimated net (ha))				400.0	Į	· · · · · · · · · · · · · · · · ·		== '=	l	
Population Density (ppha)	İ			22.5			<u> </u>			/
Wastewater volumes (m3/d)							i			
No. of connections	ļ	_		1400					ļ — — —	
	PF		A	st .]		PF, Prima M, Matar	ry facultative	:	
	PF			v1	}		M, Mater	ation		
Description & dimensions			îze			Asea	M, Mater	ation		olume
Primary Facultative Pond	dian	e te r	îze	200.0		1,400.0	M, Marar.	epth	V	37680.
	dian		îze				M, Marar.	ation		37680.
Primary Facultative Pond	dian	e te r	îze	200.0		1,400.0	M, Marar.	epth	V	37680.
Primary Facultative Pond	dian	e te r	îze	200.0		1,400.0	M, Marar.	epth	V	37680.
Primary Facultative Pond	dian	e te r	îze	200.0		1,400.0	M, Marar.	epth	V	37680.
Primary Facultative Pond	dian	e te r	îze	200.0		1,400.0	M, Marar.	epth	V	37680.
Primary Facultative Pond	dian 1	eter 200.0	ize	200.0		1,400.0	M, Matur	epth 20 0.00	V	37680.
Primary Facultative Pond	dian 1	ign	ize	200.0		1,400.0	M, Matur	epth	V	37680.
Primary Facultative Pond	dian 1	ign	ize	200.0		1,400.0	M, Mater	epth 20 0.00	V	37680.
Primary Facultative Pond	dian 1	ign	ize	200.0		1,400.0	M, Mater	epth 1.20 0.00	triangu	37680.
Primary Facultative Pond Maturation Pond	Der Dry weath	ign	ize	200.0		1,400.0 8,400.0 Min	M, Mater	epth 1.20 0.00	triangu	37680.
Primary Facultative Pond Maturation Pond Hydrautic loading	Der Dry weath	ign	Capacity	200.0		1,400.0 8,400.0 Min	M, Marar.	epth 1.20 0.00	triangu	37680.
Primary Facultative Pond Maturation Pond Hydraulic loading	Des Dry weath	ign	Capacity	200.0 84.0		Min \$56	M, Marar.	epth 1.20 0.00 ral Gow Max .800	triangu	37680.
Primary Facultative Pond Maturation Pond Maturation Pond Hydrautic loading BOD loading	Dev Dry weath 682	ign	Capacity Popu	200.0 84.0		Min 556	M, Mater	epth 1.20 0.00 ral Gow Max .800	triangu	37680.
Primary Facultative Pond Maturation Pond Maturation Pond Hydrautic loading BOD loading influent	Des Dry weath 682 BOD 700	ign	Capacity Popularity Capacity 2	200.0 84.0 84.0		Min \$56 \$8 \$900	M, Mater	epth 1.20 0.00 ral Gow Max 1.800	triangu	37680.4 For Avg 1,178



	Treatment Method	Disposal
Studge Processing	Drying on the ground	Disposed on site
Operation & Maintenance	Treatment Wo	or <u>ks</u>
1. Sludge accumulation in facultative p	ond	
2. Overloaded		
3. New outlet constructed for maturation	on pond due to problems with effluent quality	
4. Removal of grit from grit chamber to		
5. All chambers require minor rehabilit	ation	
6. Screens at inlet in poor condition an	are not regularly cleaned.	
	reatment works and evidence of vandalism.	
	Sewers	
1. No cleaning operations		
2. Frequent blockages on the network		
3. 18m concrete pipes cottapsed in 199	27	
4	·	
l :` — — — // — — — — — — — — — — — — —		

ar energia en la composició de la compos	anne contraret	and the second	ravarianiani	ace i e e e e e e e e e e e e e e e e e e	angan yan ngangan ngan dadasa	ang
		No Piet	ture Avail	»hie		
		340110	1110 711011	30.70		

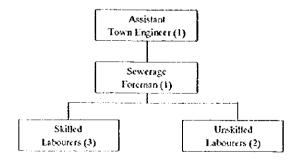
On-going projects
Project for new treatment works has been designed and tender documents are ready
HCA was approached for funding but no commitments.

Staffing					
	Skilled		Unskilled	\neg	
Sewage works and sewer maintenance	5		2	7	
Bye-law enforcement	-		-		
Other (watchmen)					
Resources Available					
Kesources Available	t Mar Park	4		Comments Good condition	
	I No. Fxh			Good condition	
	1 No. Cou Sewer rock		pick-up	Good condition	
	Tools	•		Good condition	
	Loois	-		toog condinon	· · · · · · · · · · · · · · · · · · ·
Sources of Revenue					
	Sewer char	rges			
	Connection	o fee	:s		
Annual Cash Flow, Kshs.					
	Year		Revenue	Expenditure	Surplus
	19	995			-
	<u> </u>	996			-
		997	<u> </u>		
Financial Problems	Insocuente	Site.	ina dua ta laci	of service to meter	
realital 1 took his			are to pay bill:		S
				customer meters	
	Dedicki	i Iui	aning to repair	Cusioner in ters	
				, , , , , , , , , , , , , , , , , , , ,	
Investment Budget Han					
	Type of ac	livit	<u> </u>		Target Year
				inistry of local	Looking for
			Runji & Partn		funding agency

On - Plot Sanitation

% Population with on-plot sanitation	85%	
Method of desludging facility	Municipal Council Exhauster	
Estimated Quantity of sludge m³/year	450	
Location of disposal point	Sewage treatment works	

Staff Organization Chart

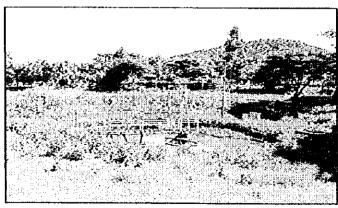


ane of Urban Center 11	Iomabay						<u>s]</u>		.У
**************************************	lomabay			Coord	linates	34	28'	0	31'
	Nyanza				vation			1	135m
ean Annual Precipitation (mm)			Temperal	ure max & 1	nin [©] C				
	1995	1998		2000		2005	i	2010	
pulation Projections	30,995		75,000		16 <u>,</u> 428		61,065		71,860
unicipal Area (ha)	115		19,700.0						
pulation Density (ppha)			3.8						
7 27 37 37 37 37 37 37 37 37 37 37 37 37 37						ļ			
ater Supply	1995	1998		2000		2005	· · · ·	2010	
omestic water demand (m3/d)		<u> </u>						!	9,740
otal water consumption (m3/d)	819		1,230						552.0
rea served (estimated net (ha))	172.0		4,000.0	- -	363.0	ļ. — -			332.0
aw water source	Lake Victoria					ļ		1010	
ewerage Facilities	1995	1998		2000		2003	12012	2010	17,965
opulation Served	2,912	1	15,000	3	6,964	1	12,813	1	25%
ervice coverage ratio %	9%		19%	3	_15%	ļ	20%	`	
rea served (estimated net (ha))			1,950.0	3				·	-
opulation Density (ppha)			7.7	3 — — · —					
Vastewater volumes (m3/d)		-	1,045					+	.
lo. of conections	<u> </u>		2500	11		1			
	[s	L } F] 	ST M				rated lagoon dimentation tar arration	nk	
		_ → 	[ST]			ST, Sec	timentation tar		
Description & dimensions		_ → 	[ST]	Surface		ST, Sec	timentation tar suration Depth		Volume
Description & dimensions Oxidation lagoon	M 46	Size	ST M 36.	0 1,65	0.0	ST, Sec	timentation tar equation Depth 3.00		2800
Oxidation lagoon Oxidation lagoon	1 46 2 46	Size	ST M 36. 36. 36.	0 1,65 0 1,65	0.0 0.0	ST, Sec	Depth 3.00		2800 2800
Oxidation lagoon	M 46 2 46 k Di	Size .0 .0 .0	36. 36.	0 1,65 0 1,65 63	0.0 0.0 .6	ST, Sec	Depth 3.00 2.25		2800 2800 143
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan	1 46 2 46 k Di	Size 0 0 0 a = 9.0	36. 36.	0 1,65 0 1,65 63	0.0 0.0 .6	ST, Sec	Depth 3.00 2.25 2.25		2800 2800 143 143
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond	M 46 2 46 k Di k Di 1 136	Size .0 .0 .0 a = 9.0 a = 9.0	36. 36.	0 1,65 0 1,65 63 63 0 4,90	0.0 0.0 .6 .6	ST, Sec	Depth 3.00 2.25 2.25 1.80		2800 2800 143 143 7500
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pond	M 46 2 46 k Di k Di 1 136 2 135	Size 0 0 0 a = 9.0 a = 9.0	36. 36. 36. 36.	0 1,65 0 1,65 63 63 0 4,90 0 4,90	0.0 0.0 .6 .6 00.0	ST, Sec	Depth 3.00 2.25 2.25 1.80 1.40		2800 2800 143 143 7500 5800
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pond Studge thickening far	M 46 2 46 k Di 136 2 135 k 4	Size 0 0 0 0 0 0 0 0 0 0 0 0 0	36. 36. 36. 36.	0 1,65 0 1,65 63 63 0 4,90 0 4,90	0.0 0.0 .6 .6 .00.0	ST, Sec	Depth 3.00 2.25 2.25 1.80		2800 2800 143 143 7500 5800
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pond	M 46 2 46 k Di 136 2 135 k 4	Size 0 0 0 a = 9.0 a = 9.0	36. 36. 36. 36.	0 1,65 0 1,65 63 63 0 4,90 0 4,90	0.0 0.0 .6 .6 00.0	ST, Sec	Depth 3.00 2.25 2.25 1.80 1.40		2800 2800 143 143 7500 5800
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pond Studge thickening far	M 46 2 46 k Di 136 2 135 k 4	Size 0 0 0 0 0 0 0 0 0 0 0 0 0	36. 36. 36. 36.	0 1,65 0 1,65 63 63 0 4,90 0 4,90	0.0 0.0 .6 .6 .00.0	ST, Sec	Depth 3.00 2.25 2.25 1.80 1.40		Volume 2800 2800 143 143 7500 5800
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pond Studge thickening far	M 46 2 46 k Di 136 2 135 k 4	Size 0 0 0 0 0 0 0 0 0 0 0 0 0	36. 36. 36. 36.	0 1,65 0 1,65 63 63 0 4,90 0 4,90	0.0 0.0 .6 .6 .00.0	ST, Sec	Depth 3.00 2.25 2.25 1.80 1.40		2800 2800 143 143 7500 5800
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pond Studge thickening far	M 46 2 46 k Di k Di 1 136 2 135 k 4 0 0	Size 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	36. 36. 36. 36.	0 1,65 0 1,65 63 63 0 4,90 0 4,90	0.0 0.0 .6 .6 .00.0	ST, Sec M, Mar	Depth 3.00 3.00 2.25 2.25 1.80 1.40 3.65		2800 2800 143 143 7500 5800
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pond Studge thickening far	M 46 2 46 k Di 1 136 2 135 k 4 0	Size .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	36. 36. 36. 4 1	0 1,65 0 1,65 63 63 0 4,90 0 4,90 0 16 0 72	0.0 0.0 .6 .6 .00.0 00.0 2.0	ST, Sec M, Mar	Depth 3.00 3.00 2.25 1.80 1.40 3.65		2800 2800 143 143 7500 5800
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Ton Maturation Pond Maturation Pend Studge thickening far Studge drying beds - 12 N	M 46 2 46 k Di 1 136 2 135 k 4 0 Design Dry weather	Size .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	36. 36. 36. 36.	0 1,65 0 1,65 63 63 0 4,90 0 4,90 0 16 0 72	0.0 0.0 .6 .6 .00.0	ST, Sec M, Mar	Depth 3.00 3.00 2.25 2.25 1.80 1.40 3.65		2800 2800 143 143 7500 5800
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pend Studge thickening tar Studge drying teds - 12 N	M 46 2 46 k Di 1 136 2 135 k 4 0	Size .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	36. 36. 36. 4 1	0 1,65 0 1,65 63 63 0 4,90 0 4,90 0 16 0 72	0.0 0.0 .6 .6 .00.0 00.0 2.0	ST, Sec M, Mar	Depth 3.00 2.25 2.25 1.80 1.40 3.65		2800 2800 143 143 7500 5800 58
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Ton Maturation Pond Maturation Pend Studge thickening far Studge drying beds - 12 N	M 1	Size .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	M 36. 36 36 36 4 1 Acity Population	0 1,65 0 1,65 63 63 0 4,90 0 16 0 72	0.0 0.0 .6 .6 .00.0 00.0 2.0	ST, Sec M, Mar	Depth 3.00 2.25 2.25 1.80 1.40 3.65		2800 2800 143 143 7500 5800 59
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pend Studge thickening tar Studge drying beds - 12 N Hydraulic loading BOD loading	M 1	Size .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	36. 36. 36. 4 1	0 1,65 0 1,65 63 63 0 4,90 0 16 0 72	0.0 0.0 .6 .6 .0.0 00.0 00.0	ST, Sec M, Mar	Depth 3.00 3.00 2.25 2.25 1.80 1.40 3.65		2800 2800 143 143 7500 5800 59
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Ton Maturation Pond Maturation Pend Studge thickening tar Studge drying teds - 12 N Hydraulic loading BOD loading	M 1	Size .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	36. 36. 36. 36. 4 1 1	0 1,65 0 1,65 63 63 0 4,90 0 16 0 72	0.0 0.0 .6 .6 .00.0 00.0 00.0	ST, Sec M, Mar	Depth 3.00 2.25 2.25 1.80 1.40 3.65		2800 2800 143 143 7500 5800 59
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pend Studge thickening tar Studge drying beds - 12 N Hydraulie loading BOD loading influent effluent	M 1	Size .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	36. 36. 36. 36. 36. 4 1 1	0 1,65 0 1,65 63 63 0 4,90 0 16 0 72	0.0 0.0 .6 .6 00.0 00.0 0.0 2.0	ST, Sec M, Mar	Depth 3.00 3.00 2.25 1.80 1.40 3.65 Actual flow Max 450		2800 2800 143 143 7500 5800 59 Avg 370
Oxidation lagoon Oxidation lagoon Sedimentation Tan Sedimentation Tan Maturation Pond Maturation Pend Studge thickening tar Studge drying beds - 12 N Hydraulic loading BOD loading	M 1	Size .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	36. 36. 36. 36. 4 1 1	0 1,65 0 1,65 63 63 0 4,90 0 16 0 72	0.0 0.0 .6 .6 00.0 00.0 0.0 2.0	ST, Sec M, Mar	Depth 3.00 3.00 2.25 1.80 1.40 3.65 Actual flow Max 450		2800 2800 143 144 7500 580 59 4Vg 370

	Treatment Method	Disposal
Studge Processing	Sludge thickener +drying ted	Sold as manure
Operation & Maintenance	Treatment Wo	rks
1. Inlet pipe is blocked and an	overflow of sewage noticed on site	
2. Automatic flow recorder wa	s vandalised in 1997	
3. 1 No. aerator not working. I	lowever, aerators have not been used since 1997 due to ac	cumulation of sludge in the sedimentation
	are being used as anaerobic ponds and require destudging	
	t operational due to the accumulation of sludge. Motors ar	· · · · · · · · · · · · · · · · · · ·
vandalised.		
5. Slabs on one side of maturat	ion pond 1 have collapsed	
6. Pump house for studge not o	operational. 2 No. centifugal pumps not repairable.	
7. Stormwater from road nearb	y is flowing into the maturation ponds.	
8. Grass growing in sludge dry	ing beds	
9. General tack of maintenance	on site and vandalism rampant. Treatment works not fund	tioning as per design.
	Sewers	
1. Frequent blockages		
2		
3		
4		
5		



Note: Oxidation lagoons are used as anacrobic ponds



Note: Sludge thickener is overgrown and has collapsed

On-going projects	None
	. A from the first the second state of the sec

talling	· · · · · · · · · · · · · · · · · · ·			
	Skilled	Unskilled	_	
Sewage works and sewer maintenance	7	4		
Bye-law enforcement				
Other		<u> </u>		··
tesources Available			Comments	
	1 No. Veh		Good condition	
	1 No. Rod	ding machine	Out of order	
	Tools		Good condition	
Sources of Revenue			KShs.	
	Sewer cha			
	Connectio	n fees		
Annual Cash Flow, Kshs.	r:	- 	- I'-	Tet.s
	Year	Revenue	Expenditure	Surplus
		995		
		1996		
	i	1997		
Financial Problems				
				
Investment Budget Plan				IT
	Type of a	ctivity		Target Year
	<u></u>			
	<u> </u>			_
		-		L

On - Plot Sanitation

% Population with on-plot sanitation
Method of desludging facility

Estimated Quantity of studge m³/year
Location of disposal point

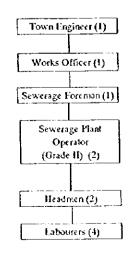
84%

Ministry of Public Works Exhauster

No information

Sewage treatment works

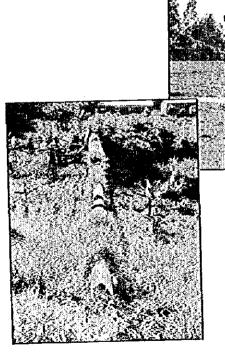
Staff Organization Chart



Vania of Urban Cartar					
Name of Urban Center	Kakamega		·	<u>x</u>	у
District	Kakamega		Coordinates		
Province	Western		Flevation		. 1508
Mean Annual Precipitation (mm)	-	Tempera	ture max & min OC		
	1995	1998	2000	2005	2010
Population Projections	77,306	110,000	123,558	177,064	202,516
Municipal Area (ha)	ļ	5,100.0			
Population Density (ppha)		21.6			
	<u> </u>				
Water Supply	1995	1998	2000	2005	2010
Domestic water demand (m3/d)					27,431
Total water consumption (m3/d)	2,760	300 a 200 a 20			
Area served (estimated net (ha))	[40.0	<u> </u>	60.0
Raw water source	Isiukhu River				
Sewerage Facilities	1995	1998	2000	2005	2010
Population Served	5,145		9	1	
Service coverage ratio %	7%	The state of the s	 	20%	25%
Area served (estimated net (ha))	 	\$60.0	4		f- ·
Population Density (ppha)	{	92.3	#		
Wastewater volumes (m3/d)	ļ	2,400	31		
No. of connections Treatment process	:	500);	L	L
•					
				M, Maturation	
	Facility name	e: Kambi Ponds		M, Maturation	
Description & dimensions	·	:: Kambi Ponds	Area	M, Maturation Depth	Volume
Description & dimensions Primaryary Facultative Pond	s	ize		1	Volume
	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Velume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Velume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Velume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Velume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0	55.0	1,980.0	1	Volume
Primaryary Facultative Pond	S 36.0 42.0	55.0 68.0	1,980.0	Depth	Volume
Primaryary Facultative Pond	9 36.0 42.0 Design	55.0 68.0 Capacity	1,980.0	Depth Actual flow	
Primaryary Facultative Pond Maturation Pond	S 36.0 42.0	55.0 68.0	1,980.0	Depth	Velume
Primaryary Facultative Pond Maturation Pond Maturation Pond	9 36.0 42.0 Design	55.0 68.0 Capacity	1,980.0 2,856.0 Min	Depth Actual flow	
Primaryary Facultative Pond Maturation Pond	9 36.0 42.0 Design	55.0 68.0 Capacity	1,980.0 2,856.0 Min	Depth Actual flow	Avg
Primaryary Facultative Pond Maturation Pond Maturation Pond	Design Dry weather	Capacity Population	1,980.0 2,856.0 Min 200	Actual flow Max	
Primaryary Facultative Pond Maturation Pond Maturation Pond Hydraulic loading BOD loading	Design Dry weather	Capacity Population COD	Min 200	Actual flow Max	Avg
Primaryary Facultative Pond Maturation Pond Maturation Pond Hydraulic loading BOD loading	Design Dry weather	Capacity Population COD	Min 200	Actual flow Max	Avg
Primaryary Facultative Pond Maturation Pond Maturation Pond Hydraulic loading BOD loading influent effluent	Design Dry weather	Capacity Population COD	Min 200	Actual flow Max	Avg

KAKAMEGA(2/3)

	Treatment Method	Disposal
Sludge Processing	No treatment	
Operation & Maintenance	Treatment Wor	ks
	rvice housing development built by NHC	
2. Screens are not cleaned and the	ere is no grit removal facility; primary facultative pond no	reds desludging and is
overgrown with aquatic plants		
3. All chambers are full of grit an		
3. The flow of sewage into the po	nds is very low probably due to leakage or blockage of s	ewers. Sewage from part of the
network is leaking straight int	o the river from the aerial crossing.	
4. The maturation pond is overgr	own with weeds and aquatic plants and has a huge collec-	tion of debris in the middle.
	er has totally collapsed due to embankment erosion.	
6. No effluent to River.		
7. No maintenance at treatment v	works	
-	Sewers	
1. The flow to the ponds increase	s substantially during storms indicating high infiltration	
2. Silting of pipes due to stormwa		
3. Frequent blockages due to lac	k of water-	
4. Manholes require raising in or	der to prevent stormwater entry.	
5. Sewer lines overloaded		
6. No manhole covers due to van	idalism and garbage is dumped into the manholes.	
7. Stum areas using water downs	stream from leak.	



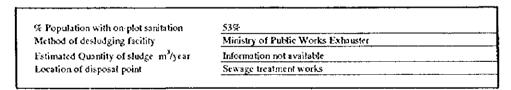
Primary Facultative Pond: note sludge accumulation & plant growth.

Trunk Sewer: cast from main crossing river, note complete failure & discharge of sewagge to river

On-going pr	ojects	None	 	 	 		
			 	 	 	. – – – –	
<u> </u>			 	 	 		

Staffing				
	SkilleJ	Unskilled		
Sewage works	·			
Sewer Maintenace	4	7		
Bye-law enforcement	-	-		
Other	-			
•				
Resources Available			Comments	
	1 No. rodding	machine	Good condition	
	Sewer rods		Good condition	
	Tools		Good condition	
Sources of Revenue	Sewer charges		1	
	Connection fee	25		
	Z CHART GOD FO			
	Commediation			
	Contraction			
Angual Cash Flow, Kshs. (Iocle	ides revenue and expenditu		ere Treatment worl	
Angual Cash Flow, Kshs. (Incl.)			Expenditure	ks) Surplus
Angual Cash Flow, Kshs. (Incle	ides revenue and expenditu	e figures for Shire Revenue		
Angual Cash Flow, Kshs. (Iocle	ides revenue and expenditui	e figures for Shin Revenue Not available	Expenditure	Surplus
Angual Cash Flow, Kshs. (lock	ides revenue and expenditui	e figures for Shin Revenue Not available 484,069	Expenditure 659,063	Surplus
	rdes revenue and expenditur Year 1995 1996 1997	e figures for Shin Revenue Not available 484,069	Expenditure 659,063 726,730 674,530	Surplus - (242,661)
	rdes revenue and expenditur Year	e figures for Shim Revenue Not available 484,069 1,430,651	Expenditure 659,063 726,730 674,530	Surplus - (242,661)
Angual Cash Flow, Kshs. (Incle	rdes revenue and expenditur Year	e figures for Shin Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills	Expenditure 659,063 726,730 674,530	Surplus - (242,661) 756,121
	rdes revenue and expenditur Year	e figures for Shin Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
Financial Problems	ldes revenue and expenditur Year 1995 1996 1997 Inaccurate bill Consumer fail Insufficient fur	e figures for Shin Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
	ldes revenue and expenditur Year	e figures for Shin Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills oding for rehabilit	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
Financial Problems	lides revenue and expenditur Year 1995 1996 1997 Inaccurate bill Consumer fail Insufficient fur Bad Debts	e figures for Shin Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills oding for rehabilit	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
Financial Problems	ldes revenue and expenditur Year	e figures for Shin Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills oding for rehabilit	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
Financial Problems	lides revenue and expenditur Year 1995 1996 1997 Inaccurate bill Consumer fail Insufficient fur Bad Debts	e figures for Shin Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills oding for rehabilit	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121

On - Plot Sanitation



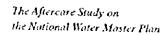
Staff Organization Chart



Note: The same staff are used for both Kambi and Shirere Treatment works







ame of Urban Center	Kakamega						<u>×</u>	l	*
listrict	Kakamega			<u>C</u>	oordinates				
rovince	Western				Elevation		approx	1508	
Ican Annual Precipitation (num)			Tempera	ture max	& min C				
	1995	1998		2000		2005		2010	
opulation Projections	77,306		110,000	l	123,558		177,064		202,510
Junicipal Area (ha)			-5,100.0	<u></u>					
opulation Density (ppha)			21.6						
Vater Supply	1995	1998		2000		2005		2010	
Domestic water demand (m3/d)									27,43
Total water consumption (m3/d)	2,760								
Area served (estimated net (ha))	16.0				40.0	_			60.
Raw water source	Isiakha River							ļ	
Sewrrage Facilities	1995	1998		2000		2005		2010	
Population Served	5,445		× 51.700		18,534		35,413		50,62
Service coverage ratio %	7%		11%		15%		20%	ļ	259
Area served (estimated not (ha))			560.0			<u> </u>		ļ	
Population Density (ppha)			923					<u> </u>	
Wastewater volumes (m3/d)			2,400			<u> </u>			
No. of connections			5000			<u> </u>		<u></u>	
Treatment process				-					
	SF	PF		}	-		ary facultativ ndary facults ration		
	L		M Me: Shirere	}Ponds	-	SF, S∝c	ndary facults		
Description & dimensions	Fac		Ļ		- Area	SF, Seco	ndary facults	rise	Volume
Description & dimensions Primary Facultative Pond	Fac	sility nam	Ļ		Area 5,440.0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond	Fac	ritity nam	L ne: Shirere	0 15		SF, Seco	ndary faculta ration	rise	Volume
	Fac 1 80.1 1 78.1	Size	e: Shirere	0 35	5,440.0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 1 80.1 1 78.1	Size	193.	0 35	5,440. 0 ,680. 0	SF, Seco	ndary faculta ration	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac 80.0	Size D D D	193. 60. 75.	0 35	5,440. 0 ,680. 0	SF. Seco	ndary facults ration Depth	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac. 80.4 78.1 110.1 110.1 Design	Size D D D O O O O O O O O O O O O O O O O	193. 60. 75.	0 35	5,440. 0 ,680. 0 ,250.0	SF. Seco	ndary facults ration Depth tual flow	rise	
Primary Facultative Pond Secondary Facultative Pond Maturation Pond	Fac 80.0	Size D D D O O O O O O O O O O O O O O O O	193. 60. 75.	0 35	5,440.0 ,680.0 ,250.0 Min	SF. Seco	Depth tual flow Nox	rise	Volume
Primary Facultative Pond Secondary Facultative Pond	Fac. 80.4 78.1 110.1 110.1 Design	Size D D D O O O O O O O O O O O O O O O O	193. 60. 75.	0 35	5,440. 0 ,680. 0 ,250.0	SF. Seco	ndary facults ration Depth tual flow	rise	
Primary Facultative Pond Secondary Facultative Pond Maturation Pond	Fac. 80.4 78.1 110.1 110.1 Design	Size D D D O O O O O O O O O O O O O O O O	193) 60 75.	0 35	5,440.0 ,680.0 ,250.0 Min 500	SF. Seco	ndary facults ration Depth tual flow 85ax 700	rise	Avg
Primary Facultative Pond Secondary Facultative Pond Maturation Pond Hydraulic leading	Pesign Dry weather	Size D D D O O O O O O O O O O O O O O O O	193) 60 75.	0 35	Min 500	SF. Seco	Depth tual flow Nox	rise	
Primary Facultative Pond Secondary Facultative Pond Maturation Pond Hydraulic leading	SO SO SO SO SO SO SO SO	Size D D D O O O O O O O O O O O O O O O O	193. 60. 75. ty pulation COD 957	0 35	Min 500 SS 200	SF. Second, Maria	Depth tual flow Mox 700	rise	Avg
Primary Facultative Pond Secondary Facultative Pond Maturation Pond Maturation Pond Hydraulic leading BOD leading	S0.0 78. 110. 1	Size D D D O O O O O O O O O O O O O O O O	193. 60. 75. ty opulation COD 957 100	0 35	Min 500 SS 200 20	SF. Second, Maria	ndary facults ration Depth tual flow 85ax 700	rise	Avg
Primary Facultative Pond Secondary Facultative Pond Maturation	SO SO SO SO SO SO SO SO	Size D D D O O O O O O O O O O O O O O O O	193. 60. 75. ty pulation COD 957	0 35	Min 500 SS 200	SF. Second, Maria	Depth tual flow Mox 700	rise	Avg

KAKAMEGA (2/3)

Sewerage System Survey

	Treatment Method	Disposa
Sludge Processing	No treatment	
Operation & Maintenance	Treatment Wor	ks
1. Surface water enters pond due to p	oor site grading	
2. Screens at inlet in poor condition a	nd grass growing in grit chamber. By pass is blocked	<u> </u>
3. The flow of sewage into the ponds	is very low probably due to leakage or blockage of s	ewers and inlet pipe to firs
pond destroyed.		·
4. Pond requires desludging and has	grass/weeds growing in it.	
5. Stabs tining all ponds are missing of	due to vandalism	
6. No flow to maturation pond due to	low level in the secondary facultative pond.	. <u></u>
7. All chambers etc. are in poor struc	tural condition.	.
8. No maintenance at treatment work	8.	
	Sewers	
1. The flow to the ponds increases su	bstantially during storms indicating high infiltration	
2. Main trunk lines in the town center	rare only 150mm and are frequently blocked and silti	ng occurs frequently
3. The condition of the sewer lines is	questionable considering the age and lack of mainten	ance.
4.One trunk line crossing a ravine ha	s completely failed and sewage is flowing into a small	stream
5. No manhole covers due to vandati	sm and garbage is dumped into chambers	
6. Staffing levels of 7 for the and sev	vers is insufficient to cover the operational and mainte	nance requirements.

No	Dictore	Available
NO	ricinte	Avaitable

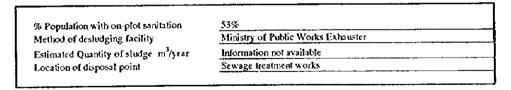
On-going projects	None	 	

Sewerage System Survey

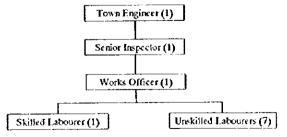
Management

Staffing				
ł	Skilled	Unskilled		
Sewage works	-			
Sewer Maintenace	4	7		
Bye-law enforcement	-			
Other	·	-		
Resources Available			Comments	
	1 No. rodding	machine	Good condition	
	Sewer rods		Good condition	
	Tools		Good condition	
	······································			
Sources of Revenue				
ovaries of herebot	Sewer charges		1	
	Connection fe			
Annual Cash Flow, Kshs. (Inclu-	des revenue and expenditur	e figures for Kan	nbi Treatment work	s)
Annual Cash How, Kshs. (Inclu-	des revenue and expenditur	e figures for Kan Revenue	Expenditure	s) Surplus
Annual Cash How, Kshs. (Inclu		Revenue		s) Surplus -
Annual Cash Flow, Kshs. (Inclu	Year	Revenue Not available	Expenditure 659,063	Surplus -
Annual Cash Flow, Kshs. (Inclu	Year 1995	Revenue Not available 484,069	Expenditure 659,063	Surplus -
	Year 1995 1996 1997	Revenue Not available 484,069 1,430,651	Expenditure 659,063 726,730 674,530	Susplus - (242,661)
	Year 1995 1996 1997 Inaccurate bill	Revenue Not available 484,069 1,430,651 ing due to lack of	Expenditure 659,063 726,730	Susplus - (242,661)
	Year 1995 1996 1997 Inaccurate bill Consumer fail	Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
	1995 1996 1997 Inaccurate bill Consumer fail Insufficient fu	Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills	Expenditure 659,063 726,730 674,530	Surplus - (242,661) 756,121
	Year 1995 1996 1997 Inaccurate bill Consumer fail	Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
Financial Problems	1995 1996 1997 Inaccurate bill Consumer fail Insufficient fu	Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
	1995 1996 1997 Inaccurate bill Consumer fail Insufficient fur Bad Debts	Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills nding for rehability	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
Financial Problems	1995 1996 1997 Inaccurate bill Consumer fail Insufficient for Bad Debts Type of activit	Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills nding for rehability	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
Financial Problems	1995 1996 1997 Inaccurate bill Consumer fail Insufficient fur Bad Debts	Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills nding for rehability	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121
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Financial Problems	1995 1996 1997 Inaccurate bill Consumer fail Insufficient for Bad Debts Type of activit	Revenue Not available 484,069 1,430,651 ing due to lack of ure to pay bills nding for rehability	Expenditure 659,063 726,730 674,530 service to meters	Surplus - (242,661) 756,121

On - Plot Sanitation



Staff Organization Chart



Note: The same staff are used for both Kambi and Shirere Treatment works