

Q1 Average family Size 5.5

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	13	>13
Frequency	42	72	87	121	105	110	84	42	21	28	8	18	4	14
%	5.6	9.5	11.5	16.0	13.9	14.6	11.1	5.6	2.8	3.7	1.1	2.4	0.5	1.9

Q2 Average No of students

Kindergarten	1.2	Secondary	1.6
Primary	2.3	Post Secondary	1.6

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	39	414	396	13	5
%	4.5	47.8	45.7	1.5	0.6

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	88	165	205	119	64	31	22	60
%	11.7	21.9	27.2	15.8	8.5	4.1	2.9	8.0

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	221	57	77	56	121	17	2	10
%	39.4	10.2	13.7	10.0	21.6	3.0	0.4	1.8

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	306	214	6	11	1	48	100
%	44.6	31.2	0.9	1.6	0.1	7.0	14.6

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	312	244	111	11	62	71	50	36	13	9	7
%	33.7	26.3	12.0	1.2	6.7	7.7	5.4	3.9	1.4	1.0	0.8

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	8	9	1	0	6	1	2	0	0	0	0
%	29.6	33.3	3.7	0.0	22.2	3.7	7.4	0.0	0.0	0.0	0.0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	22	22	20	6	3	3	6	0	0	0	0
%	26.8	26.8	24.4	7.3	3.7	3.7	7.3	0.0	0.0	0.0	0.0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	535	234
%	69.6	30.4

Q7 Average no of families using standpipe 16.8

Q8 Is drinking water boiled?

	Yes	No
Frequency	522	234
%	69.0	31.0

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	296	397	46	12	5
%	39.2	52.5	6.1	1.6	0.7

Q11 Frequency of water collection

	1	2	3
Frequency	231	77	322
%	36.7	12.2	51.1

Q11 Means of water collection

	B	D	J
Frequency	77	3	339
%	18.4	0.7	83.9

Q12 Shortages during the dry season?

	Yes	No
Frequency	633	123
%	83.7	16.3

Q13 Days per week during season when water available

	1	2	3	4
Frequency	384	138	81	24
%	61.2	22.0	12.9	3.8

Q14 Is water enough for	Yes	No		Yes
i) Washing hands	742	14	i)Washing hands, ii)Taking bath	65
%	93.1	1.9	%	8.6
ii) Taking bath	726	30	ii)Washing hands, ii)Taking bath, iii)Washing clothes	660
%	96.0	4.0	%	87.3
iii) Washing clothes	661	95		
%	87.4	12.6		

Q15 Do you have storage facilities?

	Yes	No
Frequency	500	256
%	66.1	33.9

Q15 Type of storage

	C	D	T
Frequency	254	70	176
%	50.8	14.0	35.2

Q15 Average volume of storage 2.31m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	148	137	159	117	106
%	22.2	20.5	23.8	17.5	15.9

Q17-1 Satisfied with water services?

	Yes	No
Frequency	210	494
%	29.8	70.2

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	176	139	307	44	54
%	24.4	19.3	42.6	6.1	7.5

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	467	131
%	78.1	21.9

Q18 Land Size

	1	2	3	4
Frequency	41	122	20	14
%	20.8	61.9	10.2	7.1

Q19 Crops grown

	1	2	3	4	5
Frequency	6	1	0	38	27
%	8.3	1.4	0.0	52.8	37.5

Q20 Animals kept

	1	2	3	4	5
Frequency	17	3	24	3	11
%	29.3	5.2	41.4	5.2	19.0

Q20 Average no of cows 4.2

Q20 Average no of goats 5.5

Q20 Average no of others 35.8

Q21 Fish caught

	Omena	Tuna
Frequency	0	1

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	80	256	159	301
%	10.1	32.2	20.0	37.8

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	15	355	337	22	33
%	2.0	46.6	44.2	2.9	4.3

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	29	727
%	3.8	96.2

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	4	10	0	2	1
%	23.5	58.8	0.0	11.8	5.9

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	118	220	15	4	21
%	31.2	58.2	4.0	1.1	5.6

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	88	36	57	36	3
%	40.0	16.4	25.9	16.4	1.4

Q27 Reason for not desludging

	1	2	3	4
Frequency	1	0	0	75
%	1.3	0.0	0.0	98.7

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	318	47	22
%	82.2	12.1	5.7

Q29 Knowledge about water related diseases

	Yes	No
Frequency	735	21
%	97.2	2.8

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	238	444	139	34	29	23
%	26.2	49.0	15.3	3.7	3.2	2.5

Q31 House type

	P	SP	T
Frequency	563	109	84
%	74.5	14.4	11.1

Q31 Electricity

	Yes	No
Frequency	496	260
%	65.6	34.4

Q31 Telephone

	Yes	No
Frequency	138	618
%	18.3	81.7

Q32 Average Distance from leaching pit/drain 82 m

Q1 Average family Size

8.4

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	13	>13
Frequency	16	9	21	46	51	57	56	37	24	45	15	19	9	56
%	3.5	2.0	4.6	10.0	11.1	12.4	12.1	8.0	5.2	9.8	3.3	4.1	2.0	12.1

Q2 Average No of students

Kindergarten

1.7

Secondary

1.8

Primary

3.1

Post Secondary

1.7

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	196	121	137	22	2
%	41.0	25.3	28.7	4.6	0.4

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	129	104	128	60	15	6	4	9
%	28.4	22.9	28.1	13.2	3.3	1.3	0.9	2.0

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	347	120	92	10	103	34	21	5
%	47.4	16.4	12.6	1.4	14.1	4.6	2.9	0.7

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	126	89	97	31	2	4	0
%	36.1	25.5	27.8	8.9	0.6	1.1	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	75	182	67	16	60	80	7	37	30	10	0
%	13.3	32.3	11.9	2.8	10.5	14.2	1.2	6.6	5.3	1.8	0.0

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	11	56	1	1	41	22	0	4	16	21	1
%	6.3	32.2	0.6	0.6	23.6	12.6	0.0	2.3	9.2	12.1	0.6

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	3	10	2	1	4	8	0	8	6	8	0
%	6.0	20.0	4.0	2.0	8.0	16.0	0.0	16.0	12.0	16.0	0.0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	149	151
%	49.7	50.3

Q7 Average no of families using standpipe

12.6

Q8 Is drinking water boiled?

	Yes	No
Frequency	205	256
%	44.5	55.5

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	69	314	48	10	12
%	15.2	69.3	10.6	2.2	2.6

Q11 Frequency of water collection

	1	2	3
Frequency	127	74	223
%	30.0	17.5	52.6

Q11 Means of water collection

	B	D	J
Frequency	47	4	241
%	16.1	1.4	82.5

Q12 Shortages during the dry season?

	Yes	No
Frequency	352	109
%	76.4	23.6

Q13 Days per week during season when water available

	1	2	3	4
Frequency	231	53	42	15
%	67.7	15.5	12.3	4.4

Q14 Is water enough for

	Yes	No
i) Washing hands	445	16
%	96.5	3.5
ii) Taking bath	435	26
%	94.4	5.6
iii) Washing clothes	399	62
%	86.6	13.4

i)Washing hands, ii)Taking bath

	Yes
%	32
%	6.9
%	398
%	86.3

i)Washing hands, ii)Taking bath, iii)Washing clothes

Q15 Do you have storage facilities?

	Yes	No
Frequency	222	239
%	48.2	51.8

Q15 Type of storage

	C	D	T
Frequency	89	63	70
%	40.1	28.4	31.5

Q15 Average volume of storage $2.51m^3$

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	81	105	124	30	20
%	22.5	29.2	34.4	8.3	5.6

Q17-1 Satisfied with water services?

	Yes	No
Frequency	134	276
%	32.7	67.3

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	84	70	153	26	35
%	22.8	19.0	41.6	7.1	9.5

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	235	107
%	68.7	31.3

Q18 Land Size

	1	2	3	4
Frequency	21	89	87	126
%	6.5	27.6	26.9	39.0

Q19 Crops grown

	1	2	3	4	5
Frequency	49	37	1	257	105
%	10.9	8.2	0.2	57.2	23.4

Q20 Animals kept

	1	2	3	4	5
Frequency	172	151	175	28	38
%	30.5	26.8	31.0	5.0	6.7

Q20 Average no of cows 14.4Q20 Average no of goats 15.5Q20 Average no of others 15.3

Q21 Fish caught

	Ormena	Tuna
Frequency	5	0

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	174	151	80	76
%	36.2	31.4	16.6	15.8

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	41	362	53	2	9
%	8.8	77.5	11.3	0.4	1.9

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	21	440
%	4.6	95.4

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	5	31	0	0	3
%	12.8	79.5	0.0	0.0	7.7

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	15	28	10	0	24
%	19.5	36.4	13.0	0.0	31.2

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	19	4	4	5	0
%	59.4	12.5	12.5	15.6	0.0

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	0	3	17
%	0.0	0.0	15.0	85.0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	290	67	15
%	78.0	18.0	4.0

Q29 Knowledge about water related diseases

	Yes	No
Frequency	436	25
%	94.6	5.4

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	124	296	96	11	54	21
%	20.6	49.2	15.9	1.8	9.0	3.5

Q31 House type

	P	SP	T
Frequency	204	120	137
%	44.3	26.0	29.7

Q31 Electricity

	Yes	No
Frequency	83	378
%	18.0	82.0

Q31 Telephone

	Yes	No
Frequency	29	432
%	6.3	93.7

Q32 Average Distance from leaching pit/drain 189 m

Q1 Average family Size 7.0

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	13	>13
Frequency	2	2	2	9	9	16	10	7	2	4	1	1	0	5
%	2.9	2.9	2.9	12.9	12.9	22.9	14.3	10.0	2.9	5.7	1.4	1.4	0.0	7.1

Q2 Average No of students

Kindergarten	1.3	Secondary	1.5
Primary	2.7	Post Secondary	1.8

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	22	27	17	4	2
%	30.6	37.5	23.6	5.6	2.8

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	23	18	17	5	2	3	2	0
%	32.9	25.7	24.3	7.1	2.9	4.3	2.9	0.0

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	48	13	3	0	18	17	0	0
%	48.5	13.1	3.0	0.0	18.2	17.2	0.0	0.0

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	24	20	0	0	0	0	0
%	54.5	45.5	0.0	0.0	0.0	0.0	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	23	19	35	2	0	3	2	16	9	0	0
%	21.1	17.4	32.1	1.8	0.0	2.8	1.8	14.7	8.3	0.0	0.0

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	3	3	0	0	11	1	0	0	6	0	0
%	12.5	12.5	0.0	0.0	45.8	4.2	0.0	0.0	25.0	0.0	0.0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	1	0	0	0	2	0	0	0	2	0	0
%	20.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0	40.0	0.0	0.0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	21	4
%	84.0	16.0

Q7 Average no of families using standpipe 7.1

Q8 Is drinking water boiled?

	Yes	No
Frequency	63	7
%	90.0	10.0

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	21	38	7	2	1
%	30.4	55.1	10.1	2.9	1.4

Q11 Frequency of water collection

	1	2	3
Frequency	13	11	39
%	20.6	17.5	61.9

Q11 Means of water collection

	B	D	J
Frequency	0	0	39
%	0.0	0.0	100.0

Q12 Shortages during the dry season?

	Yes	No
Frequency	40	30
%	57.1	42.9

Q13 Days per week during season when water available

	1	2	3	4
Frequency	29	7	5	1
%	69.0	16.7	11.9	2.4

Q14 Is water enough for	Yes	No
i) Washing hands	61	9
%	87.1	12.9
ii) Taking bath	66	4
%	94.3	5.7
iii) Washing clothes	61	9
%	87.1	12.9

	Yes
i)Washing hands, ii)Taking bath	5
%	7.1
ii)Washing hands, ii)Taking bath, iii)Washing clothes	61
%	87.1

Q15 Do you have storage facilities?

	Yes	No
Frequency	33	37
%	47.1	52.9

Q15 Type of storage

	C	D	T
Frequency	18	11	2
%	58.1	35.5	6.5

Q15 Average volume of storage 0.43m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	10	9	8	3	1
%	32.3	29.0	25.8	9.7	3.2

Q17-1 Satisfied with water services?

	Yes	No
Frequency	7	63
%	10.0	90.0

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	11	7	12	0	3
%	33.3	21.2	36.4	0.0	9.1

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	23	47
%	32.9	67.1

Q18 Land Size

	1	2	3	4
Frequency	4	23	14	6
%	8.5	46.9	29.8	12.8

Q19 Crops grown

	1	2	3	4	5
Frequency	14	13	0	31	2
%	23.3	21.7	0.0	51.7	3.3

Q20 Animals kept

	1	2	3	4	5
Frequency	31	0	17	1	5
%	57.4	0.0	31.5	1.9	9.3

Q20 Average no of cows 3.1

Q20 Average no of goats 0

Q20 Average no of others 8.5

Q21 Fish caught

	Omena	Tuna
Frequency	0	0

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	29	37	8	5
%	36.7	46.8	10.1	6.3

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	0	61	9	0	0
%	0.0	87.1	12.9	0.0	0.0

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	1	69
%	1.4	93.6

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	0	0	0	0	0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	2	4	2	0	1
%	22.2	44.4	22.2	0.0	11.1

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	3	0	3	0	0
%	50.0	0.0	50.0	0.0	0.0

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	0	0	0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	46	13	2
%	75.4	21.3	3.3

Q29 Knowledge about water related diseases

	Yes	No
Frequency	68	2
%	97.1	2.9

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	5	60	6	0	1	6
%	6.4	75.9	7.7	0.0	1.3	7.7

Q31 House type

	P	SP	T
Frequency	36	15	19
%	51.4	21.4	27.1

Q31 Electricity

	Yes	No
Frequency	20	50
%	28.6	71.4

Q31 Telephone

	Yes	No
Frequency	4	66
%	5.7	94.3

Q32 Average Distance from leaching pit/drain 235 m

Q1 Average family Size

4.7

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	>13
Frequency	9	14	10	13	15	17	14	5	2	0	0	0	1
%	9.0	14.0	10.0	13.0	15.0	17.0	14.0	5.0	2.0	0.0	0.0	0.0	1.0

Q2 Average No of students

Kindergarten 1.2 Secondary 1.5
Primary 2 Post Secondary 2

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	6	43	49	6	0
%	5.8	41.3	47.1	5.8	0.0

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	8	23	15	12	13	7	4	18
%	8.0	23.0	15.0	12.0	13.0	7.0	4.0	18.0

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	99	0	2	5	13	0	0	0
%	83.2	0.0	1.7	4.2	10.9	0.0	0.0	0.0

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	0	0	0	0	0	0	97
%	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	49	41	11	0	0	0	3	0	0	0	0
%	47.1	39.4	10.6	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	0	1	0	0	0	0	0	0	0	0	0
%	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	5	1	0	0	0	0	0	0	0	0	0
%	83.3	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	97	3
%	97.0	3.0

Q7 Average no of families using standpipe

32.1

Q8 Is drinking water boiled?

	Yes	No
Frequency	76	24
%	76.0	24.0

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	50	48	2	0	0
%	50.0	48.0	2.0	0.0	0.0

Q11 Frequency of water collection

	1	2	3
Frequency	33	11	17
%	54.1	18.0	27.9

Q11 Means of water collection

	B	D	J
Frequency	15	0	39
%	27.8	0.0	72.2

Q12 Shortages during the dry season?

	Yes	No
Frequency	84	16
%	84.0	16.0

Q13 Days per week during season when water available

	1	2	3	4
Frequency	57	21	16	2
%	59.4	21.9	16.7	2.1

Q14 Is water enough for	Yes	No		Yes
i) Washing hands	87	13	i)Washing hands, ii)Taking bath	6
%	87.0	13.0	%	5.0
ii) Taking bath	93	7	ii)Washing hands, ii)Taking bath, iii)Washing clothes	87
%	93.0	7.0	%	87.0
iii) Washing clothes	87	13		
%	87.0	13.0		

Q15 Do you have storage facilities?

	Yes	No
Frequency	89	11
%	89.0	11.0

Q15 Type of storage

	C	D	T
Frequency	48	9	32
%	53.9	10.1	36.0

Q15 Average volume of storage 0.87m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	21	15	22	19	22
%	21.2	15.2	22.2	19.2	22.2

Q17-1 Satisfied with water services?

	Yes	No
Frequency	44	56
%	44.0	56.0

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	22	22	45	3	0
%	23.9	23.9	48.9	3.3	0.0

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	58	39
%	59.8	40.2

Q18 Land Size

	1	2	3	4
Frequency	1	9	3	2
%	6.7	60.0	20.0	13.3

Q19 Crops grown

	1	2	3	4	5
Frequency	0	0	0	1	4
%	0.0	0.0	0.0	20.0	80.0

Q20 Animals kept

	1	2	3	4	5
Frequency	3	0	0	0	1
%	75.0	0.0	0.0	0.0	25.0

Q20 Average no of cows 7.6

Q20 Average no of goats 0

Q20 Average no of others 101.5

Q21 Fish caught

	Omena	Tuna
Frequency	0	0

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	6	26	16	52
%	6.0	26.0	16.0	52.0

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	2	21	68	9	0
%	2.0	21.0	68.0	9.0	0.0

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	9	93
%	8.8	91.2

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	0	0	0	2	0
%	0.0	0.0	0.0	100.0	0.0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	56	18	2	4	6
%	65.1	20.9	2.3	4.7	7.0

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	6	2	4	2	1
%	40.0	13.3	26.7	13.3	6.7

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	0	0	5
%	0.0	0.0	0.0	100.0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	14	5	3
%	63.6	22.7	13.6

Q29 Knowledge about water related diseases

	Yes	No
Frequency	98	2
%	98.0	2.0

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	52	28	12	6	6	4
%	43.1	25.9	11.1	5.6	5.6	3.7

Q31 House type

	P	SP	T
Frequency	78	8	14
%	78.0	8.0	14.0

Q31 Electricity

	Yes	No
Frequency	82	18
%	82.0	18.0

Q31 Telephone

	Yes	No
Frequency	33	67
%	33.0	67.0

Q32 Average Distance from leaching pit/drain 77 m

Q1 Average family Size 5.8

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	13	>13
Frequency	4	10	7	28	17	17	12	7	5	3	0	3	0	4
%	3.4	8.5	6.0	23.9	14.5	14.5	10.3	6.0	4.3	2.6	0.0	2.6	0.0	3.4

Q2 Average No of students

Kindergarten	<u>1.4</u>	Secondary	<u>1.8</u>
Primary	<u>2.2</u>	Post Secondary	<u>1.4</u>

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	0	68	43	6	0
%	0.0	58.1	36.8	5.1	0.0

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	5	15	40	14	12	6	7	18
%	4.3	12.8	34.2	12.0	10.3	5.1	6.0	15.4

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	12	0	3	4	4	0	0	1
%	50.0	0.0	12.5	16.7	16.7	0.0	0.0	4.2

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	0	111	0	0	0	0	0
%	0.0	100.0	0.0	0.0	0.0	0.0	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	70	14	15	0	1	4	13	10	0	0	0
%	55.1	11.0	11.8	0.0	0.8	3.1	10.2	7.9	0.0	0.0	0.0

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	0	0	0	0	0	0	0	0	0	0	0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	4	0	9	0	2	1	6	0	0	0	0
%	18.2	0.0	40.9	0.0	9.1	4.5	27.3	0.0	0.0	0.0	0.0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	25	3
%	89.3	10.7

Q7 Average no of families using standpipe 15.7

Q8 Is drinking water boiled?

	Yes	No
Frequency	103	14
%	88.0	12.0

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	70	54	2	0	0
%	55.6	42.9	1.6	0.0	0.0

Q11 Frequency of water collection

	1	2	3
Frequency	44	9	39
%	47.8	9.8	42.4

Q11 Means of water collection

	B	D	J
Frequency	12	1	34
%	25.5	2.1	72.3

Q12 Shortages during the dry season?

	Yes	No
Frequency	97	20
%	82.9	17.1

Q13 Days per week during season when water available

	1	2	3	4
Frequency	65	19	8	4
%	67.7	19.8	8.3	4.2

Q14 Is water enough for	Yes	No
i) Washing hands	102	15
%	87.2	12.8
ii) Taking bath	114	3
%	97.4	2.6
iii) Washing clothes	102	15
%	87.2	12.8

	Yes
i)Washing hands, ii)Taking bath	12
%	10.3
i)Washing hands, ii)Taking bath, iii)Washing clothes	102
%	87.2

Q15 Do you have storage facilities?

	Yes	No
Frequency	106	11
%	90.6	9.4

Q15 Type of storage

	C	D	T
Frequency	54	12	38
%	51.9	11.5	36.5

Q15 Average volume of storage 6.14m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	13	9	30	25	35
%	11.6	8.0	26.8	22.3	31.3

Q17-1 Satisfied with water services?

	Yes	No
Frequency	26	86
%	23.2	76.8

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	32	24	70	6	4
%	23.5	17.6	51.5	4.4	2.9

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	83	8
%	91.2	8.8

Q18 Land Size

	1	2	3	4
Frequency	3	34	0	0
%	6.1	51.9	0.0	0.0

Q19 Crops grown

	1	2	3	4	5
Frequency	0	0	0	0	0

Q20 Animals kept

	1	2	3	4	5
Frequency	0	0	0	0	0

Q20 Average no of cows

0

Q20 Average no of goats

0

Q20 Average no of others

0

Q21 Fish caught

	Ormena	Tuna
Frequency	0	0

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	13	23	36	53
%	10.4	18.4	28.8	42.4

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	1	32	71	1	2
%	0.9	29.9	66.4	0.9	1.9

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	5	112
%	4.3	95.7

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	0	3	0	0	0
%	0.0	100.0	0.0	0.0	0.0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	27	48	3	0	3
%	33.3	59.3	3.7	0.0	3.7

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	7	14	21	4	2
%	14.6	29.2	43.8	8.3	4.2

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	0	0	5
%	0.0	0.0	0.0	100.0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	25	5	6
%	69.4	13.9	16.7

Q29 Knowledge about water related diseases

	Yes	No
Frequency	117	0
%	100.0	0.0

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	30	84	2	8	12	2
%	21.7	60.9	1.4	5.8	8.7	1.4

Q31 House type

	P	SP	T
Frequency	98	18	1
%	83.8	15.4	0.9

Q31 Electricity

	Yes	No
Frequency	105	12
%	89.7	10.3

Q31 Telephone

	Yes	No
Frequency	35	82
%	29.9	70.1

Q32 Average Distance from leaching pit/drain 132 m

Q1 Average family Size 6.1

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	13	>13
Frequency	1	5	8	8	13	11	9	5	2	5	1	1	1	1
%	1.4	7.0	11.3	11.3	18.3	15.5	12.7	7.0	2.8	7.0	1.4	1.4	1.4	1.4

Q2 Average No of students

Kindergarten	<u>1.2</u>	Secondary	<u>1.7</u>
Primary	<u>2.7</u>	Post Secondary	<u>1.1</u>

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	18	32	18	3	2
%	24.7	43.8	24.7	4.1	2.7

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	21	17	15	8	1	1	2	5
%	30.0	24.3	21.4	11.4	1.4	1.4	2.9	7.1

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	53	16	7	0	35	1	0	0
%	47.3	14.3	6.3	0.0	31.3	0.9	0.0	0.0

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	16	7	28	0	0	20	0
%	22.5	9.9	39.4	0.0	0.0	28.2	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	10	30	10	4	13	5	0	1	5	3	0
%	12.3	37.0	12.3	4.9	16.0	6.2	0.0	1.2	6.2	3.7	0.0

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	1	8	0	0	8	4	0	0	2	1	0
%	4.2	33.3	0.0	0.0	33.3	16.7	0.0	0.0	8.3	4.2	0.0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	0	0	0	0	0	0	0	0	0	0	0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	35	15
%	70.0	30.0

Q7 Average no of families using standpipe

11.1

Q8 Is drinking water boiled?

	Yes	No
Frequency	42	39
%	51.9	48.1

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	9	59	3	0	0
%	12.7	83.1	4.2	0.0	0.0

Q11 Frequency of water collection

	1	2	3
Frequency	27	13	31
%	33.0	15.3	43.7

Q11 Means of water collection

	B	D	J
Frequency	4	0	29
%	12.1	0.0	87.9

Q12 Shortages during the dry season?

	Yes	No
Frequency	66	5
%	93.0	7.0

Q13 Days per week during season when water available

	1	2	3	4
Frequency	52	10	5	0
%	77.6	14.9	7.5	0.0

Q14 Is water enough for		Yes	No			Yes
i) Washing hands		68	3	i)Washing hands, ii)Taking bath		3
%		95.8	4.2		%	4.2
ii) Taking bath		71	0	ii)Washing hands, ii)Taking bath, iii)Washing clothes		68
%		100.0	0.0		%	95.8
iii) Washing clothes		68	3			
%		95.8	4.2			

Q15 Do you have storage facilities?

	Yes	No
Frequency	49	22
%	69.0	31.0

Q15 Type of storage

	C	D	T
Frequency	30	13	6
%	61.2	26.5	12.2

Q15 Average volume of storage 0.28 m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	10	9	20	9	2
%	20.0	18.0	40.0	18.0	4.0

Q17-1 Satisfied with water services?

	Yes	No
Frequency	40	25
%	61.5	38.5

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	4	12	7	6	6
%	11.4	34.3	20.0	17.1	17.1

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	25	1
%	96.2	3.8

Q18 Land Size

	1	2	3	4
Frequency	1	12	5	14
%	3.1	37.5	15.6	43.8

Q19 Crops grown

	1	2	3	4	5
Frequency	2	12	0	28	11
%	3.8	22.6	0.0	52.8	20.8

Q20 Animals kept

	1	2	3	4	5
Frequency	30	0	15	7	1
%	56.6	0.0	28.3	13.2	1.9

Q20 Average no of cows 4.6

Q20 Average no of goats 4.7

Q20 Average no of others 5

Q21 Fish caught

	Omena	Tuna
Frequency	0	0

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	16	36	8	11
%	22.5	59.7	11.3	15.5

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	3	57	11	0	0
%	4.2	80.3	15.5	0.0	0.0

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	1	70
%	1.4	98.6

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	1	2	0	0	0
%	33.3	66.7	0.0	0.0	0.0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	3	3	4	0	0
%	30.0	30.0	40.0	0.0	0.0

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	6	0	1	0	0
%	85.7	0.0	14.3	0.0	0.0

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	0	0	5
%	0.0	0.0	0.0	100.0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	55	5	3
%	87.3	7.9	4.8

Q29 Knowledge about water related diseases

	Yes	No
Frequency	70	1
%	98.6	1.4

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	26	36	17	0	2	3
%	31.0	42.9	20.2	0.0	2.4	3.6

Q31 House type

	P	SP	T
Frequency	27	17	27
%	38.0	23.9	38.0

Q31 Electricity

	Yes	No
Frequency	16	55
%	22.5	77.5

Q31 Telephone

	Yes	No
Frequency	7	64
%	9.9	90.1

Q32 Average Distance from leaching pit/drain 0 m

Q1 Average family Size 6.4

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	13	>13
Frequency	19	14	27	43	41	38	28	13	14	20	1	5	3	18
%	6.7	4.9	9.5	15.1	14.4	13.4	9.9	4.6	4.9	7.0	0.4	1.8	1.1	6.3

Q2 Average No of students

Kindergarten	<u>1.7</u>	Secondary	<u>1.8</u>
Primary	<u>2.7</u>	Post Secondary	<u>1.7</u>

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	79	107	91	8	2
%	27.5	37.3	31.7	2.8	0.7

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	37	77	91	41	14	5	7	9
%	13.2	27.4	32.4	14.6	5.0	1.8	2.5	3.2

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	36	68	17	10	63	16	8	8
%	15.9	30.1	7.5	4.4	27.9	7.1	3.5	3.5

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	142	52	32	7	1	9	0
%	58.4	21.4	13.2	2.9	0.4	3.7	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	78	107	28	5	45	26	9	30	13	10	2
%	22.1	30.3	7.9	1.4	12.7	7.4	2.5	8.5	3.7	2.8	0.6

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	1	39	1	1	10	6	0	4	8	12	1
%	1.2	47.0	1.2	1.2	12.0	7.2	0.0	4.8	9.6	14.5	1.2

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	6	11	0	0	2	8	0	8	5	8	1
%	12.2	22.4	0.0	0.0	4.1	16.3	0.0	16.3	10.2	16.3	2.0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	130	65
%	66.7	33.3

Q7 Average no of families using standpipe 18.7

Q8 Is drinking water boiled?

	Yes	No
Frequency	199	85
%	70.1	29.9

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	63	165	42	8	1
%	22.6	59.1	15.1	2.9	0.4

Q11 Frequency of water collection

	1	2	3
Frequency	74	45	129
%	29.8	18.1	52.0

Q11 Means of water collection

	B	D	J
Frequency	21	4	155
%	11.7	2.2	66.1

Q12 Shortages during the dry season?

	Yes	No
Frequency	226	58
%	79.5	20.4

Q13 Days per week during season when water available

	1	2	3	4
Frequency	136	39	33	11
%	62.1	17.8	15.1	5.0

Q14 Is water enough for	Yes	No
i) Washing hands	271	13
%	95.4	4.6
ii) Taking bath	261	19
%	91.9	6.7
iii) Washing clothes	238	46
%	83.8	16.2

	Yes
i)Washing hands, ii) Taking bath	23
%	8.1
i)Washing hands, ii)Taking bath, iii)Washing clothes	237
%	83.5

Q15 Do you have storage facilities?

	Yes	No
Frequency	197	87
%	69.4	30.6

Q15 Type of storage

	C	D	T
Frequency	88	34	60
%	43.4	18.7	33.0

Q15 Average volume of storage 2.51m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	60	69	85	24	14
%	23.8	27.4	33.7	9.5	5.6

Q17-1 Satisfied with water services?

	Yes	No
Frequency	88	189
%	31.8	68.2

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	56	54	114	24	37
%	19.6	18.9	40.0	8.4	13.0

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	176	50
%	77.9	22.1

Q18 Land Size

	1	2	3	4
Frequency	18	44	45	36
%	12.6	30.8	31.5	25.2

Q19 Crops grown

	1	2	3	4	5
Frequency	36	8	1	98	40
%	19.7	4.4	0.5	53.6	21.9

Q20 Animals kept

	1	2	3	4	5
Frequency	68	10	52	3	16
%	45.6	6.7	34.9	2.0	10.7

Q20 Average no of cows 4.8

Q20 Average no of goats 5.8

Q20 Average no of others 4.7

Q21 Fish caught

	Omena	Tuna
Frequency	5	0

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	5	102	43	61
%	2.4	43.3	20.4	28.9

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	3	190	89	3	0
%	1.1	68.7	31.2	1.1	0.0

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	31	253
%	10.9	89.1

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	2	0	0	0	2
%	50.0	0.0	0.0	0.0	50.0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	26	59	7	0	4
%	27.1	61.5	7.3	0.0	4.2

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	32	8	3	13	0
%	57.1	14.3	5.4	23.2	0.0

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	3	0	27
%	0.0	10.0	0.0	90.0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	149	43	12
%	73.0	21.1	5.9

Q29 Knowledge about water related diseases

	Yes	No
Frequency	273	11
%	96.1	3.9

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	99	152	53	12	15	11
%	28.9	44.4	15.5	3.5	4.4	3.2

Q31 House type

	P	SP	T
Frequency	207	45	32
%	72.9	15.8	11.3

Q31 Electricity

	Yes	No
Frequency	121	63
%	65.8	34.2

Q31 Telephone

	Yes	No
Frequency	22	262
%	7.7	92.3

Q32 Average Distance from leaching pit/drain 135 m

Q1 Average family Size 6.4

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	13	>13
Frequency	2	4	7	8	10	12	6	4	2	5	4	3	0	2
%	2.9	5.8	10.1	11.6	14.5	17.4	8.7	5.8	2.9	7.2	5.8	4.3	0.0	2.9

Q2 Average No of students

Kindergarten	<u>1.5</u>	Secondary	<u>1.9</u>
Primary	<u>2.5</u>	Post Secondary	<u>1.1</u>

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	17	22	29	1	0
%	24.6	31.9	42.0	1.4	0.0

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	9	9	23	19	4	2	2	1
%	13.0	13.0	33.3	27.5	5.8	2.9	2.9	1.4

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	62	8	18	10	4	5	2	0
%	56.9	7.3	16.5	9.2	3.7	4.6	1.8	0.0

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	22	0	12	6	3	22	0
%	33.8	0.0	18.5	9.2	4.6	33.8	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	3	2	1	0	1	1	2	0	0	0	0
%	30.0	20.0	10.0	0.0	10.0	10.0	20.0	0.0	0.0	0.0	0.0

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	32	21	6	4	3	22	2	1	1	2	0
%	34.0	22.3	6.4	4.3	3.2	23.4	2.1	1.1	1.1	2.1	0.0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	0	0	0	0	0	0	0	0	0	0	0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	31	22
%	58.5	41.5

Q7 Average no of families using standpipe 31.3

Q8 Is drinking water boiled?

	Yes	No
Frequency	53	16
%	76.8	23.2

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	30	33	5	1	0
%	43.5	47.8	7.2	1.4	0.0

Q11 Frequency of water collection

	1	2	3
Frequency	12	4	40
%	21.4	7.1	71.4

Q11 Means of water collection

	B	D	J
Frequency	0	0	38
%	0.0	0.0	100.0

Q12 Shortages during the dry season?

	Yes	No
Frequency	57	12
%	82.6	17.4

Q13 Days per week during season when water available

	1	2	3	4
Frequency	38	12	61	15
%	30.2	9.5	48.4	11.9

Q14 Is water enough for		Yes	No			Yes
i) Washing hands		69	0	i)Washing hands, ii)Taking bath		5
%		100.0	0.0	%		7.2
ii) Taking bath		68	1	ii)Washing hands, ii)Taking bath, ii)Washing clothes		63
%		98.6	1.4	%		91.3
iii) Washing clothes		63	6			
%		91.3	8.7			

Q15 Do you have storage facilities?

	Yes	No
Frequency	21	48
%	30.4	69.6

Q15 Type of storage

	C	D	T
Frequency	2	1	19
%	9.1	4.5	86.4

Q15 Average volume of storage 1.53m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	16	10	19	5	14
%	25.0	15.6	29.7	7.8	21.9

Q17-1 Satisfied with water services?

	Yes	No
Frequency	24	39
%	38.1	61.9

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	24	9	23	2	5
%	38.1	14.3	36.5	3.2	7.9

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	39	16
%	70.9	29.1

Q18 Land Size

	1	2	3	4
Frequency	12	20	3	16
%	23.5	39.2	5.9	31.4

Q19 Crops grown

	1	2	3	4	5
Frequency	0	0	0	26	10
%	0.0	0.0	0.0	72.2	27.8

Q20 Animals kept

	1	2	3	4	5
Frequency	24	2	21	0	3
%	43.0	4.0	42.0	0.0	6.0

Q20 Average no of cows 10.3

Q20 Average no of goats 14.7

Q20 Average no of others 5.5

Q21 Fish caught

	Omena	Tuna
Frequency	0	0

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	18	22	11	19
%	25.7	31.4	15.7	27.1

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	0	38	31	0	0
%	0.0	55.1	44.9	0.0	0.0

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	0	69
%	0.0	100.0

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	0	0	0	0	0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	11	17	2	0	0
%	36.7	56.7	6.7	0.0	0.0

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	7	5	2	4	0
%	38.9	27.8	11.1	22.2	0.0

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	0	0	7
%	0.0	0.0	0.0	100.0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	35	7	1
%	81.4	16.3	2.3

Q29 Knowledge about water related diseases

	Yes	No
Frequency	60	9
%	87.0	13.0

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	29	37	19	0	0	0
%	34.1	43.5	22.4	0.0	0.0	0.0

Q31 House type

	P	SP	T
Frequency	50	11	8
%	72.5	15.9	11.6

Q31 Electricity

	Yes	No
Frequency	47	22
%	68.1	31.9

Q31 Telephone

	Yes	No
Frequency	21	48
%	30.4	69.6

Q32 Average Distance from leaching pit/drain 95 m

Q1 Average family Size

Z

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	>13
Frequency	7	6	19	23	13	22	22	5	3	7	4	7	11
%	4.7	4.0	12.8	15.4	8.7	14.8	14.8	3.4	2.0	4.7	2.7	4.7	7.4

Q2 Average No of students

Kindergarten	1.4	Secondary	1.5
Primary	2.8	Post Secondary	1.8

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	40	56	47	6	0
%	26.8	37.6	31.5	4.0	0.0

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	32	36	38	21	6	3	0	6
%	22.5	25.4	26.8	14.8	4.2	2.1	0.0	4.2

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	147	32	18	15	18	7	5	0
%	60.7	13.2	7.4	6.2	7.4	2.9	2.1	0.0

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	53	73	0	19	0	0	0
%	36.6	50.3	0.0	13.1	0.0	0.0	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	48	65	35	4	11	16	4	23	11	0	0
%	22.1	30.0	16.1	1.8	5.1	7.4	1.8	10.6	5.1	0.0	0.0

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	3	11	0	0	2	4	0	0	0	1	0
%	14.3	52.4	0.0	0.0	9.5	19.0	0.0	0.0	0.0	4.8	0.0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	0	0	0	0	0	0	0	0	0	0	0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	102	39
%	72.3	27.7

Q7 Average no of families using standpipe

21

Q8 is drinking water boiled?

	Yes	No
Frequency	87	62
%	58.4	41.6

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	47	91	5	2	3
%	31.8	61.5	3.4	1.4	2.0

Q11 Frequency of water collection

	1	2	3
Frequency	39	20	86
%	26.9	13.8	59.3

Q11 Means of water collection

	B	D	J
Frequency	6	0	80
%	7.0	0.0	53.0

Q12 Shortages during the dry season?

	Yes	No
Frequency	127	22
%	65.2	14.8

Q13 Days per week during season when water available

	1	2	3	4
Frequency	88	17	18	7
%	67.7	13.1	13.8	5.4

Q14 Is water enough for	Yes	No
i) Washing hands	148	1
%	99.3	0.7
ii) Taking bath	145	4
%	97.3	2.7
iii) Washing clothes	127	22
%	85.2	14.8

	Yes
i)Washing hands, ii)Taking bath	18
%	12.1
i)Washing hands, ii)Taking bath, iii)Washing clothes	126
%	84.6

Q15 Do you have storage facilities?

	Yes	No
Frequency	97	52
%	65.1	34.9

Q15 Type of storage

	C	D	T
Frequency	65	8	28
%	64.4	7.9	27.7

Q15 Average volume of storage 1.41m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	26	46	39	21	11
%	18.2	32.2	27.3	14.7	7.7

Q17-1 Satisfied with water services?

	Yes	No
Frequency	46	102
%	31.1	68.9

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	44	47	79	9	18
%	22.3	23.9	40.1	4.6	9.1

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	97	23
%	80.8	19.2

Q18 Land Size

	1	2	3	4
Frequency	5	24	17	29
%	5.7	32.0	22.7	38.7

Q19 Crops grown

	1	2	3	4	5
Frequency	0	4	0	42	29
%	0.0	5.3	0.0	56.0	38.7

Q20 Animals kept

	1	2	3	4	5
Frequency	34	0	37	0	13
%	40.5	0.0	44.0	0.0	15.5

Q20 Average no of cows 6

Q20 Average no of goats 8.3

Q20 Average no of others 37.1

Q21 Fish caught

	Omena	Tuna
Frequency	0	1

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	22	71	55	22
%	12.9	41.8	32.4	12.9

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	9	110	29	1	1
%	6.0	73.3	19.3	0.7	0.7

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	146	3
%	98.0	2.0

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	3	5	0	0	2
%	30.0	50.0	0.0	0.0	20.0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	0	31	0	0	0
%	0.0	100.0	0.0	0.0	0.0

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	24	1	2	1	0
%	85.7	3.6	7.1	3.6	0.0

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	0	0	22
%	0.0	0.0	0.0	100.0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	101	7	6
%	88.6	6.1	5.3

Q29 Knowledge about water related diseases

	Yes	No
Frequency	149	0
%	100.0	0.0

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	35	105	21	8	6	10
%	18.9	56.8	11.4	4.3	3.2	5.4

Q31 House type

	P	SP	T
Frequency	65	39	45
%	43.6	26.2	30.2

Q31 Electricity

	Yes	No
Frequency	68	81
%	45.6	54.4

Q31 Telephone

	Yes	No
Frequency	15	134
%	10.1	89.9

Q32 Average Distance from leaching pit/drain 55 m

Q1 Average family Size

Z

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	>13
Frequency	11	12	19	24	26	21	24	23	9	13	9	6	16
%	5.2	5.6	8.9	11.3	12.2	9.9	11.3	10.8	4.2	6.1	4.2	2.8	7.5

Q2 Average No of students

Kindergarten	1.5	Secondary	1.8
Primary	2.9	Post Secondary	1.6

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	42	87	81	5	0
%	19.5	40.5	37.7	2.3	0.0

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	35	40	55	37	22	8	2	12
%	16.6	19.0	26.1	17.5	10.4	3.8	0.9	5.7

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	193	34	14	6	69	2	4	5
%	59.0	10.4	4.3	1.8	21.1	0.6	1.2	1.5

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	116	31	39	5	0	0	0
%	63.7	16.2	20.4	2.6	0.0	0.0	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	66	72	35	22	18	6	7	6	2	1	5
%	27.5	30.0	14.6	9.2	7.5	2.5	2.9	2.5	0.8	0.4	2.1

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	8	1	0	0	14	2	0	0	0	3	0
%	28.6	3.6	0.0	0.0	50.0	7.1	0.0	0.0	0.0	10.7	0.0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	9	20	11	7	1	2	0	0	0	0	0
%	18.0	40.0	22.0	14.0	2.0	4.0	0.0	0.0	0.0	0.0	0.0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	131	43
%	75.3	24.7

Q7 Average no of families using standpipe

16

Q8 Is drinking water boiled?

	Yes	No
Frequency	88	125
%	41.3	58.7

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	55	109	20	7	12
%	27.1	53.7	9.9	3.4	5.9

Q11 Frequency of water collection

	1	2	3
Frequency	63	25	90
%	35.4	14.0	50.6

Q11 Means of water collection

	B	D	J
Frequency	44	1	78
%	35.8	0.8	63.4

Q12 Shortages during the dry season?

	Yes	No
Frequency	171	42
%	80.3	19.7

Q13 Days per week during season when water available

	1	2	3	4
Frequency	95	54	18	5
%	55.2	31.4	10.5	2.9

Q14 Is water enough for		Yes	No			Yes
i) Washing hands		21	3	i)Washing hands, ii)Taking bath		15
%		87.5	12.5	%		62.5
ii) Taking bath		204	9	ii)Washing hands, iii)Washing clothes		189
%		850.0	37.5	%		787.5
iii) Washing clothes		189	24			
%		787.5	100.0			

Q15 Do you have storage facilities?*		
	Yes	No
Frequency	101	112
%	47.4	52.6

Q15 Type of storage			
	C	D	T
Frequency	26	26	46
%	26.5	26.5	46.9

Q15 Average volume of storage 2.84m³

Q16 Cost of water per day/month					
	1	2	3	4	5
Frequency	43	56	32	36	24
%	22.5	29.3	15.8	18.8	12.6

Q17-1 Satisfied with water services?		
	Yes	No
Frequency	59	137
%	30.1	69.9

Q17-2 If no, reasons					
	1	2	3	4	5
Frequency	55	21	91	17	18
%	27.2	10.4	45.0	8.4	8.9

Q17-3 Willingness to pay for improved services?		
	Yes	No
Frequency	138	35
%	79.8	20.2

Q18 Land Size				
	1	2	3	4
Frequency	1	21	20	33
%	1.3	28.0	26.7	44.0

Q19 Crops grown					
	1	2	3	4	5
Frequency	0	0	0	69	5
%	0.0	0.0	0.0	93.2	6.8

Q20 Animals kept					
	1	2	3	4	5
Frequency	18	41	39	17	12
%	14.2	32.3	30.7	13.4	9.4

Q20 Average no of cows 42.1

Q20 Average no of goats 40.2

Q20 Average no of others 26.4

Q21 Fish caught			
	Omena	Tuna	
Frequency	0	0	

Q21 Average amount of fish caught 0 Kg./day

Q22 Refuse disposal				
	1	2	3	4
Frequency	59	59	21	60
%	26.9	26.9	9.6	36.5

Q23 Type of sanitary facilities					
	1	2	3	4	5
Frequency	12	61	20	0	38
%	9.2	46.6	15.3	0.0	29.0

Q23a Sanitary facilities requirements affected by culture/customs?		
	Yes	No
Frequency	213	0
%	100.0	0.0

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	3	7	0	0	0
%	30.0	70.0	0.0	0.0	0.0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	8	50	3	0	31
%	8.7	54.3	3.3	0.0	33.7

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	13	5	26	10	0
%	24.1	9.3	48.1	18.5	0.0

Q27 Reason for not desludging

	1	2	3	4
Frequency	1	0	0	13
%	7.1	0.0	0.0	92.9

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	134	19	3
%	85.9	12.2	1.9

Q29 Knowledge about water related diseases

	Yes	No
Frequency	199	14
%	93.4	6.6

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	71	116	42	1	17	4
%	28.3	46.2	16.7	0.4	6.8	1.6

Q31 House type

	P	SP	T
Frequency	131	50	32
%	61.5	23.5	15.0

Q31 Electricity

	Yes	No
Frequency	77	136
%	35.2	63.8

Q31 Telephone

	Yes	No
Frequency	25	186
%	11.7	88.3

Q32 Average Distance from leaching pit/drain 567 m

Q1 Average family Size 7.9

No. of occupants	1	2	3	4	5	6	7	8	9	10	11	12	>13
Frequency	3	14	9	11	12	13	15	10	6	16	3	11	19
%	2.1	9.9	6.3	7.7	8.5	9.2	10.6	7.0	4.2	11.3	2.1	7.7	13.4

Q2 Average No of students

Kindergarten	<u>1.4</u>	Secondary	<u>1.7</u>
Primary	<u>2.7</u>	Post Secondary	<u>1.3</u>

Q3 Main Occupation of family

Occupation	1	2	3	4	5
Frequency	1	67	39	37	0
%	0.7	45.5	27.1	25.7	0.0

Q4 Family Income

Income Range	1	2	3	4	5	6	7	8
Frequency	47	34	39	16	5	2	0	0
%	32.9	23.8	27.3	11.2	3.5	1.4	0.0	0.0

Q5 Source of water

	1	2	3	4	5	6	7	8
Frequency	78	6	79	4	9	0	0	1
%	44.1	3.4	44.6	2.3	5.1	0.0	0.0	0.6

Q5 Water undertaker for piped water supply

	A	B	C	D	E	F	G
Frequency	65	0	8	8	0	0	0
%	80.2	0.0	9.9	9.9	0.0	0.0	0.0

Q5 Source for domestic use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	21	51	4	4	14	69	8	0	0	1	0
%	12.2	29.7	2.3	2.3	8.1	40.1	4.7	0.0	0.0	0.6	0.0

Q5 Source for Livestock use

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	0	0	0	0	1	1	0	0	0	0	0
%	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0

Q5 Source for other uses

	1a	1b	1c	1d	2	3	4	5	6	7	8
Frequency	0	0	0	0	0	0	0	0	0	0	0

Q6 Status of piped supply

	Metered	Unmetered
Frequency	42	28
%	60.0	40.0

Q7 Average no of families using standpipe 16

Q8 Is drinking water boiled?

	Yes	No
Frequency	67	77
%	45.5	53.5

Q10 Distance from main water Source

	1	2	3	4	5
Frequency	20	114	8	2	0
%	13.9	79.2	5.6	1.4	0.0

Q11 Frequency of water collection

	1	2	3
Frequency	53	12	74
%	33.1	8.6	53.2

Q11 Means of water collection

	B	D	J
Frequency	22	1	88
%	19.8	0.9	79.3

Q12 Shortages during the dry season?

	Yes	No
Frequency	117	27
%	81.3	18.5

Q13 Days per week during season when water available

	1	2	3	4
Frequency	68	19	20	10
%	58.1	16.2	17.1	8.5

Q14 Is water enough for	Yes	No
i) Washing hands	142	2
%	98.6	1.4
ii) Taking bath	135	9
%	93.8	6.9
iii) Washing clothes	125	19
%	86.8	13.2

	Yes
i)Washing hands, ii)Taking bath	10
%	6.9
ii)Washing hands, ii)Taking bath, iii)Washing clothes	125
%	86.8

Q15 Do you have storage facilities?

	Yes	No
Frequency	48	96
%	33.3	66.7

Q15 Type of storage

	15	17	15
Frequency	89	63	70
%	40.1	28.4	31.5

Q15 Average volume of storage 0.53m³

Q16 Cost of water per day/month

	1	2	3	4	5
Frequency	27	18	25	5	3
%	34.6	23.1	32.1	6.4	3.8

Q17-1 Satisfied with water services?

	Yes	No
Frequency	10	73
%	12.0	88.0

Q17-2 If no, reasons

	1	2	3	4	5
Frequency	12	13	50	8	7
%	13.3	14.4	55.6	8.9	7.8

Q17-3 Willingness to pay for improved services?

	Yes	No
Frequency	63	19
%	76.8	23.2

Q18 Land Size

	1	2	3	4
Frequency	17	24	0	0
%	41.5	58.5	0.0	0.0

Q19 Crops grown

	1	2	3	4	5
Frequency	0	0	0	0	1
%	0.0	0.0	0.0	0.0	100.0

Q20 Animals kept

	1	2	3	4	5
Frequency	0	1	14	3	0
%	0.0	5.6	77.8	16.7	0.0

Q20 Average no of cows 8.7

Q20 Average no of goats 24.4

Q20 Average no of others 5

Q21 Fish caught

	Omena	Tuna
Frequency	0	0

Q21 Average amount of fish caught 0 Kg/day

Q22 Refuse disposal

	1	2	3	4
Frequency	6	42	33	70
%	4.0	27.8	21.9	46.4

Q23 Type of sanitary facilities

	1	2	3	4	5
Frequency	26	61	20	0	37
%	18.1	42.4	13.9	0.0	25.7

Q23a Sanitary facilities requirements affected by culture/customs?

	Yes	No
Frequency	142	2
%	98.6	1.4

Q24 If no latrine, what is the alternative?

	1	2	3	4	5
Frequency	0	24	0	0	0
%	0.0	100.0	0.0	0.0	0.0

Q25 Liquid effluent disposal

	1	2	3	4	5
Frequency	0	18	2	0	0
%	0.0	90.0	10.0	0.0	0.0

Q26 Desludging interval for septic tank

	1	2	3	4	5
Frequency	9	5	2	4	0
%	45.0	25.0	10.0	20.0	0.0

Q27 Reason for not desludging

	1	2	3	4
Frequency	0	0	0	8
%	0.0	0.0	0.0	100.0

Q28 Rise in water level during rainfall in pit latrines

	1	2	3
Frequency	49	10	1
%	81.7	16.7	1.7

Q29 Knowledge about water related diseases

	Yes	No
Frequency	137	7
%	95.1	4.9

Q30 Diseases suffered by family in the preceding year

	1	2	3	4	5	6
Frequency	15	126	53	8	33	3
%	6.3	52.9	22.3	3.4	13.9	1.3

Q31 House type

	P	SP	T
Frequency	75	26	43
%	52.1	18.1	29.9

Q31 Electricity

	Yes	No
Frequency	43	101
%	29.9	70.1

Q31 Telephone

	Yes	No
Frequency	5	139
%	3.5	96.5

Q32 Average Distance from leaching pit/drain 22 m

DATA BOOK III

**RESULT OF SURVEY ON EXISTING URBAN
WATER SUPPLY SYSTEMS**

**THE AFTERCARE STUDY
ON THE NATIONAL WATER MASTER PLAN**

DATA BOOK

**DATA BOOK III : RESULT OF SURVEY ON EXISTING URBAN WATER SUPPLY
SYSTEMS**

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GRAND SUMMARY

Aftercare Study on
the National Water Master Plan

Grand Summary of Urban Water Supply System (1/7)

DISTRICT	NAME OF URBAN SCHEME	WATER UNDERTAKER	MAP REF. (1/50000)	AREA COVERED Km ²	SOURCE/TREATMENT PROCESS	CHEMICALS DOSED	DOSING FREQUENCY	WATER PRODUCTION m ³ /Day	CONSUMER		POPULATION	FINANCE		FUTURE EXPANSION	REMARKS	
Nairobi	Nairobi	Nairobi City Council	148/4	540	Kikuyu Springs, Sasumua, Ruiru, Thika, & Chania Dams / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	364,000	142,206	7,358	1,980,000				The extreme western parts of the City experiences low pressure thus severe water shortages.	
Kiambu	Karuri	Municipal Council of Karuri	148/2	8	Borehole / No Treatment			520	Nil	396	30,000	1,990,000	732,680		Operation and Maintenance require to be strengthened and all consumers metered.	
	Limuru	MOWR	148/1	10	Borehole / No Treatment			660	Nil	656	3,000	3,691,225	2,768,030		The existing supply is not adequate to meet the demand of the growing Urban population as a result most consumers have their own boreholes.	
	Kiambu	Kiambu Municipal Council	148/2	2	Pipeline offtake & Borehole / No Treatment				1,560	Nil		3,076,187	2,306,930		The current supply is not adequate and sinking of more boreholes has been identified as a viable source for future.	
	Githunguri	MOWR	148/2	1	Borehole / No Treatment			300	439	Nil		960,000	480,000		Existing Githunguri water supply has outlived its original design horizon and the whole system needs to be improved and extended.	
	Kikuyu	MOWR	148/1	8	Borehole / Disinfection by Chlorine	Chlorine (TCL)	Daily	1,278	1,181	Nil	23,892	9,812,764	6,011,540		At present there is no disinfection being carried as result of breakdown of dosing equipment	
Thika	Gatundu	Nairobi City Council	148/2	10	Pipeline offtake (Ngetu Water Supply) / Conventional Full Treatment.		Daily	411				5,800,000	5,500,000			
	Ruiru	MOWR	148/2	2	Ruiru River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily		650	Nil	100,000	2,358,000	1,427,000		Ruiru urban is one of the fast growing industrial towns and the existing water supply is not adequate to meet the demand	
	Thika	Thika Municipal Council	149/1	80	Thika & Chania Rivers / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	24,000			149,448	50,737,754	38,751,351		Thika water supply is adequate to meet the anticipated demand until year 2005.	
Kirinyaga	Wanguru	MOWR	135/2	4	Thiba River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	80							The existing Scheme has not been operating for the last 5 years due to major rehabilitation works being carried out.	
	Sagana	MOWR	135/1	5	Ragati River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	610	770	5	18,000	3,079,042	1,650,840		The existing source is adequate to meet present demand of the urban population.	
	Kerugoya	MOWR	121/4	4	Rutui River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	1,200	1,717	Nil	37,000	5,649,000	4,074,000		The existing water supply system is not adequate to meet the demand of the growing urban population.	
	Kutus	NWCPC	135/2		Pipeline offtake (Ndia Water Supply) / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	246	250	Nil	9,550		360,000		Kutus urban does not have its own water. There is a pipe line offtake from Ndia water supply Scheme.	
Muranga	Kandara	NWCPC	135/3	1	Pipeline Offtake (Kandara Rural Water Supply) / No Treatment			14,640						Preliminary design has been carried out for Kandara Rural water supply for 2020 requirement	Kandara urban is supplied from Kandara Rural Water Supply Scheme.	
	Kangema	NWCPC	134/2	4	Pipeline Offtake (Kahuti Rural Water Supply) & South Mathoya River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	150	568	37	2,000		601,413		Preliminary design has been carried out for Kahuti Rural water supply for 2020 requirement	The existing Scheme has depredated over the years and is in an uneconomical state to rehabilitate.
	Muranga	MOWR	135/1	5	Mathiyoa & Kayahwa Rivers / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)		2,000	2,672	Nil	56,000	9,895,437	8,337,201		The existing water Supply System is not adequate to meet the demand of the growing urban population.	
Maragua	Maragua	MOWR	135/3		Borehole / No Treatment			15	14	169	12,000	152,970	143,931		The existing borehole should be abandoned since yield is very little and it is in uneconomical state to rehabilitate.	
	Makuyu	Punda Mile Farmers Co-operative	135/3	6	Borehole / No Treatment			360	170	140	24,000			Final Design for an alternative source (earth dam) was carried in 1991 but the project has not been implemented.	Makuyu urban does not have its own source.	
Nyandarua	Olkariou	MOWR	119/4	4	Boreholes / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	220	300	Nil	10,000	1,459,920	1,140,260		The existing supply comprises of 4 No. boreholes of which 2 No. are not equipped.	
Nyeri	Karatina	MOWR	121/3	37	Ragati River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	1,300	1,195	Nil		5,508,204	4,412,082			
	Othaya	NWCPC	134/2	8	Gakira River & Borehole / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	700	472	Nil	17,500	1,200,000	1,080,000		The scheme was designed for 2000 demand of 11000m ³ /day.	
	Nyeri	Nyeri Municipal Council	120/4	20	Chania River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	7,000	5,848	Nil	11,590	38,935,012	13,619,396		Feasibility Studies have been carried out by a firm of consulting Engineers for 2010 requirement.	
Kiifi	Kiifi	NWCPC	198/2	120	Pipeline Offtake (Mzima Springs) / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	4,300	2,733	Nil	73,000		10,148,731		Preliminary Design has been carried out for 2020 requirement.	At present water supply is irregular due to frequent breakdown at the T/Works as well as along Sabaki pipeline.
	Mariakani	NWCPC	197/4	30	Pipeline Offtake (Sabaki Pipe line) / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	1,200	1,009	Nil	19,109		5,389,068		Preliminary Design has been carried out for 2020 requirement.	The existing water supply is not adequate to meet the demand of the growing urban population.
Malindi	Malindi	NWCPC	193/1	5	Sabaki River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	15,985	4,810	Nil			39,976,729		The existing supply is not adequate to meet the demand of the growing Urban population.	
	Mambur	Local Community	193/1	2	Well / No Treatment			207	Nil	157	3,000	180,500	109,800		Location of boreholes has been identified for 2008 requirement.	

Aftercare Study on
the National Water Master Plan

Grand Summary of Urban Water Supply System (2/7)

Urban Water Supply
System Survey

DISTRICT	NAME OF URBAN SCHEME	WATER UNDERTAKER	MAP REF. (1/50000)	AREA COVERED Km ²	SOURCE/TREATMENT PROCESS	CHEMICALS DOSED	DOSING FREQUENCY	WATER PRODUCTION m ³ /Day	CONSUMER		POPULATION	FINANCE		FUTURE EXPANSION	REMARKS
Malindi	Watamu	NWCPC	193/3	6	Pipeline offtake / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily		1,250	Nil					
Kwale	Kwale	NWCPC	200/2	4	Pipeline Offtake from Marere Spring / Disinfection by chlorine	Chlorine(TCL)	Daily	520	452	Nil	4,360		1,977,797	Preliminary design for 2020 requirement has	Studies carried out by Consultants in 1995 indicate that unaccounted for water (UFW) is approximate 81% which is very high.
	Kinango	NWCPC	200/2	1	Pipeline Offtake from Marere Spring / Disinfection by chlorine	Chlorine(TCL)	Daily	440	340	Nil	5,321		1,064,948	Preliminary design for 2020 requirement has been done under Second Mombasa and Coastal Water Supply Project.	
	Maambweni	MOWR	200/4	4	Wells / Disinfection by chlorine	Chlorine(TCL)	Daily	520	240	Nil	25,000	936,000	720,000		There was a proposal to construct a dam for 1997 requirement which was never implemented.
	Lunga Lunga	MOWR	202/1	2	Borehole / No Treatment			220	28	Nil				Location of boreholes has been identified for 2017 requirement.	The scheme is in a terrible state of affair due to lack of regular maintenance.
Lamu	Witu	German Government Aid Agency (GTZ)	179/4	3	Shallow Wells / No Treatment			85			3,273				Witu water supply serves only Government administrative areas.
	Lamu	MOWR	180/4		Shallow Wells / Disinfection by Chlorine (TCL)	Chlorine(TCL)	Daily	575	1,315	Nil	20,000	1,053,440	816,427		The existing water supply system is not adequate to meet the demand of the growing urban population. At present majority of residents resort to the numerous contaminated shallow wells.
Mombasa	Mombasa	NWCPC	201/1	12	Sabaki River & Mzima Springs / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	18,200	19,894	Nil	138,300		148,192,085	Preliminary Design has been carried out for 2020 requirement.	The existing water supply system is not adequate to meet the demand of the growing Population. At present the supply is 18200m ³ /day while the demand is 56000m ³ /day.
Taita Taveta	Tavete	NWCPC	188/3		Njoro springs / Disinfection by chlorine	Chlorine(TCL)	Daily	1,600	879	Nil	43,790		8,077,360		
	Voit	NWCPC	190/3	9	Pipeline offtake (Mzima pipe line) / Disinfection by chlorine	Chlorine(TCL)	Daily	2,700	1,594	Nil	4,800		18,847,173		The existing supply is not adequate to meet the demand of the growing Urban population.
	Wundanyi	MOWR	189/4	12	River / Conventional Full Treatment.	Alum, Soda ash, and Chlorine (TLC)	Daily	1,232	1,001	Nil		2,636,450	2,564,763		
Tana River	Bura	MOWR	154/2		Tana River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	288							The existing water supply is non function since the river has shifted course, the intake need to be re-located. This happened before the 1997/1998 floods which has made the situation even worse.
	Madogo	MOWR	126/3	2	Tana River / No Treatment				Nil	200	4,000				The existing water supply is not adequate to meet the demand of the growing urban population.
	Hola	MOWR	155/3	4	Tana River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	228	410	Nil	15,000		504,320		Operation and Maintenance cost is far much higher than the revenue generated from the sales of water. The scheme experiences chemical shortages during rainy seasons due to inaccessible roads.
	Garsen	MOWR	179/3		Tana River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily								Garsen water supply system was swept away by floods in 1989 and no rehabilitation works has been carried out since then.
Embu	Runyenjes	Municipal council of Runyenjes.	123/3	15	Ena River / No Treatment				Nil	840	4,500	302,740			All consumers should be metered in order to control wastage of water and enhance revenue collection.
	Siakago	MOWR	136/1	2	Pipeline Offtake (Siakago Rural Water Supply) / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	196	72	Nil					Siakago urban does not have its own water source and its supplied from Siakago Rural Water Supply Scheme.
	Embu	NWCPC	135/2	31	Pipeline Offtake (Embu Water Supply) / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	7,305	4,691	Nil	30,000	10,425,000	11,370,948		
Isiolo	Isiolo	MOWR	108/1	18	Pipeline Offtake from Ewaso Nyiro Water Supply / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	4,356	2,771	Nil	40,000	12,807,502	12,538		The existing source is not adequate to meet the demand of the growing Urban population.
	Oldo-Nyiro	Catholic Mission	92/4	1	Ewaso Nyiro River / No Treatment			850							The scheme serve the Catholic Mission only.
	Merti	Local Community	82/3	3	Borehole / No Treatment				Nil	230	6,248				The current water supply serves a very small section of the community & residents depend on individual shallow wells.
	Modo Gaehe	Local Community	NA-37-15		Gaa Gof River / No Treatment										This is an old community managed water supply scheme which is currently being rehabilitated.
	Garbetula	MOWR	96/3	2.5	Borehole / No Treatment			56	Nil	106	5,000		300,000		The existing source is not adequate to meet the demand of the growing Urban population and serves Government offices only.
Kitui	Kitui	MOWR	151/3	10	Borehole / No Treatment			800	900	250	25,000	1,714,134	436,776	Plan are underway to connect the urban supply with Masinga Kitui water supply Scheme.	Water test carried out indicate that the borehole water require disinfection.
	Mutomo	MOWR	154/3	20	Borehole / No Treatment						9,500				The Scheme was abandoned in 1991
Mwingi	Mwingi	MOWR	137/3	1.5	Tyaa River / Disinfection by Chlorine	Chlorine(TCL)	Twice a week.	300	18	296	15,000	555,600	120,747	Plans are underway to supplement the Urban supply with Kiambere Water Supply Project.	The existing source is not adequate to meet the demand of the growing Urban population.

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Grand Summary of Urban Water Supply System (3/7)

Urban Water Supply
System Survey

DISTRICT	NAME OF URBAN SCHEME	WATER UNDERTAKER	MAP REF. (1/50000)	AREA COVERED Km ²	SOURCE/TREATMENT PROCESS	CHEMICALS DOSED	DOSING FREQUENCY	WATER PRODUCTION m ³ /Day	CONSUMER	POPULATION	FINANCE	FUTURE EXPANSION	REMARKS	
Machakos	Tala	Kangundo-Tala Town Council	149/4	5	Borehole / No Treatment			100	80	320	13,000	276,660	217,911	Operation and Maintenance require to be strengthened for efficient running of the Scheme.
Machakos	Uasni	Local Community	162/2	4	Pipeline offtake / No Treatment				Nil	844	18,000	700,000	350,000	The existing source has adequate supply however treatment facilities are required
	Athi River	Mavoko Municipal Council	148/4	35	Pipeline offtake / Conventional Full Treatment.	Alum, Soda ash, and Chlorine (TCL)	Daily	2,000	1,200	Nil	50,000	4,925,132	4,472,018	Feasibility study for a concrete dam on Mbagathi River are being carried by consultants The existing supply is not adequate to meet demand of the growing Urban population
	Machakos	NWCPC	161/4	22.5	Dam on maruba River / Conventional Full Treatment.	Alum, Soda ash, and Chlorine (TCL)	Daily				120,000	16,509,095	14,780,280	Majority of the meters are not working or are buried. 85% of the consumers are billed on estimates thus loss of revenue.
	Mtshoni	MOWR	149/3	2.5	Kathaama river & Borehole / No Treatment			438			4,000			Treatment facilities should be installed.
	Kengundo	Kangundo-Tala Town Council	149/4	4	Borehole / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	341	316	120	9,500	461,000	363,160	Operation and Maintenance require to be strengthened.
Makueni	Nunguni	Local Community	162/4	2.5	Spring / No Treatment									The existing Scheme has been unoperation since mid-1996 and the supply is not adequate to meet the demand of the local community.
	Wote	MOWR	163/3	2	Borehole / No Treatment			84	127	1	6,000	294,621	221,626	There is a proposed Water Supply Scheme on Kaiti River which is supposed to serve Makueni and Wote Urban centres.
	Email	NWCPC	173/2	1	Noluresh Spring / Preventive chlorination (TCL) at the source.	Chlorine (TCL)	Daily	482	10	198		301,971	244,257	The water from the source is well mineralised and of high quality though not adequate to meet the demand of the growing Urban population.
	Mito Andel	MOWR	183/1	5	Umanyi Springs / No Treatment				328	22	35,000	1,674,803	656,419	
Marsabit	Marsabit	MOWR	NA-37-6		Bakuli Spring / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	136	643	37	28,000	625,749	666,050	Planning for an alternative source (Dam) for 2023 requirement are underway. The existing water supply is not adequate to meet the demand of the growing Urban population.
	North Horr	Local Community	NA-37-1	.5	Shallow well / No Treatment			21	Nil	6	9,690			The design year (1989) for future development of shallow wells and pans has already been surpassed. The existing Source is not adequate to meet the demand of the local Community.
	Kergl	Local Community	NA-37-6		Borehole / No Treatment			160	Nil	6				Location of Boreholes and pans have been identified for 2023 requirement. The existing Source is not adequate to meet the demand of the local Community.
	Korr		66/2	3	Shallow well / No Treatment									The scheme comprises of 3 No. shallow well which are equipped with handpumps.
Moyale	Sololo	Local Community and NGO.	NA-37-2	8	Wells equipped with Handpumps / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily				9,885			Sololo does not have a formal water supply and residents depend on water from shallow wells which are not protected and are prone to contamination.
	Moyale	MOWR	NA-37-3	3	Moyale Dam / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily							The capacity of the dam has been reduced considerably as a result of siltation. Depth reduced from 10m to 1m.
Meru	Meru	MOWR	108/3	12	Gatabora Spring & Kathita River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	4,730	2,247	272	85,000	9,247,008	4,812,980	Another source on Kathita river has been proposed including convention full treatment with a capacity of 10280m ³ /day for 2010 requirement. High level zone experiences severe water shortages as a result of siltation at Kathita intake
	Nkubu	MORW	122/1		Thingithu River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily		300	23			1,124,139	Another source on Kiungwa Ndegwa river has been proposed including convention full treatment with a capacity of 1160m ³ /day for 2010 requirement. The existing Scheme is not adequate to meet the demand of the growing Urban centre
	Chogoria	MORW	122/1		Mufonga River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily		Nil	20				Details on production, population and finances are not available/ kept. The current production is 500m ³ /day while the demand is 2010m ³ /day.
	Chuka	MORW	122/1		Tungu River / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	355	590	Nil	8,000	974,367	924,846	A new source on Ruguti River has been identified but detailed survey has not been carried out.

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Grand Summary of Urban Water Supply System (4/7)

Urban Water Supply
System Survey

DISTRICT	NAME OF URBAN SCHEME	WATER UNDERTAKER	MAP REF. (1:50000)	AREA COVERED Km ²	SOURCE/TREATMENT PROCESS	CHEMICALS DOSED	DOSING FREQUENCY	WATER PRODUCTION m ³ /Day	CONSUMER	POPULATION	FINANCE	FUTURE EXPANSION	REMARKS	
Meru	Maui	MORW	108/4		Mboone stream / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	164	Nil	455	8,000	1,115,913	1,037,784	A new source on Ura River has been identified including conventional full treatment with a capacity of 1590m ³ /day for 2000 requirement. The system is designed for convention full treatment however at present only disinfection by chlorine is carried out.
Garissa	Ijara	Local Community	SA-37-8	4	Pans / No Treatment						20,000			The existing system comprises of pans which face severe siltation problem.
	Kollie	MORW	158/3	1	Pans / No Treatment						5,000			The capacity of the pans has been reduced drastically after the rains due to high level of siltation, the pans also tend to dry up during prolonged drought.
	Masalent	Local Community	168/1	3.5	Tana River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	480			8,000			The existing treatment works is in very poor condition and in most cases water is distributed to consumers without being treated.
Mandera	Garissa	MORW	126/3	35	Tana River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	1,440	958	1,909	57,930	2,900,000	2,400,000	Due to high demand and inefficient filtration units untreated water is supplied to consumers.
	Mandera	MOWR	NA-37-4		Borehole / Disinfection by Chlorine	Chlorine(TCL)	-Ditto-	500	Nil	1,600		2,500,000	700,000	Location of Boreholes has been identified for 2020 requirement. The existing Scheme comprises of 6No. shallow Boreholes of which water from 2No. Boreholes is saline and contaminated.
	Rhamu	Local Community	NA-37-4		Borehole / Disinfection by Chlorine	Chlorine(TCL)	-Ditto-	140			15,000			The DWE provide the local community with Chlorine but not on regular basis due to funds and transport constraints.
Wajir	Elwak	Local Community			Borehole / Disinfection by Chlorine	Chlorine(TCL)	-Ditto-							The DWE provide the local community with Chlorine but not on regular basis due to funds and transport constraints.
	Wajir	MORW	NH-37-11	1.5	Shallow Wells / Disinfection by Chlorine (TCL)	Chlorine(TCL)	Daily	20	Nil	74		130,015	202,925	Operation and Maintenance cost is far much higher than the revenue generated from the sales of water. The supply serves Government offices and houses only.
	Buna	MORW	NH-37-7	.5	Borehole / No Treatment									The supply is not adequate to meet the present demand and most people depend on individual shallow well which are prone to contamination.
Nyamira	Bute	MORW	NH-37-7	.5	Borehole / No Treatment									There is no formal water supply Scheme in Bute. Residents depend on individual shallow wells which are not protected and are prone to contamination.
	Nyamira	MOWR	130/2		Eyaka River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	466	802	296	40,000	1,612,839	1,298,756	The existing Water Supply is not adequate to meet the demand of the growing Urban population.
	Manga	MOWR	130/2	5	Spring / No Treatment	Alum, Soda ash and Chlorine (TCL)			26	83	9,444	48,112	23,873	The existing Water Supply is not adequate to meet the demand of the growing Urban population.
Kisii	Kisii	NWCPC	130/2	18	Gucha River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	4,000	3,074	620		8,113,387	8,045,156	Due to frequent siltation at the intake works and breakdown of raw water pumps the Treatment Works production is lower than its design capacity.
	Keroka	MOWR	130/4		Chirichiri River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily		155	144	55,425	576,309	182,559	Alternative source for 2017 requirement has been identified. The supply is not adequate to meet the demand of the growing Urban population.
Gucha	Ogembo	Gusii County Council	130/3		Spring & Gucha River / No Treatment									There are no records available / kept on water production, service connections & finances.
Kisumu	Kisumu	Kisumu Municipal Council.	116/2	180	Lake Victoria & Kibos River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily			330,000		101,240,000		A master plan to Augment Water Supply System for the Township is under preparation by JICA. Operation and Maintenance require to be strengthened including customer survey to identify location of customers and their physical addresses since there no records available/ kept on service connection.
	Ahero	Ahero Catholic Chu	116/2	.5	Borehole / No Treatment				91	Nil				The existing water supply system managed by Ahero Catholic Church and is not adequate to meet the demand of the local Community.
	Muhoroni	MOWR	117/1	2	Nyando River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	600	Nil	120	10,000			Production is hindered due to frequent break-down of pumps.
Siaya	Siaya	NWCPC	104/4	12	Abura Dam on Nyamwin River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	770	20,364	11,340	299,500	1,710	180	Preliminary Design for alternative Source to 2020 requirement completed. The existing Scheme is primarily a pumping Scheme and the operational cost is much more than the revenue earned. The water supply is not adequate to meet the demand of the growing Urban population.
	Bondo	MOWR	115/2	1	Yala River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily		232	129		495,103	129	The capacity of the existing Treatment Works is not adequate to meet the demand of the growing Urban population. Delays in purchase/delivery of chemical due to limited funds and resources result in supply of untreated water to consumers.
	Ukwala	MOWR	101/3	.8	Borehole / No Treatment			214	116	94	25,000	319,746	284,302	The existing water supply is not adequate to meet the demand of growing Urban population. The existing elevated steel tank is seriously leaking and so much water is going to waste.
	Yala	MOWR	102/3	1	Yala River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily		31	80				There no records available/kept on the service connections, financial status, etc. Operation and maintenance require to be strengthened in order enhance revenue collection.
Homa Bay	Homa Bay	MOWR	129/2	40	Lake Victoria /Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	1,231	1,498	10		1,917,646	1,496,308	Boreholes are being considered as a future source for development. The existing intake is choked with water hyacinth causing problems in the supply of water.

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Grand Summary of Urban Water Supply System (5/7)

Urban Water Supply
System Survey

DISTRICT	NAME OF URBAN SCHEME	WATER UNDERTAKER	MAP REF. (1/50000)	AREA COVERED Km ²	SOURCE/TREATMENT PROCESS	CHEMICALS DOSED	DOSING FREQUENCY	WATER PRODUCTION m ³ /Day	CONSUMER		POPULATION	FINANCE		FUTURE EXPANSION	REMARKS
Migori	Migori	MOWR			Borehole / Disinfection by chlorine (TLC)	Chlorine (TCL)	Daily	220	450	380				Preliminary Design for rehabilitation and expansion of the scheme for 2018 requirement has been done.	Operation and maintenance require to be strengthened including repairing of meters and billing of consumers.
	Awendo	MOWR			No existing Water supply System									There is no existing water supply system in Awendo. Proposed water supply with conventional full treatment and river Sare as source is under design.	
Kuria	Kenhacha	MOWR	144/1		Orawa Dam / No Treatment			44			9,000	122,000	61,920		Construction of a composite filtration unit is in progress.
	Ieebania	MOWR	143/3	3	Ragana River / No Treatment									An alternative source has been proposed on Ragana river including convention full treatment with a capacity of 270m ³ /day for 2017 requirement.	Treatment facilities are of utmost necessity since raw water quality is not good and is prone to contamination.
Rachuonyo	Oyugie	MOWR		4	Awach River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily							There are plan to change the Scheme to pumping system to gravity system.	There no records available/kept on production, service connections and finances.
	Kendu Bay	MOWR	116/3		Awach River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily								There no records available/kept on production, service connections and finances.
Kajiado	Ngong	MOWR	148/3	19	Borehole / No Treatment			1,260	300	1,776	45,000	1,382,628	388,171		The existing supply is not adequate to meet the demand of the growing Urban population. All consumers should be metered in order to control wastage of water and to enhance revenue collection.
	Kajiado	NWCPC	161/4	60	Nolturesh pipeline offtake & Borehole / Disinfection by chlorine (TCL)	Chlorine (TCL)	Daily	450	350	750	9,000	2,400,000	2,000,000		The existing supply is not adequate to meet the demand of the growing Urban population. All consumers should be metered in order to control wastage of water and to enhance revenue collection.
	LitokHok	NWCPC	162/3	40	Not Turesh Springs/Preventive Chlorination (TCL)	Chlorine (TCL)	Daily	1,440	1,491	Nil					The existing supply is not adequate to meet the demand of the growing Urban population. All consumers should be metered in order to control wastage of water and to enhance revenue collection.
	Magadi	Magadi Soda Factory	160/4	2	Oloibor river / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	1,364	10,000	10,000					
	Namanga	MOWR	181w/2	12	Oldonyo Orok springs / Disinfection by chlorine (TCL)	Chlorine (TCL)	Daily		57	473	12,000	1,136,900	1,155,900	Location of Boreholes has been identified for 2010 requirement.	The existing supply is not adequate to meet the demand of the growing Urban population. All consumers should in order to control wastage of water and to enhance revenue collection.
Kericho	Kericho	Kericho Municipal Council	117/4	66	Timbili River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	-Ditto-	5,246	4,801	Nil					Operation and Maintenance require to be strengthened, in order to enhance revenue collection, control wastage of water and ensure equitable distribution of water to more consumers.
	Kipkelion	MOWR	117/2		River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	4	108	Nil	20,000	68,001	34,108		Chemical dosing is supposed to be carried out on daily basis. However due to frequent breakdown of dosing equipment chemical dosing is rarely carried out.
	Londiani	MOWR	118/1		River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	169	190	34	18,000	737,431	311,450		The Scheme is currently supplying untreated water to consumers due breakdown of dosing equipment and lack of chemicals.
	Sotik	NWCPC	131/1		Kipsonoi River & Pipeline Offtake / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily							Preliminary Design for alternative source for 2020 demand completed	The existing scheme has been dilapidated over the years and is uneconomical to rehabilitate.
Laikipia	Nyahururu	Nyahururu Municipal Council	104/5	4.8	River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	3,000	2,250	32	150,000	9,245,663	8,206,261	Alternative source has been identified on eastern side of Town for 1998 requirement.	The existing source is adequate for future planning but is polluted.
	Rumuruti	Laikipia County Council	106/1	6	Borehole / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Ditto-		Nil	232				Alternative source with Conventional Full Treatment has been identified on Ewaso River, for 2020 requirement.	The existing spring source is not adequate to meet the demand of the growing Urban population.
	Nanyuki	Nanyuki Municipal Council	107/3		Liki River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily				53,100		47,716,000		River Liki has been identified as the source for future, but no comprehensive study has been carried out. There are no records available / kept on water production and service connections.

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Grand Summary of Urban Water Supply System (6/7)

Urban Water Supply
System Survey

DISTRICT	NAME OF URBAN SCHEME	WATER UNDERTAKER	MAP REF. (1/50000)	AREA COVERED Km ²	SOURCE/TREATMENT PROCESS	CHEMICALS DOSED	DOSING FREQUENCY	WATER PRODUCTION m ³ /Day	CONSUMER		POPULATION	FINANCE		FUTURE EXPANSION	REMARKS
Nakuru	Nakuru	Municipal Council of Nakuru	119/3	44.1	Mereroni & Malewa rivers, Kabatini & Baharini boreholes / Conventional Full Treatment	Alum, Soda ash, Chlorine (TCL)	Daily	28,164	19,223	Nil	232,000	131,766,920		Feasibility Study in progress for 2020 requirement	Operation and Maintenance require to be strengthened in order to control wastage of water and enhance revenue collection
	Njoro	NWCPC	118/4	2	Boreholes / Disinfection by Tropical Chloride of Lime (TCL)	Tropical Chloride of Lime (TCL)	Daily	224	200	98	20,000	685,440	1,370,880	Feasibility Study in progress for 2020 requirement	Present supply not adequate to meet the demand of the area
	Elburgon	NWCPC	118/4	1	Boreholes / Disinfection by Tropical Chloride of Lime (TCL)	Tropical Chloride of Lime (TCL)	Daily	391	681	6	30,000	1,586,076	2,709,921	Feasibility Study in progress for 2020 requirement	Present supply not adequate to meet the demand of the area
	Neivasha	NWCPC	133/2	3	Boreholes / Disinfection by Tropical Chloride of Lime (TCL)	Tropical Chloride of Lime (TCL)	Daily	762	1,531	416	48,000		365,617	Feasibility Study in progress for 2020 requirement	Present supply not adequate to meet the demand of the area
	Molo	NWCPC	118/2	.8	Nguso springs & Boreholes / Disinfection by Tropical Chloride of Lime (TCL)	Tropical Chloride of Lime (TCL)	Daily	775	602	61	30,000	1,452,332	1,618,215	Feasibility Study in progress for 2020 requirement	Present supply not adequate to meet the demand of the area
	Gilgil	NWCPC	119/4	2	Muranditi & Malewa rivers / Conventional Full Treatment	Tropical Chloride of Lime (TCL)	Daily	12,956	501	776	475,000	46,902,612	24,300,408		Operation and Maintenance require to be strengthened in order to enhance revenue collection
Narok	Narok	Narok Municipal Council	146/2	3	Narok river & spring / Conventional Full Treatment	Tropical Chloride of Lime (TCL)	Daily	1,315	913	114	30,000	2,760,000	2,500,000		Present Water Supply is not adequate to meet the demand of the area. Existing spring source require to be rehabilitated to supplement the supply
	Kilgoris	MORW	144/2	1.5	Inkituak river / Conventional Full Treatment	Tropical Chloride of Lime (TCL)	Daily	362	224	82	8,500	1,139,023	1,034,742		Present Water Supply not adequate to meet the demand of the area.
	Nalrage Ngare	MOWR	147/1	.5	Earth Dam / No Treatment										The existing source (Earth Dam) is not protected and there is likelihood of the water being contaminated. The existing Water Supply comprises of one communal stand pipe and cattle trough.
	Lolgorien	MOWR	144/2	1	Lolgorien River / No Treatment			4	9	6	1,475	13,486	14,199	Drilling 1 No. Borehole for 2006 requirement	The present operation cost of the Scheme is much higher than the revenue generated from the sales of water. The Scheme require to be expanded.
Trans Nzoia	Kitale	Kitale Municipal Council	75/3		Nzoia River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	9,000	4,000	Nil	70,000			Mount Elgon spring has been proposed as an alternative source including conventional full treatment with a capacity of 7500m ³ /day for 2000 requirement.	Frequent pump breakdowns have resulted in intermittent functioning of the T/Works and water supply interruption.
	Kaminini	MOWR	88/2	1.5	Spring / No Treatment			24	53	26	3,000	51,981	49,172		The existing pumps which are driven by diesel engine are prone to frequent breakdown and are costly to maintain.
	Endebess	MOWR	75/3	3	Ngenge & Asega Dams / No Treatment				47	45	2,300	5,927	4,041	Preliminary design has been carried out for an alternative source on Kimothon River including conventional full treatment for 2002 requirement.	
Uasin Gishu	Mota Bridge	MOWR	89/1		Nzoia River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	105			4,200		108,500		Operation and maintenance cost is far much higher than the revenue generated from the sales of water
	Turbo	MOWR	89/3	6	Confluence of Sergoit & Sosiani River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	300	245	Nil	4,600	1,189,052	118,952		Frequent pump breakdowns have resulted in intermittent functioning of the T/Works and water supply interruption.
	Eldoret	Eldoret Municipal Council	89/4	150	Kaplagat, Eldoroto, Elligirini Rivers & Dam on Moiben River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	30,000	9,250	1,029	250,000	143,700,000	124,100,000		Eldoret Municipal Council does not have any major problems with its water supply system for the next 10 years.
	Burnt Forest	MOWR	89/3	11	Dam & Borehole / No Treatment			500	42	125	5,000		296,292		The existing water supply system is not adequate to meet the demand of the growing urban population.
	Karbernet	NWCPC	104/1		Kapchemuswo Dam & Boreholes / No Treatment				596	154	250,000		2,060,788	Kirandich dam is under construction	The existing scheme is supplied from 2Nos boreholes with a production capacity of 90m ³ /day. Upon completion of Kirandich Dam water supply will improve by augmenting the future demand by 14000m ³ /day.
	Meji Mazuri	MOWR	118/2	5	Kapkor River / No Treatment		Nil		Nil	96	10,000		52,795		Absence of any form of treatment of the raw water makes it susceptible to water borne diseases.
	Elda Ravine	NWCPC	104/3	10	Chemususu River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	2,460	480	120		3,331,927	2,987,615		
	Mogotio	MOWR	118/2		Molo River & Borehole / No Treatment				580	Nil	15,000		274,567		All consumers should be metered in order to ensure equitable distribution of water to more consumers and enhance revenue collection.
Baringo	Merigat	MOWR	104/2		Perekera River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	154	Nil	239				Records on population and finances are not available/kept. All consumers are on flat rate and they should be metered in order to enhance revenue collection.	
Kericho	Iten	MOWR	90/3		Kamariya Springs & Boreholes / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	460	572	37	13,000	1,064,999	875,203		The existing sources have a potential of 600m ³ /day and if fully exploited the served area can be extended.
	Tambach	MOWR	90/3		Spring / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	97	50	40		209,884	109,401		Operation and maintenance cost is far much higher than the revenue generated from the sales of water.
Nandi	Nandi Hills	MOWR	103/3	2	Taito River / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily								There is an existing treatment works which has been abandoned. Records on service connections are not available/kept

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Grand Summary of Urban Water Supply System (7/7)

Urban Water Supply
System Survey

DISTRICT	NAME OF URBAN SCHEME	WATER UNDERTAKER	MAP REF. (1:50000)	AREA COVERED Km ²	SOURCE/TREATMENT PROCESS	CHEMICALS DOSED	DOSING FREQUENCY	WATER PRODUCTION m ³ /Day	CONSUMER	POPULATION	FINANCE	FUTURE EXPANSION	REMARKS
Nandi	Kapsabet	NWCPC	103/3	3	Kabutie River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	1,100	840	190	2,425,912	2,188,049	The Kapsabet water supply is not adequate to meet the demand of the growing urban population.
Samburu	Wamba	MOWR	93/2	1	Chlorine (TCL)	Chlorine (TCL)	Daily		Nil	126			The existing spring source is not adequate to meet the demand of the growing Urban population.
	Baragol	MOWR	65/2	1	Borehole / No Treatment			5	Nil	63			The scheme is run and managed by the local community with the assistance of DWE. The supply from the Boreholes is saline and contaminated. Waterborne diseases are very common in this area.
	Marefal	MOWR	78/3	6	Nundoto Earth Dam / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	529	415	11	2,177,107	1,652,038	There are plans to construct another dam for 2020 requirements. The existing spring source is not adequate to meet the demand of the growing Urban population.
Turkana	Lodwar	MOWR	NA-36-4	3	Boreholes / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	1,506	1,652	25	3,477,266	2,881,626	As a result of delays in purchase/ delivery of chemicals, quite often water is supplied to consumers without being treated
West pokot	Kapenguria	MOWR	73/3	2	Kapolet River / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	247	21	536	802,487	526,817	Kapenguria water supply is not adequate to meet the demand of the growing urban population.
	Makutano	MOWR	75/3	41	River Kapenguria / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	262	107	349	648,321	217,421	The existing pumps are old and require replacement.
Bungoma	Bungoma	NWCPC	88/3		Kuywa River & Borehole / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	2,620	2,830	205		3,244,358	There are plans to rehabilitate and expand the existing scheme to meet 2020 requirements.
Bungoma	Malakel	MOWR	87/4	45	River / Conventional Full Treatment	Alum, Soda Ash and Chlorine (TCL)	Daily		500	400			Records on population, finances and production not available / kept.
	Kimilili	MOWR	89/1		River / Conventional Full Treatment	Alum, Soda Ash and Chlorine (TCL)	Daily	4,123	670	1,090	1,549,285	1,392,613	The existing Water Supply is not adequate to meet the demand of growing Urban population.
	Cheptais	MOWR	87/2	1	Malikisi River / Conventional Full Treatment	Alum, Soda Ash and Chlorine (TCL)	Daily				152,731	100,864	There no records available / kept on water production, service connections etc.
	Webuye	MOWR	88/4		River / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	1,700	1,552	554	1,790,000	1,959,996	Power supply interruption and inadequate chemical supply adversely affect water supply to consumers.
Busia	Busia	MOWR	101/1	3	Sio River & Boreholes / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	2,072		50,000	1,860,952	2,148,362	Augmenting the existing treatment works to capacity of 3100m ³ /day for 2005 requirement.
	Nambale	MOWR	101/2	2	Boreholes / No Treatment			159			426,179	392,228	Operation and maintenance require to be strengthened for efficient operation of the scheme. Most consumers do complain about the quality of water being supplied. Water borne diseases are common in this area.
Vihiga	Vihiga/Majengo	MOWR	102/3	1	Spring / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	63	185	60	276,653	371,296	The existing Water Supply System is not adequate to meet the demand of the growing Urban population. Alternative source with conventional full treatment should be considered.
	Kaimosi	MOWR	102/4	4	Dam / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	597	450	900	2,616,221	612,910	Alternative Source for 2018 requirement According to the DWE, the present water production is 597m ³ /day and the demand of the area served stands at 3200m ³ /day.
	Maseno/Luanda	MOWR	102/3	1.5	Open Furrow / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	1,192	750	1,000	2,924,489	2,128,817	Alternative Source for 2018 requirement The existing Scheme has been adversely affected by the recent heavy rains with section of the furrow intake washed away, filters clogged, and sections of the distribution system washed away.
Kakamega	Kakamega	NWCPC	102/2	3	River & Borehole / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily		5,422	34			Production/financial details are not available/kept by the Scheme Manager.
	Mumias	MOWR	101/2	6	Lusumu River & Borehole / Conventional Full Treatment	Alum, Soda ash and Chlorine (TCL)	Daily	1,498	814	130	5,785,106	4,506,799	The existing water supply is not adequate to meet the demand of the growing Urban population.
	Butere	MOWR	101/4	3	Borehole / Disinfection by Chlorine (TCL)	Chlorine (TCL)	Daily	264	204	99	889,766	386,112	The Scheme experiences frequent power interruption which sometimes cause damage to submersible pumps. Quite often water is supplied to consumers without being treated.
	Khayega	NWCPC	102/4	3	Yala River & Borehole / Conventional Full Treatment.	Alum, Soda ash and Chlorine (TCL)	Daily	1,176	28	32	1,654,014	755,269	The existing Shituli Water Supply System which serves Khayega Urban is not adequate to meet the demand of the growing population.

**Aftercare Study on
the National Water Master Plan**

NAIROBI (1/1)

**Urban Water Supply
System Survey**

General

Name of Urban Centre : *Nairobi*

Organisation/Water Undertaker : *Nairobi City Council*

District : *Nairobi* Location : *Nairobi*

Map (1/50,000) Ref. no : *148/4*

Co-ordinates X : *34° 49' N*

Y : *00° 16' S*

Drainage Sub-basin : *38A*

Existing facilities

Source : *5 No. Sources (Kikuyu Springs, Ruiru Dam, Sasumua, Chania I&II and Thika Dam)*

Raw water system : *Gravity (All to 3 No. T/Works)*

Type of Intake :

Elevation : m

Treatment Process : *Full Conventional Treatment at 3 T/Works*

H : m

Dia : mm

Ngethu Treatment Works (Capacity 244,000 m³/d), Kabele Treatment Works (Capacity 15,500 m³/d) and Sasumua T/Works (Capacity 51,000 m³/d). Dosage rates:- Chlorination = 1.22 ppm; Alum = 20 ppm; Soda Ash = 12 ppm. This varies upon season and source

Designed Capacity : *319,000 m³/d*

Area covered : *540 km² (78% of City)*

Treated water/Distribution system -

Distribution mains (80mm and above): *50 mm to 1000 mm*

Total length : *4,000 km*

UFW (Estimated) : *m³/d*

Working Meters: *90% = 127,985*

Consumers - Total no : *149,564*

Metered : *142,206*

Unmetered : *7,358*

Water production : *364,000 m³/d*

Remark :

Service area population : *1,980,000*

Population served : *1,853,000*

Financial/Revenue

O & M costs :Kshs *620 million*

Revenue earned :Kshs

Revenue collected :Kshs

Rehabilitation required/costs

Estimated Cost

Kshs

Total

Future development plan

Source :

Treatment : Capacity : *m³/d*

Design year :

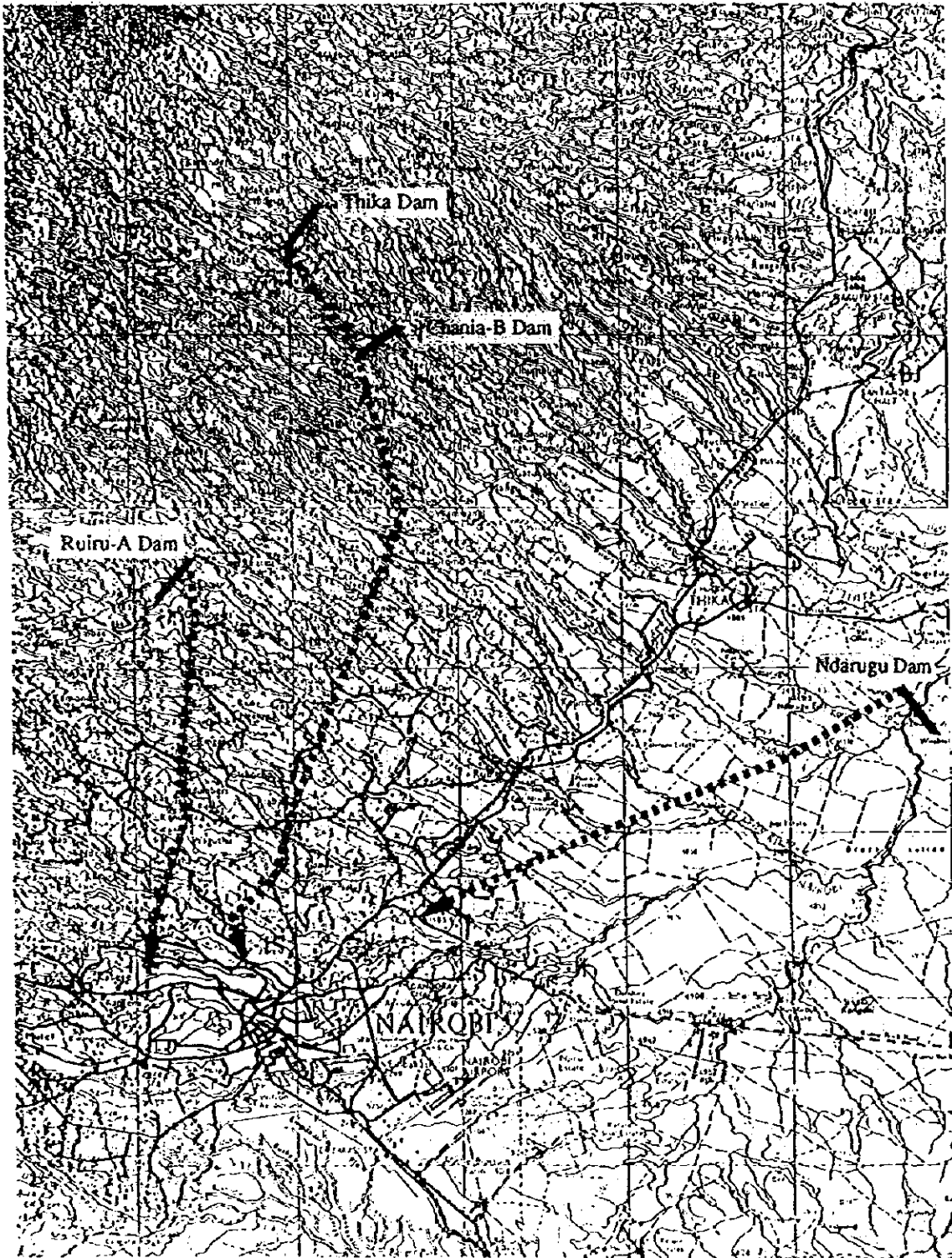
Design population :

Remarks

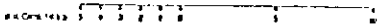
Nairobi is served from 5 sources and raw water treated at 3 treatment works. The total storage capacity is 214,000 m³, the 13 No. reservoirs scattered over Nairobi. With implementation of the second phase of TNWSP, the capacity of water supply to Nairobi will increase to 610,000 m³/d.

The extreme western parts of the City experiences low pressure and require boosting.

Fig.



Nairobi



**Aftercare Study on
the National Water Master Plan**

KIAMBU (1/1)

**Urban Water Supply
System Survey**

General

Name of Urban Centre : *Kiambu*

Organisation/Water Undertaker : *Kiambu Municipal Council*

District : *Kiambu* Location : *Kiambu Municipality*

Map (1/50,000) Ref. no : *148/2*

Co-ordinates X: *36° 50' E* Y: *01° 11' S*

Drainage Sub-basin : *38A*

Existing facilities

Source : *3 No. Boreholes + NCC Pipeline Offtake*

Type of Intake : *50mm Borehole & 100mm Pipeline Offtake*

Elevation : *1700 m*

Raw water system : *Pumping*

H: *m* Dia: *mm*

Treatment Process :

No treatment is done to water abstracted from the boreholes and the supply from Nairobi City Council is already treated water

Designed Capacity : *m³/d*

Treated water/Distribution system -

Area covered : *2 km²*

Distribution mains (80mm and above): *80 mm to 100 mm*

Total length : *9 km*

UFW (Estimated) : *m³/d*

Consumers - Total no : *1580*

Working Meters: *Data not available*

Metered : *1580*

Unmetered :

Water production : *m³/d*

Remark :

Service area population :

Population served :

Financial/Revenue

O & M costs :Kshs *1,880,229*

Revenue earned :Kshs *3,076,187*

Revenue collected :Kshs *2,306,930*

Rehabilitation required/costs

Estimated Cost Kshs

Total

Future development plan

Source :

Treatment : Capacity : *m³/d*

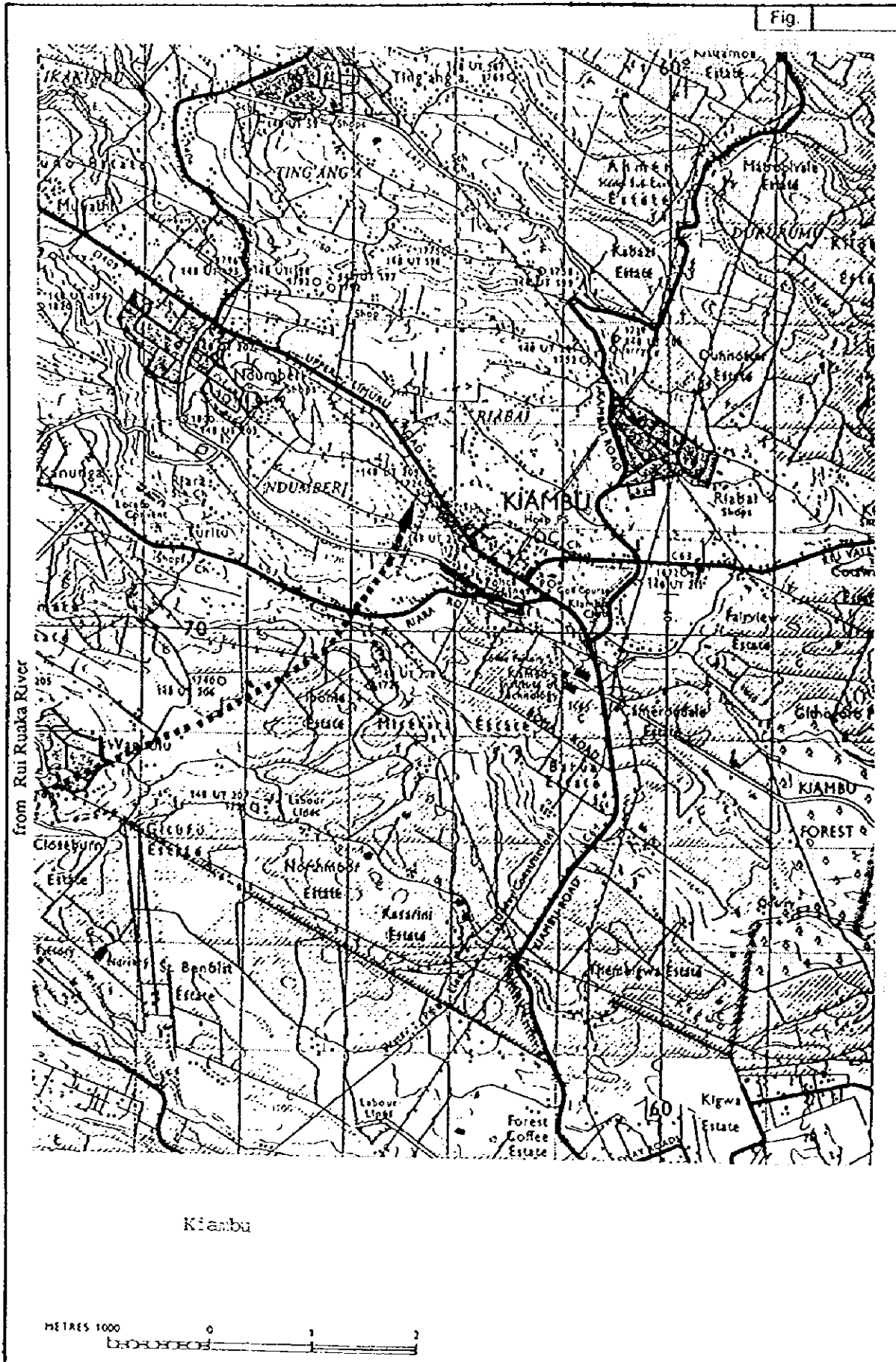
Design year :

Design population :

Remarks

The existing boreholes were drilled in the late 1950's and later supplemented by a connection from the Nairobi City Council's network.

The current supply is providing to be inadequate and sinking of more boreholes has been identified as a viable source for the future.



Aftercare Study on
the National Water Master Plan

KARURI (1/1)

Urban Water Supply
System Survey

General

Name of Urban Centre : Karuri

Organisation/Water Undertaker : Municipal Council

District : Kiambu Location: Karuri

Map (1/50,000) Ref. no : 148/2

Co-ordinates X 36° 48' Y S 1° 11'

Drainage Sub-basin : 3BA

Existing facilities:

Source: 2 No boreholes

Type of Intake : B/H Elevation : 1880m

Raw water system : Pumping

H : m Dia : 50 mm

Treatment Process : None

From the borehole the water is pumped to the nearby tank and boosted to a higher distribution tank 2km away. At present, no chlorination is done currently.

Designed Capacity: m^3/day

Treated water/Distribution system

Area covered: 8 km^2 Uaani/Tawa

Distribution mains (80mm and above): mm to mm

Total length : 2 km (smaller than 50mm)

UFW (Estimated) : m^3/d

Consumers - Total no : 396 (1996)

Working Meters: All connections are charged on flat rate

Metered :

Unmetered : 396

Water production : 520 m^3/d (1996)

Remark :

Service area population : 30,000

Population served : 15,000

Financial/Revenue: 1996

O & M costs : Ksh 843,680

Revenue earned : Kshs 1,990,00

Revenue collected : Kshs 732,680

Rehabilitation required/costs

i) 4 No additional borehole

ii) Distribution network

iii) Chlorination dosers.

Kshs Estimated

8,800,000

15,000,000

250,000

Total

24,050,000

Future development plan

Source : Riu Ruaka river

Treatment : Capacity : m^3/d

Design year :

Design population:

Remarks

Karuri urban supply is overloaded and a larger supply system is required. Karuri Water Supply is inadequate to cater satisfactorily for the present population. Augmentation and extension of the existing scheme is necessary. Ratinaing is done 6 days a week and

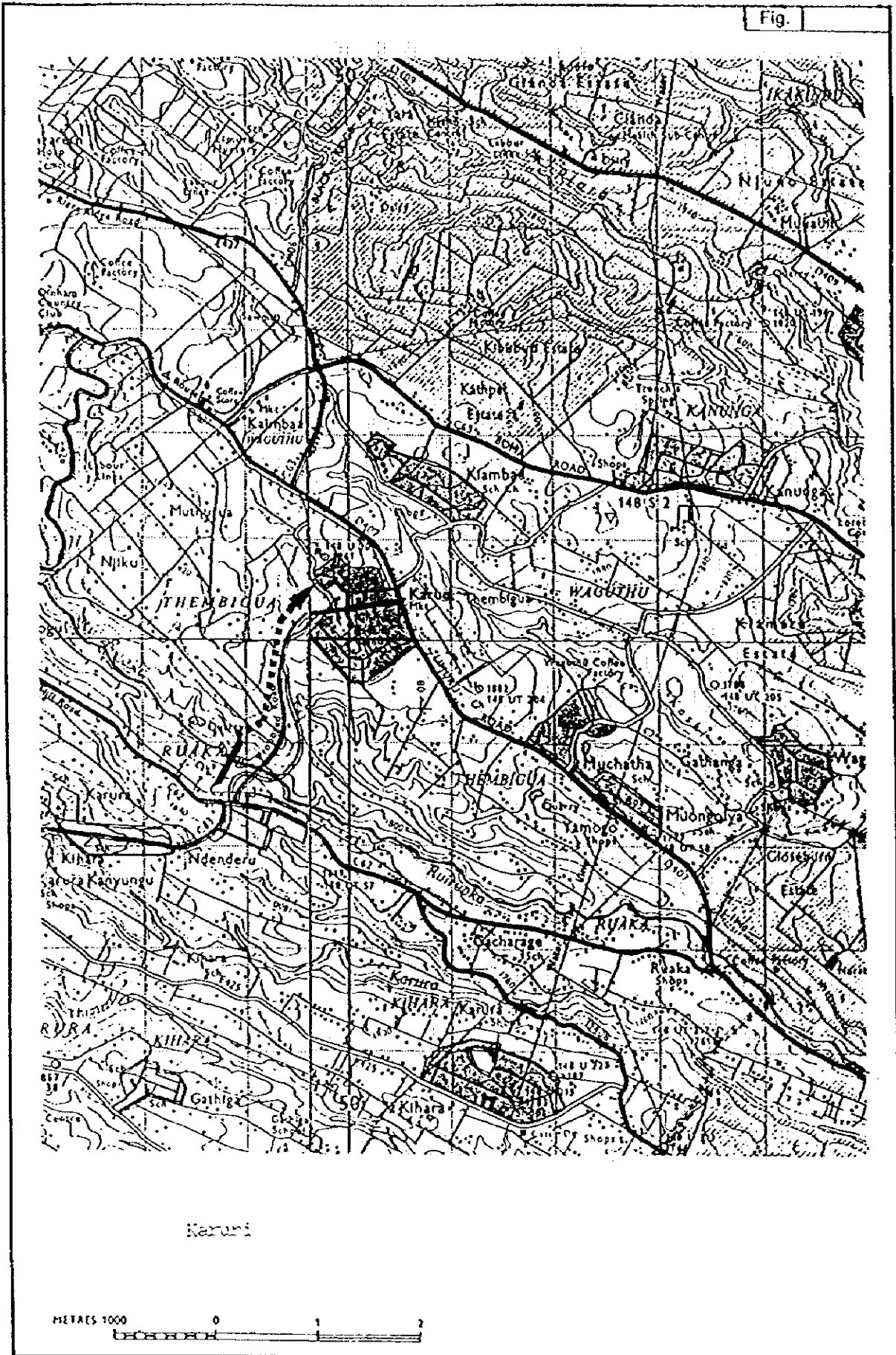


Fig.

**Aftercare Study on
the National Water Master Plan**

LIMURU (1/1)

**Urban Water Supply
System Survey**

General

Name of Urban Centre : *Limuru*

Organisation/Water Undertaker : *MOWR*

District : *Kambu* Location: *Limuru*

Map (1/50,000) Ref. no : *148/1*

Co-ordinates *X 36° 38' Y S 01° 06'*

Drainage Sub-basin : *3 BA*

Existing facilities:

Source: *4 No boreholes*

Type of Intake : Elevation : *2285m*

Raw water system : *Pumping*

H : *m* Dia : *mm*

Treatment Process : *None*

No analysis is carried out to access water gravity.

Designed Capacity: *m³/day*

Treated water/Distribution system

Area covered: *10 km² Uaani/Tawa*

Distribution mains (80mm and above): *150 mm to 80 mm*

Total length : *21.5km*

UFW (Estimated) : *m³/d*

Consumers - Total no : *650 - 1996*

Working Meters: *656*

Metered :

Unmetered : *656*

Water production : *660 m³/d - 1996*

Remark :

Service area population : *3,000*

Population served : *2,730*

Financial/Revenue: 1996

O & M costs : *Ksh 1,094,11*

Revenue earned : *Kshs 3,691,755 billed*

Revenue collected : *Kshs 2,768,030*

Rehabilitation required/costs

Kshs Estimated

i) *3 No borehole*

6,600,000

ii) *Chlorination*

250,000

iii) *Distribution*

10,000,000

Total

16,850,00

Future development plan

Source : *Borhole and Chania river*

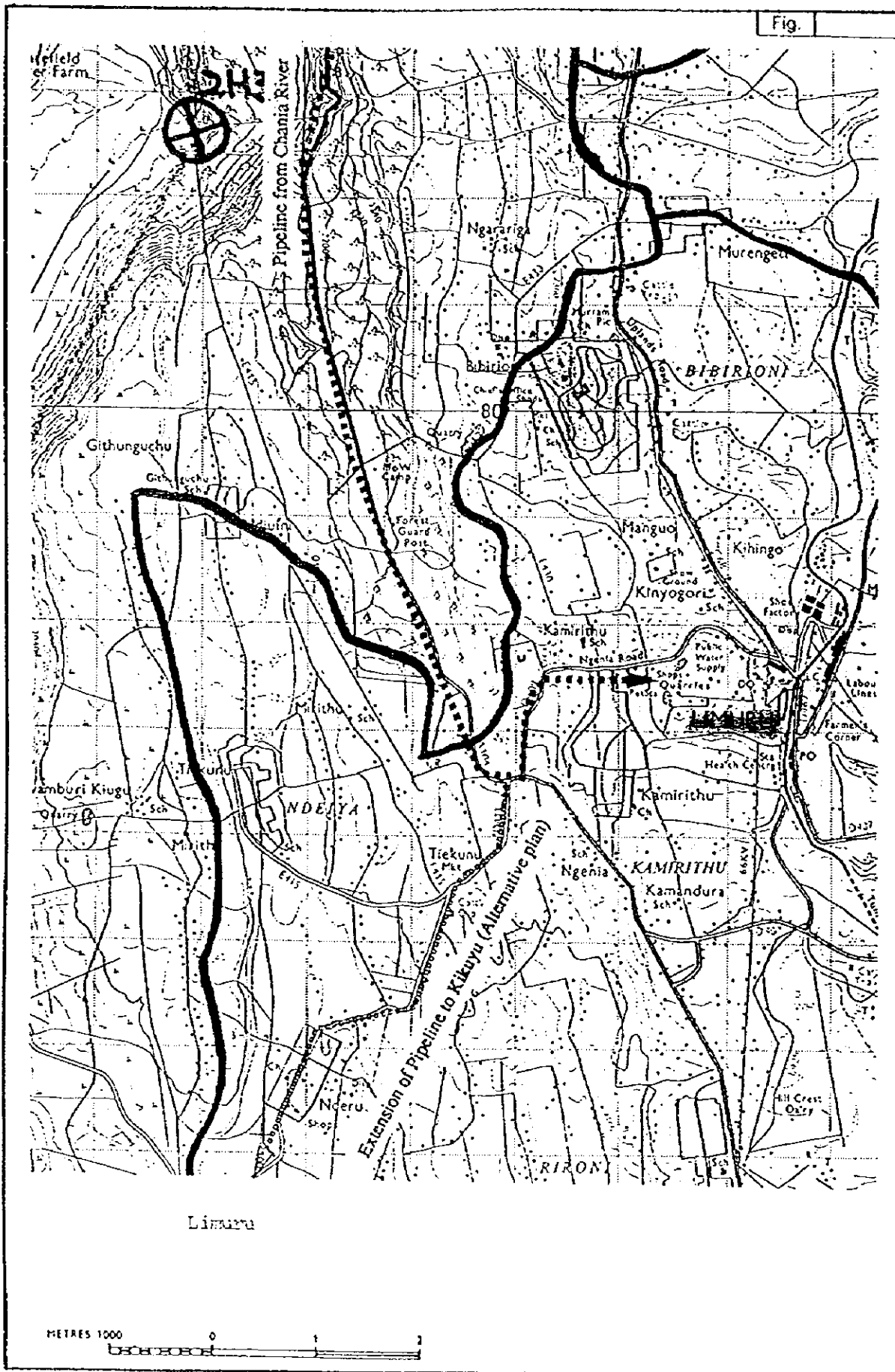
Treatment : Capacity : *m³/d*

Design year :

Design population:

Remarks

Large number of residents in the area have boreholes supply of their own.



**Aftercare Study on
the National Water Master Plan**

GITHUNGURI (1/1)

**Urban Water Supply
System Survey**

General

Name of Urban Centre : *Githunguri*

Organisation/Water Undertaker : *MOWR*

District : *Kiambu* Location: *Githunguri*

Map (1/50,000) Ref. no : *148/2*

Co-ordinates *X 36° 46' Y S 01° 03'*

Drainage Sub-basin : *3BC*

Existing facilities:

Source: *Borehole*

Type of Intake :

Elevation : *1660m*

Raw water system : *Pumping*

H : *m*

Dia : *80mm*

Treatment Process : *None*

Although bacteriology test are done twice a yer show contamination but no chloration is carried out.

Designed Capacity:

Treated water/Distribution system -

Area covered: *1.0 km² of Isiolo urban*

Distribution mains (80mm and above):

Total length : *km (all below 80mm dia).*

UFW (Estimated) : *m³/d*

Consumers - Total no : *1439-1996*

Metered : *439*

Unmetered :

Working Meters: *439*

Water production : *300 m³/d*

Remark :

Service area population :

Population served : *8000*

Financial/Revenue 1996

O & M costs : *Ksh 420,775*

Revenue earned : *Kshs 960,000 billed*

Revenue collected : *Kshs 480,000*

Rehabilitation required/costs

i) *Storage and chlorination*

ii) *2 No boreholes*

iii) *Improve and extend distribution system*

Kshs Estimated

44,000,000

2,500,000

4,000,00

Total

10,900,000

Future development plan

Source : *Borehole*

Treatment : *Chlorination* Capacity : *1,000 m³/d*

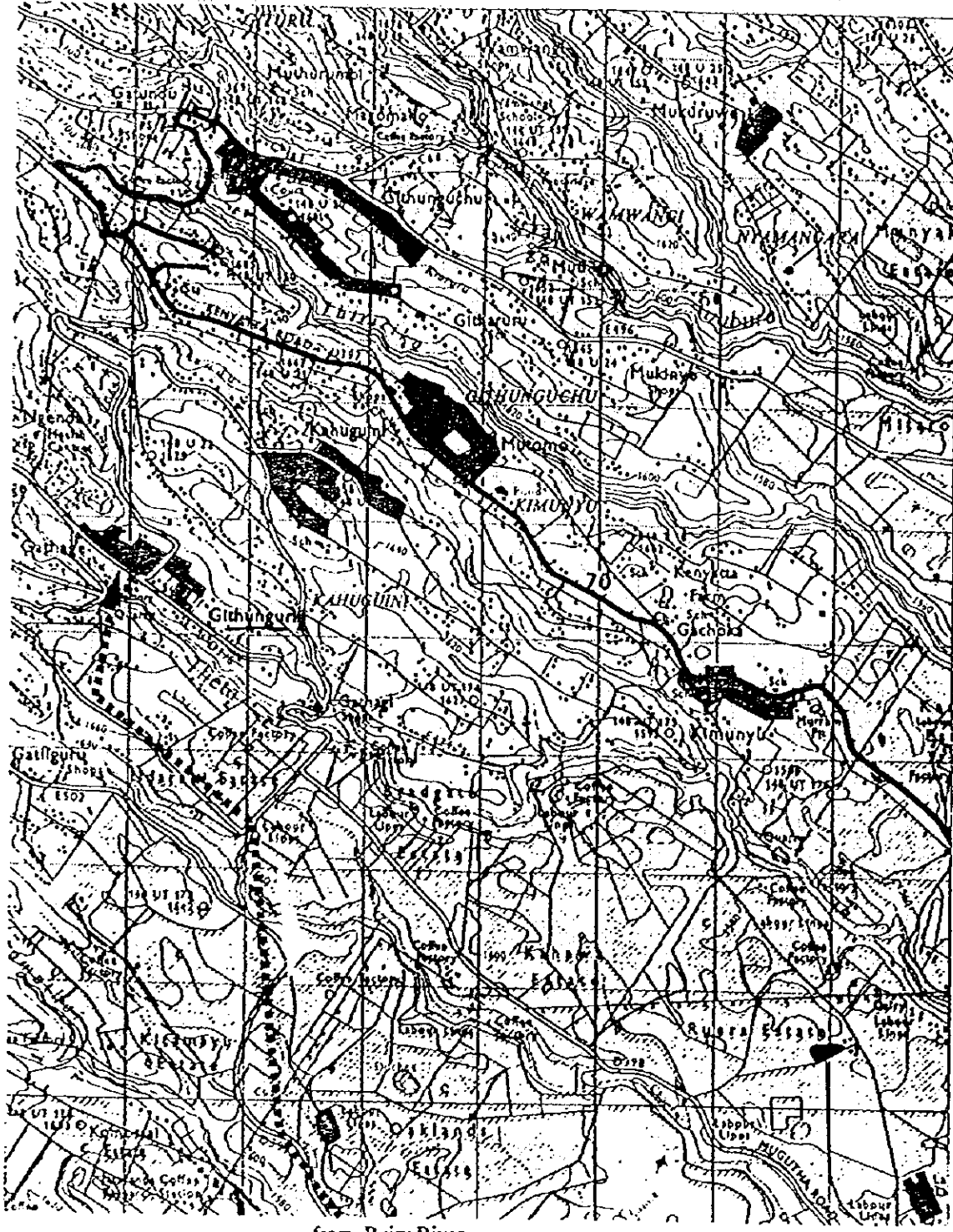
Design year :

Design population:

Remarks

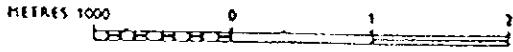
Githunguri water supply is past its prime age practically the whole system needs to be improved and extended to larger area.

Fig.



from Ruiru River

Githunguri



**Aftercare Study on
the National Water Master Plan**

KIKUYU (1/1)

**Urban Water Supply
System Survey**

General

Name of Urban Centre : *Kikuyu*

Organisation/Water Undertaker : *MOWR*

District : *Kiambu* Location: *Kikuyu*

Map (1/50,000) Ref. no : *148/1*

Co-ordinates *X 36° 39' Y S 01° 14'*

Drainage Sub-basin : *3BA*

Existing facilities:

Source : *3No boreholes near Ondiri swamp.*

Type of Intake : *B/H* Elevation : *2260m*

Raw water system : *Pumping*

H : *41.99 m* Dia : *2No. 150mm also 100mm*

Treatment Process : *None.*

Chlorine dosing equipment is broken down, no dosing is done currently. There is also boosting from town tank to Hon. Gichuru's compound tank, booster rising main is also serving as distribution main

Designed Capacity :

Treated water/Distribution system -

Area covered: *8 km²*

Distribution mains (80mm and above): *150mm and 80 mm*

Total length : *3.2km*

UFW (Estimated) : *m³/d*

Consumers - Total no : *1,181 - 1996*

Metered : *1181*

Unmetered :

Working Meters: *400 of 1181 consumers are disconnected for lack of supply of water*

Water production : *1278 m³/d 1996*

Remark : *1278m³/day for 2No pumps for more than 20 hours pumping*

Service area population : *23,892*

Population served : *9,586*

Financial/Revenue

O & M costs : *Kshs 2,644,977 - 1996*

Revenue earned : *Kshs 9,812,764*

Revenue collected : *Kshs 6,011,540*

Rehabilitation required/costs

- i) *Additional boreholes 10 No and pipe work*
- ii) *Repair to existing tanks*
- iii) *Chlorination and laboratory test equipment*
- iv) *Augmentation and repair of existing distribution system*

Kshs Estimated

22,000,000

200,000

300,000

10,000,000

Total

32,500,000

Future development plan

Source : *Ondiri Swamp/Kikuyu dam*

Treatment : *Fuf* Capacity : *4,700 m³/d*

Design year : *2018*

Design population :

Remarks

Of the 3No boreholes, one is not working. The area has high demand. The existing supply system is old and not extensive enough to serve the population. Intake from Kikuyu dam would be more appropriate instead of large number of pumps.

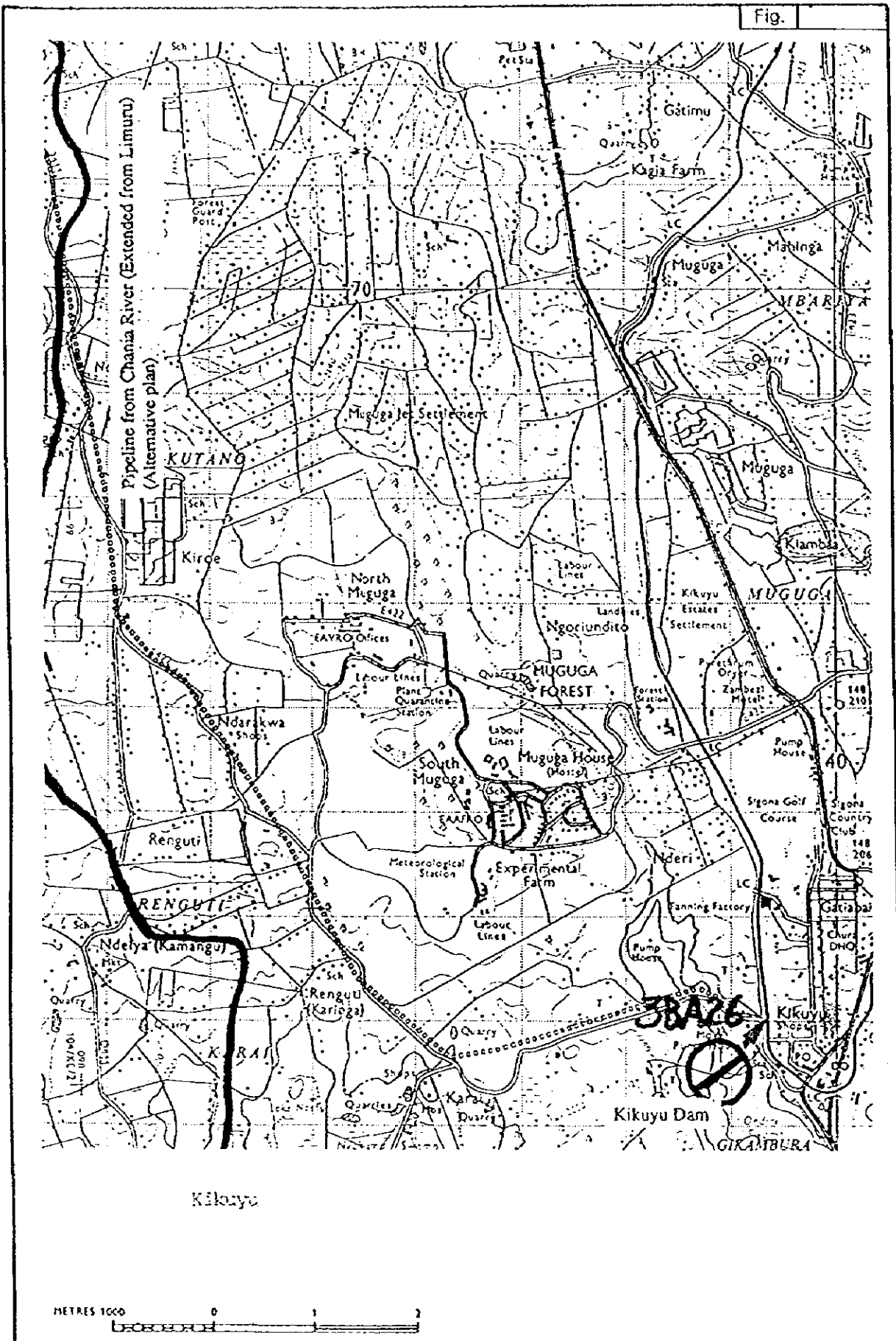


Fig.

Aftercare Study on
the National Water Master Plan

GATUNDU (1/1)

Urban Water Supply
System Survey

General

Name of Urban Centre : *Gatundu*

Organisation/Water Undertaker : *Nairobi City Council*

District : *Thika* Location: *Gatundu*

Map (1/50,000) Ref. no : *148/2*

Co-ordinates *X 36° 54' Y S 01° 00'*

Drainage Sub-basin : *38D*

Existing facilities:

Source : *Offtake from Ngethu water supply*

Type of off take : *1,700/150 ±*

Elevation : *1740m AOD*

Raw water system : *Gravity*

1,000/150

H : *m*

Dia : *700/1,000mm off Ngethu water supply*

Treatment Process : *Full*

Ngethu water supply which is 3 sources combined converging at Ngethu is treated water supply, serving mainly Nairobi and several other urban centres like Gatundu.

Designed Capacity :

Treated water/Distribution system -

Area covered: *10 km²*

Distribution mains (80mm and above): *150mm and 80 mm*

Total length : *4.0km*

UFW (Estimated) : *m³/d*

Consumers - Total no :

Metered :

Unmetered :

Working Meters: *Some of meters are not functional*

Water production : *411 m³/d 1997*

Service area population :

Population served : *10,719*

Remark : *The 4 No boreholes service meters one of them is not working One earthing borehole is non functional*

Financial/Revenue

O & M costs : *Kshs 911,000*

Revenue earned : *Kshs 5,800,000*

Revenue collected : *Kshs 5,500,000*

Rehabilitation required/costs

i) *Distribution system*

ii) *Storage tank repairs*

Kshs Estimated

3,000,000

100,000

Total

3,100,000

Future development plan

Source :

Treatment : Capacity : *m³/d*

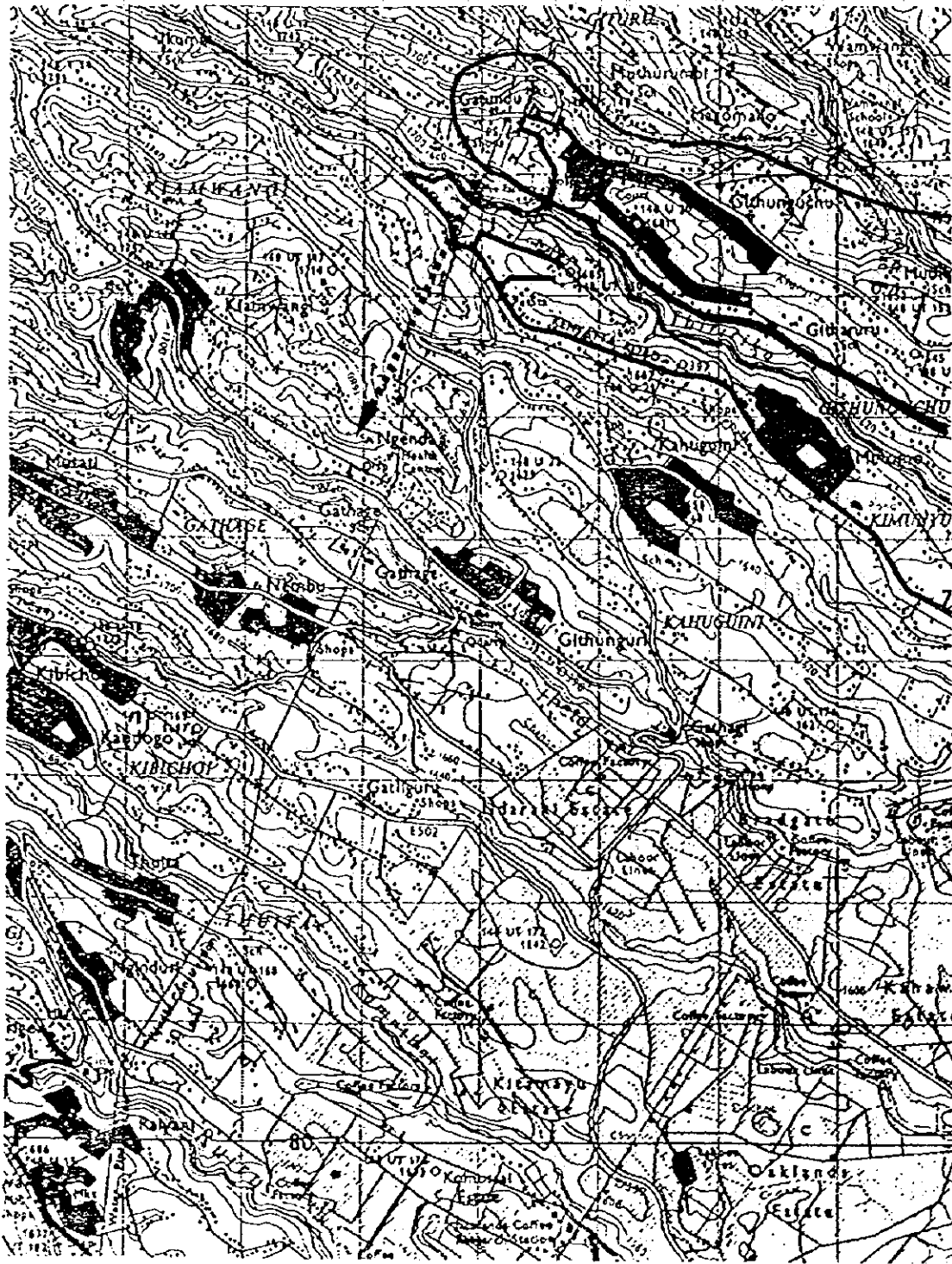
Design year :

Design population :

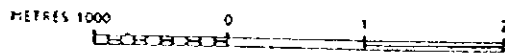
Remarks

No future plans are made. Boreholes are proposed which may augment the supply at times.

Fig.



Gatundu+Ngenda



**Aftercare Study on
the National Water Master Plan**

RUIRU (1/1)

**Urban Water Supply
System Survey**

General

Name of Urban Centre : Ruiru

Organisation/Water Undertaker : MOWR

District : Thika Location: Ruiru

Map (1/50,000) Ref. no : 148/2

Co-ordinates X 36° 58' Y S 01° 09'

Drainage Sub-basin : 3BC

Existing facilities:

Source: Ruiru river

Type of Intake : Elevation : 1530m

Raw water system : Pumping

H : m Dia : 250,000 mm 150mm

Treatment Process : Full composit plant 2 No

3 No recieving basin - 3 No mixing chambers - 2 No sedimentation and filter combined composit plant -
1 No clear water tank - 2 No pumps - Eleveted plastic tank. All tests are carried out on site.

Designed Capacity: m^3/day

Treated water/Distribution system

Area covered: $2 km^2$

Distribution mains (80mm and above): 100 mm to mm

Total length : 0.5 km

UFW (Estimated) : m^3/d

Consumers - Total no : 650 - 1996

Metered : 650

Unmetered :

Working Meters:

Remark : Population figures indicated are not

Water production : m^3/d

Service area population : 100,000 - 1996

Population served : 60,000

Financial/Revenue: 1996

O & M costs : Ksh 2,840,800

Revenue earned : Kshs 2,538,000

Revenue collected : Kshs 1,427,000

Rehabilitation required/costs

i) T' works improvements

Kshs Estimated
2,000,000

ii) Distribution system and meters

15,000,000

iii) New pumps

1,000,000

Total

18,000,000

Future development plan

Source : Ruiru river

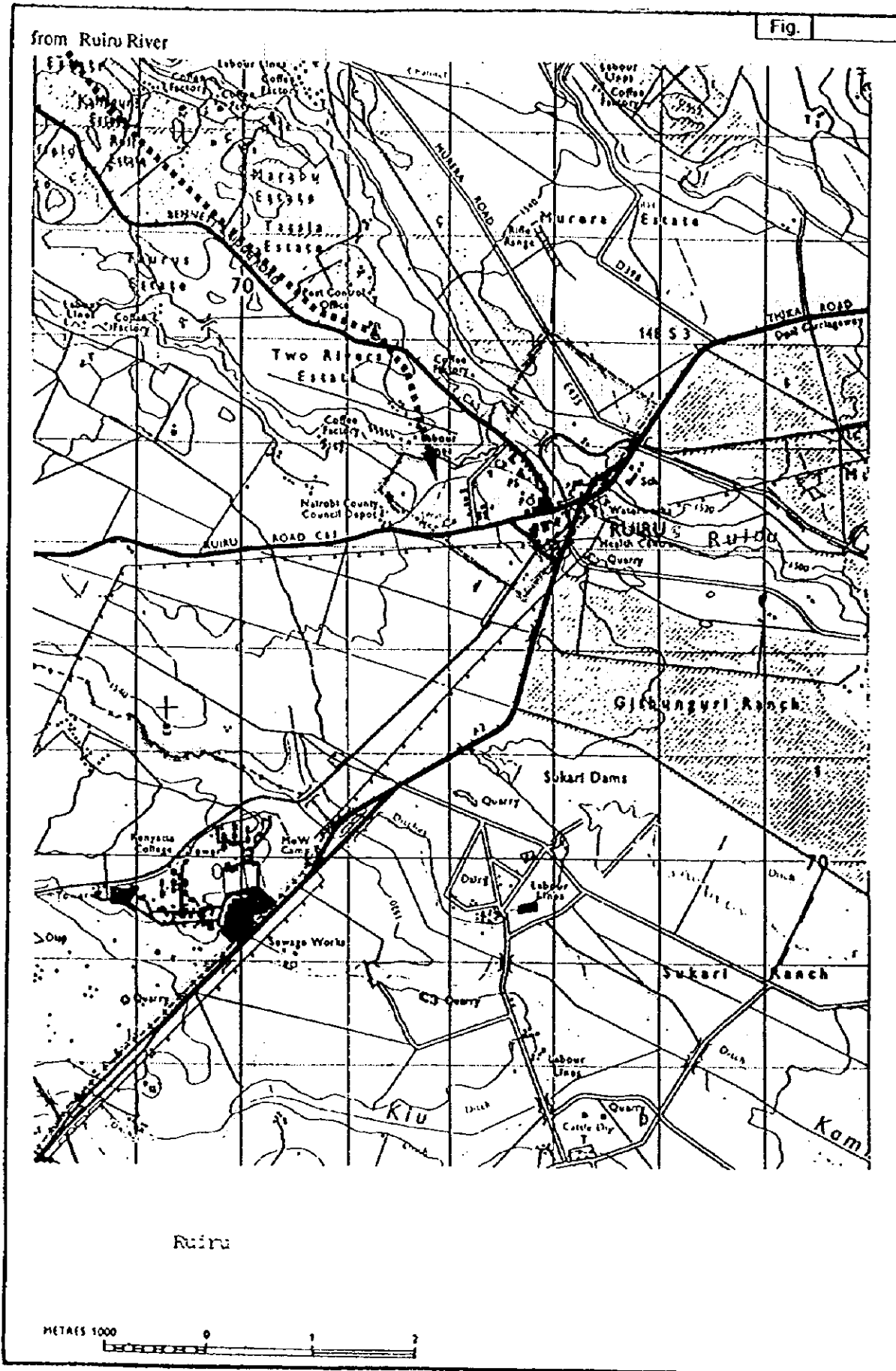
Treatment : Capacity : m^3/d

Design year :

Design population:

Remarks

Ruiru town is also one of the fast growing industrial town. It needs a complete new water supply system



**Aftercare Study on
the National Water Plan**

THIKA (1/1)

**Urban Water Supply
System Survey**

General

Name of Urban Centre : *Thika*

Organisation/Water Undertaker : *Thika Municipal Council*

District : *Thika* Location : *Thika Municipality*

Map (1/50,000) Ref. no : *149/1*

Co-ordinates X : *37° 05' E* Y : *01° 04' S*

Drainage Sub-basin : *3CB*

Existing facilities

Source : *Thika and Chania Rivers*

Type of Intake : *Weir*

Elevation : *m*

Raw water system : *Pumping*

H : *m* Dia : *250 and 350 mm*

(2 No. at Thika and 3 No. at Chania)

Treatment Process :

Full Conventional Treatment - Coagulation, Sedimentation, Filtration, Disinfection/Chlorination

Dosage:- Chlorine = 11 kg/day, Alum = 480 kg/day and Soda Ash = 250 kg/day

Designed Capacity : *36,660 m³/d*

Treated water/Distribution system -

Area covered : *80 km² - Municipality Area - 93 km²*

Distribution mains (80mm and above): *150 mm to 800 mm*

Total length : *82 km*

UFW (Estimated) : *m³/d*

Consumers - Total no :

Working Meters:

Metered :

Unmetered :

Water production : *24,000 m³/d*

Remark :

Service area population : *149,448*

Population served : *120,000*

Financial/Revenue - *1996/97*

O & M costs :Kshs *26,918,740*

Revenue earned :Kshs *50,737,754*

Revenue collected :Kshs *38,751,351*

Rehabilitation required/costs - *N/A*

Estimated Cost

Kshs

i)

ii)

iii)

iv)

v)

Total

Future development plan - *N/A*

Source :

Treatment : Capacity : *m³/d*

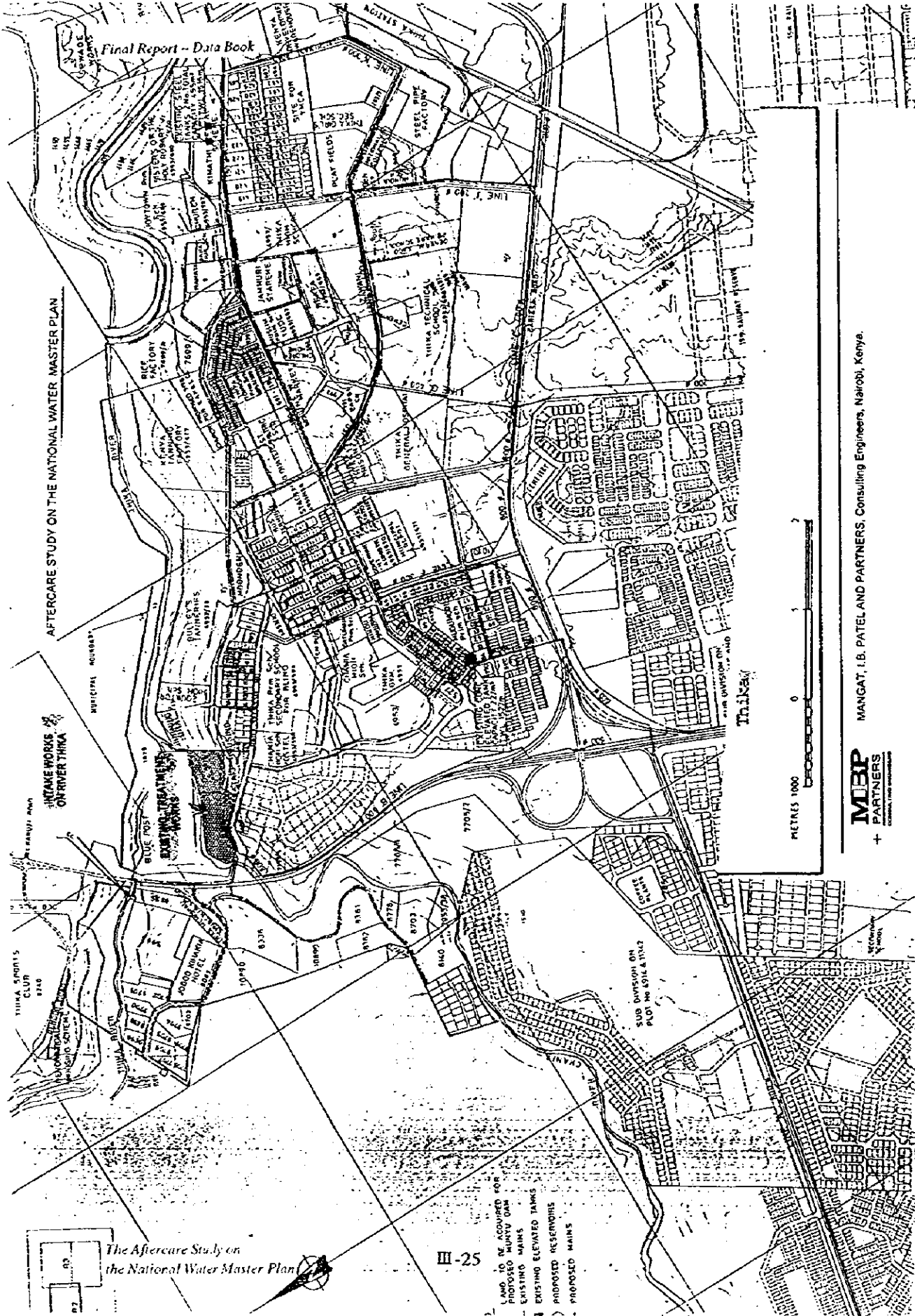
Design year :

Design population :

Remarks

The main water sources for Thika Water Supply are Chania and Thika Rivers. The Municipality has adequate water supply system to cater for the anticipated demand until year 2005, as a result of the recent Thika Water Supply Augmentation Phase II Project whose implementation was completed in late 1991.

AFTERCARE STUDY ON THE NATIONAL WATER MASTER PLAN



The Aftercare Study on the National Water Master Plan

- LAND TO BE ACQUIRED FOR PROPOSED MOUNTY DAM
- EXISTING MAINS
- EXISTING ELEVATED TANKS
- PROPOSED RESERVOIRS
- PROPOSED MAINS

0 1 2
KILOMETRES

M&P
+ PARTNERS

MANGAT, I.B. PATEL AND PARTNERS, Consulting Engineers, Nairobi, Kenya.

Aftercare Study on
the National Water Master Plan

WANGURU (1/1)

Urban Water Supply
System Survey

General

Name of Urban Centre : *Wanguru*

Organisation/Water Undertaker : *MOWR*

District : *Kirinyaga* Location:

Map (1/50,000) Ref. no : *135/2*

Co-ordinates *X 37° 23' Y S 00° 40'*

Drainage Sub-basin :

Existing facilities:

Source : *Borehole - Pipe connection-National irrigation* Type of Intake : *Canal* Elevation :

Raw water system : *Pumping* H: *m* Dia : *50mm*

Treatment Process : *Treatment.*

- *2 No receiving basins, dozed with Alum solvent and soda ash.*

- *2 No sedimentation tank which also act partially as filter.*

- *1 No clear water tank. Tests on the site - jar, P.H residual chlorine, turbidity, alkalinity, volumetric, calcium stability, since 1997 September*

Designed Capacity : *Current production 2400m³/day*

Treated water/Distribution system -

Area covered: *4 km²*

Distribution mains (80mm and above): *100mm and 80 mm*

Total length : *6km*

UFW (Estimated) : *m³/d*

Consumers - Total no : *126*

Working Meters:

Metered :

Unmetered :

Water production : *2,400 m³/d*

Remark :

Service area population :

Population served :

Financial/Revenue

O & M costs : *Kshs 685,000 chemical and electricity*

Revenue earned : *Kshs The production was stopped from year 1992 - Sept 1997,*

Revenue collected : *Kshs revenue records not compiled*

Rehabilitation required/costs

Kshs Estimated

Rehabilitation works are in process

Future development plan

Source : *Tiba river.*

Treatment : *Full* Capacity : *m³/d*

Design year :

Design population :

Remarks

The water works have been in-operational due to major rehabilitation works of pumps for 5 years. Currently gravel rehabilitation is being carried out.

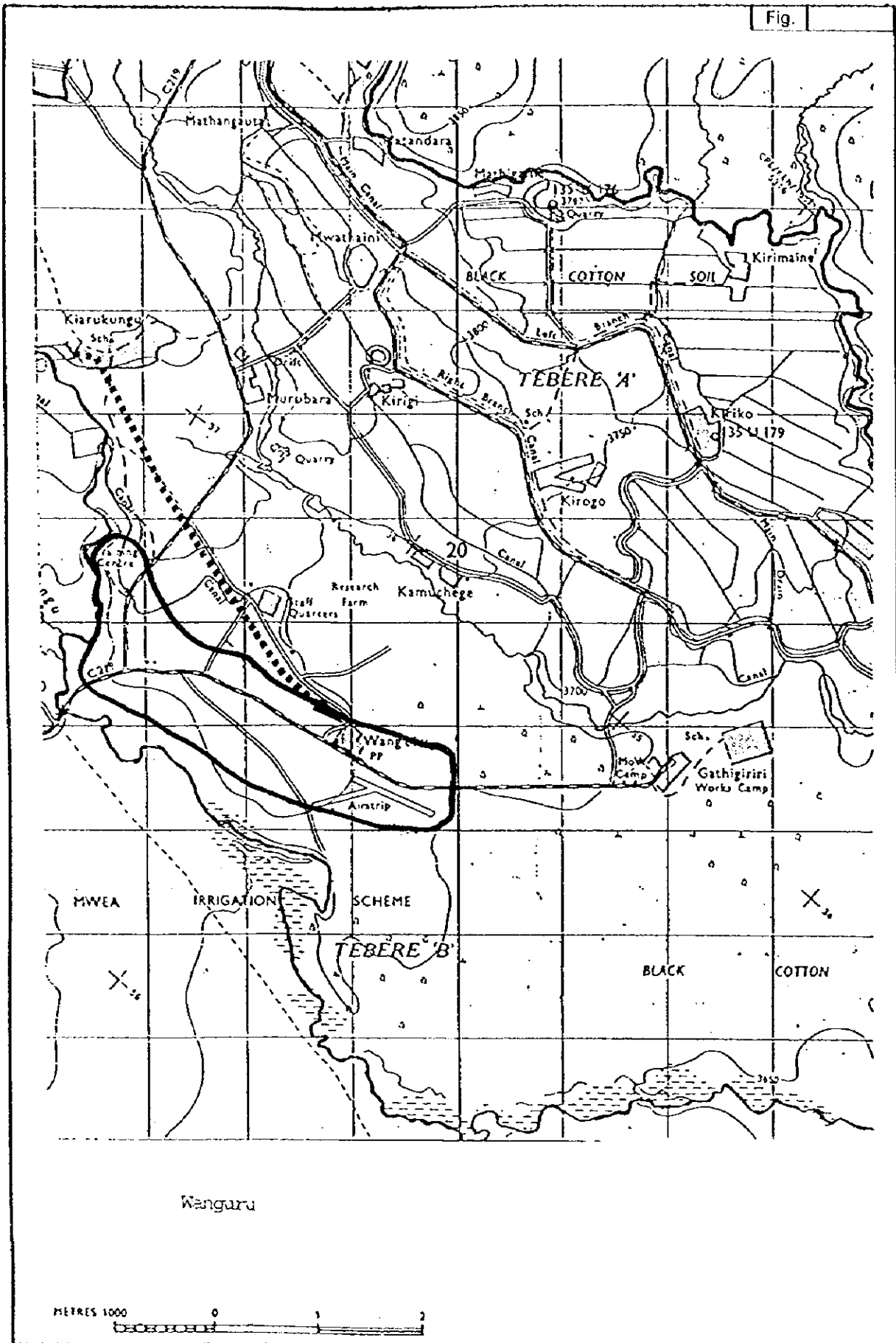


Fig.

Aftercare Study on
the National Water Master Plan

SAGANA (1/1)

Urban Water Supply
System Survey

General

Name of Urban Centre : Sagana

Organisation/Water Undertaker : MOWR

District : Kirinyaga Location: Kiira

Map (1/50,000) Ref. no : 135/1

Co-ordinates X:37° 13' Y S00° 39'

Drainage Sub-basin : 4BC

Existing facilities:

Source : River Ragati

Type of Intake : Intake chamber

Elevation :

Raw water system: Gravity

H: m Dia: 225mm

Treatment Process :

Designed Capacity : Current production 610m³/day

Treated water/Distribution system -

Area covered:

Distribution mains (80mm and above): 225 mm to 80mm

Total length :16.1 km

UFW (Estimated) : m³/d

Consumers - Total no : 775 (1995)

Working Meters: Not informed.

Metered : 770

Unmetered : 5

Water production : 610 m³/d (1996)

Remark :

Service area population :18,000

Population served : 4,000

Financial/Revenue 1997

O & M costs : Kshs 334,515 power and chemicals only

Revenue earned: Kshs 3,079,042 billed

Revenue collected : Kshs 1,650,840

Rehabilitation required/costs

Kshs Estimated

i) Distribution system

20,000,000

ii) Laboratory equipment

200,000

iii) Augmentation of existing treatment works

10,000,000

Total

30,200,000

Future development plan

Source : None

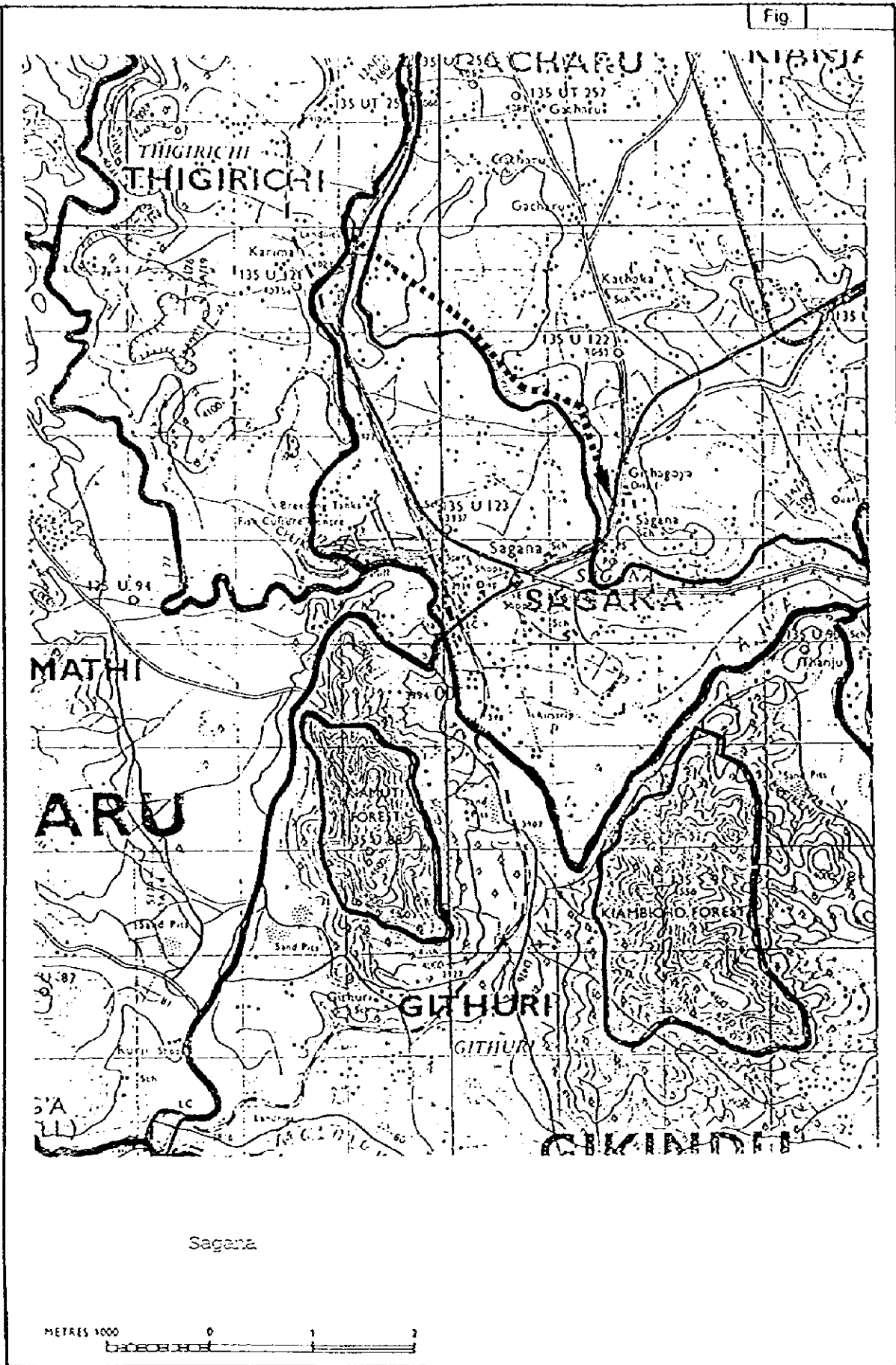
Treatment : Capacity : m³/d

Design year :

Design population :

Remarks

There is enough water and the current system is in initial phase. Augmentation of treatment works and storage tanks is required to supply larger section of population. FRO dosers required to regulate dosing. The distribution can be extended to cover the service area as design capacity of the Intake is considered to be adequate.



Aftercare Study on
the National Water Master Plan

KERUGOYA (1/1)

Urban Water Supply
System Survey

General

Name of Urban Centre : Kerugoya

Organisation/Water Undertaker : MOWR

District : Kirinyaga Location:

Map (1/50,000) Ref. no : 121/4

Co-ordinates X : 37° 17' Y 500° 29'

Drainage Sub-basin : 4DA

Existing facilities:

Source : Rutui River

Type of Intake : Furrow Elevation : 1525m

Raw water system: Gravity

H: m Dia : 2x150 mm

Treatment Process : 2No mixing tanks also act as sedimentation tanks, 1No filter 1No clear water tank+ chlorination.
Tests are done at provincial laboratory. dosage rate :- Chlorine @ 12kg/d, Alum @ 34kg/d and Soda Ash @ 17kg/d. Dosers are in state of despair and require replacement.

Designed Capacity :

Treated water/Distribution system -

Area covered: 6 km²

Distribution mains (80mm and above): 100mm to 80mm

Total length : 13 km

UFW (Estimated) : m³/d

Consumers - Total no : 1717 (1996)

Working Meters:

Metered : 1717

Unmetered : None

Water production : 1,200 m³/d

Remark :

Service area population : 37,000

Population served : 8,215

Financial/Revenue 1997

O & M costs : Kshs 1,406,400

Revenue earned: Kshs 5,649,000

Revenue collected : Kshs 4,074,000

Rehabilitation required/costs: (As part of future development)

Kshs Estimated

i) Full treatment works.

60,000,000

ii) Distribution system (Rehabilitation and augmentation).

100,000,000

Total 160,000,000

Future development plan

Source : Rutui

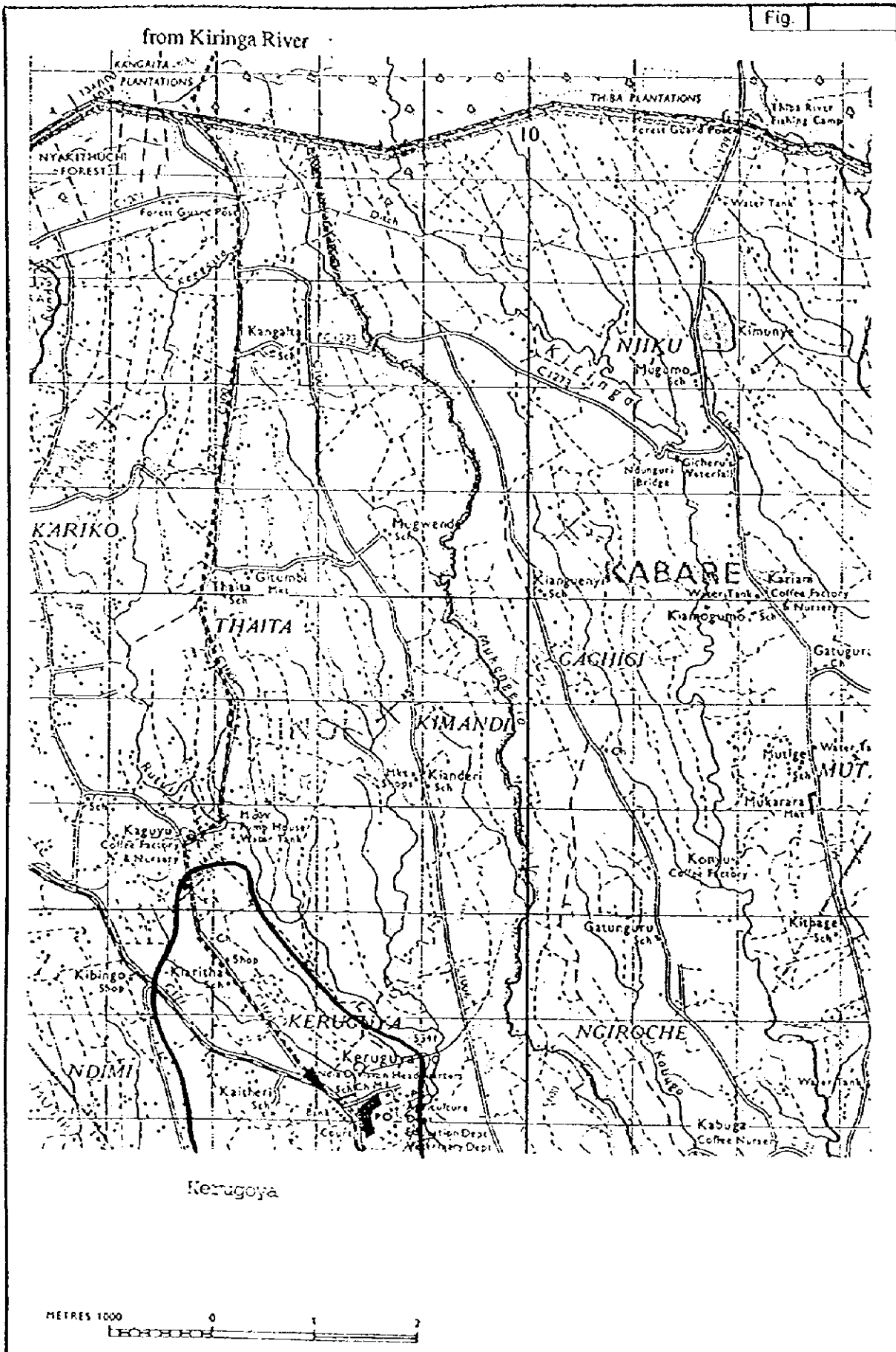
Treatment : Full Capacity: 3,000 m³/d

Design year :

Design population : 70,000

Remarks

No plans for development. But due to increase in population of Kerugoya and surrounding area, distribution system needs improving. The treatment works is overworked and chemical due to shorter than designed times dosing is inefficient. The demand has long outstripped supply, and also needs to extend to cover the whole service area.



**Aftercare Study on
the National Water Master Plan**

KUTUS (1/1)

**Urban Water Supply
System Survey**

General

Name of Urban Centre : *Kutus*

Organisation/Water Undertaker : *NWCPC*

District : *Kirinyaga* Location: *Kutus*

Map (1/50,000) Ref. no : *135/2*

Co-ordinates X: *37° 20' Y: S 00° 33'*

Drainage Sub-basin : *4DA*

Existing facilities:

Source : *Connected to Ndia Watu W/S*

Type of Intake : *Pipe connex* Elevation : *1,300m*

Raw water system : *Tapped directly to treated water.*

H: *m* Dia: *mm*

Treatment Process : *Kutus town has no supply of its own. It is connected to Ndia water supply where the treated water is then transmitted through a 150mm upto Kutus town. Ndia W/S has full conventional treatment works*

Designed Capacity :

Treated water/Distribution system -

Area covered: *4 km²*

Distribution mains (80mm and above): *150mm to 100mm*

Total length : *1.06km*

UFW (Estimated) : *m³/d*

Consumers - Total no : *250(1996)*

Working Meters: *Abt of meters have been damaged and stolen*

Metered : *250*

Unmetered : *None*

Water production : *246 m³/d (1996)*

Remark : *Water produced is sufficient to supply to larger population than one being served at present. Thus distribution networks needs to be extended and optimised.*

Service area population : *9,550*

Population served : *1,234*

Financial/Revenue 1997

O & M costs : *Kshs*

Revenue earned : *Kshs*

Revenue collected : *Kshs 360,000*

Rehabilitation required/costs

i) *Distribution system extension*

Kshs Estimated

10,000,000

Total

10,000,000

Future development plan

Source : *Rutui River*

Treatment : *Full* Capacity : *m³/d*

Design year :

Design population :

Remarks

No specific plans are set out at present but possible good source is Rutui river where full treatment works may be necessary. This entails pumping to a high level tank which can command greater service area.

Aftercare Study on
the National Water Master Plan

KANDARA (1/1)

Urban Water Supply
System Survey

General

Name of Urban Centre : *Kandara (see note below)*

Organisation/Water Undertaker : *NWCPC*

District : *Kirinyaga* Location: *Kandara*

Map (1/50,000) Ref. no : *135/3*

Co-ordinates X : *37° 00'* Y : *S 00° 53'*

Drainage Sub-basin : *4CC*

Existing facilities:

Source : *Pipe connection to Kandara rural W/S*

Type of Intake : *Thika river but Kandara is cor* Elevation :

Raw water system :

H : *2295m AOD* Dia : *2X300 mm*

Treatment Process : *None*

Designed Capacity :

Treated water/Distribution system -

Area covered: *1 km² but 4/6 km² for Kandara rural*

Distribution mains (80mm and above): *300mm to 80mm*

Total length : *2.5km for Kandara water supply*

UFW (Estimated) : *m³/d*

Consumers - Total no :

Working Meters:

Metered :

Unmetered :

Water production : *15,083 m³/d of old system*

Remark :

- *15,083 m³/day year 1987- Kandara rural.*
- *30,912 m³/day year 2010 - Kandara rural.*
- *35,844 m³/day year 2020 - Kandara rural.*

Service area population : *225,274-year 1997*

Population served :

Financial/Revenue 1996

O & M costs : *Kshs 2,002,800 salary only*

Revenue earned : *Kshs 2,326,952 billed*

Revenue collected : *Kshs 816,216 +deposits*

Rehabilitation required/costs (for Kandara rural water supply)

Kshs Estimated

i) *Phase i rehabilitation of existing distribution*

320,879,596

ii) *Phase ii new intake, Tworks and extended distribution*

1,049,247,009

iii) *Phase iii improve existing intake distribution system*

436,935,521

Total

Future development plan - Year 2010,2020

Source : *Thika river*

Treatment : *Full* Capacity : *3,091. m³/d*

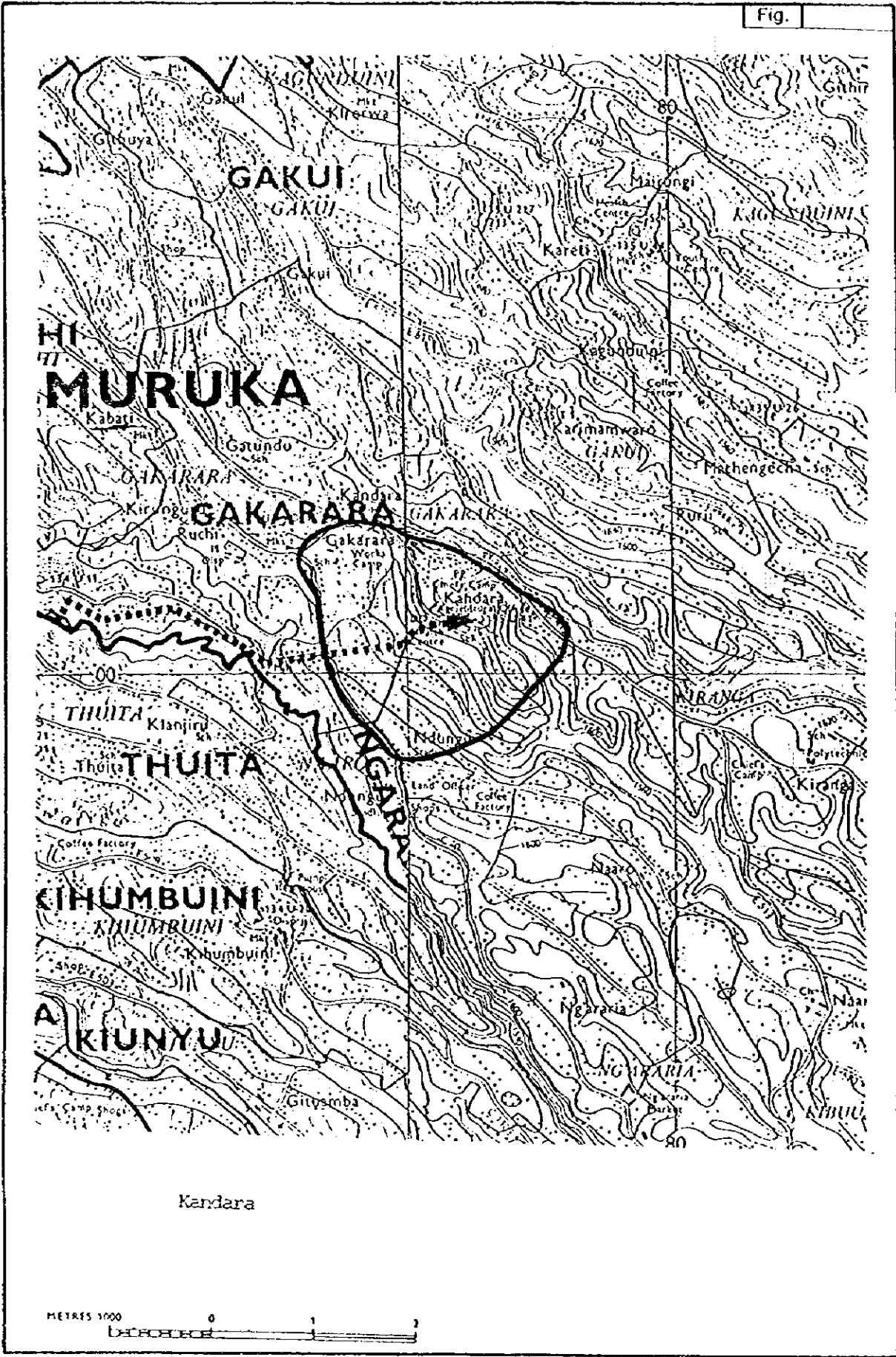
Design year : *2010 and 2020*

Design population : *46-0,678 and 625,546*

Remarks

Kandara rural water supply is a large scheme supplying water to Kandara urban - most of the above information is for Kandara rural

Fig.



Kandara

