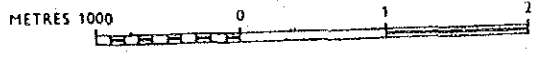


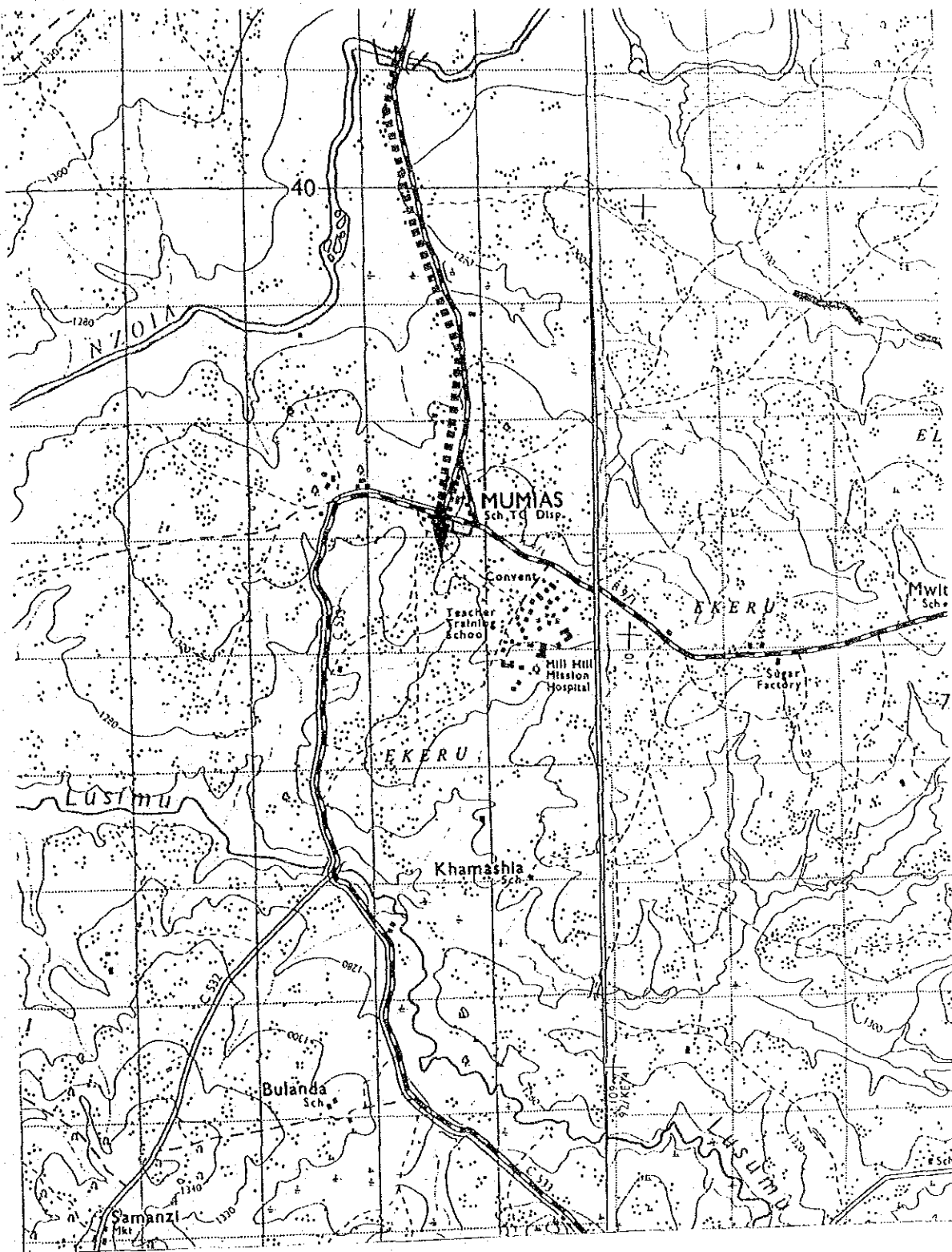
U-133 Butere

U 939.2 101/4 1EG



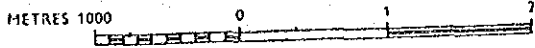
THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2	National Water Master Plan							
3	URBAN WATER SUPPLY							
4	Code No. 930 A	U-134				Rate		Jul-92 25.2
5	-----							
6	Name of Urban:	Mumias	LGL Notice No:					
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:	Kakamega	Locataion : 93A.4		Central Wanga			
10	Map (1/50,000) :	101/2	Coordinates X:		34°30'	Y:	N 00°21'	
11	Sub-basin Code:	1DD	Elevation (El. m):					
12	-----							
13	Existing Facilities							
14	Raw Water Source:	Lusumu River	River No					
15	Raw Water System:	H (m)=	L (m)=					
16	Treatment:	Capacity (m3/d)		881				
17	Distribution System:							
18	-----							
19				1990	2000	2010		
20	-----							
21	Projected Population	(no)	25,800	51,800	75,900			
22	Residential Demand	(m3/d)	3,196	6,559	9,820			
23	Non-residential Demand	(m3/d)	535	1,073	1,571			
24	Livestock Demand	(m3/d)	41	80	120			
25	Industrial Demand	(m3/d)	114	211	303			
26	Total Demand	(m3/d)	3,886	7,923	11,814			
27	Area Served (estimated net)	(ha)	193	387	567			
28	-----							
29	Future Development Plan							
30	Raw Water Source:	Nzoia River	River No:					
31	Raw Water System:	H (m)=	80 L (m)=		5,100			
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost		1990	2000	2010	Total		
36	Incremental Capacity	(m3/d)	3,005.0	4,037.2	3,890.4	10,932.6		
37	Source Works	(US\$'000)	24.2	30.2	29.3	83.6		
38	Pump Cost	(US\$'000)	6.6	8.5	8.5	23.6		
39	Raw Water Main	(US\$'000)	306.3	332.5	328.9	967.7		
40	Treatment	(US\$'000)	749.0	854.8	841.3	2,445.1		
41	Storage	(US\$'000)	124.0	173.9	167.5	465.4		
42	Distribution	(US\$'000)	1,541.4	1,553.3	1,439.8	4,534.5		
43	Miscellaneous (20%)	(US\$'000)	550.3	590.6	563.1	1,704.0		
44	Admi. & Engineering	(US\$'000)	330.2	354.4	337.8	1,022.4		
45	Contingency	(US\$'000)	726.4	779.6	743.3	2,249.3		
46	Total Cost	(US\$'000)	4,358.3	4,677.8	4,459.6	13,495.7		
47	Cost per Capita	(US\$/c)	168.9	179.9	185.0			
48	Cost per ha	(US\$/ha)	22,620.2	24,091.8	24,778.6			
49	Cost per m3	(US\$/m3)	1.5	1.2	1.1	1.2		
50	-----							
51	Present Value of Water at DF=10 %		1990	2000	2010	Total		
52	Direct O & M Costs	(US\$'000)	217.9	233.9	223.0			
53	Capital Costs	(US\$'000)	448.9	481.8	459.3			
54	Total Annual Cost	(US\$'000)	666.8	715.7	682.3			
55	Unit Cost per m3	(US\$/m3)	0.6	0.5	0.5			
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							



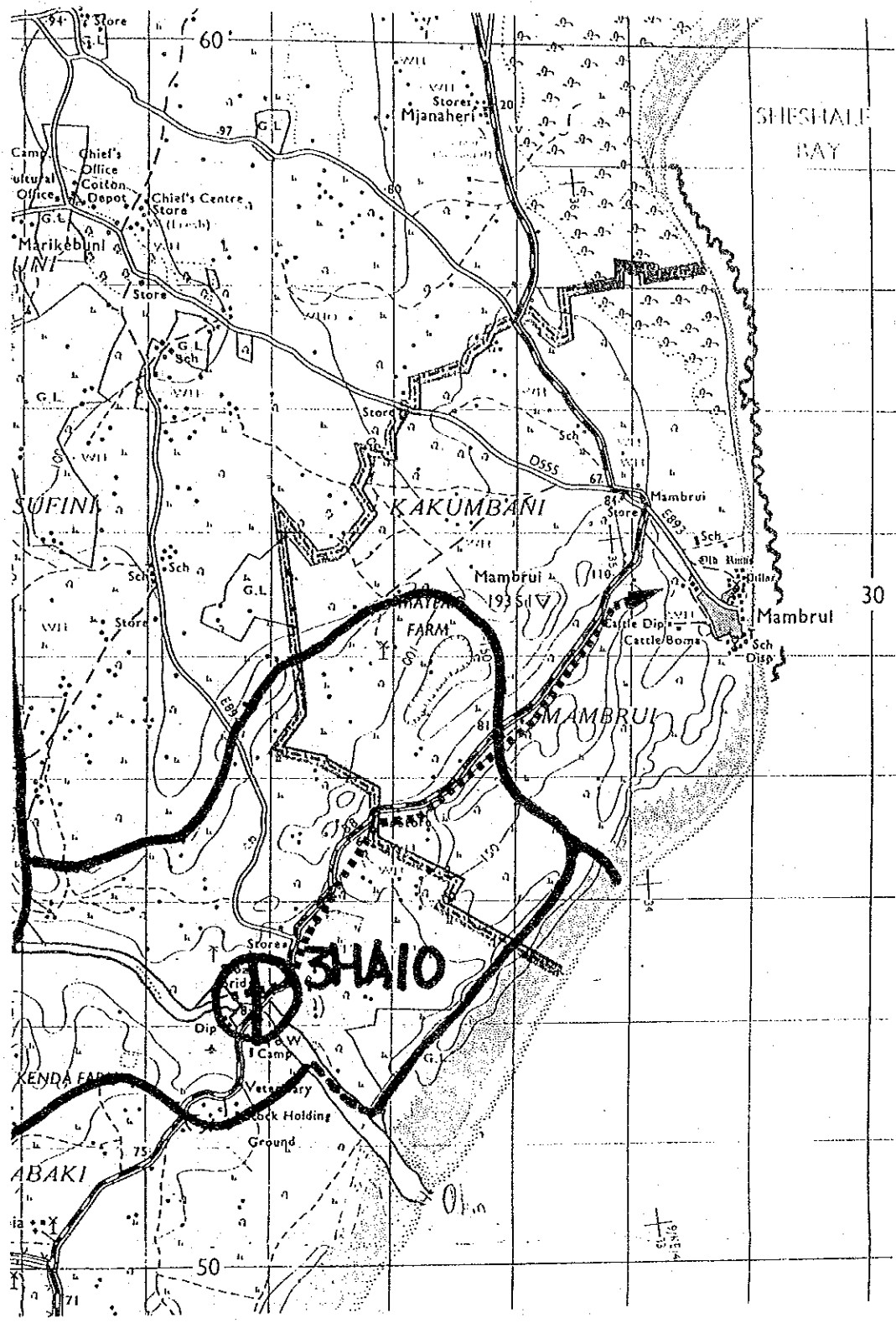
U-134 Mumias

U 93A.4 101/2 1DD

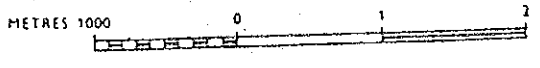


THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i	
2									
3			National Water Master Plan						
4	Code No.	310	URBAN WATER SUPPLY					Feb-92	
5			U-135			Rate		25.2	
6	Name of Urban:		Mambrui		LGL Notice No:				
7	Organization:								
8	Per Capita GRDP in 1988 (guess):								
9	District:		Kilifi	Locataion :	314.6		Magarimi		
10	Map (1/50,000):		193/1	Coordinates X:		40°08'	Y:	S 03°05'	
11	Sub-basin Code:		3HD2	Elevation (El. m):					
12	-----								
13	Existing Facilities								
14	Raw Water Source:		Borehole /small dam			River No			
15	Raw Water System:		H (m)=	L (m)=					
16	Treatment:			Capacity (m3/d)					
17	Distribution System:								
18	-----								
19					1990	2000	2010		
20	-----								
21	Projected Population		(no)		3,200	6,900	14,400		
22	Residential Demand		(m3/d)		396	874	1,863		
23	Non-residential Demand		(m3/d)		66	142	217		
24	Livestock Demand		(m3/d)		4	8	12		
25	Industrial Demand		(m3/d)		0	0	0		
26	Total Demand		(m3/d)		466	1,024	2,092		
27	Area Served (estimated net)		(ha)		24	52	108		
28	-----								
29	Future Development Plan								
30	Raw Water Source:		Sabaki river			River No:			
31	Raw Water System:		H (m)=	60 L (m)=		5,500			
32	Treatment:								
33	Distribution System:								
34	-----								
35	Incremental Capital Cost				1990	2000	2010	Total	
36	Incremental Capacity		(m3/d)		466.4	557.3	1,068.3	2,092.0	
37	Source Works		(US\$'000)		6.0	6.8	11.1	23.9	
38	Pump Cost		(US\$'000)		2.1	2.3	2.3	6.7	
39	Raw Water Main		(US\$'000)		232.7	238.2	263.5	734.3	
40	Treatment		(US\$'000)		276.9	307.0	442.3	1,026.2	
41	Storage		(US\$'000)		47.4	52.7	76.1	176.2	
42	Distribution		(US\$'000)		191.2	221.1	448.1	860.3	
43	Miscellaneous (20%)		(US\$'000)		151.3	165.6	248.7	565.5	
44	Admi. & Engineering		(US\$'000)		90.8	99.4	149.2	339.3	
45	Contingency		(US\$'000)		199.7	218.6	328.3	746.5	
46	Total Cost		(US\$'000)		1,198.0	1,311.6	1,969.6	4,479.1	
47	Cost per Capita		(US\$/c)		374.4	354.5	262.6		
48	Cost per ha		(US\$/ha)		50,129.1	47,467.3	35,164.6		
49	Cost per m3		(US\$/m3)		2.6	2.4	1.8	2.1	
50	-----								
51	Present Value of Water at DF=10 %				1990	2000	2010	Total	
52	Direct O & M Costs		(US\$'000)		59.9	65.6	98.5		
53	Capital Costs		(US\$'000)		123.4	135.1	202.9		
54	Total Annual Cost		(US\$'000)		183.3	200.7	301.3		
55	Unit Cost per m3		(US\$/m3)		1.1	1.0	0.8		
56	-----								
57	Remarks:								
58									
59									
60									
61									
62									
63	-----								



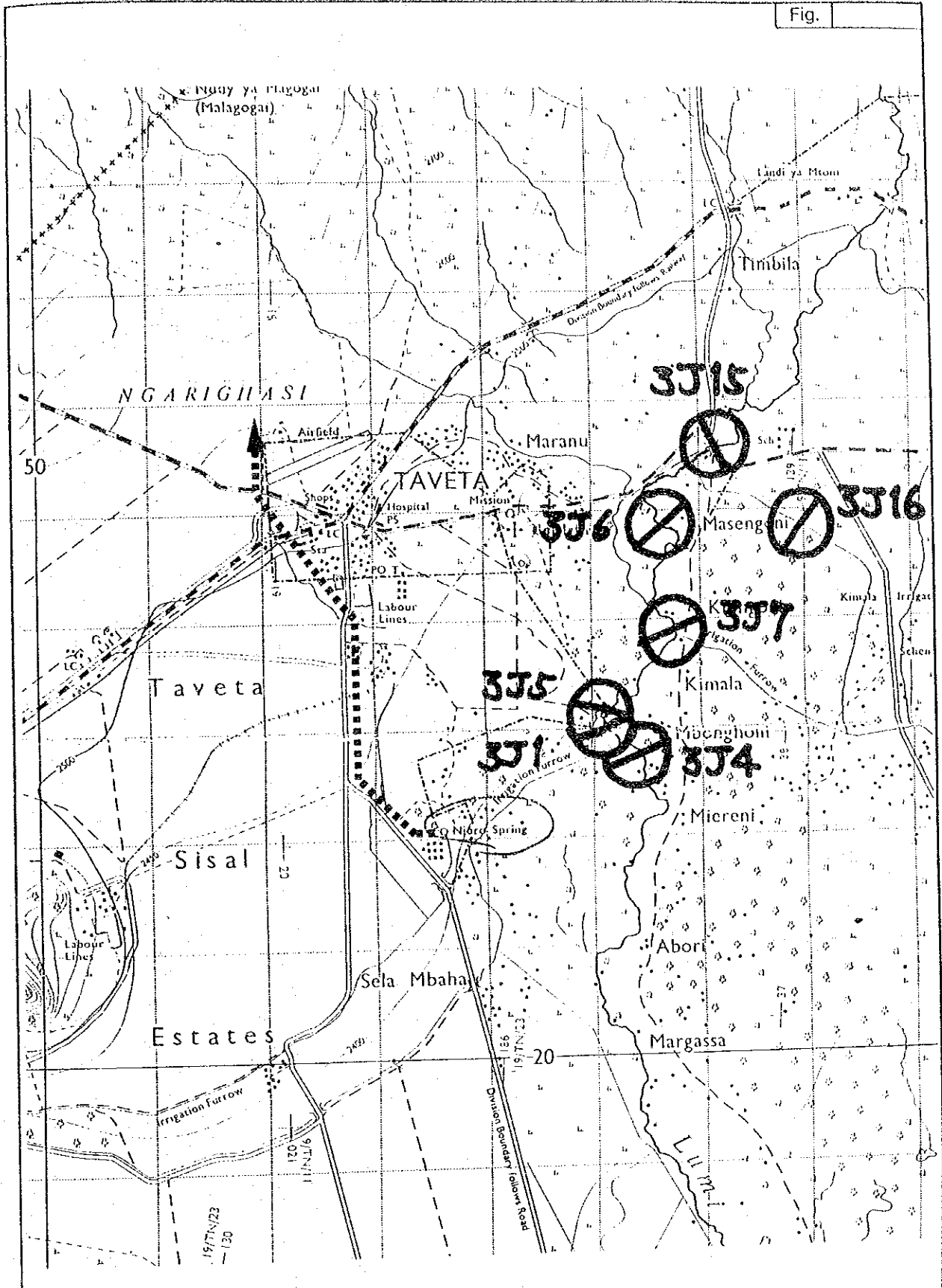
U- 135 Mambrai R 314.6 193/1 3HD2



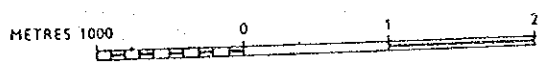
THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2						National Water Master Plan		
3			URBAN WATER SUPPLY					Jul-92
4	Code No.	320	U- 136			Rate		25.2
5	-----							
6	Name of Urban:	Lungalunga		LGL Notice No:				
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:	Kwale	Locataion :	324.5		Lungalunga		
10	Map (1/50,000) :	202/1	Coordinates X:		39°05'		Y:	S 04°35'
11	Sub-basin Code:	3K	Elevation (El. m):					
12	-----							
13	Existing Facilities							
14	Raw Water Source:	Boreholes				River No		
15	Raw Water System:	H (m)=	L (m)=					
16	Treatment:	Capacity (m3/d)				300		
17	Distribution System:							
18	-----							
19				1990	2000	2010		
20	-----							
21	Projected Population		(no)	2,600	5,700	8,200		
22	Residential Demand		(m3/d)	322	722	1,061		
23	Non-residential Demand		(m3/d)	54	116	168		
24	Livestock Demand		(m3/d)	8	16	23		
25	Industrial Demand		(m3/d)	57	105	152		
26	Total Demand		(m3/d)	441	959	1,404		
27	Area Served (estimated net)		(ha)	19	43	61		
28	-----							
29	Future Development Plan							
30	Raw Water Source:	Umba river				River No:		
31	Raw Water System:	H (m)=	40 L (m)=			1,300		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost							
36	Incremental Capacity		(m3/d)	141.1	517.7	445.1	Total	1,103.9
37	Source Works		(US\$'000)	2.4	6.5	5.8		14.7
38	Pump Cost		(US\$'000)	1.5	1.8	1.7		5.0
39	Raw Water Main		(US\$'000)	49.0	55.7	54.7		159.4
40	Treatment		(US\$'000)	135.2	294.2	269.5		698.9
41	Storage		(US\$'000)	22.3	50.4	46.1		118.8
42	Distribution		(US\$'000)	155.3	185.2	149.4		489.9
43	Miscellaneous (20%)		(US\$'000)	73.2	118.8	105.4		297.3
44	Admi. & Engineering		(US\$'000)	43.9	71.3	63.3		178.4
45	Contingency		(US\$'000)	96.6	156.8	139.2		392.5
46	Total Cost		(US\$'000)	579.4	940.7	834.9		2,355.0
47	Cost per Capita		(US\$/c)	222.8	303.4	334.0		
48	Cost per ha		(US\$/ha)	29,839.2	40,632.7	44,719.3		
49	Cost per m3		(US\$/m3)	4.1	1.8	1.9		2.1
50	-----							
51	Present Value of Water at DF=10 %							
52	Direct O & M Costs		(US\$'000)	29.0	47.0	41.7	Total	
53	Capital Costs		(US\$'000)	59.7	96.9	86.0		
54	Total Annual Cost		(US\$'000)	88.6	143.9	127.7		
55	Unit Cost per m3		(US\$/m3)	1.7	0.8	0.8		
56	-----							
57	Remarks:	Alternatively, groundwater development. The Umba river is prone to flooding and at times it dries off.						
58		Detailed study is required to determine the structure of intake works.						
59								
60								
61								
62								
63	-----							

a	b	c	d	e	f	g	h	i
2						National Water Master Plan		
3			URBAN WATER SUPPLY					Feb-92
4	Code No.	350	U- 137			Rate		25.2
5	-----							
6	Name of Urban:		Taveta		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Taita-taveta Locataion :		351.1		Taveta	
10	Map (1/50,000):		188/3	Coordinates X:			37°39'	Y: S 03°25'
11	Sub-basin Code:		3J	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Njoro sprig			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)		350		
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population		(no)		12,100	20,600	28,900	
22	Residential Demand		(m3/d)		1,499	2,608	3,739	
23	Non-residential Demand		(m3/d)		251	426	598	
24	Livestock Demand		(m3/d)		58	95	133	
25	Industrial Demand		(m3/d)		446	761	979	
26	Total Demand		(m3/d)		2,254	3,890	5,449	
27	Area Served (estimated net)		(ha)		90	154	216	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Njoro Spring			River No:		
31	Raw Water System:		H (m)=	60 L (m)=		5,000		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		1,903.9	1,636.6	1,558.5	5,098.9
37	Source Works		(US\$'000)		17.2	15.3	14.8	47.2
38	Pump Cost		(US\$'000)		4.2	3.8	3.8	11.8
39	Raw Water Main		(US\$'000)		268.8	260.1	257.5	786.4
40	Treatment		(US\$'000)		599.8	555.0	541.1	1,695.8
41	Storage		(US\$'000)		102.0	94.9	92.6	289.4
42	Distribution		(US\$'000)		722.9	507.8	495.9	1,726.6
43	Miscellaneous (20%)		(US\$'000)		343.0	287.4	281.1	911.4
44	Admi. & Engineering		(US\$'000)		205.8	172.4	168.7	546.9
45	Contingency		(US\$'000)		452.7	379.3	371.1	1,203.1
46	Total Cost		(US\$'000)		2,716.2	2,276.1	2,226.4	7,218.7
47	Cost per Capita		(US\$/c)		224.5	267.8	268.2	
48	Cost per ha		(US\$/ha)		30,058.8	35,856.1	35,919.4	
49	Cost per m3		(US\$/m3)		1.4	1.4	1.4	1.4
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		135.8	113.8	111.3	
53	Capital Costs		(US\$'000)		279.8	234.4	229.3	
54	Total Annual Cost		(US\$'000)		415.6	348.2	340.6	
55	Unit Cost per m3		(US\$/m3)		0.6	0.6	0.6	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							

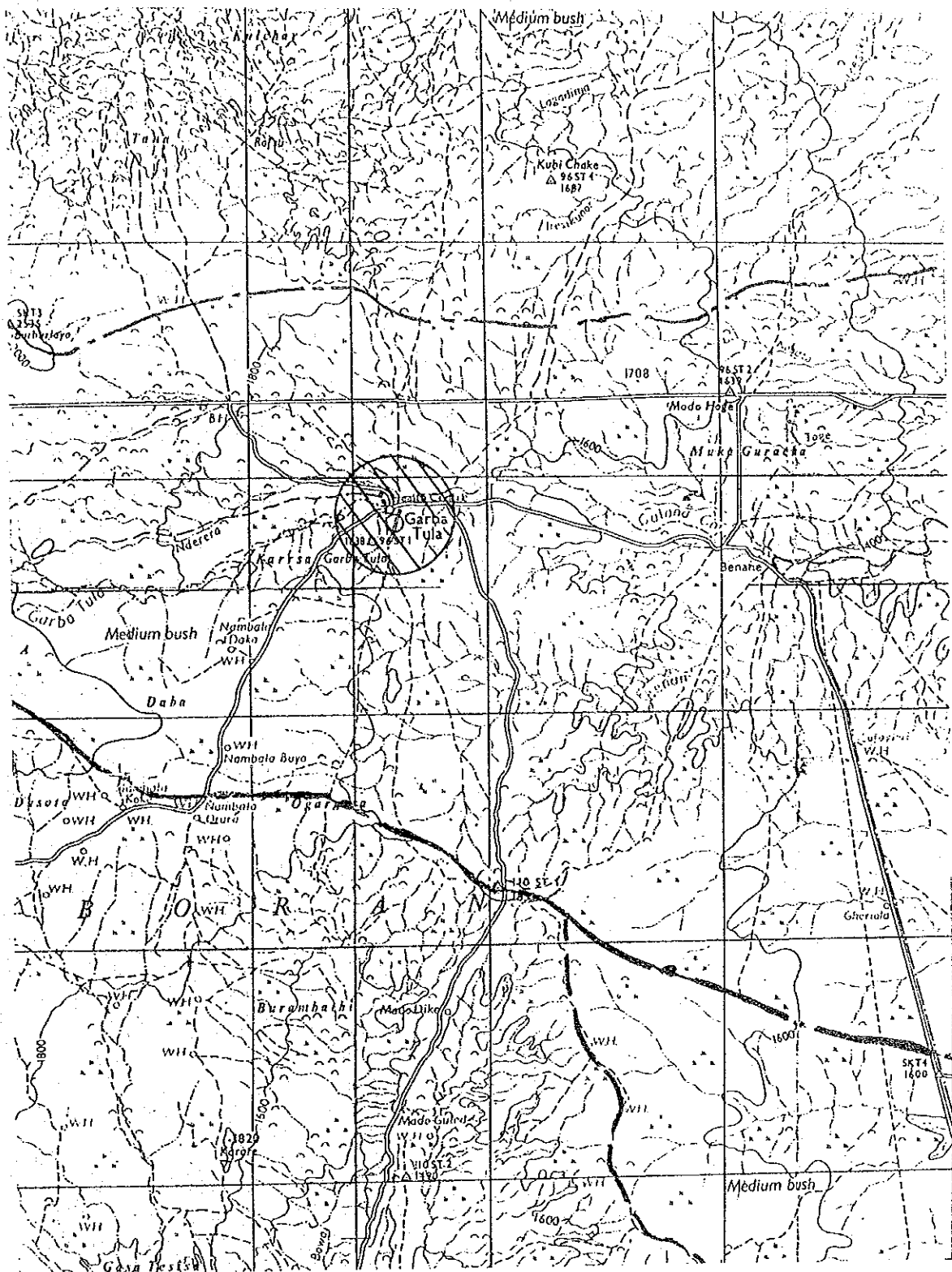


U- 137 Taveta R 351.1 188/3 3J

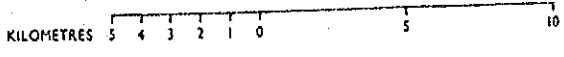


THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2	National Water Master Plan							
3	URBAN WATER SUPPLY							
4	Code No. 420		U- 138			Rate		Jul-92 25.2
5	-----							
6	Name of Urban:		Garbatula		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Isiolo	Locataion :	422.1		Garbatula	
10	Map (1/50,000):		96/3	Coordinates X:		38°34'	Y:	N 00°30'
11	Sub-basin Code:		5FA	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Boreholes			River No		
15	Raw Water System:		H (m)=	10 L (m)=		4000		
16	Treatment:			Capacity (m3/d)		150		
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population		(no)		1,900	4,800	7,600	
22	Residential Demand		(m3/d)		235	608	983	
23	Non-residential Demand		(m3/d)		39	98	157	
24	Livestock Demand		(m3/d)		66	192	450	
25	Industrial Demand		(m3/d)		0	0	0	
26	Total Demand		(m3/d)		340	898	1,590	
27	Area Served (estimated net)		(ha)		14	36	57	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Boreholes			River No:		
31	Raw Water System:		H (m)=	L (m)=		161,000		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		190.4	557.4	692.5	1,440.3
37	Source Works		(US\$'000)		2,431.2	7,119.2	8,843.4	18,393.8
38	Pump Cost		(US\$'000)		0.0	0.0	0.0	0.0
39	Raw Water Main		(US\$'000)		725.7	2,203.7	2,764.7	5,694.1
40	Treatment		(US\$'000)		162.4	307.0	347.5	816.9
41	Storage		(US\$'000)		27.1	52.7	59.8	89.0
42	Distribution		(US\$'000)		113.5	173.3	167.3	454.1
43	Miscellaneous (20%)		(US\$'000)		692.0	1,971.2	2,436.5	5,099.7
44	Admi. & Engineering		(US\$'000)		415.2	1,182.7	1,461.9	3,059.8
45	Contingency		(US\$'000)		913.4	2,601.9	3,216.2	6,731.6
46	Total Cost		(US\$'000)		5,480.3	15,611.7	19,297.4	40,389.5
47	Cost per Capita		(US\$/c)		2,884.4	5,383.3	6,891.9	
48	Cost per ha		(US\$/ha)		386,236.1	720,858.8	922,869.4	
49	Cost per m3		(US\$/m3)		28.8	28.0	27.9	28.0
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		274.0	780.6	964.9	
53	Capital Costs		(US\$'000)		564.5	1,608.0	1,987.6	
54	Total Annual Cost		(US\$'000)		838.5	2,388.6	2,952.5	
55	Unit Cost per m3		(US\$/m3)		12.1	11.7	11.7	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							



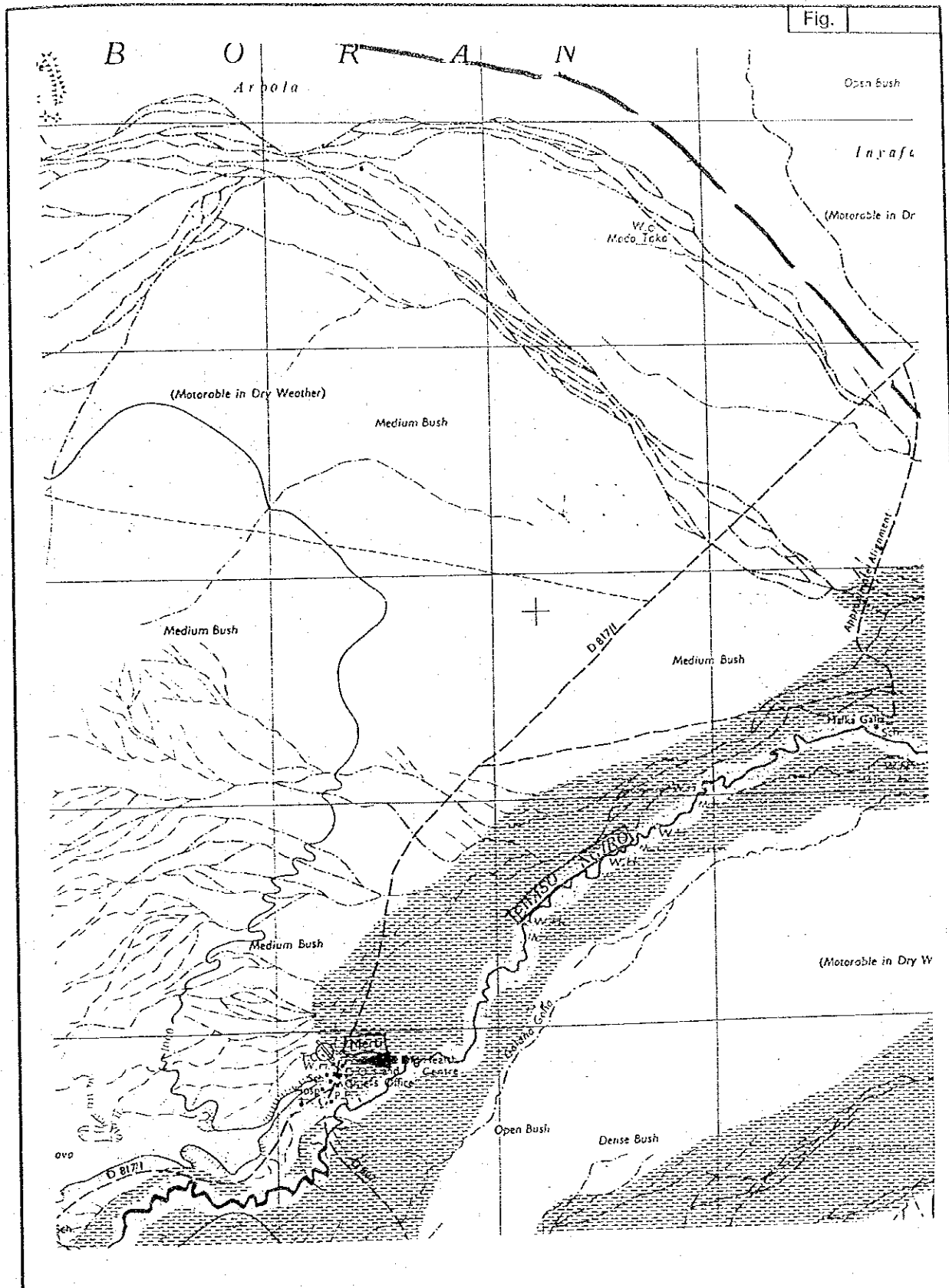
U- 138 Gargatula R 422.1 96/3 SFA



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2					National Water Master Plan			
3			URBAN WATER SUPPLY					Feb-92
4	Code No.	420	U-139			Rate		25.2
5	-----							
6	Name of Urban:		Merti		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Isiolo	Locataion :	423.1		Merti	
10	Map (1/50,000) :		82/3	Coordinates X:			38°41'	Y: N 01°05'
11	Sub-basin Code:		5ED	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Boreholes C3853			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)		70		
17	Distribution System:							
18	-----							
19						1990	2000	2010
20	-----							
21	Projected Population			(no)	5,700	14,200	22,700	
22	Residential Demand			(m3/d)	706	1,798	2,937	
23	Non-residential Demand			(m3/d)	118	294	470	
24	Livestock Demand			(m3/d)	197	576	1,350	
25	Industrial Demand			(m3/d)	0	0	0	
26	Total Demand			(m3/d)	1,021	2,668	4,757	
27	Area Served (estimated net)			(ha)	43	106	170	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Ewaso Ngiro			River No:		
31	Raw Water System:		H (m)=	10 L (m)=		1,000		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity			(m3/d)	951.1	1,647.0	2,088.7	4,686.8
37	Source Works			(US\$'000)	26.1	15.4	18.4	59.9
38	Pump Cost			(US\$'000)	1.0	1.3	1.5	3.8
39	Raw Water Main			(US\$'000)	47.0	52.1	54.9	153.9
40	Treatment			(US\$'000)	415.0	556.8	628.4	1,600.2
41	Storage			(US\$'000)	71.5	95.1	106.4	143.3
42	Distribution			(US\$'000)	340.5	507.8	507.8	1,356.2
43	Miscellaneous (20%)			(US\$'000)	180.2	245.7	263.5	689.4
44	Admi. & Engineering			(US\$'000)	108.1	147.4	158.1	413.6
45	Contingency			(US\$'000)	237.9	324.3	347.8	910.0
46	Total Cost			(US\$'000)	1,427.3	1,946.1	2,086.8	5,460.1
47	Cost per Capita			(US\$/c)	250.4	228.9	245.5	
48	Cost per ha			(US\$/ha)	33,529.5	30,657.4	32,874.3	
49	Cost per m3			(US\$/m3)	1.5	1.2	1.0	1.2
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs			(US\$'000)	71.4	97.3	104.3	
53	Capital Costs			(US\$'000)	147.0	200.4	214.9	
54	Total Annual Cost			(US\$'000)	218.4	297.7	319.3	
55	Unit Cost per m3			(US\$/m3)	0.6	0.5	0.4	
56	-----							
57	Remarks:	Source works include the construction of either a subsurface dam on the Ewaso Ngiro river.						
58								
59								
60								
61								
62								
63	-----							

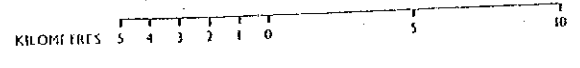
Fig.



U- 139 Merti

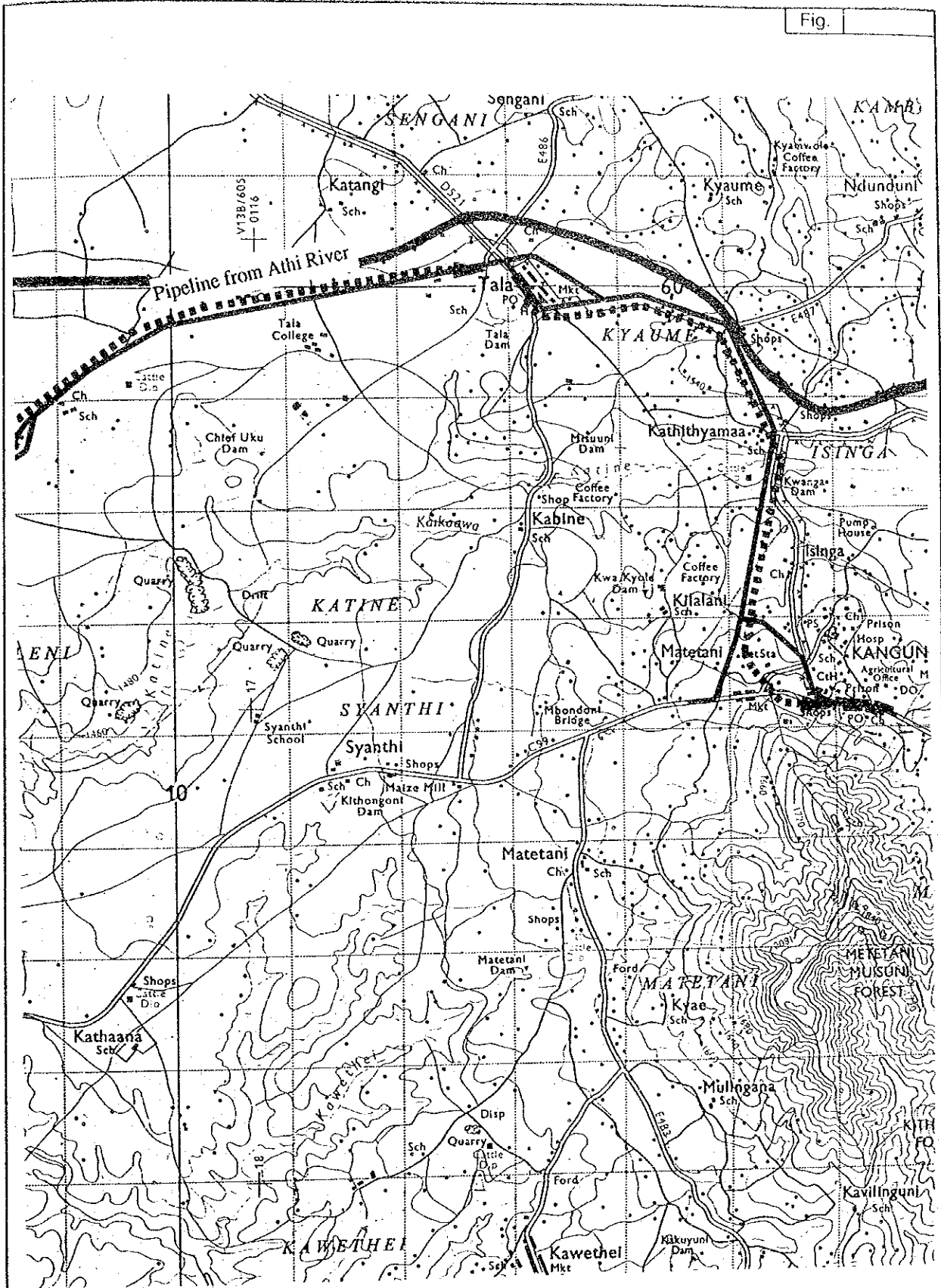
R 423.1

82/3 SED



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2	National Water Master Plan							
3	URBAN WATER SUPPLY							
4	Code No.	440	U- 140			Rate		Feb-92 25.2
5	-----							
6	Name of Urban:	Tala		LGL Notice No:				
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:	Machakos	Locataion :	445.2		Matungulu		
10	Map (1/50,000) :	149/4	Coordinates X:		37°19'		Y:	S 01°16'
11	Sub-basin Code:	3EA	Elevation (El. m):					
12	-----							
13	Existing Facilities							
14	Raw Water Source:	Boreholes		L (m)=		River No		
15	Raw Water System:	H (m)=						
16	Treatment:			Capacity (m3/d)		50		
17	Distribution System:							
18	-----							
19				1990	2000	2010		
20	-----							
21	Projected Population		(no)	2,100	4,200	6,400		
22	Residential Demand		(m3/d)	260	532	828		
23	Non-residential Demand		(m3/d)	44	87	131		
24	Livestock Demand		(m3/d)	4	7	10		
25	Industrial Demand		(m3/d)	359	673	982		
26	Total Demand		(m3/d)	667	1,299	1,951		
27	Area Served (estimated net)		(ha)	16	31	48		
28	-----							
29	Future Development Plan							
30	Raw Water Source:	Pipeline from Athi river		L (m)=		River No:		
31	Raw Water System:	H (m)=		160		28,300		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost			1990	2000	2010		Total
36	Incremental Capacity		(m3/d)	617.1	631.7	652.2		1,901.0
37	Source Works		(US\$'000)	7.4	7.5	7.7		22.6
38	Pump Cost		(US\$'000)	5.8	5.8	5.8		17.4
39	Raw Water Main		(US\$'000)	1,242.8	1,246.9	1,252.6		3,742.3
40	Treatment		(US\$'000)	325.5	329.8	335.9		991.2
41	Storage		(US\$'000)	55.9	56.7	57.8		170.4
42	Distribution		(US\$'000)	125.5	125.5	131.4		382.4
43	Miscellaneous (20%)		(US\$'000)	352.6	354.4	358.2		1,065.2
44	Admi. & Engineering		(US\$'000)	211.5	212.7	214.9		639.1
45	Contingency		(US\$'000)	465.4	467.9	472.9		1,406.1
46	Total Cost		(US\$'000)	2,792.3	2,807.2	2,837.2		8,436.7
47	Cost per Capita		(US\$/c)	1,329.7	1,336.7	1,289.6		
48	Cost per ha		(US\$/ha)	178,051.0	178,996.7	172,691.2		
49	Cost per m3		(US\$/m3)	4.5	4.4	4.4		4.4
50	-----							
51	Present Value of Water at DF=10 %			1990	2000	2010		Total
52	Direct O & M Costs		(US\$'000)	139.6	140.4	141.9		
53	Capital Costs		(US\$'000)	287.6	289.1	292.2		
54	Total Annual Cost		(US\$'000)	427.2	429.5	434.1		
55	Unit Cost per m3		(US\$/m3)	1.9	1.9	1.8		
56	-----							
57	Remarks:	The plan envisages water transfer from Athi river to Kangundo and possibly up to Mitaboni.						
58		Tala is located on the midway.						
59								
60								
61								
62								
63	-----							



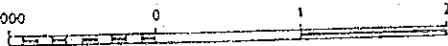
U- 140 Tala

R 445.2

149/4

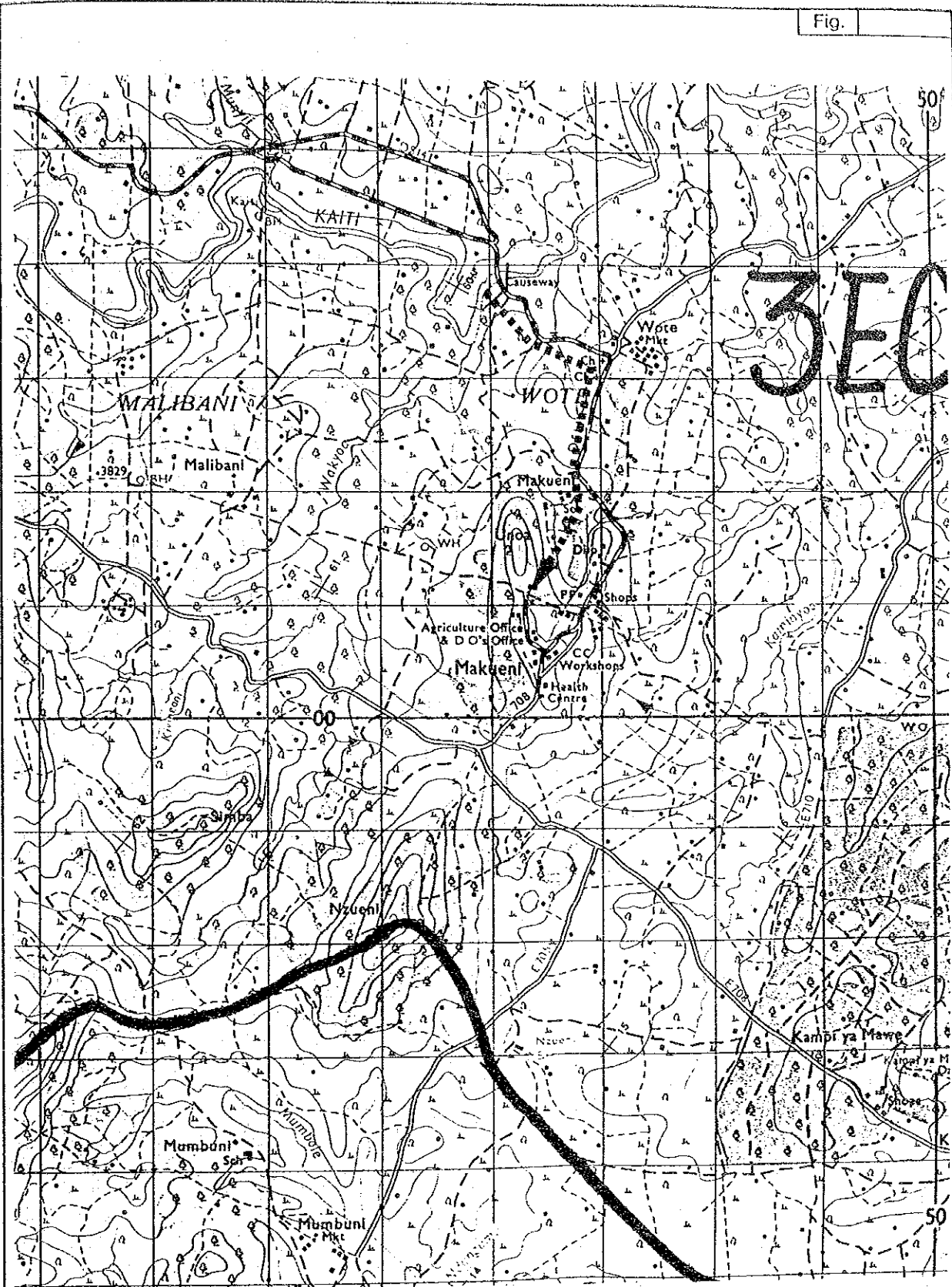
3EA

METRES 1000



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2						National Water Master Plan		
3			URBAN WATER SUPPLY					Jul-92
4	Code No.	440	U- 141			Rate		25.2
5	-----							
6	Name of Urban:		Wote		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Machakos	Locataion :	448.1		Makueni	
10	Map (1/50,000):		163/3	Coordinates X:		37°36'	Y:	S 01°48'
11	Sub-basin Code:		3EC	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Boreholes			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)		153		
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population		(no)		2,300	5,500	9,000	
22	Residential Demand		(m3/d)		285	696	1,164	
23	Non-residential Demand		(m3/d)		48	112	186	
24	Livestock Demand		(m3/d)		4	9	15	
25	Industrial Demand		(m3/d)		94	178	264	
26	Total Demand		(m3/d)		431	995	1,629	
27	Area Served (estimated net)		(ha)		17	41	67	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Kaiti river + Nzuuni river			River No:		
31	Raw Water System:		H (m)=	180 L (m)=		3,900		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		277.9	564.5	633.9	1,476.4
37	Source Works		(US\$'000)		4.1	6.9	7.5	18.5
38	Pump Cost		(US\$'000)		5.5	6.8	6.8	19.1
39	Raw Water Main		(US\$'000)		155.7	169.2	171.9	496.8
40	Treatment		(US\$'000)		204.0	309.3	330.5	843.8
41	Storage		(US\$'000)		34.5	53.1	56.8	144.4
42	Distribution		(US\$'000)		137.4	191.2	209.1	537.7
43	Miscellaneous (20%)		(US\$'000)		108.2	147.3	156.5	412.0
44	Admi. & Engineering		(US\$'000)		64.9	88.4	93.9	247.2
45	Contingency		(US\$'000)		142.9	194.4	206.6	543.9
46	Total Cost		(US\$'000)		857.2	1,166.5	1,239.8	3,263.4
47	Cost per Capita		(US\$/c)		372.7	364.5	354.2	
48	Cost per ha		(US\$/ha)		49,905.5	48,811.7	47,431.3	
49	Cost per m3		(US\$/m3)		3.1	2.1	2.0	2.2
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		42.9	58.3	62.0	
53	Capital Costs		(US\$'000)		88.3	120.1	127.7	
54	Total Annual Cost		(US\$'000)		131.2	178.5	189.7	
55	Unit Cost per m3		(US\$/m3)		1.3	0.9	0.8	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							

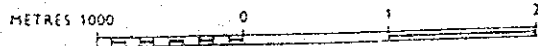


U- 141 Makueni

R 448.1

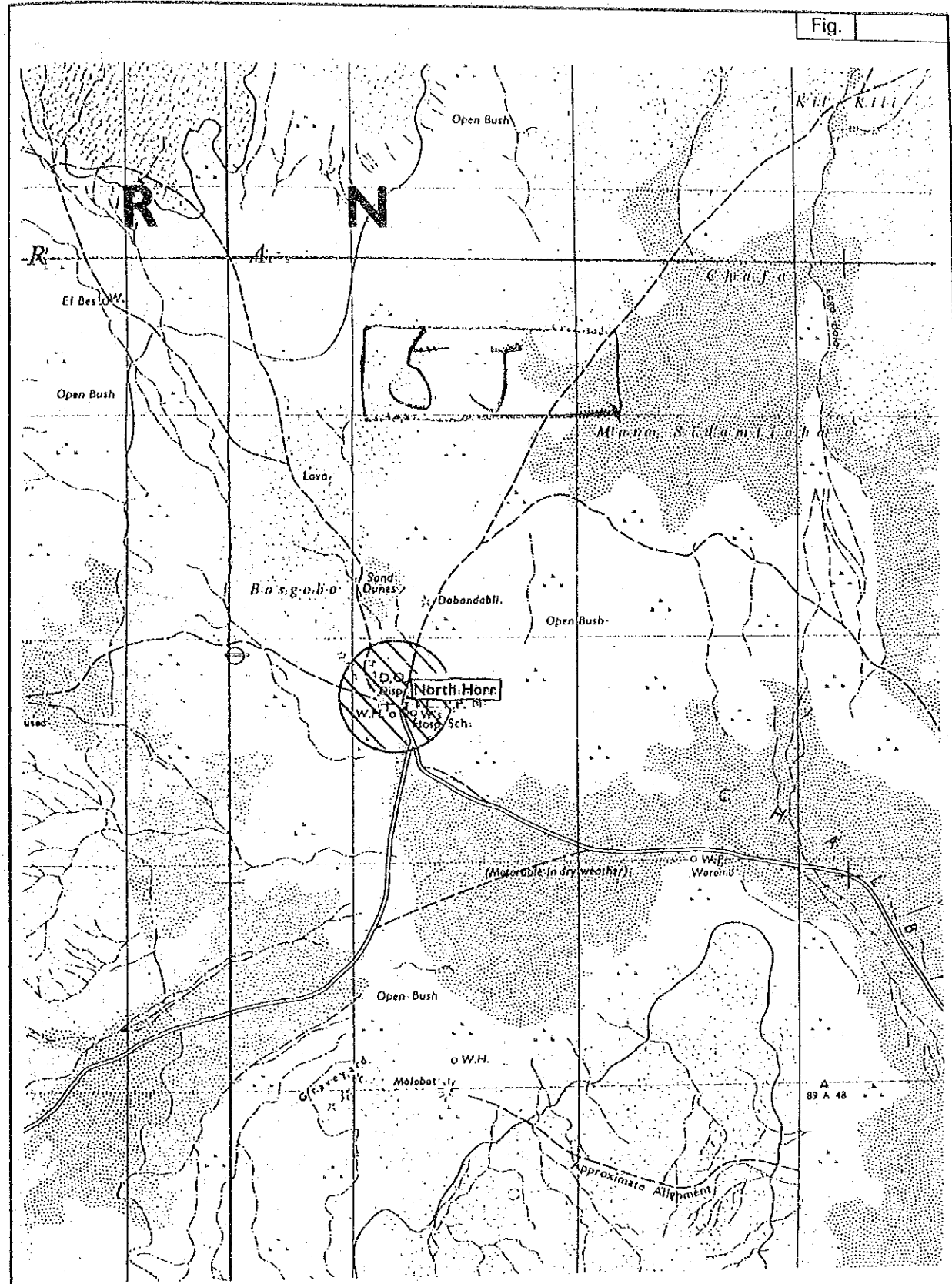
163/3

3EC



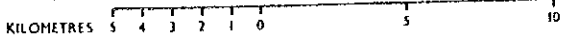
THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2	National Water Master Plan							
3	URBAN WATER SUPPLY							
4	Code No. 450		U-142			Rate		Jul-92 25.2
5	-----							
6	Name of Urban:		North Horr		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Marsabit	Locataion :	451.1		North Horr	
10	Map (1/50,000) :		NA-37-1	Coordinates X:		37°06'		Y: N 03°20'
11	Sub-basin Code:		5J	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Boreholes			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)		28		
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population		(no)		2,100	4,400	6,300	
22	Residential Demand		(m3/d)		260	557	815	
23	Non-residential Demand		(m3/d)		44	89	129	
24	Livestock Demand		(m3/d)		70	149	300	
25	Industrial Demand		(m3/d)		0	0	0	
26	Total Demand		(m3/d)		374	795	1,244	
27	Area Served (estimated net)		(ha)		16	33	47	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Boreholes			River No:		
31	Raw Water System:		H (m)=	0 L (m)=		232,000		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		346.1	421.0	448.9	1,216.1
37	Source Works		(US\$'000)		1,505.8	1,831.6	1,953.0	5,290.4
38	Pump Cost		(US\$'000)		0.0	0.0	0.0	0.0
39	Raw Water Main		(US\$'000)		2,292.6	2,808.3	3,001.9	8,102.8
40	Treatment		(US\$'000)		0.0	0.0	0.0	0.0
41	Storage		(US\$'000)		39.5	44.5	46.3	81.6
42	Distribution		(US\$'000)		125.5	137.4	113.5	376.4
43	Miscellaneous (20%)		(US\$'000)		792.7	964.4	1,022.9	2,780.0
44	Admi. & Engineering		(US\$'000)		475.6	578.6	613.8	1,668.0
45	Contingency		(US\$'000)		1,046.3	1,273.0	1,350.3	3,669.6
46	Total Cost		(US\$'000)		6,278.0	7,637.9	8,101.6	22,017.5
47	Cost per Capita		(US\$/c)		2,989.5	3,320.8	4,264.0	
48	Cost per ha		(US\$/ha)		400,316.4	444,674.6	570,972.0	
49	Cost per m3		(US\$/m3)		18.1	18.1	18.0	18.1
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		313.9	381.9	405.1	
53	Capital Costs		(US\$'000)		646.6	786.7	834.5	
54	Total Annual Cost		(US\$'000)		960.5	1,168.6	1,239.5	
55	Unit Cost per m3		(US\$/m3)		7.6	7.6	7.6	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							



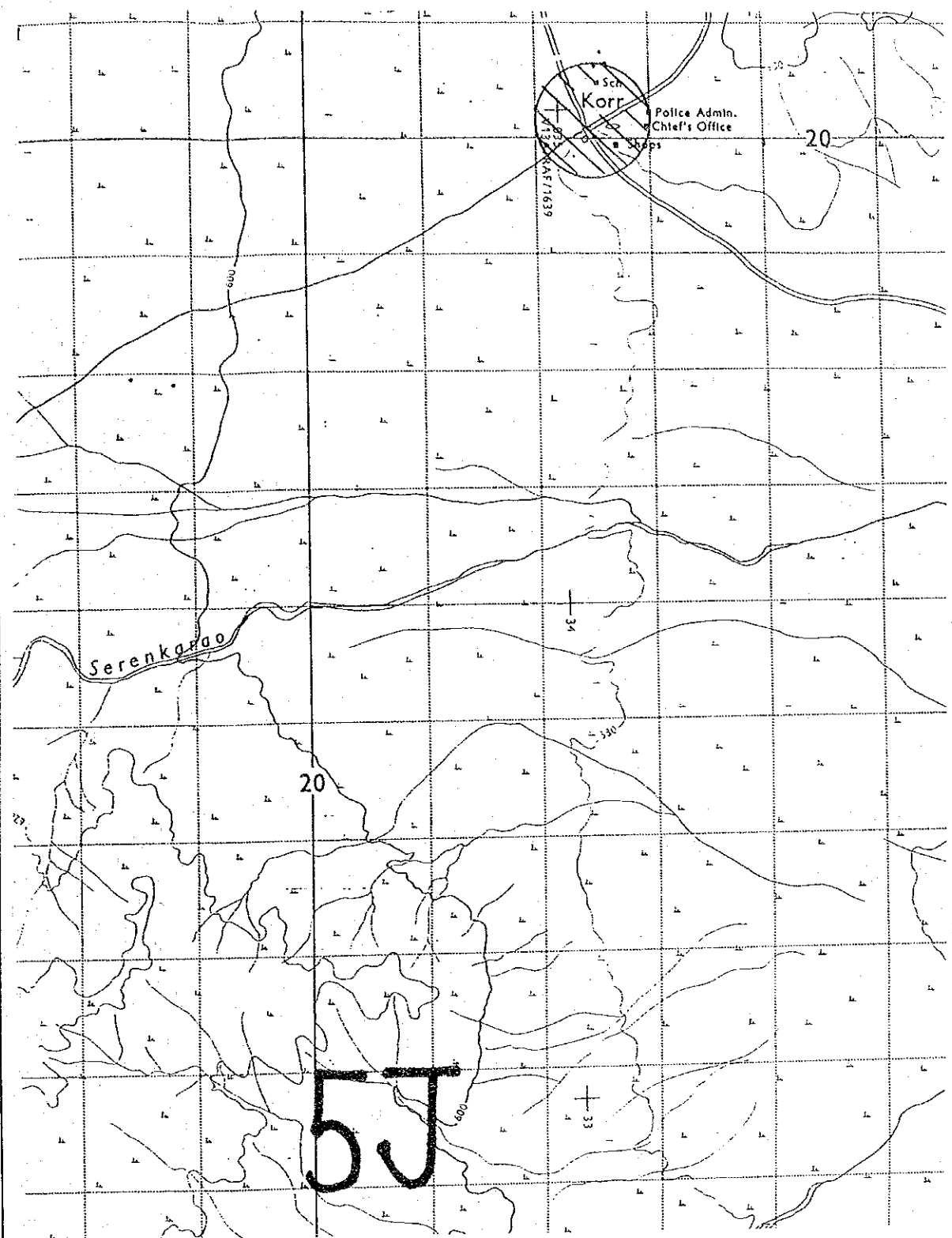
U- 142 North Horr

R 451.1 NA-37-1 5J



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i	
2						National Water	Master Plan		
3			URBAN WATER SUPPLY					Jul-92	
4	Code No.	450	U- 143			Rate		25.2	
5	-----								
6	Name of Urban:		Korr			LGL Notice No:			
7	Organization:								
8	Per Capita GRDP in 1988 (guess):								
9	District:		Nakuru	Locataion :	453.1		Korr		
10	Map (1/50,000):		66/2	Coordinates X:		37°30'		Y: N 01°58'	
11	Sub-basin Code:		2GD	Elevation (El. m):					
12	-----								
13	Existing Facilities								
14	Raw Water Source:		Boreholes			River No			
15	Raw Water System:		H (m)=	L (m)=					
16	Treatment:			Capacity (m3/d)		400			
17	Distribution System:								
18	-----								
19						1990	2000	2010	
20	-----								
21	Projected Population		(no)		5,800	11,900	17,200		
22	Residential Demand		(m3/d)		718	1,507	2,225		
23	Non-residential Demand		(m3/d)		120	246	356		
24	Livestock Demand		(m3/d)		192	413	830		
25	Industrial Demand		(m3/d)		0	0	0		
26	Total Demand		(m3/d)		1,030	2,166	3,411		
27	Arca Served (estimated net)		(ha)		43	89	128		
28	-----								
29	Future Development Plan								
30	Raw Water Source:		Boreholes			River No:			
31	Raw Water System:		H (m)=	0 L (m)=		593,000			
32	Treatment:								
33	Distribution System:								
34	-----								
35	Incremental Capital Cost					1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		630.5	1,135.4	1,245.4	1,245.4	3,011.3
37	Source Works		(US\$'000)		2,446.6	4,405.8	4,832.9	4,832.9	11,685.3
38	Pump Cost		(US\$'000)		0.0	0.0	0.0	0.0	0.0
39	Raw Water Main		(US\$'000)		4,415.0	8,202.4	9,049.3	9,049.3	21,666.7
40	Treatment		(US\$'000)		329.5	457.2	480.5	480.5	1,267.2
41	Storage		(US\$'000)		56.6	78.7	82.6	82.6	217.9
42	Distribution		(US\$'000)		346.5	364.4	316.6	316.6	1,027.6
43	Miscellaneous (20%)		(US\$'000)		1,518.8	2,701.7	2,952.4	2,952.4	7,172.9
44	Admi. & Engineering		(US\$'000)		911.3	1,621.0	1,771.4	1,771.4	4,303.8
45	Contingency		(US\$'000)		2,004.9	3,566.2	3,897.1	3,897.1	9,468.3
46	Total Cost		(US\$'000)		12,029.3	21,397.5	23,382.9	23,382.9	56,809.6
47	Cost per Capita		(US\$/c)		2,074.0	3,507.8	4,411.9	4,411.9	
48	Cost per ha		(US\$/ha)		277,721.7	469,712.1	590,773.2	590,773.2	
49	Cost per m3		(US\$/m3)		19.1	18.8	18.8	18.8	18.9
50	-----								
51	Present Value of Water at DF=10 %					1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		601.5	1,069.9	1,169.1	1,169.1	
53	Capital Costs		(US\$'000)		1,239.0	2,203.9	2,408.4	2,408.4	
54	Total Annual Cost		(US\$'000)		1,840.5	3,273.8	3,577.6	3,577.6	
55	Unit Cost per m3		(US\$/m3)		8.0	7.9	7.9	7.9	
56	-----								
57	Remarks:								
58									
59									
60									
61									
62									
63	-----								

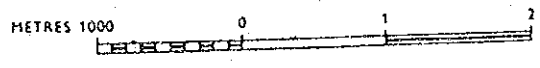


U- 143 Korr

R 453.1

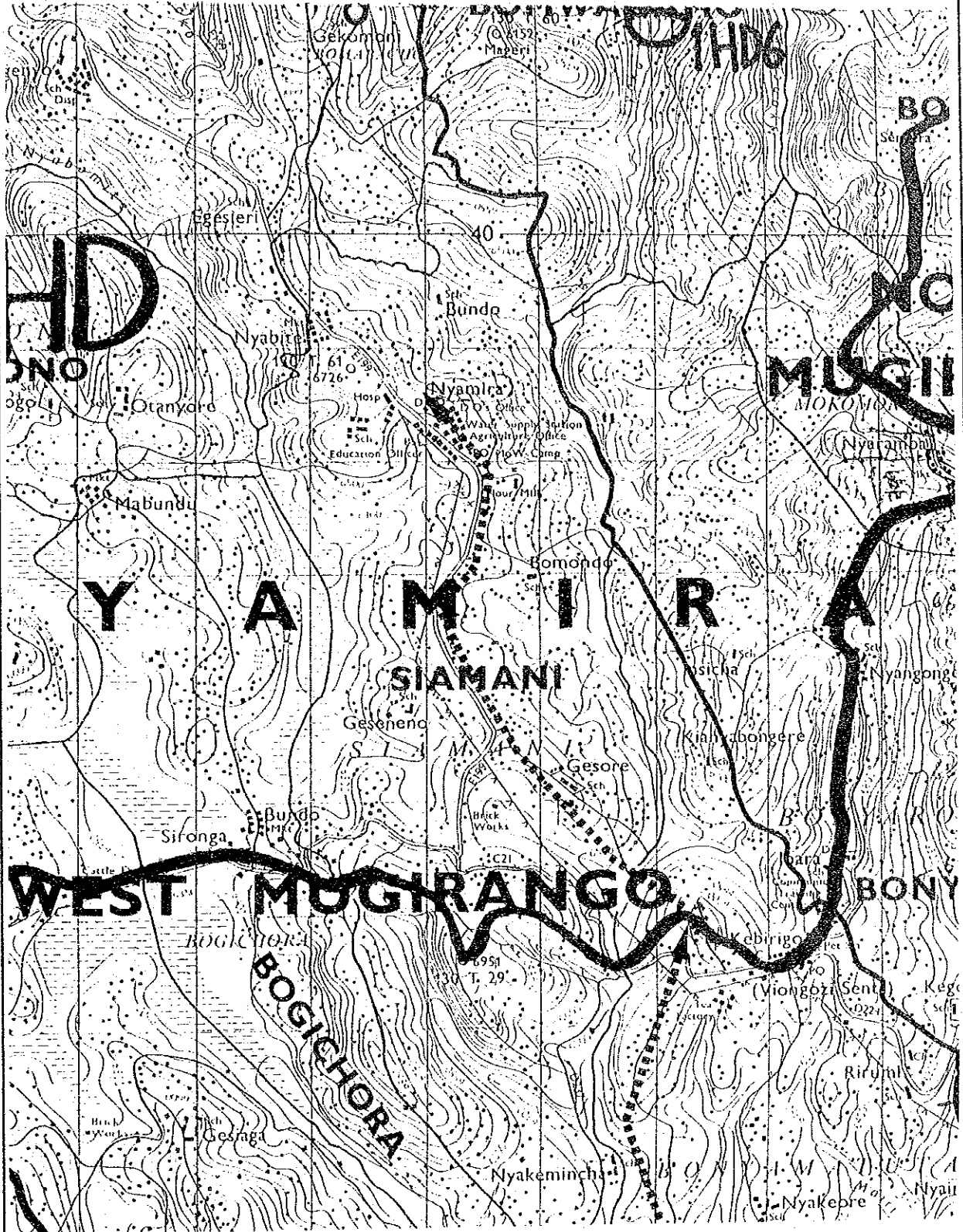
66/2

2GD



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2	National Water Master Plan							
3	URBAN WATER SUPPLY							
4	Code No.	610	U- 144			Rate		Feb-92 25.2
5	-----							
6	Name of Urban:	Nyamira + Kebirigo		LGL Notice No:				
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:	Kisii	Locataion :	612.2			East Mugirango	
10	Map (1/50,000):	130/2	Coordinates X:		34°53'		Y:	S 00°32'
11	Sub-basin Code:	1HD	Elevation (El. m):					
12	-----							
13	Existing Facilities							
14	Raw Water Source:	River (Local)		River No				
15	Raw Water System:	H (m)=	L (m)=					
16	Treatment:	Capacity (m3/d)		400				
17	Distribution System:							
18	-----							
19				1990	2000	2010		
20	-----							
21	Projected Population	(no)		11,000	21,400	32,400		
22	Residential Demand	(m3/d)		1,363	2,710	4,192		
23	Non-residential Demand	(m3/d)		213	443	670		
24	Livestock Demand	(m3/d)		26	52	80		
25	Industrial Demand	(m3/d)		69	117	148		
26	Total Demand	(m3/d)		1,671	3,322	5,090		
27	Area Served (estimated net)	(ha)		82	160	242		
28	-----							
29	Future Development Plan							
30	Raw Water Source:	Kuja river		River No:				
31	Raw Water System:	H (m)=	220 L (m)=	22,000				
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost			1990	2000	2010	Total	
36	Incremental Capacity	(m3/d)		1,270.6	1,651.1	1,768.0	4,689.8	
37	Source Works	(US\$'000)		12.7	15.4	16.2	44.3	
38	Pump Cost	(US\$'000)		11.9	14.4	14.4	40.7	
39	Raw Water Main	(US\$'000)		1,088.0	1,146.7	1,163.5	3,398.2	
40	Treatment	(US\$'000)		485.7	557.5	577.5	1,620.8	
41	Storage	(US\$'000)		83.5	95.3	98.5	277.2	
42	Distribution	(US\$'000)		657.2	621.3	657.2	1,935.7	
43	Miscellaneous (20%)	(US\$'000)		467.8	490.1	505.5	1,463.4	
44	Admi. & Engineering	(US\$'000)		280.7	294.1	303.3	878.0	
45	Contingency	(US\$'000)		617.5	647.0	667.2	1,931.7	
46	Total Cost	(US\$'000)		3,704.9	3,881.8	4,003.3	11,590.0	
47	Cost per Capita	(US\$/c)		336.8	373.2	363.9		
48	Cost per ha	(US\$/ha)		45,101.0	49,980.0	48,732.9		
49	Cost per m3	(US\$/m3)		2.9	2.4	2.3	2.5	
50	-----							
51	Present Value of Water at DF=10 %			1990	2000	2010	Total	
52	Direct O & M Costs	(US\$'000)		185.2	194.1	200.2		
53	Capital Costs	(US\$'000)		381.6	399.8	412.3		
54	Total Annual Cost	(US\$'000)		566.9	593.9	612.5		
55	Unit Cost per m3	(US\$/m3)		1.2	1.0	0.9		
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							



from Kuja River

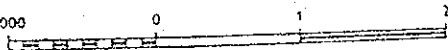
U- 144 Nyamira+Kebirigo

R 612.2

130/2

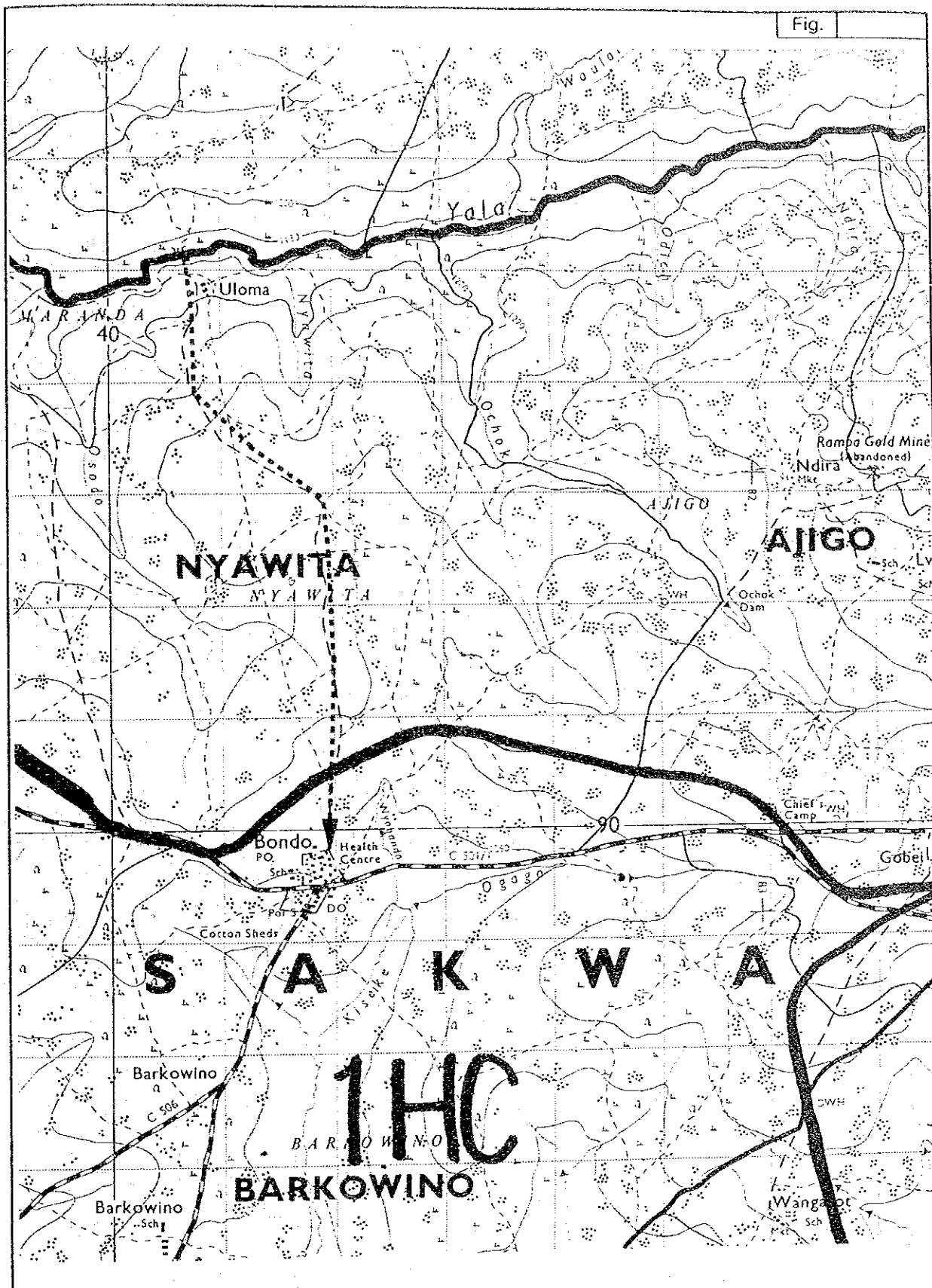
1HD

METRES 1000



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2					National Water Master Plan			
3			URBAN WATER SUPPLY					Jul-92
4	Code No.	630	U-145		Rate			25.2
5	-----							
6	Name of Urban:		Bondo		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Siaya	Locataion :	632.4		West Sakwa	
10	Map (1/50,000):		115/2	Coordinates X:		34°16'	Y:	S 00°05'
11	Sub-basin Code:		1EE	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Yala River			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)		160		
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population			(no)	3,600	6,100	8,600	
22	Residential Demand			(m3/d)	446	772	1,113	
23	Non-residential Demand			(m3/d)	75	126	178	
24	Livestock Demand			(m3/d)	11	17	25	
25	Industrial Demand			(m3/d)	171	316	455	
26	Total Demand			(m3/d)	703	1,231	1,771	
27	Area Served (estimated net)			(ha)	27	46	64	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Yala river			River No:		
31	Raw Water System:		H (m)=	100 L (m)=		8,000		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity			(m3/d)	543.0	528.5	539.2	1,610.6
37	Source Works			(US\$'000)	6.7	6.6	6.7	19.9
38	Pump Cost			(US\$'000)	3.4	3.4	3.4	10.2
39	Raw Water Main			(US\$'000)	345.2	344.0	344.9	1,034.0
40	Treatment			(US\$'000)	302.4	297.7	301.2	901.4
41	Storage			(US\$'000)	51.9	51.1	51.7	154.6
42	Distribution			(US\$'000)	215.1	149.4	149.4	513.8
43	Miscellaneous (20%)			(US\$'000)	184.9	170.4	171.4	526.8
44	Admi. & Engineering			(US\$'000)	111.0	102.2	102.9	316.1
45	Contingency			(US\$'000)	244.1	224.9	226.3	695.4
46	Total Cost			(US\$'000)	1,464.7	1,349.7	1,357.8	4,172.1
47	Cost per Capita			(US\$/c)	406.9	539.9	543.1	
48	Cost per ha			(US\$/ha)	54,480.1	72,292.1	72,725.8	
49	Cost per m3			(US\$/m3)	2.7	2.6	2.5	2.6
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs			(US\$'000)	73.2	67.5	67.9	
53	Capital Costs			(US\$'000)	150.9	139.0	139.9	
54	Total Annual Cost			(US\$'000)	224.1	206.5	207.7	
55	Unit Cost per m3			(US\$/m3)	1.1	1.1	1.1	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							



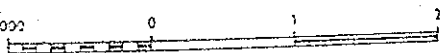
U-145

Bondo

R 632.4

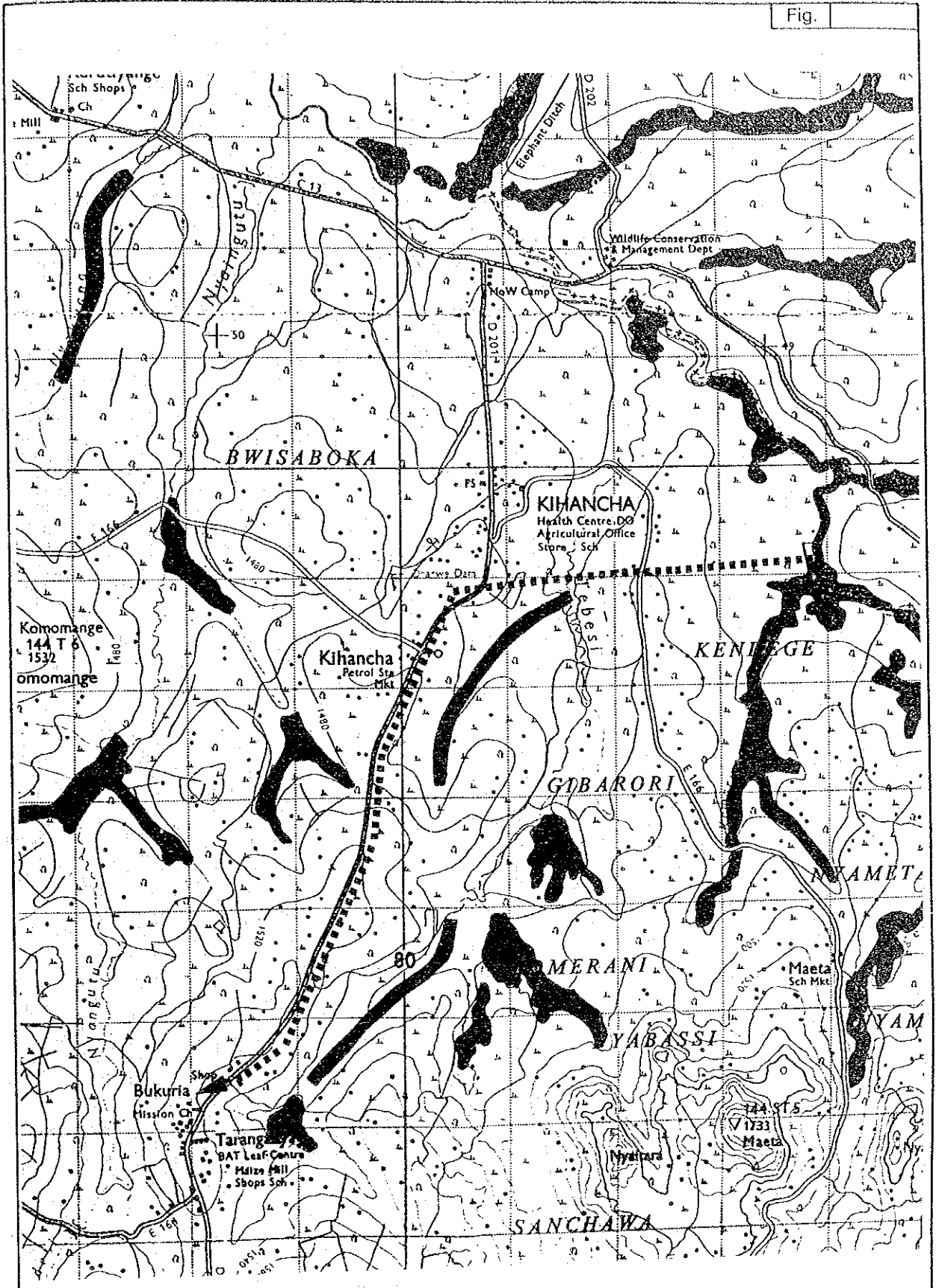
115/2 1FG

METRES 1000

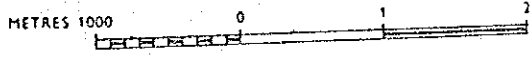


THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i	
2						National Water Master Plan			
3			URBAN WATER SUPPLY					Feb-92	
4	Code No.	640	U- 146			Rate		25.2	
5	-----								
6	Name of Urban:	Kehancha + Tarang'any; LGL Notice No:							
7	Organization:								
8	Per Capita GRDP in 1988 (guess):								
9	District:	South Nyan Locataion :	646.3			Bukira East			
10	Map (1/50,000) :	144/1	Coordinates X:		34°37'		Y:	S 01°10'	
11	Sub-basin Code:	1KC	Elevation (El. m):						
12	-----								
13	Existing Facilities								
14	Raw Water Source:	Orawe Dam				River No			
15	Raw Water System:	H (m)=	L (m)=						
16	Treatment:		Capacity (m3/d)			10			
17	Distribution System:								
18	-----								
19					1990	2000		2010	
20	-----								
21	Projected Population	(no)		3,800		7,000		9,800	
22	Residential Demand	(m3/d)		471		886		1,268	
23	Non-residential Demand	(m3/d)		79		144		201	
24	Livestock Demand	(m3/d)		5		8		12	
25	Industrial Demand	(m3/d)		0		0		0	
26	Total Demand	(m3/d)		555		1,038		1,481	
27	Area Served (estimated net)	(ha)		28		52		73	
28	-----								
29	Future Development Plan								
30	Raw Water Source:	Migori river				River No:			
31	Raw Water System:	H (m)=	120	L (m)=		10,800			
32	Treatment:								
33	Distribution System:								
34	-----								
35	Incremental Capital Cost			1990		2000		2010	Total
36	Incremental Capacity	(m3/d)		544.7		483.7		442.5	1,470.9
37	Source Works	(US\$'000)		6.7		6.1		5.7	18.6
38	Pump Cost	(US\$'000)		6.4		6.2		6.2	18.8
39	Raw Water Main	(US\$'000)		466.2		459.0		454.0	1,379.3
40	Treatment	(US\$'000)		303.0		282.8		268.6	854.4
41	Storage	(US\$'000)		52.0		48.4		45.9	146.3
42	Distribution	(US\$'000)		227.0		191.2		167.3	585.5
43	Miscellaneous (20%)	(US\$'000)		212.3		198.8		189.5	600.6
44	Admi. & Engineering	(US\$'000)		127.4		119.3		113.7	360.3
45	Contingency	(US\$'000)		280.2		262.4		250.2	792.8
46	Total Cost	(US\$'000)		1,681.1		1,574.2		1,501.2	4,756.5
47	Cost per Capita	(US\$/c)		442.4		492.0		536.1	
48	Cost per ha	(US\$/ha)		59,240.5		65,875.2		71,790.4	
49	Cost per m3	(US\$/m3)		3.1		3.3		3.4	3.2
50	-----								
51	Present Value of Water at DF=10 %			1990		2000		2010	Total
52	Direct O & M Costs	(US\$'000)		84.1		78.7		75.1	
53	Capital Costs	(US\$'000)		173.2		162.1		154.6	
54	Total Annual Cost	(US\$'000)		257.2		240.9		229.7	
55	Unit Cost per m3	(US\$/m3)		1.3		1.4		1.4	
56	-----								
57	Remarks:								
58									
59									
60									
61									
62									
63	-----								

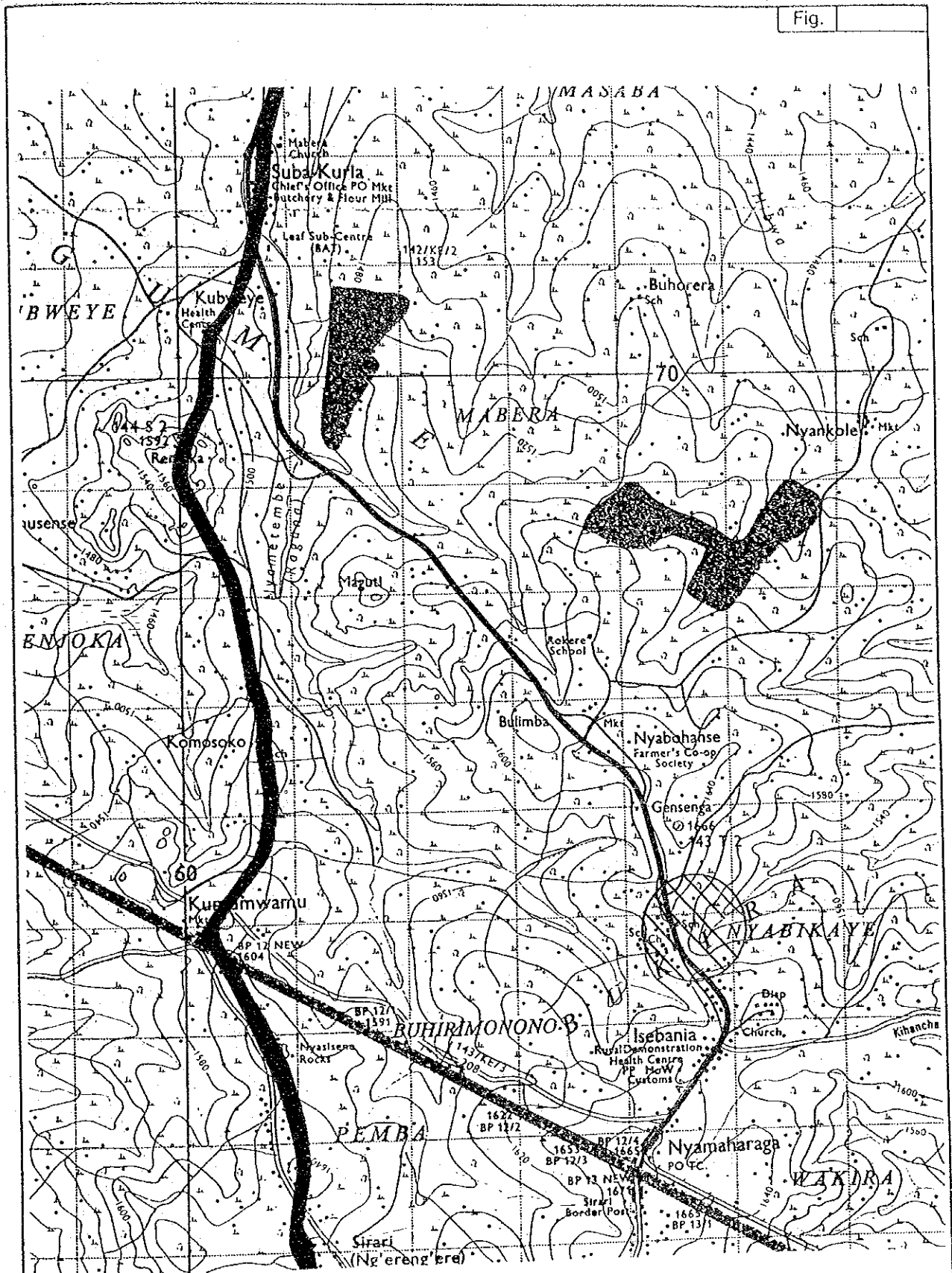


U- 146 Kehancha+Tarang'anya R 646.3 144/1 1KC



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i	
2						National Water Master Plan			
3			URBAN WATER SUPPLY					Jul-92	
4	Code No.	640	U- 147			Rate		25.2	
5	-----								
6	Name of Urban:		Nyabikaye		LGL Notice No:				
7	Organization:								
8	Per Capita GRDP in 1988 (guess):								
9	District:		South Nyan Locataion :		646.8		Bugembe West		
10	Map (1/50,000) :		143/2	Coordinates X:		34°29'	Y:	S 01°14'	
11	Sub-basin Code:		1KC	Elevation (El. m):					
12	-----								
13	Existing Facilities								
14	Raw Water Source:		Stream			River No			
15	Raw Water System:		H (m)=		L (m)=				
16	Treatment:				Capacity (m3/d)				
17	Distribution System:								
18	-----								
19						1990	2000	2010	
20	-----								
21	Projected Population		(no)			3,600	6,600	9,300	
22	Residential Demand		(m3/d)			446	836	1,203	
23	Non-residential Demand		(m3/d)			75	136	191	
24	Livestock Demand		(m3/d)			4	8	11	
25	Industrial Demand		(m3/d)			0	0	0	
26	Total Demand		(m3/d)			525	980	1,405	
27	Area Served (estimated net)		(ha)			27	49	69	
28	-----								
29	Future Development Plan								
30	Raw Water Source:		Boreholes				River No:		
31	Raw Water System:		H (m)=		L (m)=		267,000		
32	Treatment:								
33	Distribution System:								
34	-----								
35	Incremental Capital Cost					1990	2000	2010	Total
36	Incremental Capacity		(m3/d)			525.0	454.8	425.5	1,405.2
37	Source Works		(US\$'000)			2,304.2	1,996.2	1,867.5	6,167.9
38	Pump Cost		(US\$'000)			0.0	0.0	0.0	0.0
39	Raw Water Main		(US\$'000)			3,518.4	3,030.3	2,827.7	9,376.5
40	Treatment		(US\$'000)			296.6	272.9	262.5	832.0
41	Storage		(US\$'000)			50.9	46.7	44.8	87.9
42	Distribution		(US\$'000)			215.1	179.2	161.3	555.6
43	Miscellaneous (20%)		(US\$'000)			1,277.0	1,105.1	1,032.8	3,414.9
44	Admi. & Engineering		(US\$'000)			766.2	663.0	619.7	2,048.9
45	Contingency		(US\$'000)			1,685.7	1,458.7	1,363.3	4,507.6
46	Total Cost		(US\$'000)			10,114.1	8,752.1	8,179.6	27,045.8
47	Cost per Capita		(US\$/c)			2,809.5	2,917.4	3,029.5	
48	Cost per ha		(US\$/ha)			376,205.0	390,652.5	405,662.2	
49	Cost per m3		(US\$/m3)			19.3	19.2	19.2	19.2
50	-----								
51	Present Value of Water at DF=10 %					1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)			505.7	437.6	409.0	
53	Capital Costs		(US\$'000)			1,041.8	901.5	842.5	
54	Total Annual Cost		(US\$'000)			1,547.5	1,339.1	1,251.5	
55	Unit Cost per m3		(US\$/m3)			8.1	8.1	8.1	
56	-----								
57	Remarks:	Alternatively water could be conveyed from the proposed Kihancha - Taranganya system (by pump-up).							
58									
59									
60									
61									
62									
63	-----								

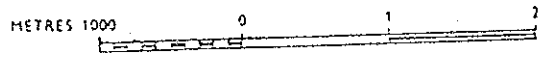


U- 147 Nyabikaya

R 646.8

143/2

2GD

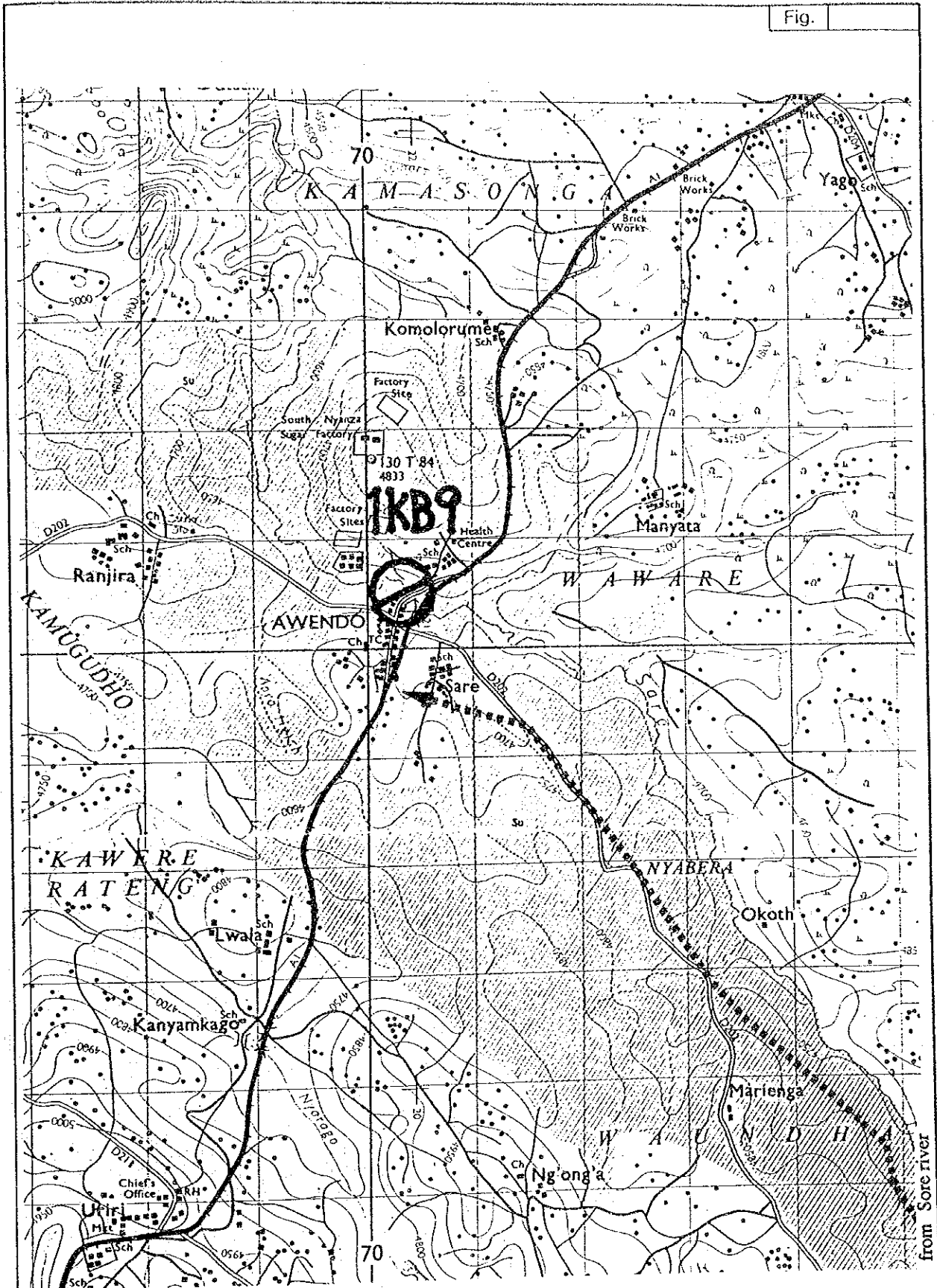


THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i	
2						National Water Master Plan			
3					URBAN WATER SUPPLY			Feb-92	
4	Code No.	640	U- 148			Rate		25.2	
5	-----								
6	Name of Urban:		Oyugis		LGL Notice No:				
7	Organization:								
8	Per Capita GRDP in 1988 (guess):								
9	District:		South Nyan Locataion :		647.4		Central Kasipul		
10	Map (1/50,000) :		130/1	Coordinates X:		34°46'	Y:	S 00°28'	
11	Sub-basin Code:		1HD	Elevation (El. m):					
12	-----								
13	Existing Facilities								
14	Raw Water Source:		Awachi River			River No			
15	Raw Water System:		H (m)=	L (m)=					
16	Treatment:			Capacity (m3/d)		200			
17	Distribution System:								
18	-----								
19						1990	2000	2010	
20	-----								
21	Projected Population		(no)		3,800	7,000	9,800		
22	Residential Demand		(m3/d)		471	886	1,268		
23	Non-residential Demand		(m3/d)		79	144	201		
24	Livestock Demand		(m3/d)		5	8	12		
25	Industrial Demand		(m3/d)		69	117	148		
26	Total Demand		(m3/d)		624	1,155	1,629		
27	Area Served (estimated net)		(ha)		28	52	73		
28	-----								
29	Future Development Plan								
30	Raw Water Source:		Isanta river(Awach Tende)			River No:			
31	Raw Water System:		H (m)=	0 L (m)=		11,300			
32	Treatment:								
33	Distribution System:								
34	-----								
35	Incremental Capital Cost					1990	2000	2010	Total
36	Incremental Capacity		(m3/d)			423.7	531.7	473.5	1,428.9
37	Source Works		(US\$'000)			97.6	6.6	6.0	110.2
38	Pump Cost		(US\$'000)			0.0	0.0	0.0	0.0
39	Raw Water Main		(US\$'000)			472.5	486.2	479.0	1,437.8
40	Treatment		(US\$'000)			261.9	298.8	279.4	840.0
41	Storage		(US\$'000)			44.7	51.2	47.8	143.8
42	Distribution		(US\$'000)			227.0	191.2	167.3	585.5
43	Miscellaneous (20%)		(US\$'000)			220.7	206.8	195.9	623.4
44	Admi. & Engineering		(US\$'000)			132.4	124.1	117.5	374.1
45	Contingency		(US\$'000)			291.4	273.0	258.6	822.9
46	Total Cost		(US\$'000)			1,748.2	1,637.9	1,551.6	4,937.7
47	Cost per Capita		(US\$/c)			460.1	511.8	554.1	
48	Cost per ha		(US\$/ha)			61,604.7	68,537.6	74,202.3	
49	Cost per m3		(US\$/m3)			4.1	3.1	3.3	3.5
50	-----								
51	Present Value of Water at DF=10 %					1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)			87.4	81.9	77.6	
53	Capital Costs		(US\$'000)			180.1	168.7	159.8	
54	Total Annual Cost		(US\$'000)			267.5	250.6	237.4	
55	Unit Cost per m3		(US\$/m3)			1.7	1.3	1.4	
56	-----								
57	Remarks:		Source works will include the construction of a small dam.						
58			Alternatively groundwater development should also be considered.						
59									
60									
61									
62									
63	-----								

a	b	c	d	e	f	g	h	i
2						National Water Master Plan		
3			URBAN WATER SUPPLY					Jul-92
4	Code No.	640	U- 149			Rate		25.2
5	-----							
6	Name of Urban:		Awendo/Sare		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		South Nyan Locataion :	649.4		South Sakwa		
10	Map (1/50,000) :		130/3	Coordinates X:		34°32'	Y:	S 00°54'
11	Sub-basin Code:		1KB	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Sare River			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)				
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population	(no)			4,300	7,900	11,000	
22	Residential Demand	(m3/d)			533	1,000	1,423	
23	Non-residential Demand	(m3/d)			89	163	228	
24	Livestock Demand	(m3/d)			5	9	13	
25	Industrial Demand	(m3/d)			455	843	1,213	
26	Total Demand	(m3/d)			1,082	2,015	2,877	
27	Area Served (estimated net)	(ha)			32	59	82	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Sare river			River No:		
31	Raw Water System:		H (m)=	0 L (m)=		8,300		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity	(m3/d)			1,081.7	933.7	861.8	2,877.1
37	Source Works	(US\$'000)			11.2	10.1	9.5	30.8
38	Pump Cost	(US\$'000)			0.0	0.0	0.0	0.0
39	Raw Water Main	(US\$'000)			398.5	388.5	383.4	1,170.4
40	Treatment	(US\$'000)			445.3	410.8	392.9	1,249.0
41	Storage	(US\$'000)			76.7	70.8	67.7	215.1
42	Distribution	(US\$'000)			256.9	215.1	185.2	657.2
43	Miscellaneous (20%)	(US\$'000)			237.7	219.0	207.7	664.5
44	Admi. & Engineering	(US\$'000)			142.6	131.4	124.6	398.7
45	Contingency	(US\$'000)			313.8	289.1	274.2	877.1
46	Total Cost	(US\$'000)			1,882.7	1,734.7	1,645.3	5,262.7
47	Cost per Capita	(US\$/c)			437.8	481.9	530.7	
48	Cost per ha	(US\$/ha)			58,628.6	64,525.0	71,068.1	
49	Cost per m3	(US\$/m3)			1.7	1.9	1.9	1.8
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs	(US\$'000)			94.1	86.7	82.3	
53	Capital Costs	(US\$'000)			193.9	178.7	169.5	
54	Total Annual Cost	(US\$'000)			288.1	265.4	251.7	
55	Unit Cost per m3	(US\$/m3)			0.7	0.8	0.8	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							

Fig.

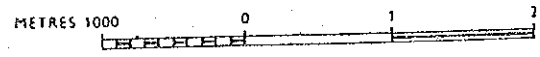


U- 149 Awendo

R 649.4

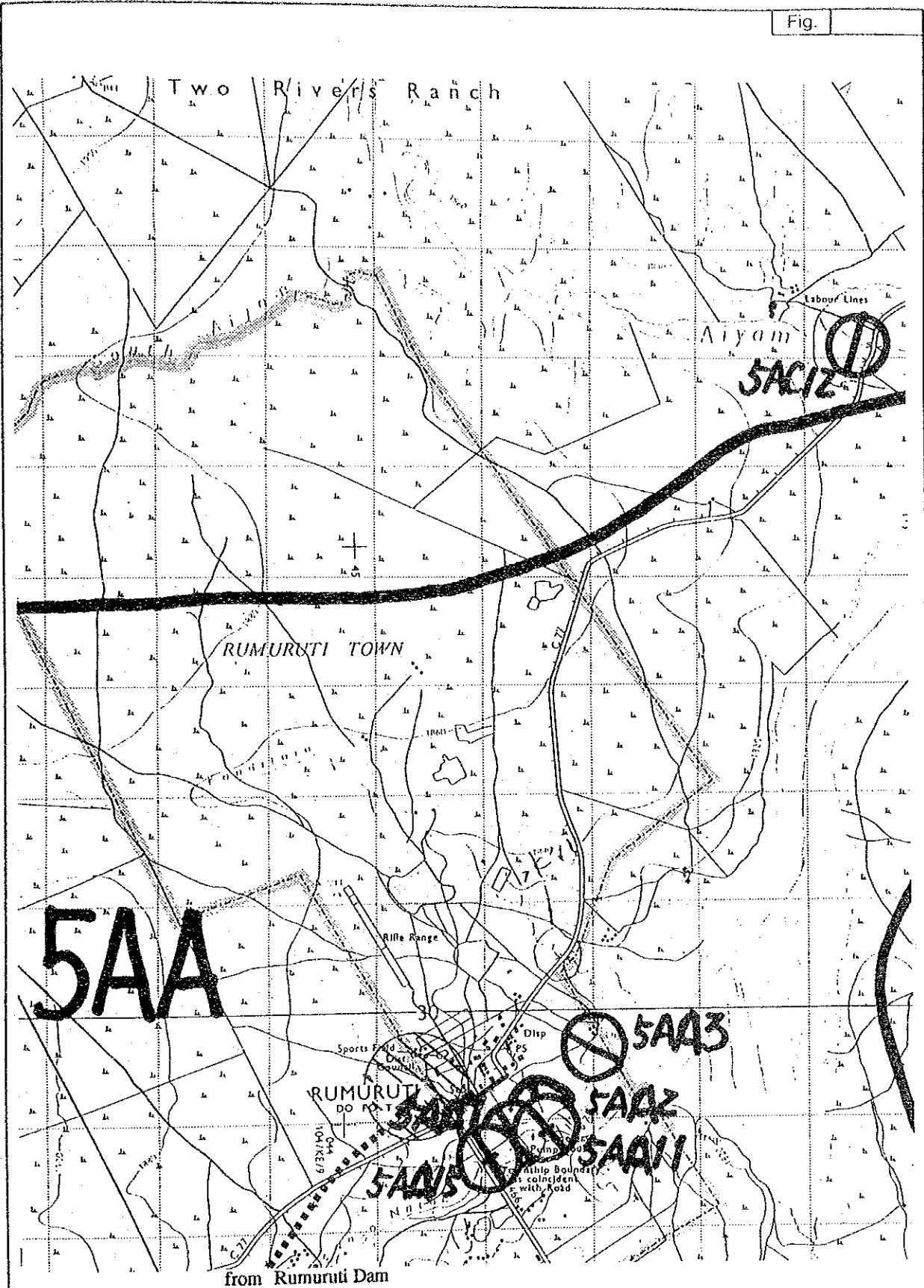
130/3

2GD

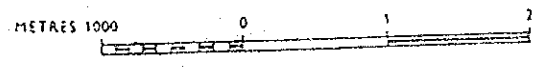


THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2						National Water Master Plan		
3			URBAN WATER SUPPLY					Jul-92
4	Code No.	730	U- 150			Rate		25.2
5	-----							
6	Name of Urban:		Rumuruti		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Laikipia	Locataion :	733.4		Rumuruti	
10	Map (1/50,000) :		106/1	Coordinates X:		36°31'	Y:	N 00°18'
11	Sub-basin Code:		5AA	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Ewaso Narok River			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)		90		
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population		(no)		2,400	5,100	8,200	
22	Residential Demand		(m3/d)		297	646	1,061	
23	Non-residential Demand		(m3/d)		50	105	170	
24	Livestock Demand		(m3/d)		24	53	117	
25	Industrial Demand		(m3/d)		114	211	303	
26	Total Demand		(m3/d)		485	1,015	1,651	
27	Area Served (estimated net)		(ha)		18	38	61	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Rumuruti Dam + Borehole			River No:		
31	Raw Water System:		H (m)=	0 L (m)=		120,000	4,400	
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		395.3	529.5	636.1	1,560.9
37	Source Works		(US\$'000)		3.1	3.9	4.5	11.5
38	Pump Cost		(US\$'000)		0.0	0.0	0.0	0.0
39	Raw Water Main		(US\$'000)		429.6	525.1	601.4	1,556.1
40	Treatment		(US\$'000)		251.4	298.1	331.1	880.6
41	Storage		(US\$'000)		42.9	51.1	56.9	150.9
42	Distribution		(US\$'000)		143.4	161.3	185.2	489.9
43	Miscellaneous (20%)		(US\$'000)		174.1	207.9	235.8	617.8
44	Admi. & Engineering		(US\$'000)		104.4	124.7	141.5	370.7
45	Contingency		(US\$'000)		229.8	274.4	311.3	815.5
46	Total Cost		(US\$'000)		1,378.7	1,646.6	1,867.7	4,893.0
47	Cost per Capita		(US\$/c)		574.5	609.8	602.5	
48	Cost per ha		(US\$/ha)		76,923.5	81,662.2	80,678.0	
49	Cost per m3		(US\$/m3)		3.5	3.1	2.9	3.1
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		68.9	82.3	93.4	
53	Capital Costs		(US\$'000)		142.0	169.6	192.4	
54	Total Annual Cost		(US\$'000)		210.9	251.9	285.8	
55	Unit Cost per m3		(US\$/m3)		1.5	1.3	1.2	
56	-----							
57	Remarks:	Boreholes and Rumuruti river are possible water sources for the urban centre. In this study,						
58		a combinational use of these two water sources in equal proportion was assumed.						
59		Source works cost does not include the cost of Rumuruti dam, which should be added separately						
60		(see Sectoral Report M).						
61								
62								
63	-----							



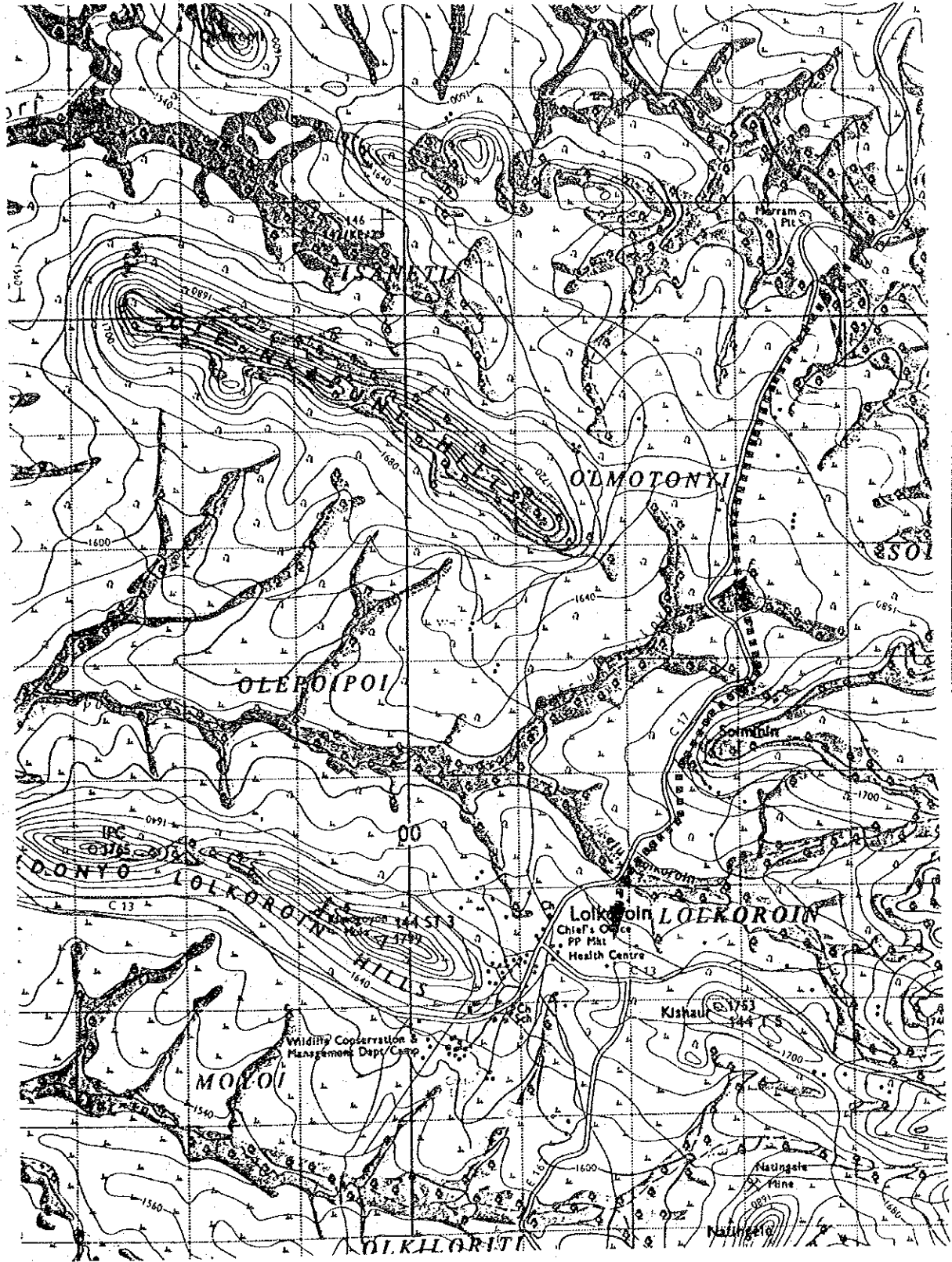
U- 150 Rumuruti R 733.4 106/1 SAC



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i	
2	National Water Master Plan								
3	URBAN WATER SUPPLY								
4	Code No. 750	U-151	Rate			Feb-92 25.2			
5	-----								
6	Name of Urban:	Kilgoris	LGL Notice No:						
7	Organization:								
8	Per Capita GRDP in 1988 (guess):								
9	District:	Narok	Locataion :	754.4	Uasin Gishu East				
10	Map (1/50,000) :	144/2	Coordinates X:	34°53'	Y:		S 01°00'		
11	Sub-basin Code:	IKC	Elevation (El. m):						
12	-----								
13	Existing Facilities								
14	Raw Water Source:	Poroko River			River No				
15	Raw Water System:	H (m)=	L (m)=						
16	Treatment:	Capacity (m3/d)			130				
17	Distribution System:								
18	-----								
19				1990	2000	2010			
20	-----								
21	Projected Population	(no)	3,300	9,300	16,200				
22	Residential Demand	(m3/d)	409	1,178	2,096				
23	Non-residential Demand	(m3/d)	68	191	335				
24	Livestock Demand	(m3/d)	64	157	255				
25	Industrial Demand	(m3/d)	0	0	0				
26	Total Demand	(m3/d)	541	1,526	2,686				
27	Area Served (estimated net)	(ha)	25	69	121				
28	-----								
29	Future Development Plan								
30	Raw Water Source:	Poroko river			River No:				
31	Raw Water System:	H (m)=	130 L (m)=		1,900				
32	Treatment:								
33	Distribution System:								
34	-----								
35	Incremental Capital Cost		1990	2000	2010	Total			
36	Incremental Capacity	(m3/d)	410.8	984.8	1,160.3	2,555.9			
37	Source Works	(US\$'000)	97.4	10.5	11.8	119.7			
38	Pump Cost	(US\$'000)	4.5	5.5	5.7	15.7			
39	Raw Water Main	(US\$'000)	79.2	89.7	92.4	261.3			
40	Treatment	(US\$'000)	257.1	423.0	462.5	1,142.7			
41	Storage	(US\$'000)	43.9	72.9	79.6	196.3			
42	Distribution	(US\$'000)	197.2	358.5	412.2	967.8			
43	Miscellaneous (20%)	(US\$'000)	135.9	192.0	212.9	540.7			
44	Admi. & Engineering	(US\$'000)	81.5	115.2	127.7	324.4			
45	Contingency	(US\$'000)	179.3	253.5	281.0	713.7			
46	Total Cost	(US\$'000)	1,076.0	1,520.7	1,685.8	4,282.5			
47	Cost per Capita	(US\$/c)	326.0	253.5	244.3				
48	Cost per ha	(US\$/ha)	43,659.8	33,938.6	32,716.1				
49	Cost per m3	(US\$/m3)	2.6	1.5	1.5	1.7			
50	-----								
51	Present Value of Water at DF=10 %		1990	2000	2010	Total			
52	Direct O & M Costs	(US\$'000)	53.8	76.0	84.3				
53	Capital Costs	(US\$'000)	110.8	156.6	173.6				
54	Total Annual Cost	(US\$'000)	164.6	232.7	257.9				
55	Unit Cost per m3	(US\$/m3)	1.1	0.6	0.6				
56	-----								
57	Remarks: Source works include the construction of a small dam.								
58									
59									
60									
61									
62									
63	-----								

a	b	c	d	e	f	g	h	i
2	National Water Master Plan							
3	URBAN WATER SUPPLY							
4	Code No.	750	U-152			Rate		Feb-92 25.2
5	-----							
6	Name of Urban:	Lolkorian		LGL Notice No:				
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:	Narok	Locataion :	755.1			Siria East	
10	Map (1/50,000) :	144/2	Coordinates X:		34°48'		Y:	S 01°13'
11	Sub-basin Code:	1KC	Elevation (El. m):					
12	-----							
13	Existing Facilities							
14	Raw Water Source:	Spring				River No		
15	Raw Water System:	H (m)=	L (m)=					
16	Treatment:	Capacity (m3/d)		70				
17	Distribution System:							
18	-----							
19				1990	2000	2010		
20	-----							
21	Projected Population		(no)	1,700	4,800	8,400		
22	Residential Demand		(m3/d)	211	608	1,087		
23	Non-residential Demand		(m3/d)	35	99	173		
24	Livestock Demand		(m3/d)	33	81	131		
25	Industrial Demand		(m3/d)	0	0	0		
26	Total Demand		(m3/d)	279	788	1,391		
27	Area Served (estimated nct)		(ha)	13	36	63		
28	-----							
29	Future Development Plan							
30	Raw Water Source:	Migori river				River No:		
31	Raw Water System:	H (m)=	160 L (m)=	7,200				
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost			1990	2000	2010	Total	
36	Incremental Capacity		(m3/d)	208.6	509.2	603.0	1,320.8	
37	Source Works		(US\$'000)	3.3	6.4	7.2	16.9	
38	Pump Cost		(US\$'000)	5.5	5.9	6.1	17.5	
39	Raw Water Main		(US\$'000)	279.9	308.1	315.2	903.1	
40	Treatment		(US\$'000)	171.6	291.4	321.2	784.2	
41	Storage		(US\$'000)	28.7	49.9	55.2	133.9	
42	Distribution		(US\$'000)	101.6	185.2	215.1	501.8	
43	Miscellaneous (20%)		(US\$'000)	118.1	169.4	184.0	471.5	
44	Admi. & Engineering		(US\$'000)	70.9	101.6	110.4	282.9	
45	Contingency		(US\$'000)	155.9	223.6	242.9	622.4	
46	Total Cost		(US\$'000)	935.5	1,341.5	1,457.2	3,734.2	
47	Cost per Capita		(US\$/c)	550.3	432.7	404.8		
48	Cost per ha		(US\$/ha)	73,688.7	57,946.9	54,201.4		
49	Cost per m3		(US\$/m3)	4.5	2.6	2.4	2.8	
50	-----							
51	Present Value of Water at DF=10 %			1990	2000	2010	Total	
52	Direct O & M Costs		(US\$'000)	46.8	67.1	72.9		
53	Capital Costs		(US\$'000)	96.4	138.2	150.1		
54	Total Annual Cost		(US\$'000)	143.1	205.3	222.9		
55	Unit Cost per m3		(US\$/m3)	1.9	1.1	1.0		
56	-----							
57	Remarks:	Water abstraction from Migori river is tentatively proposed above. Nevertheless, water exploitation						
58		by small dams on nearby streams and/or boreholes/shallow wells should also be searched.						
59								
60								
61								
62								
63	-----							

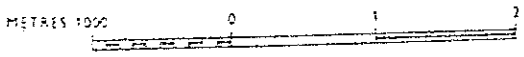


U- 152 Lolgorian

R 755.1

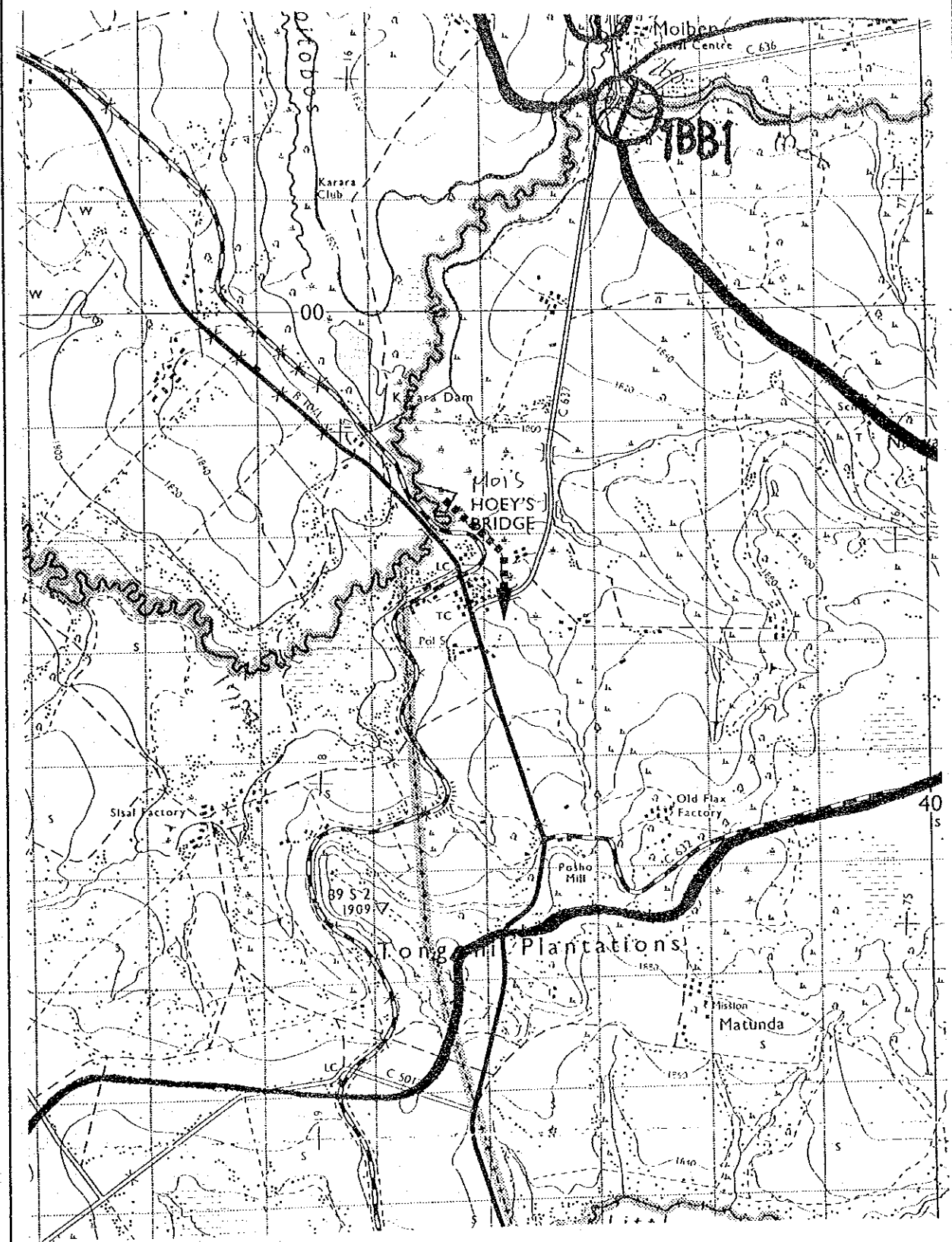
144/2

1KC

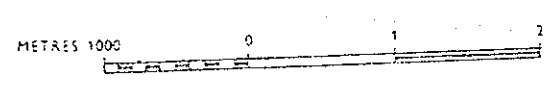


THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY.

a	b	c	d	e	f	g	h	i
2	National Water Master Plan							
3	URBAN WATER SUPPLY							
4	Code No. 770		U- 153			Rate		Feb-92 25.2
5	-----							
6	Name of Urban:		Moi's Bridge		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Uasin Gishu Locataion :		771.2		Moi's Bridge	
10	Map (1/50,000) :		89/1	Coordinates X:		35°08'	Y:	N 00°53'
11	Sub-basin Code:		1BE	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:		River			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)		26		
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population		(no)		3,100	6,400	10,100	
22	Residential Demand		(m3/d)		384	810	1,307	
23	Non-residential Demand		(m3/d)		64	131	209	
24	Livestock Demand		(m3/d)		16	34	61	
25	Industrial Demand		(m3/d)		0	0	0	
26	Total Demand		(m3/d)		464	975	1,577	
27	Area Served (estimated net)		(ha)		23	48	75	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Nzoia river			River No:		
31	Raw Water System:		H (m)=	40 L (m)=		1,500		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		438.0	511.4	601.3	1,550.7
37	Source Works		(US\$'000)		5.7	6.4	7.2	19.3
38	Pump Cost		(US\$'000)		1.9	1.9	2.1	5.9
39	Raw Water Main		(US\$'000)		63.0	64.2	65.6	192.8
40	Treatment		(US\$'000)		267.0	292.1	320.7	879.8
41	Storage		(US\$'000)		45.6	50.1	55.1	150.8
42	Distribution		(US\$'000)		185.2	197.2	221.1	603.4
43	Miscellaneous (20%)		(US\$'000)		113.7	122.4	134.4	370.4
44	Admi. & Engineering		(US\$'000)		68.2	73.4	80.6	222.2
45	Contingency		(US\$'000)		150.1	161.5	177.3	488.9
46	Total Cost		(US\$'000)		900.3	969.2	1,064.1	2,933.6
47	Cost per Capita		(US\$/c)		290.4	293.7	287.6	
48	Cost per ha		(US\$/ha)		38,890.0	39,328.4	38,510.5	
49	Cost per m3		(US\$/m3)		2.1	1.9	1.8	1.9
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		45.0	48.5	53.2	
53	Capital Costs		(US\$'000)		92.7	99.8	109.6	
54	Total Annual Cost		(US\$'000)		137.8	148.3	162.8	
55	Unit Cost per m3		(US\$/m3)		0.9	0.8	0.7	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							

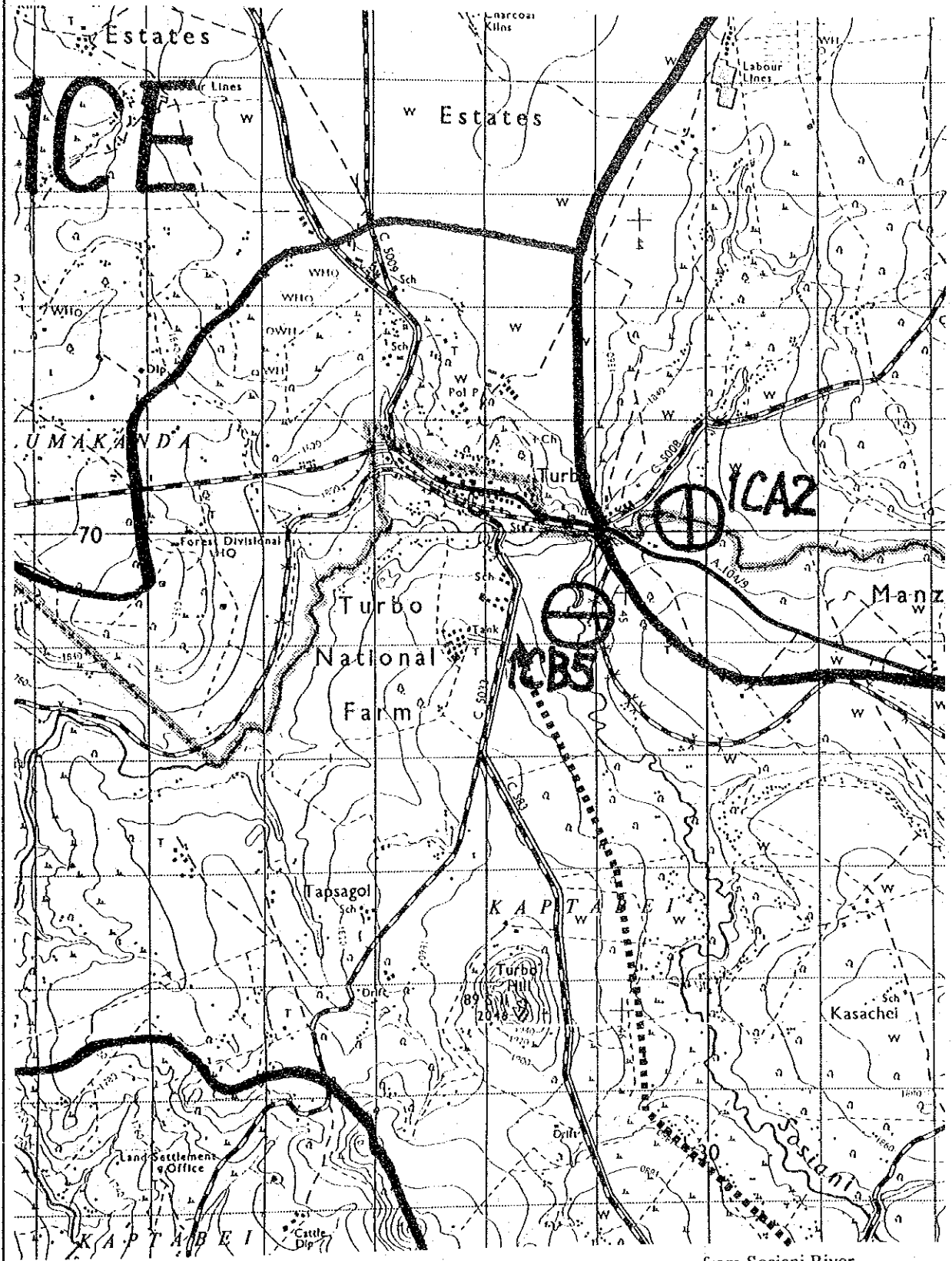


U- 153 Moi's Bridge R 771.2 89/1 1BE



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2						National Water Master Plan		
3			URBAN WATER SUPPLY					
4	Code No. 770		U- 154			Rate		Feb-92
5								25.2
6	Name of Urban:		Turbo			LGL Notice No:		
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Uasin Gishu Locataion :		772.4		Turbo West	
10	Map (1/50,000) :		89/3	Coordinates X:		35°04'	Y:	N 00°38'
11	Sub-basin Code:		1CB	Elevation (El. m):				
12								
13	Existing Facilities							
14	Raw Water Source:		River			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:			Capacity (m3/d)		150		
17	Distribution System:							
18								
19					1990	2000	2010	
20								
21	Projected Population		(no)		4,300	8,800	14,000	
22	Residential Demand		(m3/d)		533	1,114	1,811	
23	Non-residential Demand		(m3/d)		89	181	289	
24	Livestock Demand		(m3/d)		22	47	85	
25	Industrial Demand		(m3/d)		0	0	0	
26	Total Demand		(m3/d)		644	1,342	2,185	
27	Area Served (estimated net)		(ha)		32	66	105	
28								
29	Future Development Plan							
30	Raw Water Source:		Sosiani river			River No:		
31	Raw Water System:		H (m)=	0 L (m)=		10,500		
32	Treatment:							
33	Distribution System:							
34								
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		493.7	698.6	843.0	2,035.3
37	Source Works		(US\$'000)		6.2	8.1	9.3	23.6
38	Pump Cost		(US\$'000)		0.0	0.0	0.0	0.0
39	Raw Water Main		(US\$'000)		447.5	469.5	483.3	1,400.2
40	Treatment		(US\$'000)		286.2	349.3	388.1	1,023.6
41	Storage		(US\$'000)		49.0	60.1	66.9	176.0
42	Distribution		(US\$'000)		256.9	268.8	310.7	836.4
43	Miscellaneous (20%)		(US\$'000)		209.2	231.2	251.6	692.0
44	Admi. & Engineering		(US\$'000)		125.5	138.7	151.0	415.2
45	Contingency		(US\$'000)		276.1	305.1	332.2	913.4
46	Total Cost		(US\$'000)		1,656.6	1,830.7	1,993.1	5,480.4
47	Cost per Capita		(US\$/c)		385.3	406.8	383.3	
48	Cost per ha		(US\$/ha)		51,588.9	54,476.6	51,323.5	
49	Cost per m3		(US\$/m3)		3.4	2.6	2.4	2.7
50								
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		82.8	91.5	99.7	
53	Capital Costs		(US\$'000)		170.6	188.6	205.3	
54	Total Annual Cost		(US\$'000)		253.5	280.1	304.9	
55	Unit Cost per m3		(US\$/m3)		1.4	1.1	1.0	
56								
57	Remarks:							
58								
59								
60								
61								
62								
63								



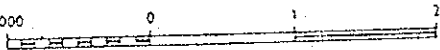
U- 154 Turbo

R 772.4

89/3

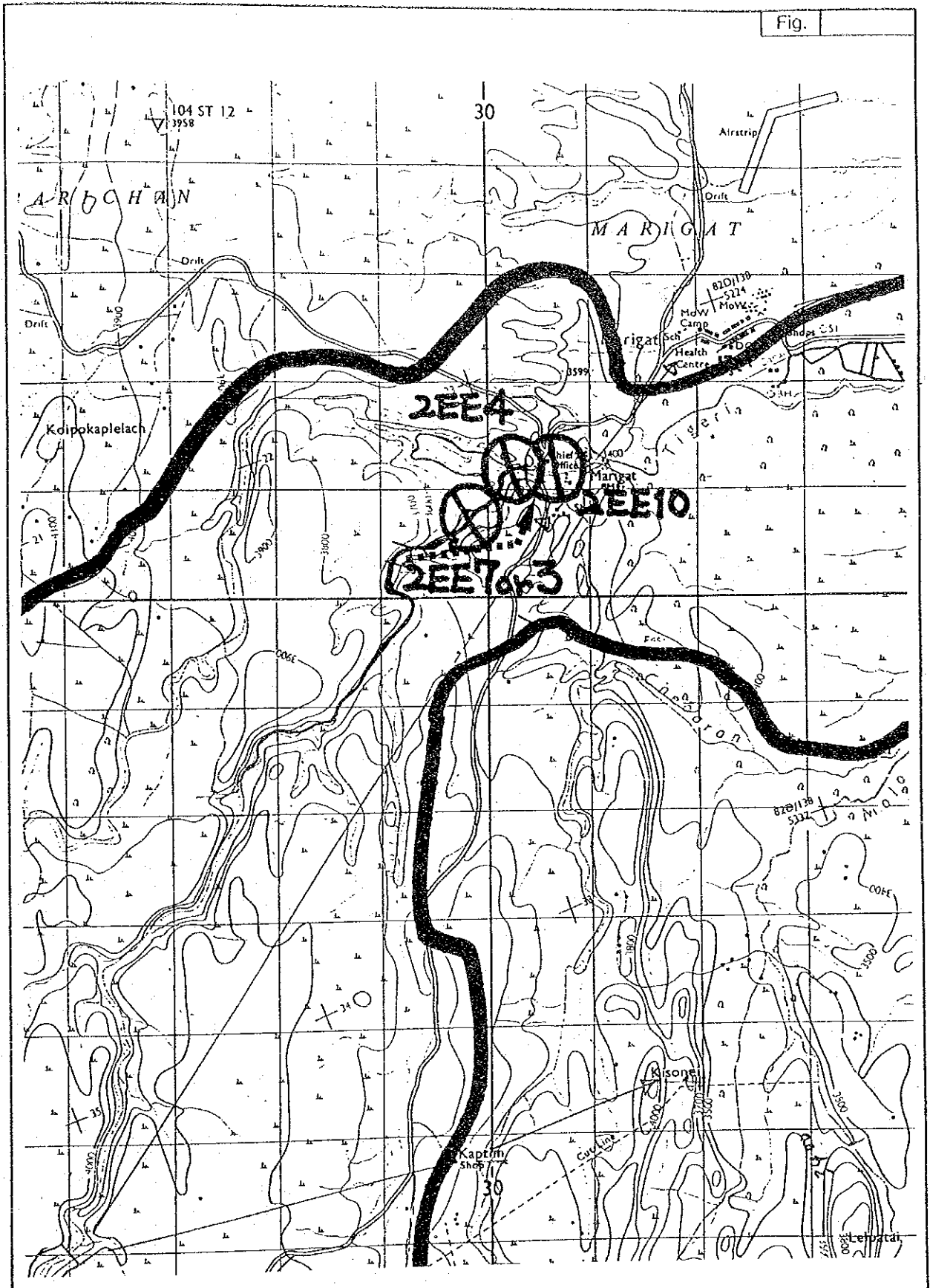
ICB

METRES 1000



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2					National Water Master Plan			
3			URBAN WATER SUPPLY					Feb-92
4	Code No.	810	U- 155			Rate		25.2
5	-----							
6	Name of Urban:		Marigat		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:	Baringo	Locataion :	816.2			Marigat	
10	Map (1/50,000) :	104/2	Coordinates X:			36°00'	Y:	N 00°29'
11	Sub-basin Code:	2EE	Elevation (El. m):					
12	-----							
13	Existing Facilities							
14	Raw Water Source:		Parkerra River/ Chemeron dam			River No		
15	Raw Water System:		H (m)=	L (m)=				
16	Treatment:		Capacity (m3/d)			173		
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population		(no)		3,000	5,700	8,600	
22	Residential Demand		(m3/d)		372	722	1,113	
23	Non-residential Demand		(m3/d)		62	117	178	
24	Livestock Demand		(m3/d)		17	30	46	
25	Industrial Demand		(m3/d)		1	2	3	
26	Total Demand		(m3/d)		452	871	1,340	
27	Area Served (estimated net)		(ha)		22	43	64	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Parkerra river				River No:	
31	Raw Water System:		H (m)=	0 L (m)=			1,700	
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		278.6	419.1	468.9	1,166.6
37	Source Works		(US\$'000)		4.1	5.5	6.0	15.6
38	Pump Cost		(US\$'000)		0.0	0.0	0.0	0.0
39	Raw Water Main		(US\$'000)		67.9	71.0	72.0	210.9
40	Treatment		(US\$'000)		204.3	260.2	277.8	742.3
41	Storage		(US\$'000)		34.5	44.4	47.5	126.5
42	Distribution		(US\$'000)		179.2	161.3	173.3	513.8
43	Miscellaneous (20%)		(US\$'000)		98.0	108.5	115.3	321.8
44	Admi. & Engineering		(US\$'000)		58.8	65.1	69.2	193.1
45	Contingency		(US\$'000)		129.4	143.2	152.2	424.8
46	Total Cost		(US\$'000)		776.2	859.2	913.3	2,548.7
47	Cost per Capita		(US\$/c)		258.7	318.2	314.9	
48	Cost per ha		(US\$/ha)		34,645.7	42,612.4	42,169.3	
49	Cost per m3		(US\$/m3)		2.8	2.0	1.9	2.2
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		38.8	43.0	45.7	
53	Capital Costs		(US\$'000)		79.9	88.5	94.1	
54	Total Annual Cost		(US\$'000)		118.8	131.5	139.7	
55	Unit Cost per m3		(US\$/m3)		1.2	0.9	0.8	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							

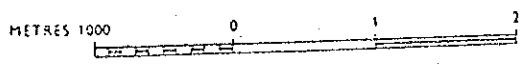


U- 155 Marigat

R 816.2

104/2

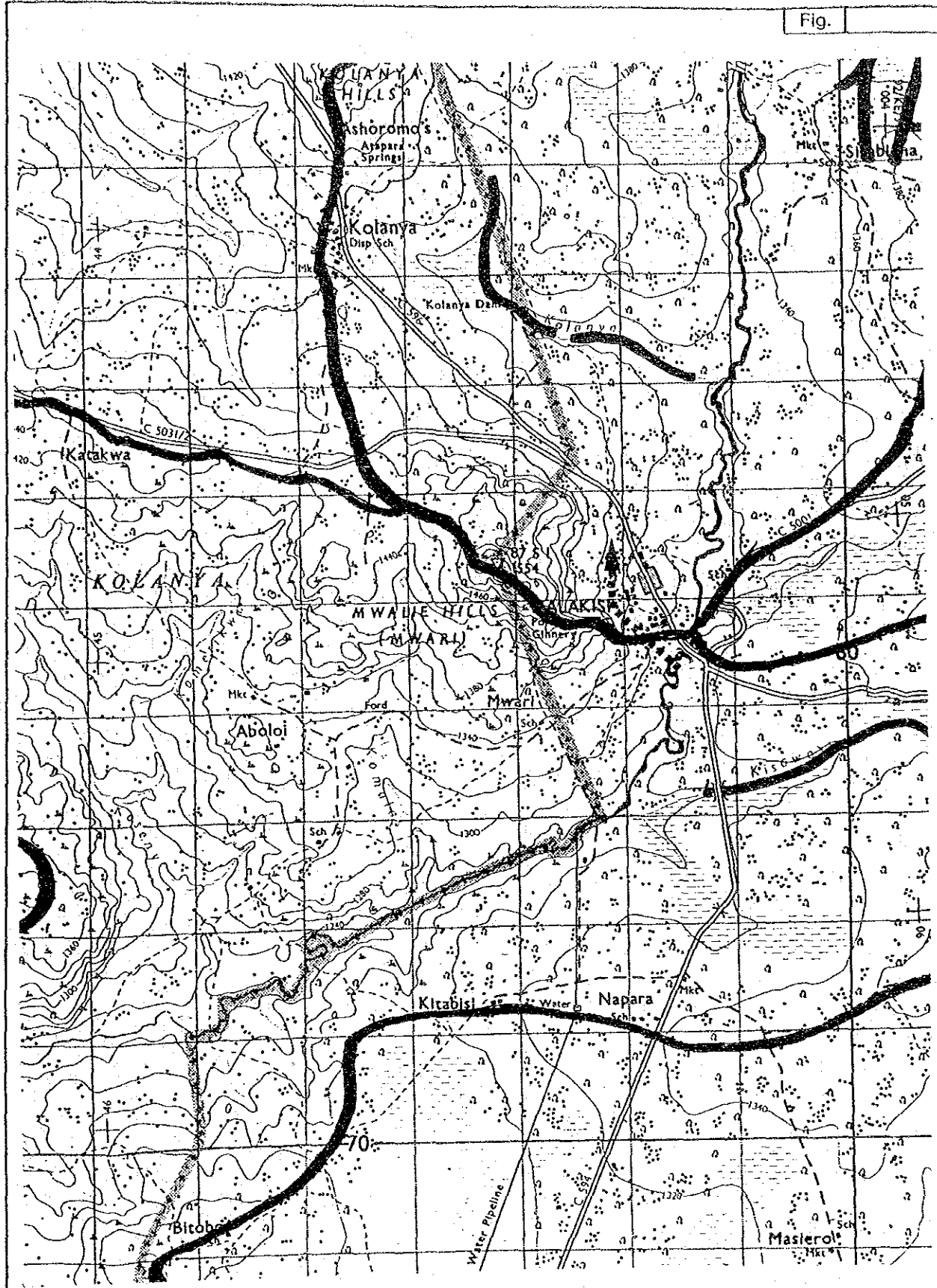
2EH



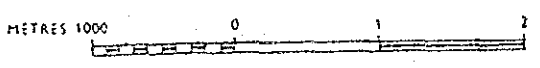
THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2					National Water Master Plan			
3			URBAN WATER SUPPLY					Feb-92
4	Code No.	910	U-156			Rate		25.2
5	-----							
6	Name of Urban:	Mawalie + Malakisi		LGL Notice No:				
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:	Bugoma	Locataion :	911.4		Malakisi		
10	Map (1/50,000):	87/4	Coordinates X:		34°27'		Y:	N 00°42'
11	Sub-basin Code:	1AB	Elevation (El. m):					
12	-----							
13	Existing Facilities							
14	Raw Water Source:				River No			
15	Raw Water System:	H (m)=	L (m)=					
16	Treatment:	Capacity (m3/d)						
17	Distribution System:							
18	-----							
19				1990	2000	2010		
20	-----							
21	Projected Population		(no)	3,200	7,100	10,700		
22	Residential Demand		(m3/d)	396	899	1,384		
23	Non-residential Demand		(m3/d)	54	146	222		
24	Livestock Demand		(m3/d)	6	15	23		
25	Industrial Demand		(m3/d)	171	316	455		
26	Total Demand		(m3/d)	627	1,376	2,084		
27	Area Served (estimated net)		(ha)	24	53	80		
28	-----							
29	Future Development Plan							
30	Raw Water Source:	Malikisi river			River No:			
31	Raw Water System:	H (m)=	60 L (m)=	1,500				
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost			1990	2000	2010	Total	
36	Incremental Capacity		(m3/d)	627.4	748.6	708.3	2,084.3	
37	Source Works		(US\$'000)	7.5	8.5	8.2	24.2	
38	Pump Cost		(US\$'000)	2.3	2.8	2.7	7.8	
39	Raw Water Main		(US\$'000)	66.0	67.8	67.2	201.0	
40	Treatment		(US\$'000)	328.6	363.2	352.0	1,043.7	
41	Storage		(US\$'000)	56.5	62.5	60.6	179.6	
42	Distribution		(US\$'000)	191.2	233.0	215.1	639.3	
43	Miscellaneous (20%)		(US\$'000)	130.4	147.6	141.1	419.1	
44	Admi. & Engineecring		(US\$'000)	78.2	88.5	84.7	251.5	
45	Contingency		(US\$'000)	172.1	194.8	186.3	553.2	
46	Total Cost		(US\$'000)	1,032.8	1,168.6	1,117.9	3,319.3	
47	Cost per Capita		(US\$/c)	322.7	299.7	310.5		
48	Cost per ha		(US\$/ha)	43,217.1	40,125.0	41,579.6		
49	Cost per m3		(US\$/m3)	1.6	1.6	1.6	1.6	
50	-----							
51	Present Value of Water at DF=10 %			1990	2000	2010	Total	
52	Direct O & M Costs		(US\$'000)	51.6	58.4	55.9		
53	Capital Costs		(US\$'000)	106.4	120.4	115.1		
54	Total Annual Cost		(US\$'000)	158.0	178.8	171.0		
55	Unit Cost per m3		(US\$/m3)	0.7	0.7	0.7		
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							

Fig.



U- 156 Mwalie + Malakisi R 911.4 87/4 IAB



THE STUDY
ON
THE NATIONAL WATER MASTER PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY

a	b	c	d	e	f	g	h	i
2					National Water Master Plan			
3			URBAN WATER SUPPLY					Feb-92
4	Code No.	910	U- 157			Rate		25.2
5	-----							
6	Name of Urban:		Chaptais		LGL Notice No:			
7	Organization:							
8	Per Capita GRDP in 1988 (guess):							
9	District:		Bungoma	Locataion :	916.1		Cheptais	
10	Map (1/50,000) :		87/2	Coordinates X:		34°29'	Y:	N 00°50'
11	Sub-basin Code:		1AA	Elevation (El. m):				
12	-----							
13	Existing Facilities							
14	Raw Water Source:					River No		
15	Raw Water System:		H (m)=		L (m)=			
16	Treatment:			Capacity (m3/d)				
17	Distribution System:							
18	-----							
19					1990	2000	2010	
20	-----							
21	Projected Population		(no)		2,800	6,500	10,000	
22	Residential Demand		(m3/d)		347	823	1,294	
23	Non-residential Demand		(m3/d)		58	134	207	
24	Livestock Demand		(m3/d)		6	14	22	
25	Industrial Demand		(m3/d)		57	105	152	
26	Total Demand		(m3/d)		468	1,076	1,675	
27	Area Served (estimated net)		(ha)		21	49	75	
28	-----							
29	Future Development Plan							
30	Raw Water Source:		Sasuri river			River No:		
31	Raw Water System:		H (m)=	20 L (m)=		0		
32	Treatment:							
33	Distribution System:							
34	-----							
35	Incremental Capital Cost				1990	2000	2010	Total
36	Incremental Capacity		(m3/d)		467.9	608.2	598.7	1,674.8
37	Source Works		(US\$'000)		6.0	7.3	7.2	20.5
38	Pump Cost		(US\$'000)		1.3	1.5	1.5	4.3
39	Raw Water Main		(US\$'000)		0.0	0.0	0.0	0.0
40	Treatment		(US\$'000)		277.4	322.8	319.9	920.1
41	Storage		(US\$'000)		47.5	55.5	55.0	95.9
42	Distribution		(US\$'000)		167.3	221.1	209.1	597.4
43	Miscellaneous (20%)		(US\$'000)		99.9	121.6	118.5	340.0
44	Admi. & Engineering		(US\$'000)		59.9	73.0	71.1	204.0
45	Contingency		(US\$'000)		131.9	160.5	156.5	448.9
46	Total Cost		(US\$'000)		791.2	963.2	938.7	2,693.1
47	Cost per Capita		(US\$/c)		282.6	260.3	268.2	
48	Cost per ha		(US\$/ha)		37,837.1	34,859.3	35,915.2	
49	Cost per m3		(US\$/m3)		1.7	1.6	1.6	1.6
50	-----							
51	Present Value of Water at DF=10 %				1990	2000	2010	Total
52	Direct O & M Costs		(US\$'000)		39.6	48.2	46.9	
53	Capital Costs		(US\$'000)		81.5	99.2	96.7	
54	Total Annual Cost		(US\$'000)		121.1	147.4	143.6	
55	Unit Cost per m3		(US\$/m3)		0.7	0.7	0.7	
56	-----							
57	Remarks:							
58								
59								
60								
61								
62								
63	-----							

