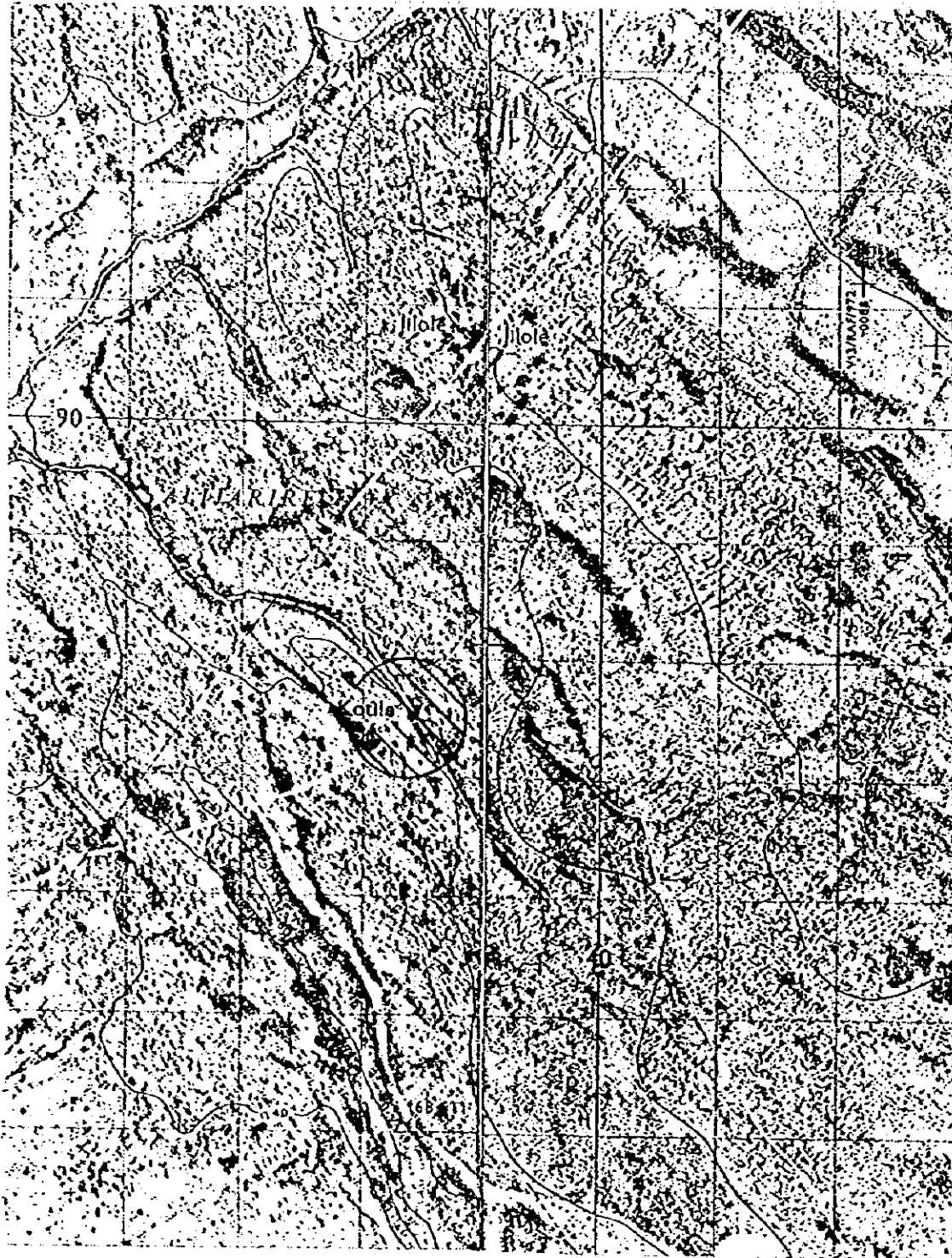
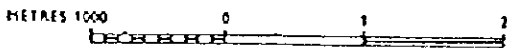


Fig.



Kotile



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

**MASALANI (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Masalani*  
 Organisation/Water Undertaker : *Community*  
 District : *Garissa* Location : *Masalani*  
 Map (1/50,000) Ref. no : *168/1* Co-ordinates X : *40° 10' E* Y : *01° 43' S*  
 Drainage Sub-basin : *4GF*

**Existing facilities**

Source : *Tana River* Type of Intake *Pontoon* Elevation : *50 m*  
 Raw water system : *Pumping - 1N.H : 10 m* Dia : *80 mm*  
 Treatment Process : *Composite filter @ 60m<sup>3</sup>/hr.*  
*Coagulation, Flocculation, Sedimentation, Filtration, Disinfection.*  
*No chemical dosage carried out at present. Due to poor state of the Composite Filtration Unit and lack of dosage, untreated water is supplied to the residents.*

Designed Capacity : *720 m<sup>3</sup>/d*

Treated water/Distribution system - Area covered : *3.5 km<sup>2</sup>*  
 Distribution mains (80mm and above): *50 mm*  
 Total length : *1.0 km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : Working Meters:  
 Metered :  
 Unmetered :

Water production : *480 m<sup>3</sup>/d*

Remark :

Service area population : *8,000*

Population served :

**Financial/Revenue**

O & M costs :Kshs

Revenue earned :Kshs

Revenue collected :Kshs

**Rehabilitation required/costs**

	Kshs
i) <i>Rehabilitation of the 20m<sup>3</sup>/hr composite filtration unit</i>	<i>4,000,000</i>
ii) <i>Replacement of distribution network</i>	<i>900,000</i>
iii)	
iv)	
v)	
vi)	
Total estimated cost	<i>4,900,000</i>

**Future development plan**

Source : *Tana River & Boreholes*

Treatment : Capacity : *m<sup>3</sup>/d*

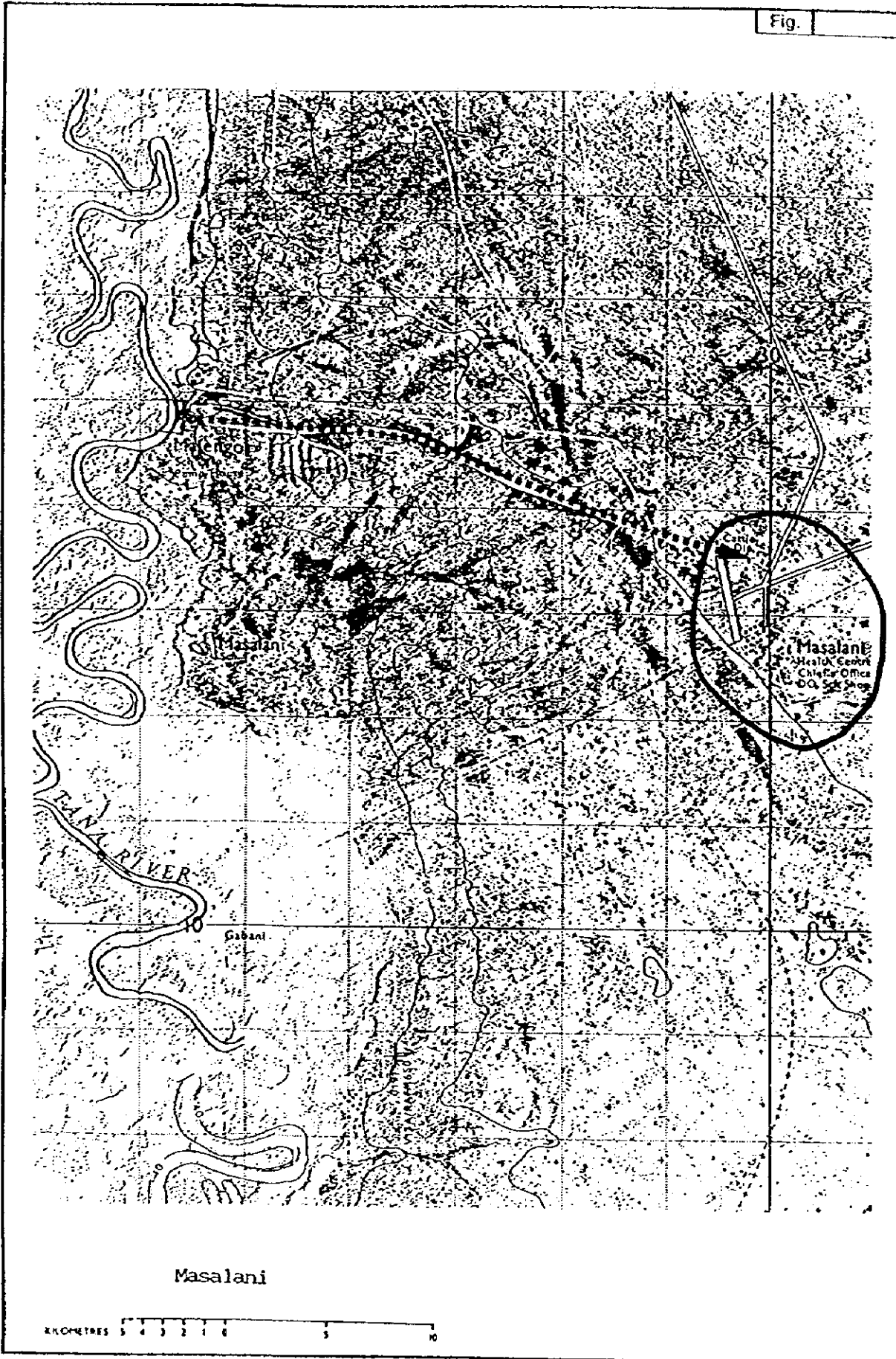
Design year :

Design population :

**Remarks**

*The scheme was constructed in 1968 and since then no rehabilitation of the components carried out. At present, the composite filtration unit is in very poor condition, producing untreated water for distribution. The distribution network is old and prone to frequent breakdowns. The hospital too is being supplied with untreated raw water.*

Fig.



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

**GARISSA (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Garissa*  
 Organisation/Water Undertaker : *Ministry of Water Resources*  
 District : *Garissa* Location : *Sankuri*  
 Map (1/50,000) Ref. no : *126/3* Co-ordinates X : *39° 39' E* Y : *00° 26' S*  
 Drainage Sub-basin : *4GC*

**Existing facilities**

Source : *Tana River* Type of Intake *Pontoon* Elevation : *148 m*  
 Raw water system : *Pumping* H : *10 m* Dia : *150 mm*  
 Treatment Process : *Full Treatment*

2 No. Treatment systems: 1) *Conventional, but with hopper bottom sedimentation and rapid filtration basins.*  
 2) *Composite Filter. The hopper bottom system is facing recurrent breakdowns and untreated water is pumped into the distribution. Chlorine and Alum are dosed at rates of 7kg/d and 200 kg/d respectively.*

**Designed Capacity :**

Treated water/Distribution system - Area covered : *35 km<sup>2</sup>*  
 Distribution mains (80mm and above): *mm to mm*  
 Total length : *km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : *2867*

Metered : *958*

Unmetered : *1909*

Water production : *1440 m<sup>3</sup>/d*

Service area population : *57,930*

Population served : *34,758*

Working Meters:

Remark *Only about 60% of the population are served by the Garissa W/S. The rest rely on private boreholes or alternative*

**Financial/Revenue**

O & M costs : *Kshs 5,200,000 (1996)*

Revenue earned : *Kshs 2,900,000 (1996)*

Revenue collected : *Kshs 2,400,000 (1996)*

**Rehabilitation required/costs**

	Kshs
i) <i>Replacement of filter media</i>	<i>500,000</i>
ii) <i>Desludging of clear water sumps</i>	<i>100,000</i>
iii) <i>Chemical Store and Pump House re-flooring</i>	<i>150,000</i>
iv)	
v)	
vi)	
<b>Total estimated cost</b>	<b><i>750,000</i></b>

**Future development plan**

Source : *Tana River*

Treatment *Full conventional* Capacity : *m<sup>3</sup>/d*

Design year *treatment*

Design population :

**Remarks**

*The stalled so-called Adler project needs to be revitalised upto completion. This will ensure sufficient supply to Garissa and environs. The project stalled due to financial constraints and the site is currently covered with overgrown vegetation. 30% of the works have been constructed to date. Due to high demand and inefficient filtration units, untreated water is fed into the distribution network.*

Fig.

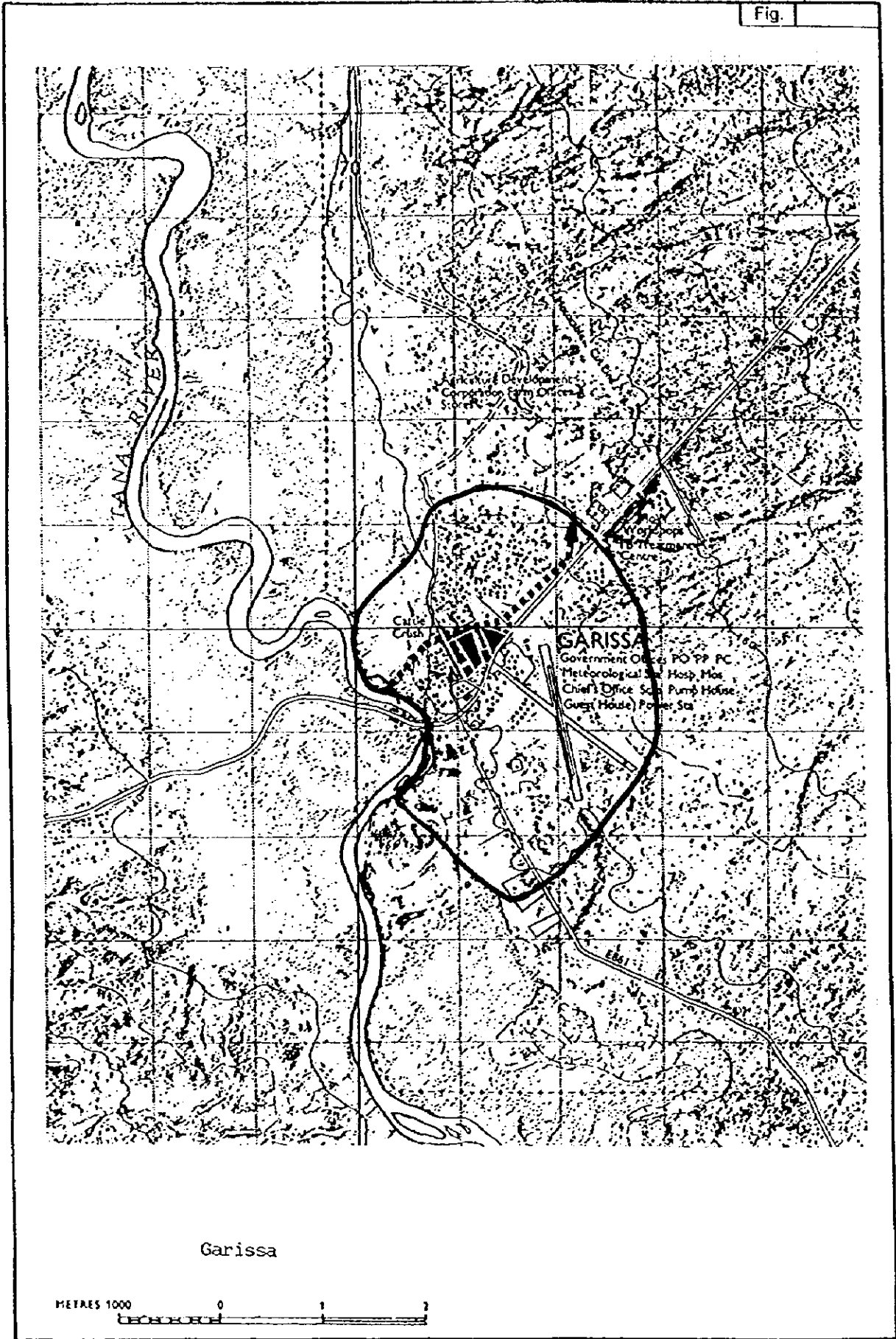
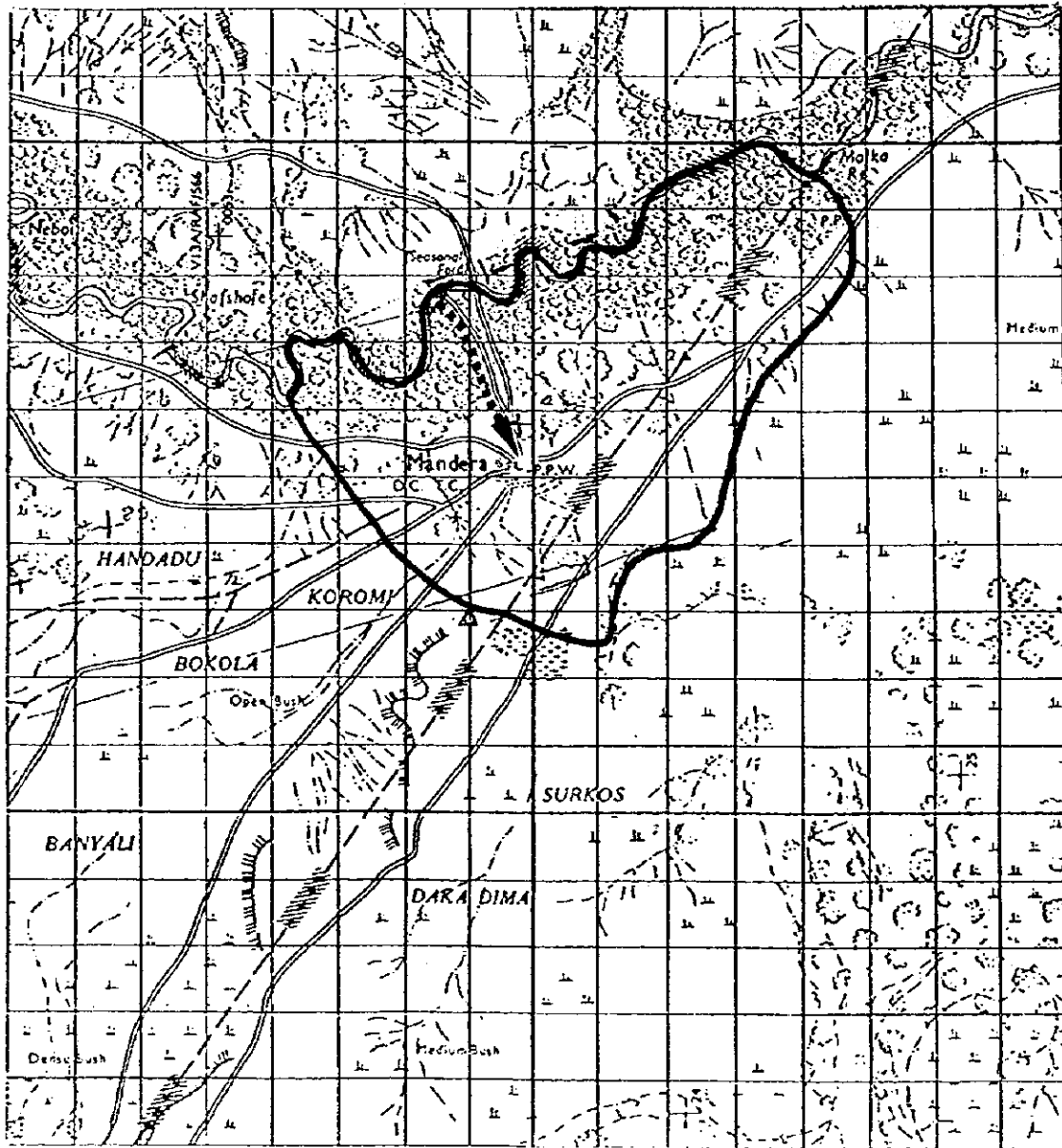




Fig.



Mandera



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

**ELWAK (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Elwak*

Organisation/Water Undertaker : *Community*

District : *Mandera* Location : *Elwak*

Map (1/50,000) Ref. no : Co-ordinates X : *40° 59'* Y : *02° 48'*

Drainage Sub-basin : *5GA*

**Existing facilities**

Source : *Borehole C4628* Type of Intake : *Borehole* Elevation : *1000 m*

Raw water system : *Pumping* H : *m* Dia : *203 mm*

Treatment Process : *Chlorination only - However, this is not properly done, resulting in varying dosage levels and inadequate disinfection*

Designed Capacity :

Treated water/Distribution system -

Area covered : *km<sup>2</sup>*

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

Total length : *km - Details not available*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : *N/A*

Metered : *N/A*

Unmetered : *N/A*

Working Meters: *None - Community Water Supply and the Management charges flat rate to consumers*

Water production : *N/A m<sup>3</sup>/d*

Remark : *Details not available*

Service area population : *N/A*

Population served : *N/A*

**Financial/Revenue**

O & M costs :Kshs )

Revenue earned :Kshs ) *Details not available*

Revenue collected :Kshs )

**Rehabilitation required/costs**

Estimated Cost Kshs

*Details not available*

**Total**

**Future development plan**

Source : )

Treatment : Capacity : *m<sup>3</sup>/d* ) *No information available*

Design year : )

Design population : )

**Remarks**

*Full details on this scheme were not available. The scheme is managed by Community Water Users Association (CWUA). Chlorine is supplied by Ministry of Water Resources District Office in Mandera. Good record keeping should be developed and sustained, along with proper metering system to enhance collection. Chlorine dosing method is poor and needs to be improved by use of proper dosing equipment. To enhance metering, the poor and haphazard distribution system needs to be improved and developed. Kiosks should be built for poorer people.*





Aftercare Study on  
the National Water Master Plan

RHAMU (1/1)

Urban Water Supply  
System Survey

**General**

Name of Urban Centre : *Rhamu*  
 Organisation/Water Undertaker : *Community*  
 District : *Mandera* Location : *Rhamu*  
 Map (1/50,000) Ref. no : *NA-37-4* Co-ordinates X : *41° 13'* Y : *00° 54'*  
 Drainage Sub-basin : *5H*

**Existing facilities**

Source : *Borehole C10426* Type of Intake : *Borehole* Elevation : *1000 m*  
 Raw water system : *Pumping* H : *1.95 m* Dia : *317 mm*  
 Treatment Process : *Chlorination is rarely done*  
 Designed Capacity :  
 Treated water/Distribution system -

Area covered : *km<sup>2</sup>*  
 Distribution mains (80mm and above): *80 mm to 100 mm*  
 Total length : *1.55 km*

UFW (Estimated) : *m<sup>3</sup>/d*  
 Consumers - Total no : *N/A*  
 Metered : *N/A*  
 Unmetered : *N/A*

Working Meters: *None - Water kiosks and few individual connections are charged flat rate*

Water production : *140 m<sup>3</sup>/d - 1996*  
 Service area population : *16,000*  
 Population served : *8,000*

Remark :

**Financial/Revenue**

O & M costs :Kshs )  
 Revenue earned :Kshs ) *Details not available*  
 Revenue collected :Kshs )

**Rehabilitation required/costs**

	Estimated Cost	Kshs
i) <i>Rehabilitation of service mains</i>		<i>1,000,000</i>
ii) <i>Protection of borehole from flooding and bank erosion</i>		<i>500,000</i>
	<b>Total</b>	<b><i>1,500,000</i></b>

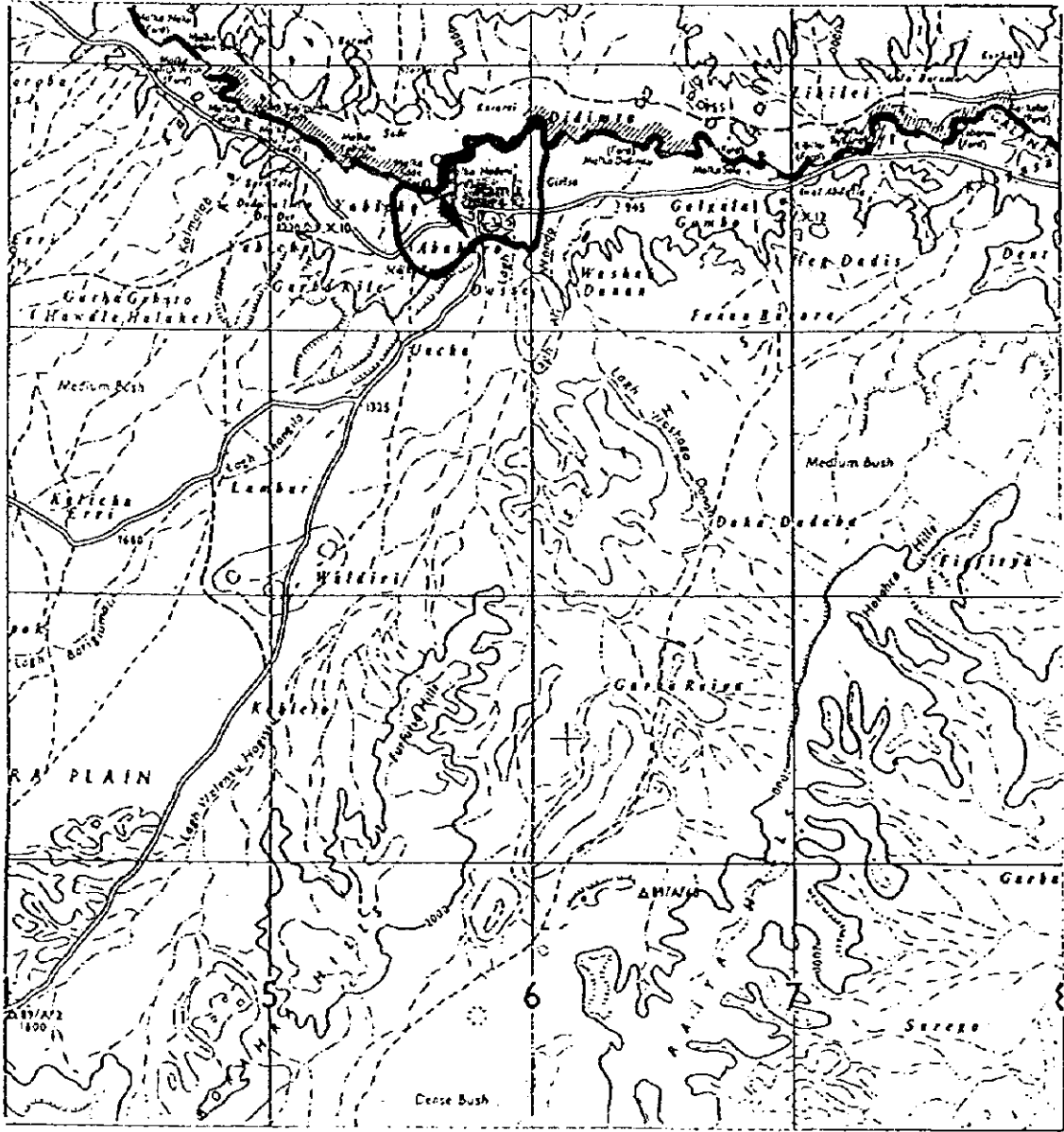
**Future development plan**

Source : )  
 Treatment : Capacity : *m<sup>3</sup>/d* ) *No information available*  
 Design year : )  
 Design population : )

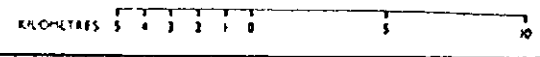
**Remarks**

*This scheme is run by Community Water Users Association (CWUA), with technical assistance of Mandera District Water Office. The District Water Engineer also supplies chemicals for chlorination. A proper metering system needs to be put in place to enhance revenue collection. Record keeping, especially in relation to revenue and operation and maintenance costs should be developed and sustained diligently. Chlorine dosing is rarely done. Daily dosing should be encouraged by purchase of proper dosing equipment, establishment of regular supply of chemicals for chlorination from DWE Mandera, and establishment of public health awareness on the part of the scheme management.*

Fig.



Rhamu



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

**WAJIR (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Wajir*

Organisation/Water Undertaker :

District : *Wajir*

Location: *Wajir*

Map (1/250,000) Ref. no : *NH - 37 - 11*

Co-ordinates *X 40° 03' Y S 01° 44'*

Drainage Sub-basin : *SEA*

**Existing facilities:**

Source: *Shallow well, yield = 3.6m<sup>3</sup>/hr*

Type of Intake :

Elevation : *790m*

Raw water system : *Pumping*

H: *20m*

Dia : *50mm*

Treatment Process : *None*

*Chlorination started in Dec. 1997 at approximately 1/4 kg of chlorinated lime/day. chemicals for chlorine is always in short supply due to inaccessibility by road to Wajir from other large urban centres.*

Designed Capacity: *48 m<sup>3</sup>/day(pumping capacity).*

Treated water/Distribution system

Area covered: *1.5 km<sup>2</sup>*

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

Total length : *0.5 km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : *74*

Working Meters:

*All connections are on flat rate*

Metered :

Unmetered : *74*

Water production : *20 m<sup>3</sup>/d*

Remark :

Service area population :

Population served : *1500*

**Financial/Revenue: 1996**

O & M costs : *Ksh 5,147,748*

Revenue earned : *Kshs 130,015*

Revenue collected : *Kshs 202,925*

**Rehabilitation required/costs**

Kshs Estimated

i) *Ewaso Nyiro supply( Wajir is one of the towns which will benefit from the scheme).*

ii) *Storage tanks*

*10,000,000*

iii) *Distribution system*

*12,000,000*

Total

*22,000,000*

**Future development plan**

Source : *Ewaso Nyiro river*

Treatment :

Capacity : *m<sup>3</sup>/d*

Design year :

Design population:

**Remarks**

*The existing Wajir W/S serves the administration areas/ housing only. The remaining Township population rely on the shallow wells for domestic water. Shallow wells abstraction is contaminated and chlorination is only done at the MOWR premises.*

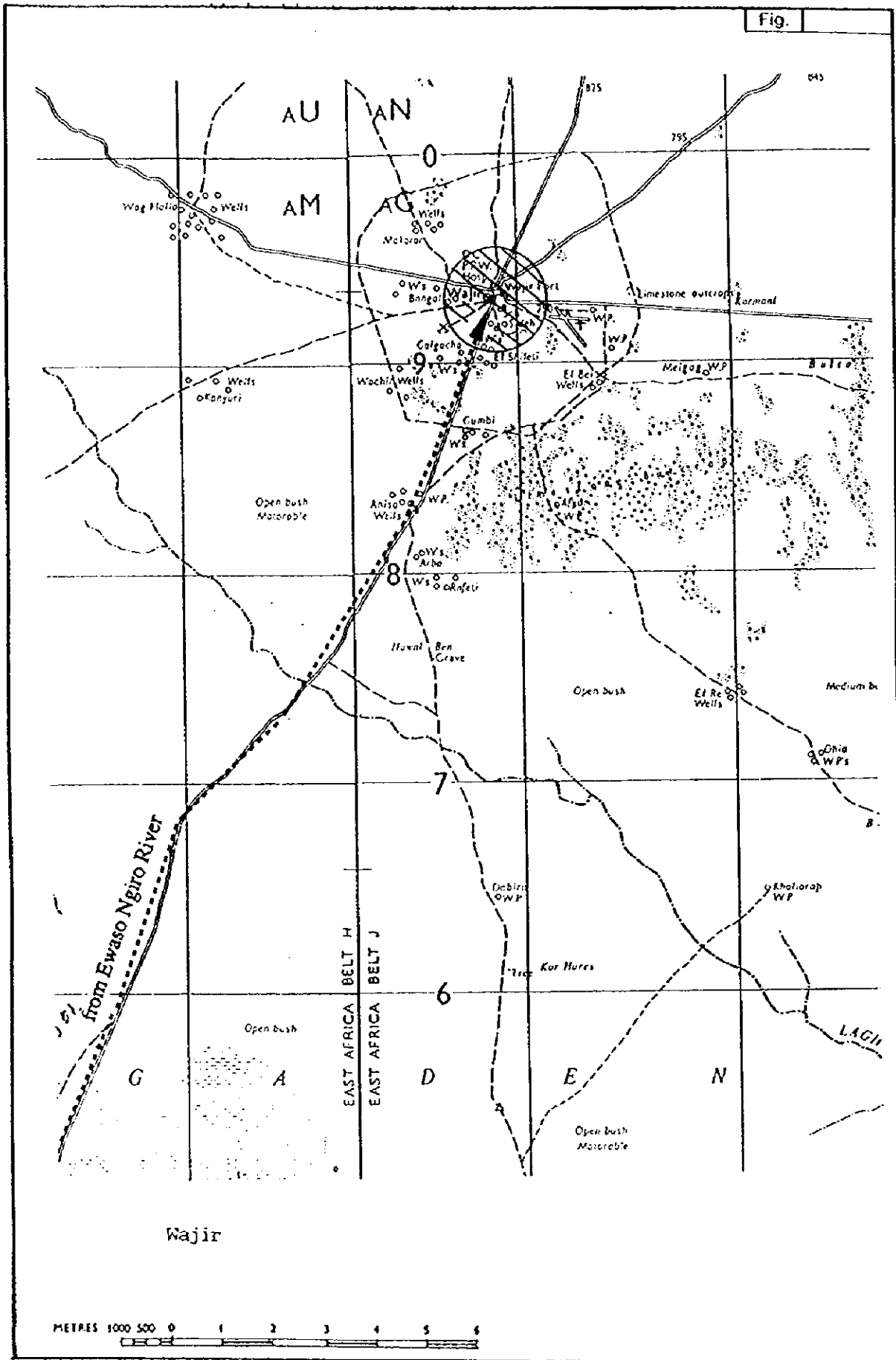


Fig.

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

**BUNA (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Buna*

Organisation/Water Undertaker : *Ministry of Water Resources.*

District : *Wajir*

Location:

Map (1/250,000) Ref. no : *NA - 37 - 7*

Co-ordinates *X 39° 31' Y S 02° 47'*

Drainage Sub-basin : *5 EA*

**Existing facilities:**

Source: *Borehole 1 No.*

Type of Intake :

Elevation : *700m*

Raw water system : *Pumping*

H : *m*

Dia : *mm*

Treatment Process : *None*

*In 1970 the original source dried and new system was to be constructed in 1989 but even that was abandoned due to vandalism and theft.*

Designed Capacity: *m<sup>3</sup>/day*

Treated water/Distribution system

Area covered: *0.5 km<sup>2</sup> Uaani/Tawa*

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

Total length : *km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no :

Working Meters:

Metered :

Unmetered :

Water production : *m<sup>3</sup>/d.*

Remark : *Scheme not functioning*

Service area population :

Population served :

**Financial/Revenue:**

O & M costs : *Ksh*

Revenue earned : *Kshs*

Revenue collected : *Kshs*

**Rehabilitation required/costs**

Kshs Estimated

i) *Shallow wells*

*2,000,000*

ii) *Electrical generators and pumps*

*4,400,000*

iii) *Distribution pipe works*

*2,000,000*

iv) *Chlorination etc.*

*5,000,000*

Total

*8,000,000*

**Future development plan**

Source : *Borehole*

Treatment :

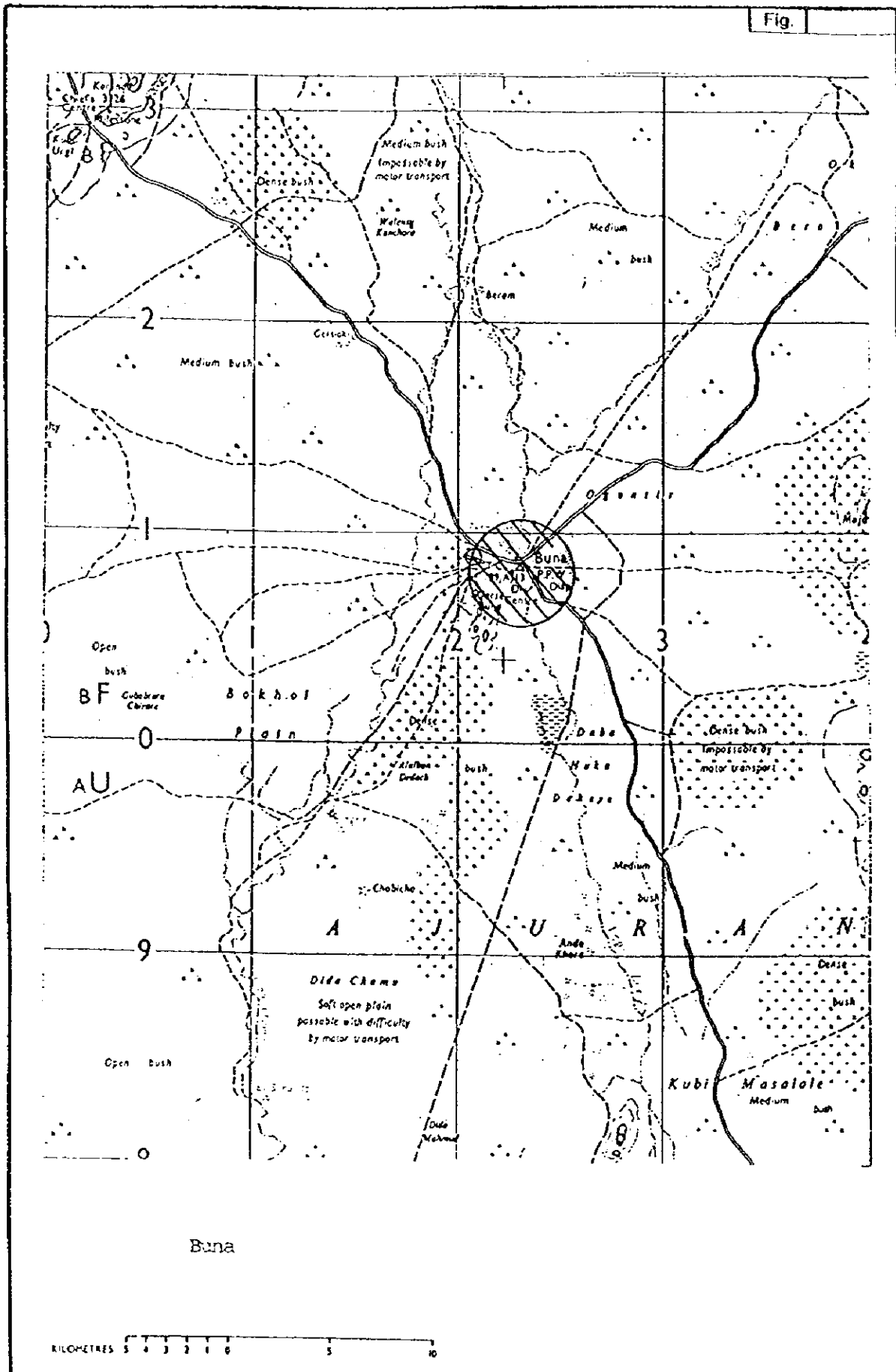
Capacity : *m<sup>3</sup>/d*

Design year :

Design population:

**Remarks**

*Currently people depend on shallow well dug by themselves. Buna being in the remote inaccessible area it suffers from insecurity. Vandalism is rife. The second scheme initiated by the Ministry of Water Resources in late 1980's after it was left incomplete.*



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

**BUTE (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Bute*  
 Organisation/Water Undertaker : *Ministry of Water Resources*  
 District : *Wajir* Location : *Bute*  
 Map (1/250,000) Ref. no : *NA-37-7* Co-ordinates X : *39° 33'E* Y : *03° 02'N*  
 Drainage Sub-basin : *SEA*  
**Existing facilities**  
 Source : *3 No. Boreholes* Type of Intake : *Borehole* Elevation : *610 m*  
 Raw water system : *2 No. Pumping @* H : *90 m* Dia : *150 mm*  
 Treatment Process : *no treatment*

Designed Capacity : *201.6 m<sup>3</sup>/day*  
 Treated water/Distribution system -

Area covered : *0.5 km<sup>2</sup>*  
 Distribution mains (80mm and above): mm to mm  
 Total length : km

UFW (Estimated) : *m<sup>3</sup>/d*  
 Consumers - Total no : *N/A*  
 Metered : *N/A*  
 Unmetered : *N/A*

Working Meters:

Water production : *m<sup>3</sup>/d* )  
 Service area population : )  
 Population served : )  
**Financial/Revenue** )  
 O & M costs :Kshs )  
 Revenue earned :Kshs )  
 Revenue collected :Kshs )

Remark :

*Information not available.*

**Rehabilitation required/costs**

i) <i>Rehabilitation of Borehole originally serving centre</i>	Kshs
ii) <i>Equipping Borehole to serve Police Station</i>	1,500,000
iii)	800,000
iv)	
v)	
vi)	
<b>Total estimated cost</b>	<b>2,300,000</b>

**Future development plan**

Source : *Borehole/Shallow wells* )  
 Treatment : Capacity : *m<sup>3</sup>/d* ) *Particulars not available.*  
 Design year : )  
 Design population : )

**Remarks**

*Bute was originally served by borehole which collapsed in 1987. The residents now depend on shallow wells. The only operating borehole serves Bute Arid Zone Primary School and is managed by School. Another Borehole sank for Police Station in 1997 is not operational as it is not equipped yet.*





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

**MANGA (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Manga*

Organisation/Water Undertaker : *MOWR*

District : *Nyamira* Location: *Manga*

Map (1/50,000) Ref. no : *130/2*

Co-ordinates *X 34° 51' Y S 00° 36'*

Drainage Sub-basin : *IHE*

**Existing facilities:**

Source: *Spring*

Type of Intake : Elevation : *1693m*

Raw water system : *Pumping*

H : *90m* Dia : *50 mm*

Treatment Process : *None*

*No chlorination*

Designed Capacity: *m<sup>3</sup>/day*

Treated water/Distribution system

Area covered: *3 km<sup>2</sup>*

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

Total length : *1.0 km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : *109 - 1996*

Metered : *26*

Unmetered : *83*

Working Meters:

Water production : *m<sup>3</sup>/d*

Remark :

Service area population : *9,444 - 1996*

Population served : *2,500*

**Financial/Revenue: 1995**

O & M costs : *Ksh 212,000*

Revenue earned : *Kshs 48,112*

Revenue collected : *Kshs 23,873*

**Rehabilitation required/costs**

i) *Rising main*

ii) *Distribution system extension.*

iii) *Additional storage tank.*

iv) *Standby pumps*

Kshs Estimated

*3,000,000*

*10,000,000*

*1,000,000*

*1,000,000*

Total

*25,000,000*

**Future development plan**

Source : *Bonyunyan*

Treatment : Capacity : *m<sup>3</sup>/d*

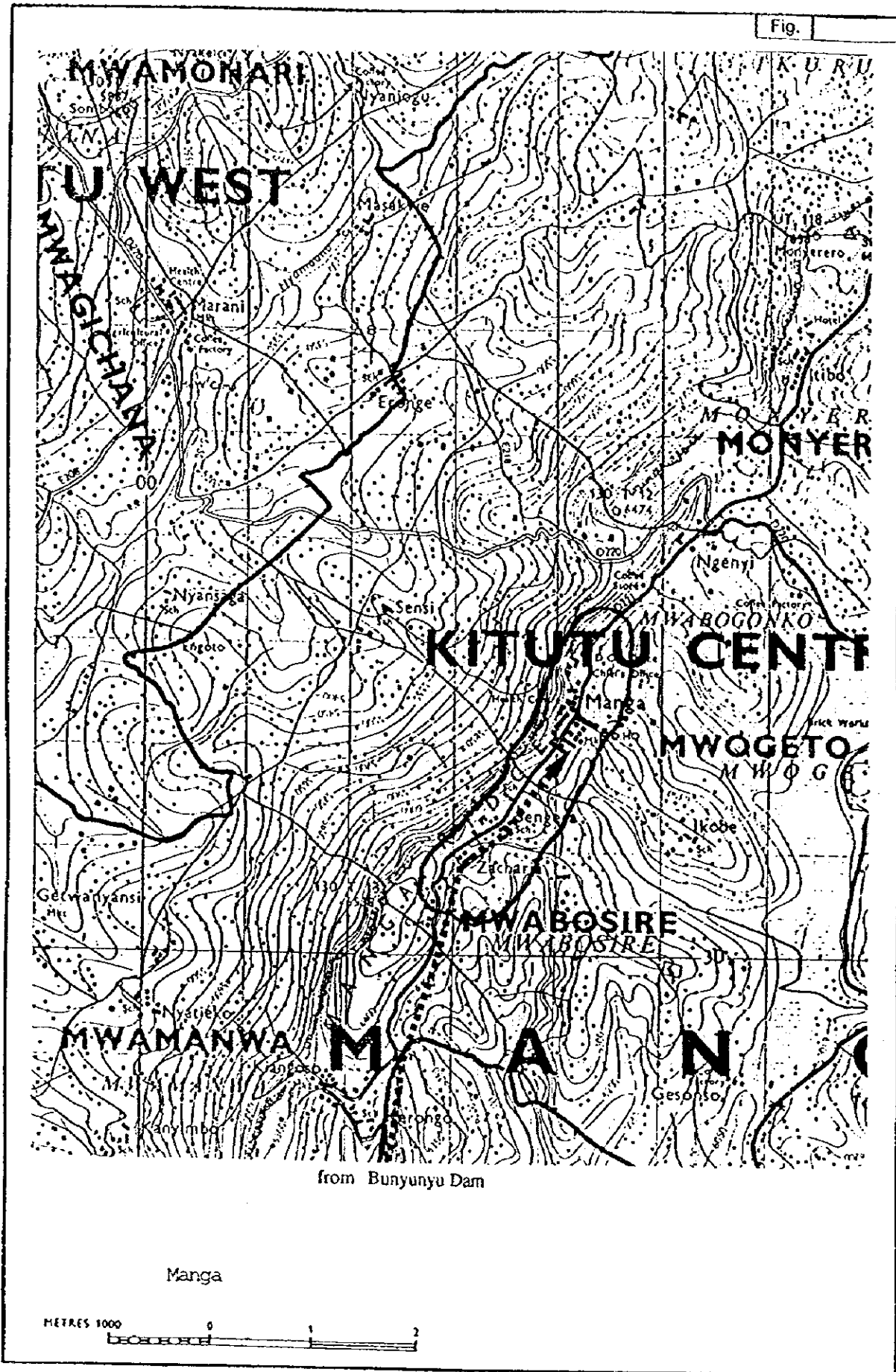
Design year :

Design population:

**Remarks**

*Manga has very poor distribution system which needs to be extended.*

Fig.



Aftercare Study on  
the National Water Master Plan

NYAMIRA (1/1)

Urban Water Supply  
System Survey

**General**

Name of Urban Centre : Nyamira

Organisation/Water Undertaker : Ministry of Water Resources

District : Nyamira

Location : East Mugirango

Map (1/50,000) Ref. no : 130/2

Co-ordinates X : 34° 53'

Y : 00° 32'

Drainage Sub-basin : 1HD

**Existing facilities**

Source : River Eyaka

Type of Intake : Weir

Elevation : 1905 m

Raw water system : Pumping - 3 No. @ 40 m<sup>3</sup>/hr

H : 190 m Dia : 200 mm GI

Treatment Process :

Full Conventional Treatment - Coagulation, Sedimentation, Filtration and Disinfection by Chlorine. Out of 3 dosers, only one is operational. The dosage rates are:- Chlorine = 15 kg/d, Alum = 100 kg/d, Soda Ash = 35 kg/d

Designed Capacity : 700 m<sup>3</sup>/d

Treated water/Distribution system -

Area covered : km<sup>2</sup>

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

Total length : 77 km

UFW (Estimated) : m<sup>3</sup>/d

Consumers - Total no : 1098

Metered : 802

Unmetered : 296

Working Meters:

Water production : 466 m<sup>3</sup>/d

Service area population : 40,000

Population served : 17,000

Remark : System not operating at full capacity due to frequent pump breakdown at intake

**Financial/Revenue**

O & M costs :Kshs 7,471,325

Revenue earned :Kshs 1,612,639

Revenue collected :Kshs 1,296,756

**Rehabilitation required/costs**

- i) Provision of standby generator set
- ii) Expansion of treatment works
- iii) Rehabilitation of distribution system
- iv) Rehabilitation of storage reservoir
- v) Operation and maintenance equipment
- vi) Repair of vehicles

Estimated Cost	Kshs
	2,500,000
	6,000,000
	5,000,000
	2,000,000
	500,000
	500,000
<b>Total</b>	<b>16,500,000</b>

**Future development plan**

Source : Boreholes around Siranga Valleys

Treatment : Capacity : m<sup>3</sup>/d

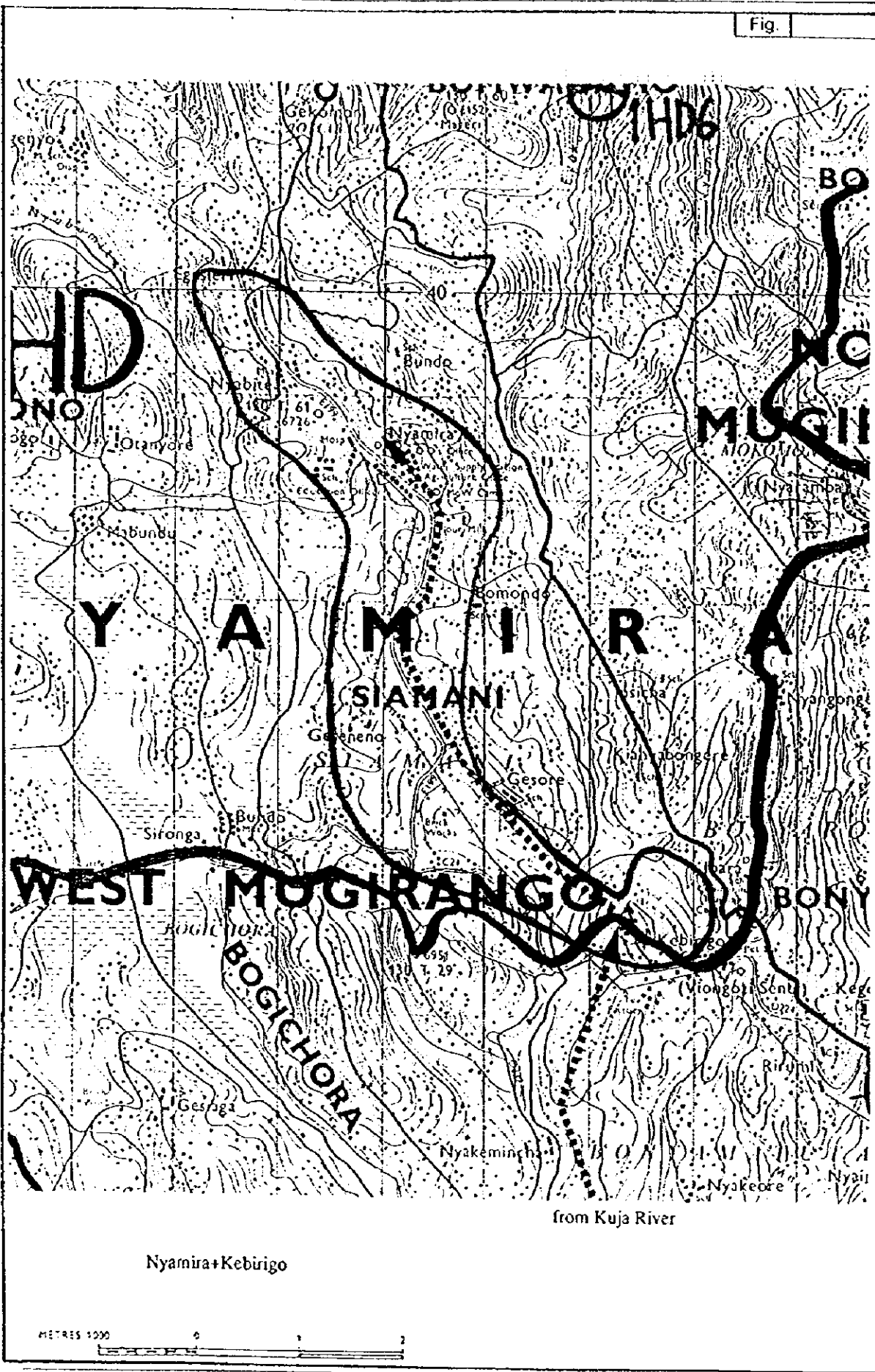
Design year :

Design population :

**Remarks**

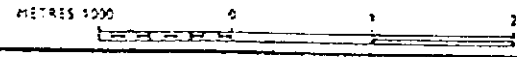
The present scheme was constructed in 1976 and only distribution extensions have been carried out thereafter. There are frequent power fluctuations causing interruptions in treated water production. This results in only about 40% of the population served. Standby diesel generator required for continuous pumping, necessary to attain the scheme's capacity. Though sources for future development have been identified, no substantial studies have been carried out to date.

Fig.



Nyamira+Kebirigo

from Kuja River



Aftercare Study on  
the National Water Master Plan

KEROKA (1/1)

Urban Water Supply  
System Survey

**General**

Name of Urban Centre : Keroka

Organisation/Water Undertaker : Ministry of Water Resources

District : Kisii

Location : East Kitutu

Map (1/50,000) Ref. no : 130/4

Co-ordinates X : 34° 57' E

Y : 00° 45' S

Drainage Sub-basin : 1KB

**Existing facilities**

Source : River Chirichiri

Type of Intake : Sump Suction

Elevation : 1759 m

Raw water system : Pumping - 2 No. @ 20 m<sup>3</sup> H : 100 m

Dia : 250 mm

Treatment Process :

Full Conventional Treatment - Coagulation, Sedimentation Tanks, Filtration and Disinfection by Chlorination. All dosers are non-functional. Dosing controlled manually at following rates:- Chlorine = 0.5 kg/d, Alum = 16 kg/d, Soda Ash = 6 kg/d

Designed Capacity : 960 m<sup>3</sup>/d

Treated water/Distribution system -

Area covered : - km<sup>2</sup>

Distribution mains (80mm and above): 90 mm to 100 mm

Total length : 16 km

UFW (Estimated) : - m<sup>3</sup>/d

Consumers - Total no : 155

Working Meters:

No records

Metered : 144

Unmetered : 11

Water production : 150 m<sup>3</sup>/d

Remark :

Service area population : 27,349

Population served : 5,000

**Financial/Revenue**

O & M costs :Kshs 1,791,210

Revenue earned :Kshs 576,309

Revenue collected :Kshs 182,559

**Rehabilitation required/costs**

- i) Rehabilitation at treatment works
- ii) Repair of distribution mains / extensions
- iii) Miscellaneous
- iv) 2 No. additional 225 m<sup>3</sup> storage tanks

Estimated Cost

Kshs

3,000,000

1,500,000

1,000,000

1,500,000

Total

7,000,000

**Future development plan**

Source : River Chirichiri

Treatment : Full Treatment

Capacity : 2,628 m<sup>3</sup>/d

Design year : 2017

Design population : 58,399

**Remarks**

The raw water main was augmented with a 250mm G.S. in 1990, but has not been effective since. Pumping of treated water is only done for about 4 hours a day due to power blackouts and fluctuations. Consumers complain of high water bills even when there has been very little water.



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

**KISII (1/1)**

**General**

Name of Urban Centre : *Kisii*

Organisation/Water Undertaker : *National Water Conservation & Pipeline Corporation*

District : *Kisii*

Location : *Kisii Municipality*

Map (1/50,000) Ref. no : *130/2*

Co-ordinates X : *34° 48'*

Y : *00° 39'*

Drainage Sub-basin : *1KA*

**Existing facilities**

Source : *River Gucha*

Type of Intake : *Weir*

Elevation : *1798 m*

Raw water system : *Pumping*

H : *20 m*      Dia : *315 mm*

Treatment Process :

*Full Conventional Treatment - Coagulation, Sedimentation Tanks, Filtration and Disinfection by Chlorine. Dosing is carried out using FRO dosers. Dosage rates:- TCL = 20 kg/d, Alum = 250 kg/d, Soda Ash = 50 kg/d*

Designed Capacity : *6000 m<sup>3</sup>/d*

Treated water/Distribution system -

Area covered : *18 km<sup>2</sup>*

Distribution mains (80mm and above): *100 mm to 350 mm*

Total length : *138.5 km*

UFW (Estimated) : *- m<sup>3</sup>/d*

Consumers - Total no : *4664*

Working Meters: *No records*

Metered : *3074*

Unmetered : *620*

Water production : *2974 m<sup>3</sup>/d*

Remark : *Production is below capacity due to breakdown of raw water pumps and siltation at intake works*

Service area population : *120,000*

Population served : *44,000*

**Financial/Revenue**

O & M costs :Kshs *11,450,369*

Revenue earned :Kshs *8,113,387*

Revenue collected :Kshs *8,045,156*

**Rehabilitation required/costs**

	Estimated Cost	Kshs
i) <i>Provision of 2 No. high lift pumps</i>		<i>2,400,000</i>
ii) <i>Repair of 2 No. Land Rover vehicles</i>		<i>400,000</i>
iii) <i>Additional reservoir near town</i>		<i>800,000</i>
iv) <i>Rehabilitation and treatment works</i>		<i>2,000,000</i>
v) <i>Operation and maintenance equipment</i>		<i>1,000,000</i>
vi) <i>Miscellaneous</i>		<i>1,000,000</i>
	<b>Total</b>	<b><i>7,600,000</i></b>

**Future development plan**

Source : *River Awach*

Treatment :                      Capacity :                      m<sup>3</sup>/d

Design year :

Design population :

**Remarks**

*Treatment works capacity is higher than the production due to problems of siltation at the intake and frequent breakdown of pumps. Disconnections of power are common due to non-payment of electricity bills.*

*The present water scheme was constructed in 1974/75, designed to serve Kisii Municipality. Production is much lower than capacity, largely due to only 3 No. functional pumps rather than the 5 No. necessary to achieve design production.*





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

**OGEMBO (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Ogembo*

Organisation/Water Undertaker : *Gusii County Council*

District : *Gucha*

Location : *Majoge Chache*

Map (1/50,000) Ref. no : *130/3*

Co-ordinates X : *34° 44' E*

Y : *00° 46' S*

Drainage Sub-basin :

**Existing facilities**

Source : *Springs, River*

Type of Intake :

Elevation : m

Raw water system : *Pumping @ 4 m<sup>3</sup>/hr*

H : *15 m* Dia : *63 mm*

Treatment Process : *Only filtration is done*

*There are three sources, River Gucha used for cattle and washing purposes, 5 No. springs used for drinking and washing purposes, and 1 No. borehole*

Designed Capacity : *m<sup>3</sup>/d*

Treated water/Distribution system -

Area covered : *km<sup>2</sup>*

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

Total length : *km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no :

Working Meters:

Metered :

Unmetered :

Water production : *m<sup>3</sup>/d*

Remark : *Institutions have their own water sources like boreholes and springs*

Service area population :

Population served :

**Financial/Revenue**

O & M costs :Kshs

Revenue earned :Kshs

Revenue collected :Kshs

**Rehabilitation required/costs**

Estimated Cost

Kshs

i) *Completely new water supply proposed for Ogembo Municipal Council*

Total

**Future development plan**

Source : *River Gucha*

Treatment : *Full*

Capacity : *1800 m<sup>3</sup>/d*

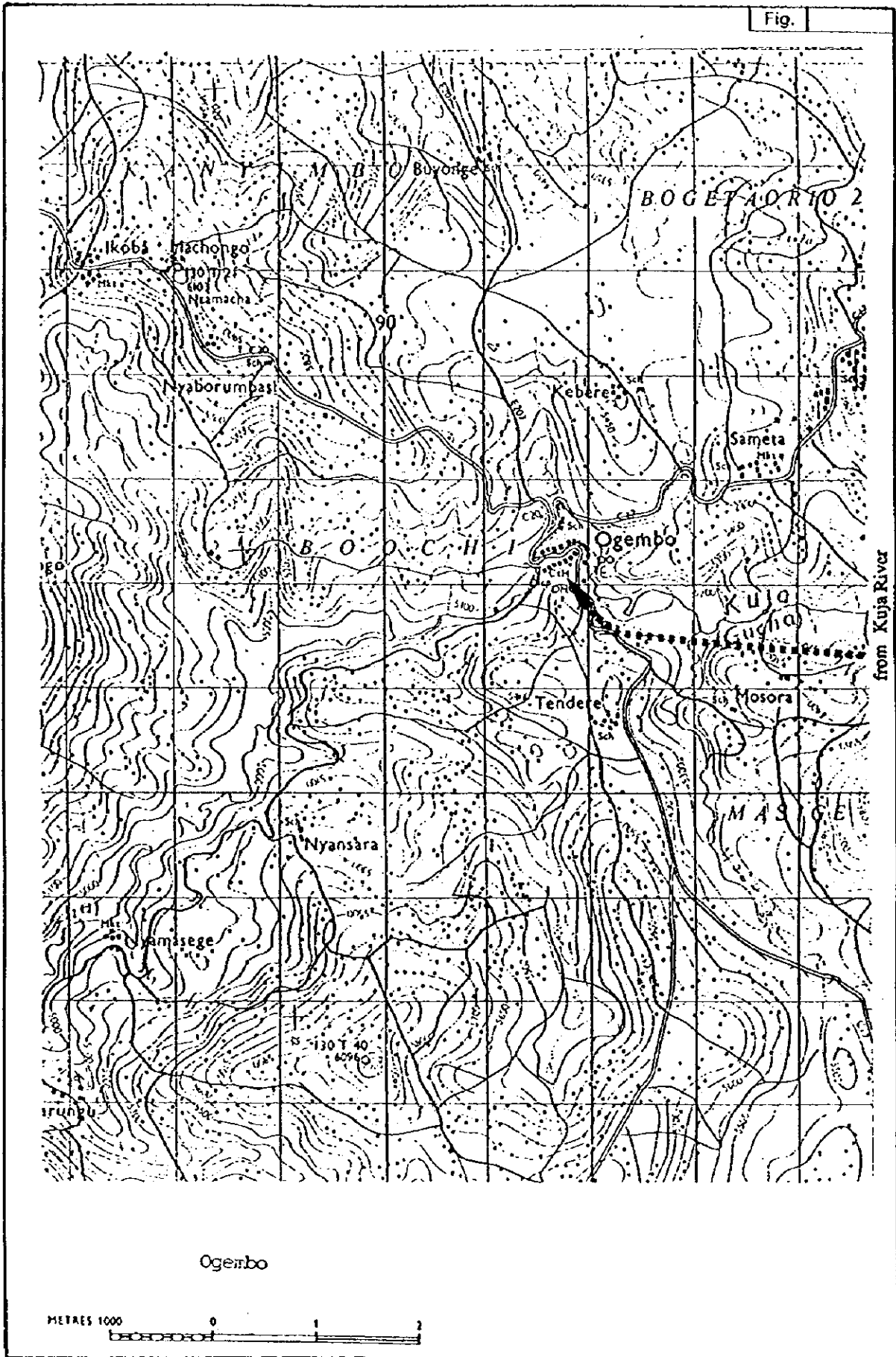
Design year : *2018*

Design population : *45,000*

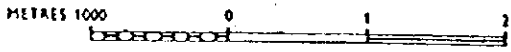
**Remarks**

*The existing supply system is not functional. Consumers draw water from the river or springs. The Hospital seems to have its own independent system with pumping from River Gucha, filtration and distribution mains to staff houses and the Hospital.*

Fig.



Ogembo



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

**KISUMU (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Kisumu*

Organisation/Water Undertaker : *Kisumu municipal council.*

District : *Kisumu*

Location: *Kisumu*

Map (1/50,000) Ref. no : *116/2*

Co-ordinates *X 34° 46' Y S 00° 04'*

Drainage Sub-basin : *1 HB*

**Existing facilities :**

Source: *a). Lake Victoria* Type of Intake : *Weir ( Kibos River) direct abstr* Elevation : *1280mm Kibos river-1130m.*

Raw water system : *Pumping(L. Victoria) 2. Kobo: H : 5 m* Dia : *150mm&1225mm Kibos*

Treatment Process : *Full Conventional* *150mm&225mm L. Victoria.*

*Full conventional treatment is provided at Kajulu and L. Victoria T/Works (16,800m<sup>3</sup>)*

Designed Capacity: *m<sup>3</sup>/day*

Treated water/Distribution system -  
*pumping and gravity.*

Area covered: *180 km<sup>2</sup>*

Distribution mains (80mm and above): *350 mm to 80 mm*

Total length : *109 km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no :

Working Meters:

Metered : *Data not available*

Unmetered :

Water production : *16,800 m<sup>3</sup>/d*

Remark : *Water main from T' works at Kajulu ( Kibos River) is 10km long and supplies residents along its route by gravity). A large number of kiosks are built along its route.*

Service area population : *330,000*

Population served :

**Financial/Revenue:**

O & M costs : *Ksh 45,044,268*

Revenue earned : *Kshs 101,240,000*

Revenue collected : *Kshs*

**Rehabilitation required/costs**

**Kshs Estimated**

i) *Appurtance on distribution system*

*12,000,000*

ii) *Distribution mains - augmentaion and extension*

*80,000,000*

iii) *Pumps and pipe works*

*50,000,000*

iv) *T' works extension.*

*50,000,000*

v) *Storage tanks.*

*10,000,000*

**Total** *202,000,000*

**Future development plan**

Source : *L. Victoria, Awach river, Sondu and Kibos rivers.*

Treatment : *Full conventional* Capacity : *106,6 m<sup>3</sup>/d*

Design year : *2015*

Design population: *690,628*

*Raw and clear water pumping is done to frequent beakdown of motors a . The 24 hrs. Clear water ri also acts as distribution main between T' works and Watson Bank Reservoir. A master plan to augm Kisumu Water Suply is being prepared by JICA.*

**Remarks** *L. Victoria T' Works:-*

*Kajulu T' Works (Kibos River).*

*This is an old system but still cater for residents in the pre-urban area of Kisumu.*

*L. Victoria T' Works involves pumping of both raw and treated water . Maintanance costs are high. M: to augment water supply the township is under preparatin by JICA.*

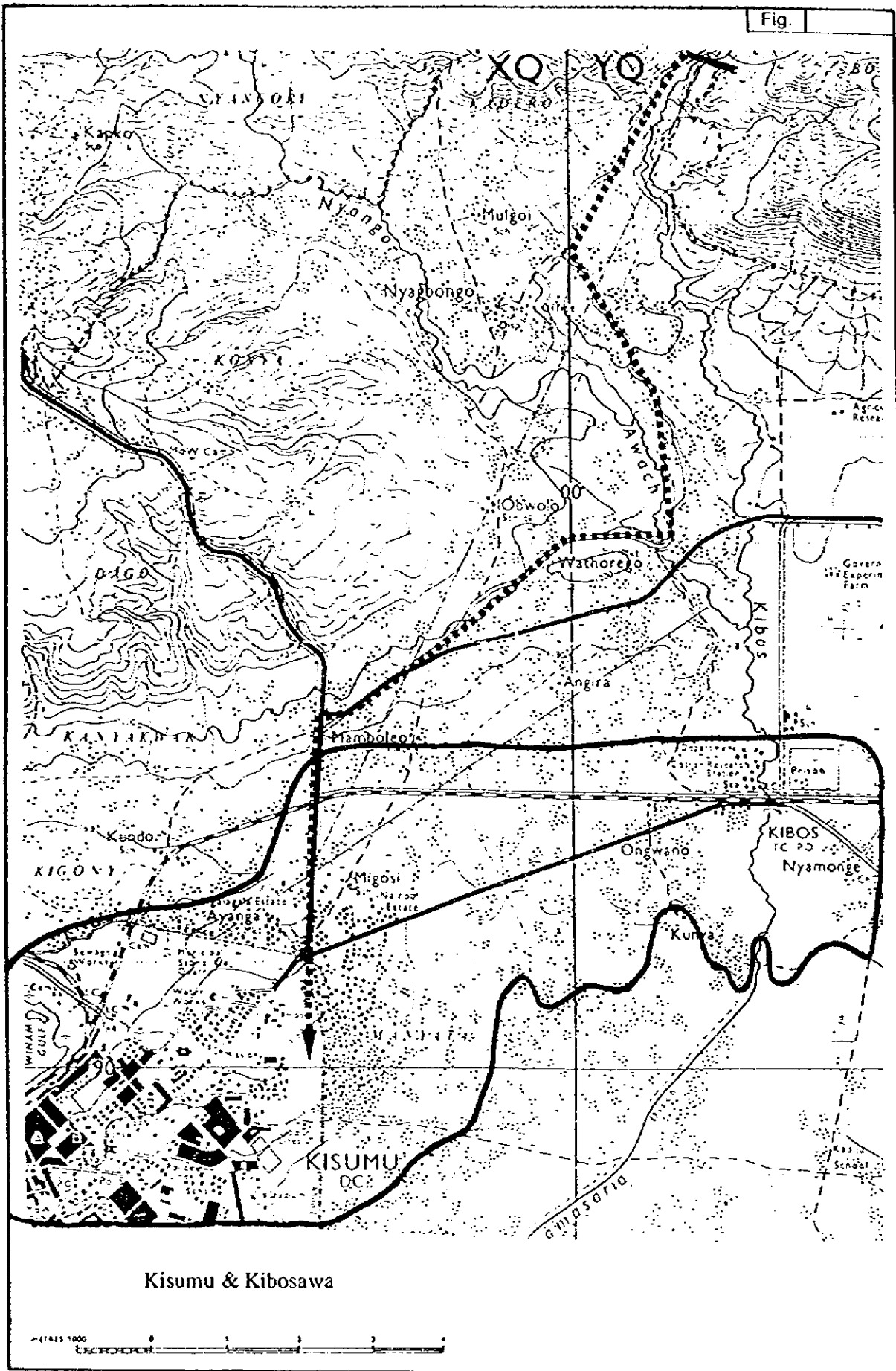


Fig.

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

**AHERO (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Ahero*  
 Organisation/Water Undertaker : *Ahero Catholic Church*  
 District : *Kisumu* Location : *623.2 - South East Kano*  
 Map (1/50,000) Ref. no : *116/2* Co-ordinates X : *34° 56'E* Y : *00° 09'S*  
 Drainage Sub-basin : *1GD*

**Existing facilities**

Source : *Borehole* Type of Intake : Elevation : *1160 m*  
 Raw water system : *Pumping* H : m Dia : *100 mm*  
 Treatment Process : *No Treatment*

Designed Capacity : *22.5 m<sup>3</sup>/hr*  
 Treated water/Distribution system -

Area covered : *0.5 km<sup>2</sup>*  
 Distribution mains (80mm and above): *80 mm to 225 mm*  
 Total length :

UFW (Estimated) : m<sup>3</sup>/d  
 Consumers - Total no : *91*  
 Metered : *91*  
 Unmetered :

Working Meters: *Info. not provided*

Water production : m<sup>3</sup>/d  
 Service area population :  
 Population served :

} *Details Not Available.*

Remark :

**Financial/Revenue**

O & M costs :Kshs  
 Revenue earned :Kshs  
 Revenue collected :Kshs

} *Details Not Available.*

**Rehabilitation required/costs**

- i) *Chlorine mixing Tank and Dosing Equipment*
- ii) *Installation of Standby Pump - 1 No.*
- iii)
- iv)
- v)
- vi)

Kshs  
*750,000*  
*300,000*

Total estimated cost *1,050,000*

**Future development plan**

Source :  
 Treatment : Capacity : m<sup>3</sup>/d  
 Design year :  
 Design population :

**Remarks**

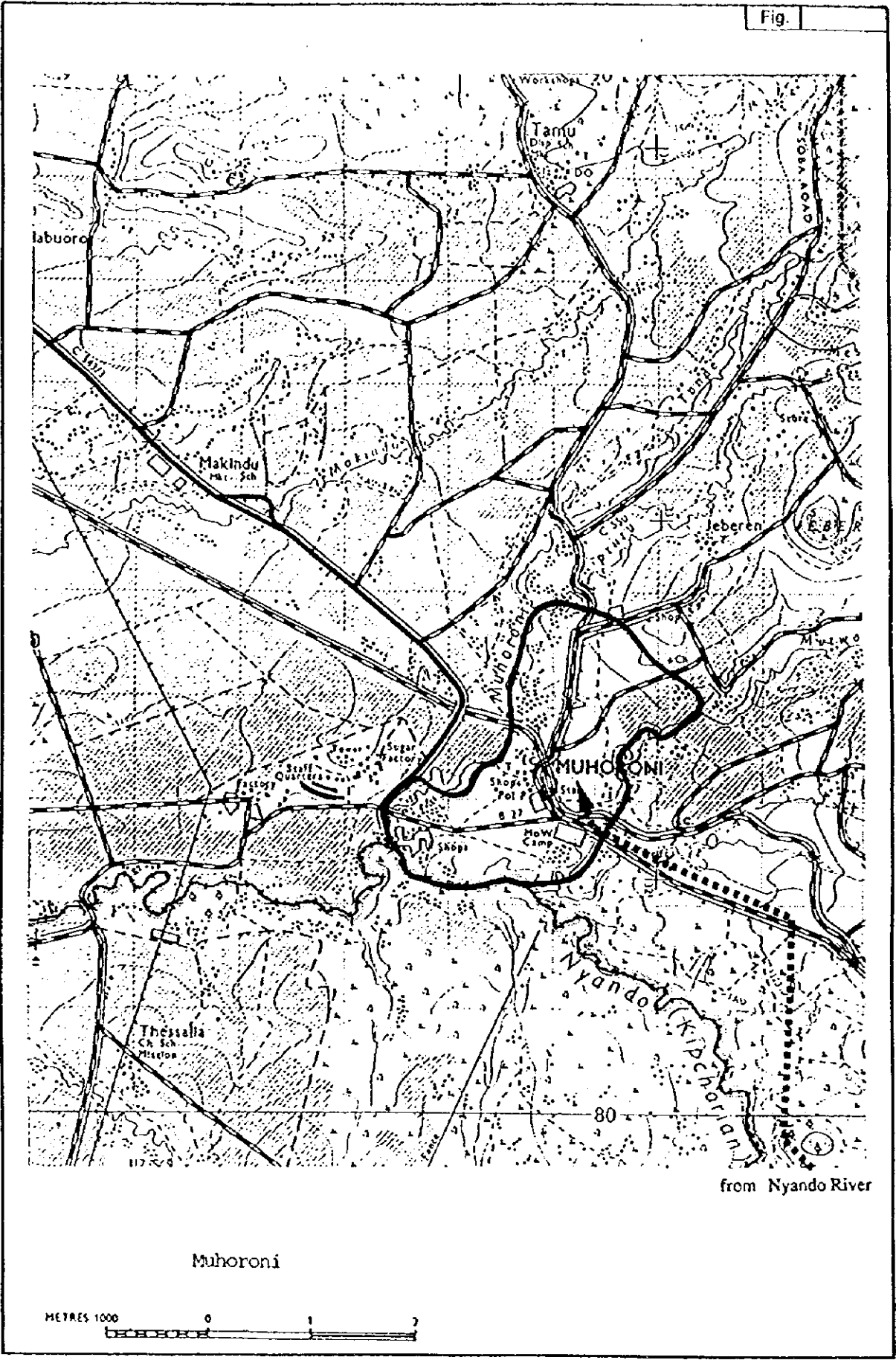
*The existing Water Supply system was constructed in 1992 and is managed by Ahero Catholic Church. The supply is not adequate to meet the demand of the growing urban population. Most consumers draw contaminated/saline water from shallow dug wells.*







Fig.



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

**BONDO (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : Bondo

Organisation/Water Undertaker : Ministry of Water Resources

District : Siaya

Location : 632.4 - West Sakwa

Map (1/50,000) Ref. no : 115/2

Co-ordinates X : 34° 16' Y : S 00° 05'

Drainage Sub-basin :

**Existing facilities**

Source : Yala River Type of Intake : Suction Pipes Elevation : m

Raw water system : Gravity H : m Dia : 75 mm - Twin Mains

Treatment Process : Full Conventional Treatment - Coagulation, Sedimentation, Filtration and Disinfection by Chlorine (TCL). Dosing of chemicals is done on daily basis. However, delay in purchase/delivery of chemicals result in water supply interruption or supply of untreated water to consumers

Designed Capacity :

Treated water/Distribution system - Area covered : 1.0 km<sup>2</sup>  
Distribution mains (80mm and above): 80 mm to 100 mm  
Total length : 7.5 km

UFW (Estimated) : m<sup>3</sup>/d

Consumers - Total no : 361

Metered : 232

Unmetered : 129

Water production : m<sup>3</sup>/d

Service area population :

Population served :

**Financial/Revenue**

O & M costs :Kshs 726,840

Revenue earned :Kshs 495,103

Revenue collected :Kshs 434,391

**Rehabilitation required/costs**

- i) Replacing 2 No. treated water pumps
- ii) Replacing existing 1 No. 100mm dia. bulk meter
- iii) Rehabilitating filter unit and providing filter media
- iv) Installation of chemical dosing equipment and chemical solution tanks - 3 No.

Estimated Cost Kshs

Total

**Future development plan**

Source : Yala River

Treatment : Full Conventional Capacity : m<sup>3</sup>/d

Design year :

Design population :

**Remarks**

Bondo water supply was constructed in 1956. Rehabilitation works were carried out in 1982 by CIDA. According to the District Water Engineer Yala River source is adequate. However, the capacity of the treatment works cannot meet the water demand of the growing Urban population. 35% of the consumers are not metered. In order to control wastage of water, ensure equitable distribution of water to more consumers and enhance revenue collection, all consumers should be metered and all existing faulty meters repaired.



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

**YALA (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Yala*

Organisation/Water Undertaker : *Ministry of Water Resources*

District : *Siaya*

Location : *633.2 - East Gem*

Map (1/50,000) Ref. no : *102/3*

Co-ordinates X : *34° 34'*

Y : *N 00° 07'*

Drainage Sub-basin :

**Existing facilities**

Source : *Yala River*

Type of Intake : *Suction Pipes / Open Inlet Side Chambers*

Elevation : *m*

H : *m*

Raw water system : *Pumping*

H : *m*

Dia : *100mm*

Treatment Process : *Full Conventional Treatment - Coagulation, Sedimentation, Filtration and Disinfection by Chlorine. Dosing of chemicals is done daily. However, delays in purchase/delivery of chemicals which is very common result in interruption of water supply for several days or supply of untreated water to consumers*

**Designed Capacity**

Treated water/Distribution system -

Area covered : *1.0 km<sup>2</sup>*

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

Total length : *2.5 km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : *111*

Working Meters:

Metered : *31*

Unmetered : *80*

Water production : *m<sup>3</sup>/d*

Remark :

Service area population :

Population served :

**Financial/Revenue**

O & M costs : *Kshs*

Revenue earned : *Kshs*

Revenue collected : *Kshs*

**Rehabilitation required/costs**

Estimated Cost

Kshs

i)

ii)

Total

**Future development plan** - *N/A*

Source :

Treatment :

Capacity :

*m<sup>3</sup>/d*

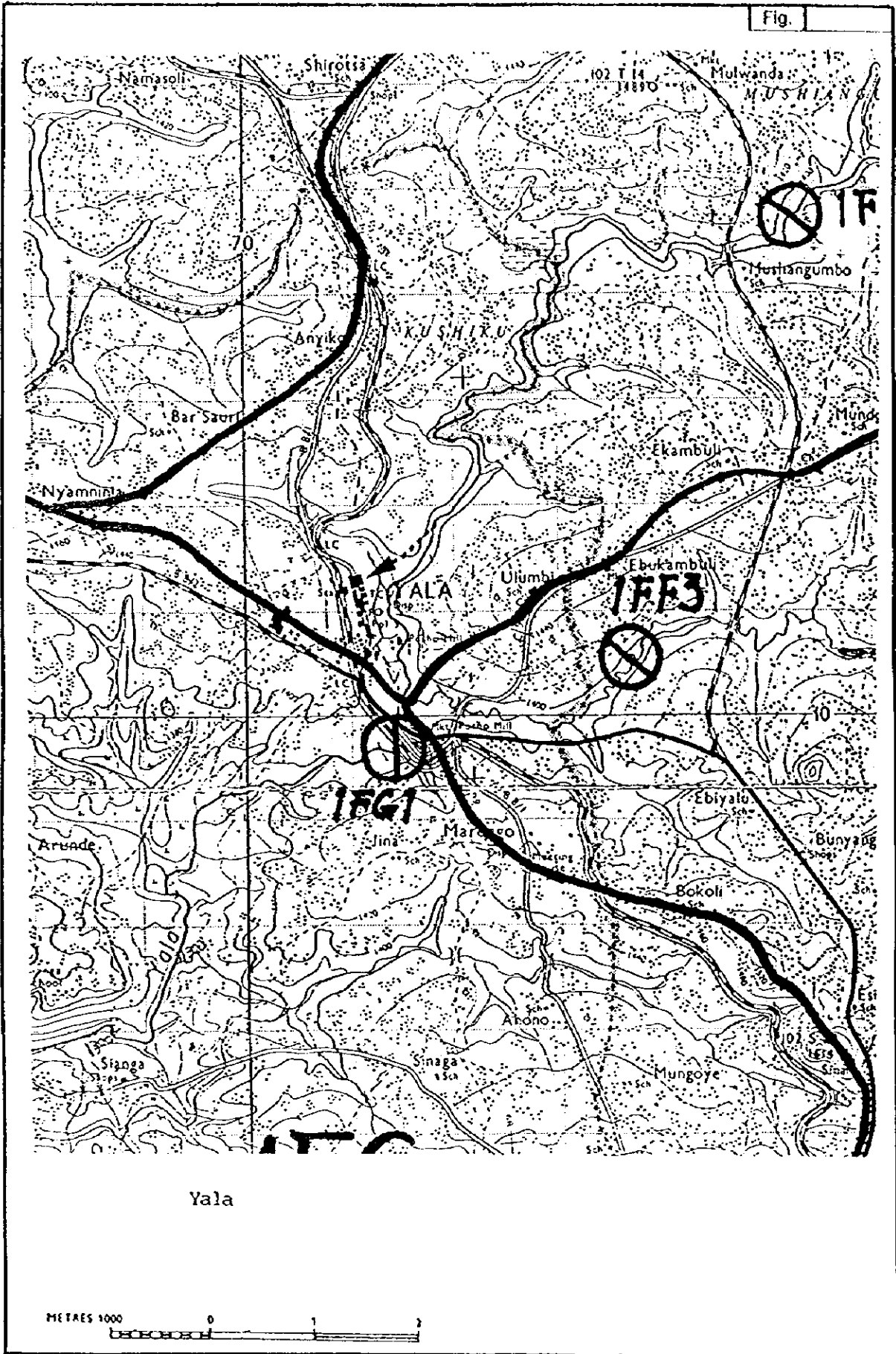
Design year :

Design population :

**Remarks**

*Yala water supply project was constructed in 1975 and no rehabilitation works or expansion has been carried out. The supply is quite unreliable and inadequate to meet the demand of the growing Urban population. In 1984 the existing distribution system was interconnected with Sididi Malanga water supply project which is a rural water supply scheme. 72% of the consumers are not metered. In order to control wastage of water, ensure equitable distribution of water to more consumers and to enhance revenue collection, all consumers should be metered and all existing faulty meters repaired.*

*There are no records available / kept on the service connections, financial status.*



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

**SIAYA (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Siaya*  
 Organisation/Water Undertaker : *National Water Conservation & Pipeline Corporation*  
 District : *Siaya* Location : *634.1 East Alego*  
 Map (1/50,000) Ref. no : *104/4* Co-ordinates X : *34° 18'* Y : *N 00° 04'*  
 Drainage Sub-basin :

**Existing facilities**

Source : *Nyamwin River - Abura Dam* Type of Intake : *Weir* Elevation : *1252 m AOD*  
 Raw water system : *Pumping* H : *m* Dia : *150 mm*  
 Treatment Process : *Conventional Treatment - Coagulation, Sedimentation, Filtration and Disinfection by Chlorine (TCL)*  
*The treatment works comprises of 1 No. vertical flow sedimentation tank, 2 No. rapid gravity sand filters, 2 No. clear water tanks, chlorination arrangement which is carried out at the clear water tanks*  
 Designed Capacity : *437 m<sup>3</sup>/day* - *Subsequent improvements and augmentation of pumping units have resulted in capacity being increased to 840 m<sup>3</sup>/day*  
 Treated water/Distribution system -

Area covered : *12 km<sup>2</sup>*  
 Distribution mains (80mm and above): *80 mm to 150 mm*  
 Total length : *9.46 km*

UFW (Estimated) : *m<sup>3</sup>/d*  
 Consumers - Total no : *1890*  
                   Metered : *1710*  
                   Unmetered : *180*

Working Meters: *615*

Water production : *770 m<sup>3</sup>/d*  
 Service area population : *20,364*  
 Population served : *11,340*

Remark : *Data based on studies carried out by Mangal, I.B. Patel & Partners in 1995*

**Financial/Revenue - 1996/97**

O & M costs : *Kshs*  
 Revenue earned : *Kshs 299,500*  
 Revenue collected : *Kshs 185,500*

**Rehabilitation required/costs**

Estimated Cost                      **Kshs**

- i) *Rehabilitation of Existing Filters, Distribution System, Treated Water Rising Mains, Buildings and Ancillary Works*
- ii) *Rehabilitation of Existing Pump House, Replacing 2 No. Pumping Units*
- iii) *Individual and Bulk Metering and Institutional Strengthening*

Total                                      **17,664,000**

**Future development plan**

Source : *Wuroya River*  
 Treatment : *Conventional* Capacity : *15,787 m<sup>3</sup>/d*  
 Design year : *2020*  
 Design population : *144,553*

**Remarks**

*The Existing Scheme is primarily a pumping scheme and the operational cost is far much more than revenue generated. The present source i.e. Abura Dam is not adequate to meet the present demand of the area of supply. Preliminary Design for an alternative source, rehabilitation of existing water supply system and institutional strengthening have been done by Consultants.*

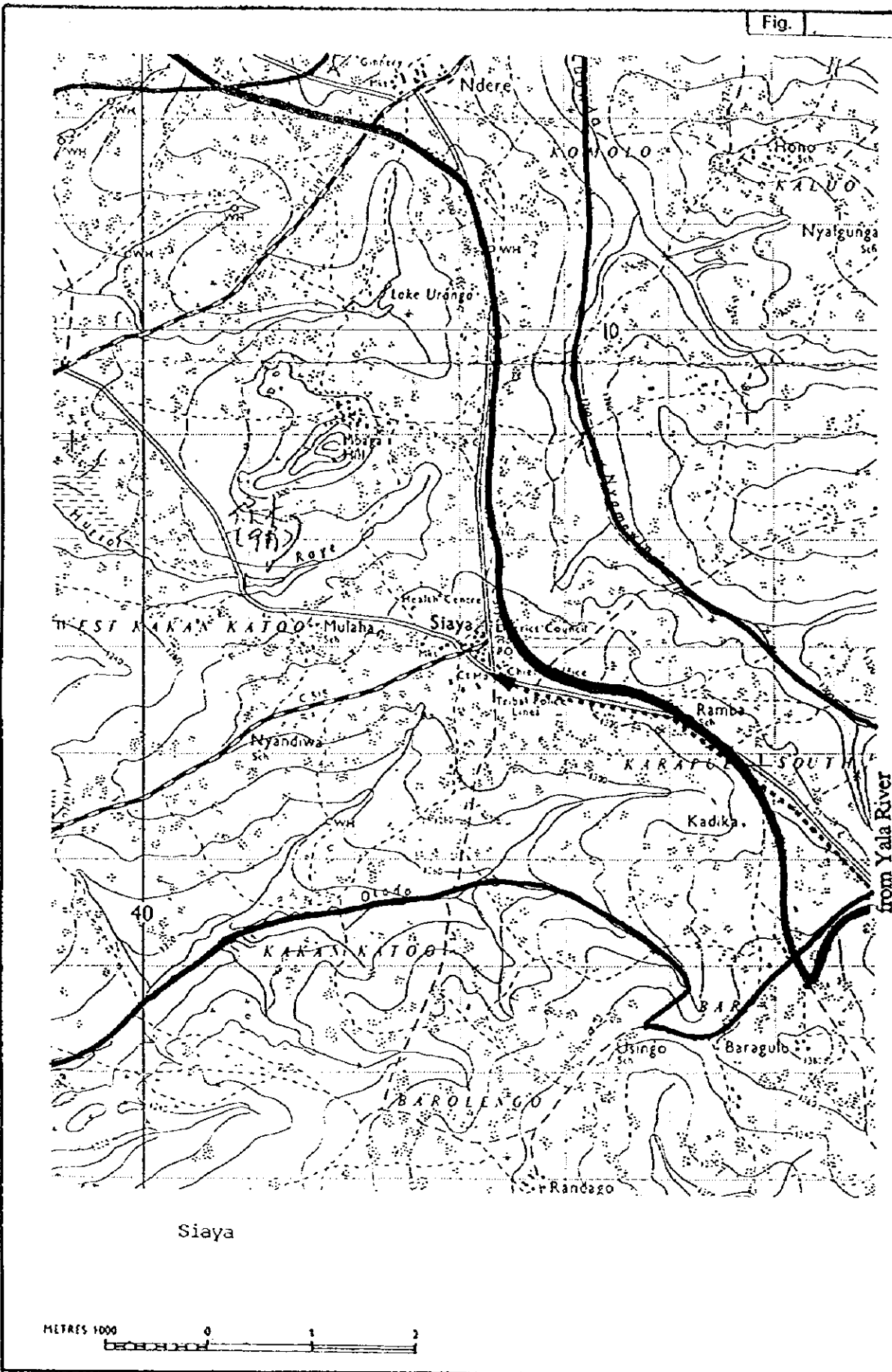


Fig. \_\_\_\_\_

Aftercare Study on  
the National Water Master Plan

UKWALA (1/1)

Urban Water Supply  
System Survey

**General**

Name of Urban Centre : *Ukwala*  
 Organisation/Water Undertaker : *Ministry of Water Resources*  
 District : *Siaya* Location : *635.4 - North Ugenya*  
 Map (1/50,000) Ref. no : *101/3* Co-ordinates X : *34° 36'* Y : *N 00° 37'*  
 Drainage Sub-basin :

**Existing facilities**

Source : *Boreholes - 3 No.* Type of Intake : *Boreholes* Elevation : *m*  
 Raw water system : *Pumping* H : *m* Dia : *mm*  
 Treatment Process : *No Treatment - Consumers do complain about the quality of water being supplied*  
 Designed Capacity :  
 Treated water/Distribution system - Area covered : *0.8 km<sup>2</sup>*  
 Distribution mains (80mm and above): *80mm to 100mm*  
 Total length : *0.92 km*

UFW (Estimated) : *m<sup>3</sup>/d*  
 Consumers - Total no : *210* Working Meters:  
 Metered : *116*  
 Unmetered : *94*

Water production : *214 m<sup>3</sup>/d* Remark :  
 Service area population : *25,000*  
 Population served : *13,000*

**Financial/Revenue**

O & M costs : *Kshs*  
 Revenue earned : *Kshs 319,746*  
 Revenue collected : *Kshs 284,302*

**Rehabilitation required/costs**

	Estimated Cost	Kshs
i) <i>Construction of 1 No. storage tank</i>		<i>1,500,000</i>
ii) <i>Rehabilitation of existing 1 No. pump</i>		<i>300,000</i>
	Total	<i>1,800,000</i>

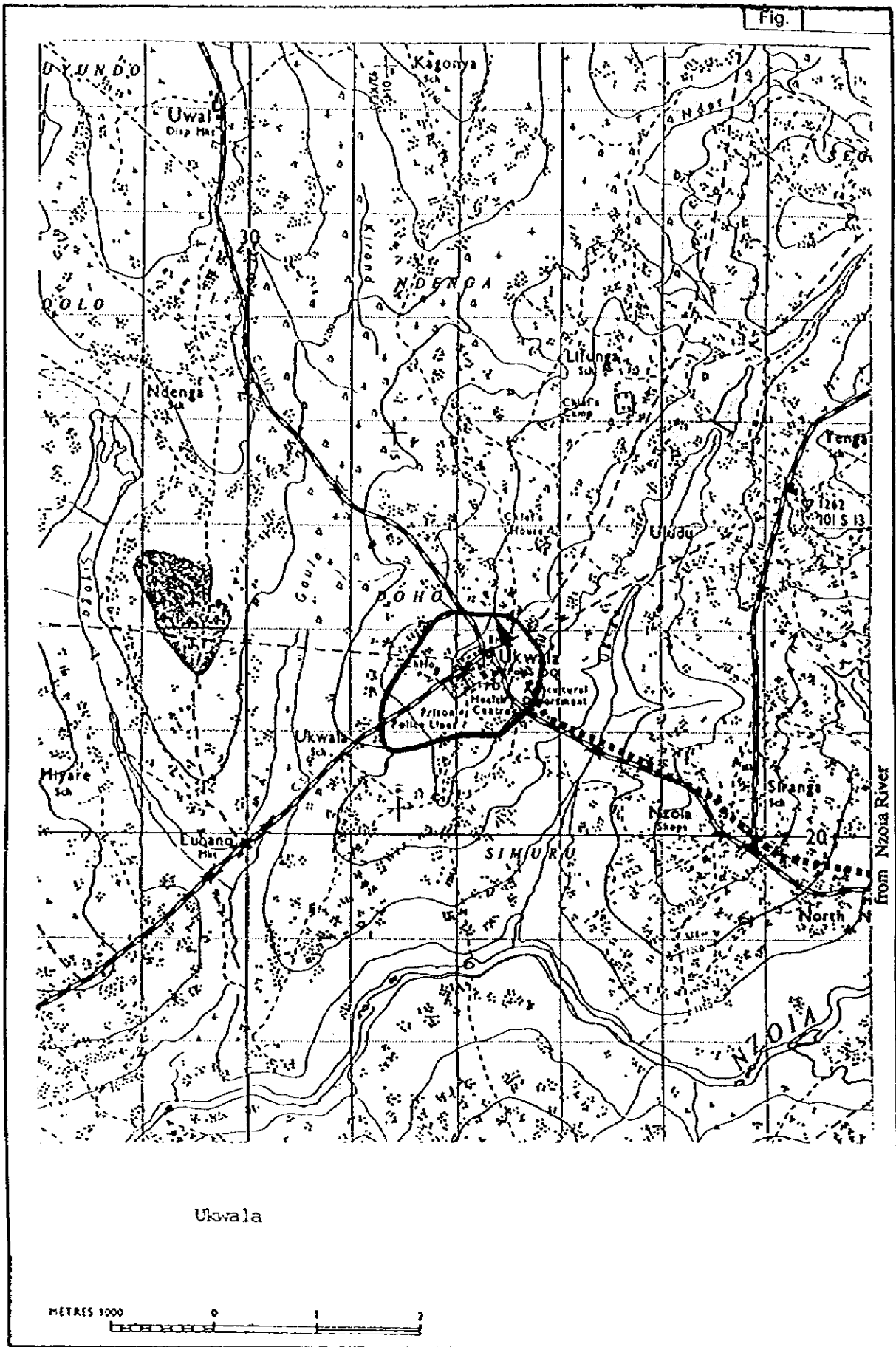
**Future development plan**

Source : *Additional 1 No. Borehole*  
 Treatment : *Disinfection by Chlorine* Capacity : *25 m<sup>3</sup>/d*  
 Design year : *2010*  
 Design population : *20,000*

**Remarks**

*Ukwala water supply was constructed in 1952 and rehabilitation/expansion works carried out in 1989. The water supply is not adequate to meet the demand of the growing urban population. According to the District Water Engineer the elevated steel tank is seriously leaking and approximately 40% of the water stored go to waste. 45% of the consumers are not metered. In order to control wastage of water, ensure equitable distribution of water to more consumers and to enhance revenue collection, all consumers should be metered and all existing faulty meters repaired.*





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

**HOMA BAY (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Homa Bay*

Organisation/Water Undertaker : *Ministry of Water Resources*

District : *Homa Bay* Location : *Kanyada West*

Map (1/50,000) Ref. no : *129/2* Co-ordinates X : *34° 28'* Y : *00° 31'*

Drainage Sub-basin : *1HF*

**Existing facilities**

Source : *Lake Victoria*

Type of Intake : *Direct Suction*

Elevation : *1120 m*

Raw water system : *Pumping*

H : *10 m* Dia : *200 mm*

Treatment Process :

*Full Conventional Treatment - Coagulation, Sedimentation, Filtration and Disinfection by Chlorine*

*Dosage Rates:- Chlorine = 3 kg/day, Alum = 150 kg/day and Soda Ash = 17 kg/day*

Designed Capacity : *1500 m<sup>3</sup>/d*

Treated water/Distribution system -

Area covered : *40 km<sup>2</sup>*

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

Total length : *km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : *1498*

Working Meters: *Data not available*

Metered : *1488*

Unmetered : *10*

Water production : *1231 m<sup>3</sup>/d*

Remark : *Figures for 1996*

Service area population :

Population served : *43,000*

**Financial/Revenue**

O & M costs :Kshs *3,056,000*

Revenue earned :Kshs *1,917,646*

Revenue collected :Kshs *1,496,308*

**Rehabilitation required/costs**

	Estimated Cost	Kshs
i) <i>Rehabilitation and expansion</i>		<i>2,652,400</i>
ii) <i>Completion of intake works</i>		<i>8,000,000</i>
iii) <i>Storage reservoirs</i>		<i>1,200,000</i>
iv) <i>New pumps and meters</i>		<i>9,040,000</i>
v) <i>Rehabilitation and extension of distribution mains</i>		<i>1,634,000</i>
vi) <i>Laboratory for tests</i>		<i>157,450</i>
	<b>Total</b>	<b><i>22,683,850</i></b>

**Future development plan**

Source : *Boreholes*

Treatment : *Full* Capacity : *4,000 m<sup>3</sup>/d*

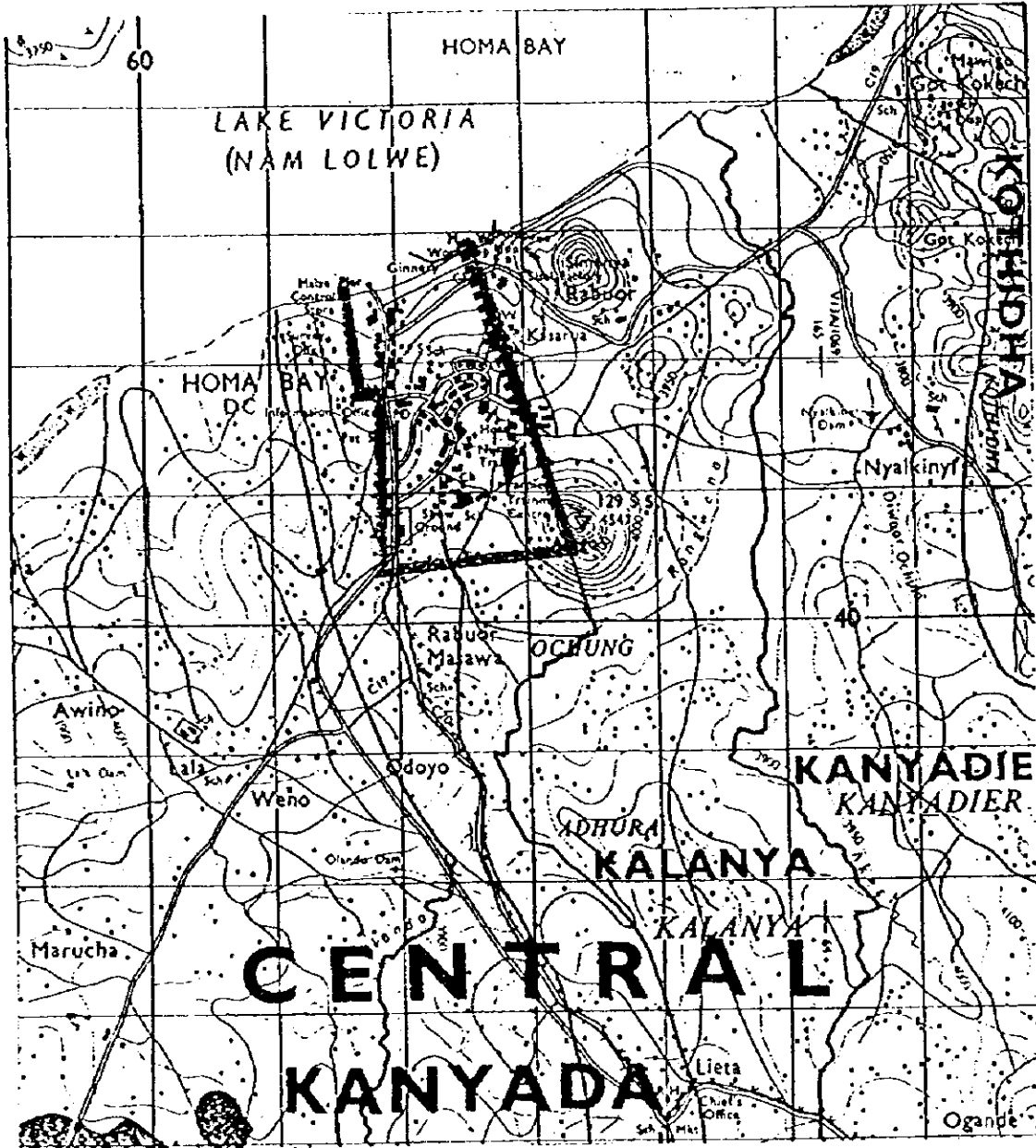
Design year : *2007*

Design population : *58,044*

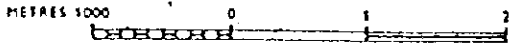
**Remarks**

*The existing intake on Lake Victoria is choked with 'water hyacinth' causing problems in the supply of water. The existing pumps are also not adequate with no standby arrangements. Customers have constantly complained about water shortages, bursts, estimated high quantities of bills (as meters are non-functional), irregular delivery of bills etc. Boreholes are being considered as future source for development.*

Fig.



Homa Bay



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

**MIGORI (1/1)**

**General**

Name of Urban Centre : *Mgori*  
Organisation/Water Undertaker : *Ministry of Water Resources*

District : *Migori*                      Location : *644.3*

Map (1/50,000) Ref. no :                      Co-ordinates X: *34° 32' E*                      Y: *00° 01'*

Drainage Sub-basin :

**Existing facilities**

Source : *Boreholes - 7 No.*

Type of Intake :                      Elevation :                      m

Raw water system : *Pumping*

H: *190 m*                      Dia: *75 mm*

Treatment Process : *None*

*Disinfection by Chlorination @ rate of 5 kg/day*

Designed Capacity : *960 m<sup>3</sup>/d*

Treated water/Distribution system -

Area covered :                      - km<sup>2</sup>

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

Total length :                      1.5 km

UFW (Estimated) :                      m<sup>3</sup>/d

Consumers - Total no : *830*

Working Meters:                      *Majority of meters do not function*

    Metered : *450*

    Unmetered : *380*

Water production : *220 m<sup>3</sup>/d*

Remark : *Out of 7 No. Boreholes, only*

Service area population :

*2 No. are functional*

Population served :

**Financial/Revenue**

O & M costs :Kshs *1,113,125*

Revenue earned :Kshs *1,003,410*

Revenue collected :Kshs *700,000*

**Rehabilitation required/costs**

- i) *Pumps for 5 No. Boreholes and Associated Works*
- ii) *Replacement of old AC pipe (size 80mm) - 0.6 km*
- iii) *Maintenance Equipment and Vehicles / Motorbikes*
- iv) *Chlorine Mixing and Dosing Equipment*
- v) *Repair of Meters*
- vi) *Miscellaneous*

Estimated Cost	Kshs
	1,000,000
	1,000,000
	5,000,000
	750,000
	1,000,000
	1,000,000
<b>Total</b>	<b>9,750,000</b>

**Future development plan**

Source : *Oyani River and Boreholes*

Treatment : *Full*                      Capacity : *7,250 m<sup>3</sup>/d*

Design year : *2018*

Design population : *145,000 (Including Rural Areas)*

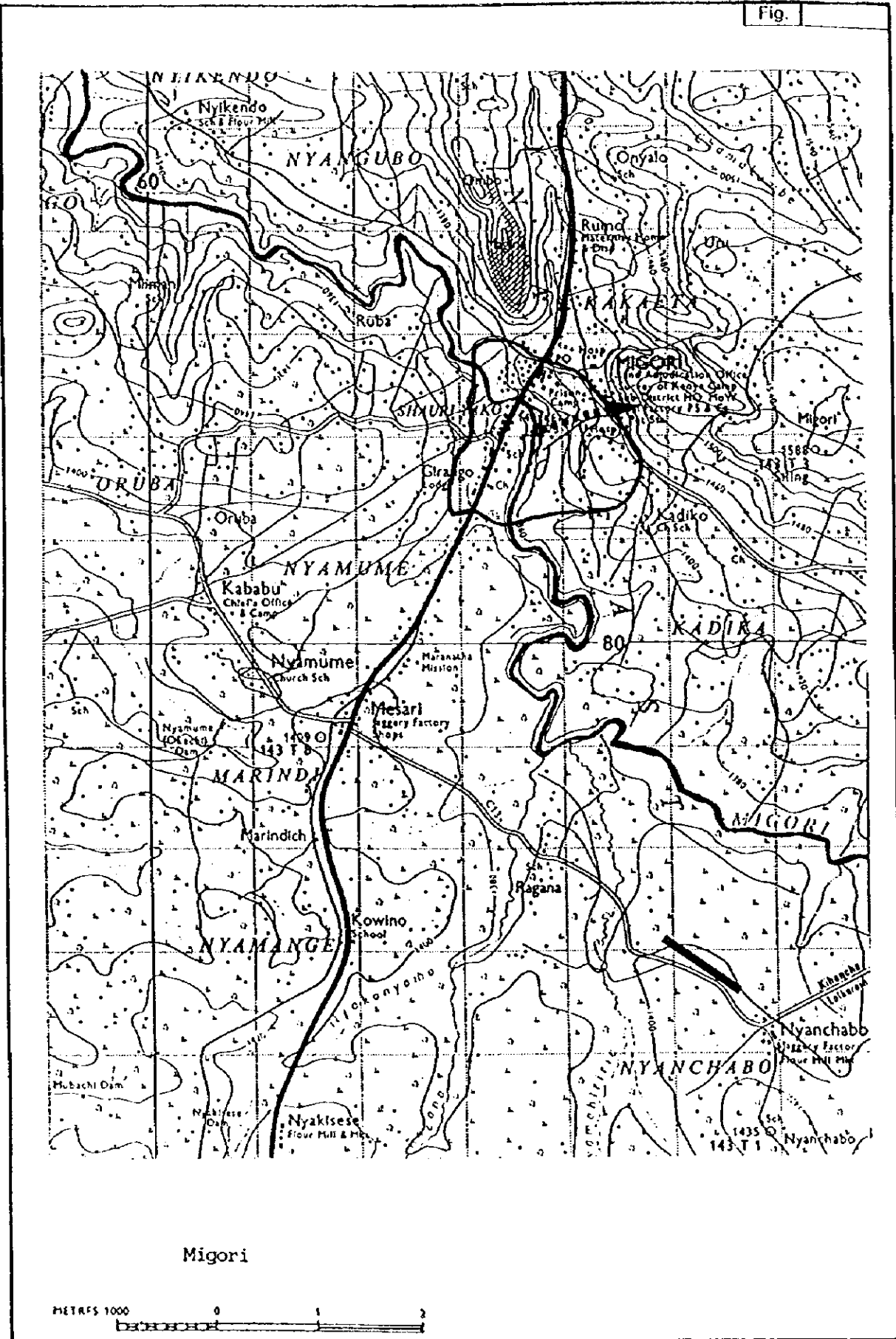
**Remarks**

*The existing water supply system based on boreholes requires activating 5 No. boreholes to meet present demand.*

*Operation and Maintenance requires to be strengthened including repair of meters and billing of consumers.*

*Preliminary Designs for extensions were done a long time ago by Consultants, but no further progress.*

Fig.



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

**AWENDO (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : Awendo

Organisation/Water Undertaker : Ministry of Water Resources

District : Migori

Location : South Sakwa

Map (1/50,000) Ref. no : 130/3

Co-ordinates X : 34° 32' E

Y : 00° 54' S

Drainage Sub-basin : 1KB

**Existing facilities**

Source :

Type of Intake :

Elevation : m

Raw water system :

H : m

Dia : mm

Treatment Process :

*No existing water supply*

Designed Capacity : m<sup>3</sup>/d

Treated water/Distribution system -

Area covered : km<sup>2</sup>

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

Total length : km

UFW (Estimated) : m<sup>3</sup>/d

Consumers - Total no :

Working Meters:

Metered :

Unmetered :

Water production : m<sup>3</sup>/d

Remark :

Service area population :

Population served :

**Financial/Revenue**

O & M costs :Kshs

Revenue earned :Kshs

Revenue collected :Kshs

**Rehabilitation required/costs**

Estimated Cost

Kshs

i) *New scheme proposed*

16,450,000

Total

16,450,000

**Future development plan**

Source :

Treatment :

Capacity :

m<sup>3</sup>/d

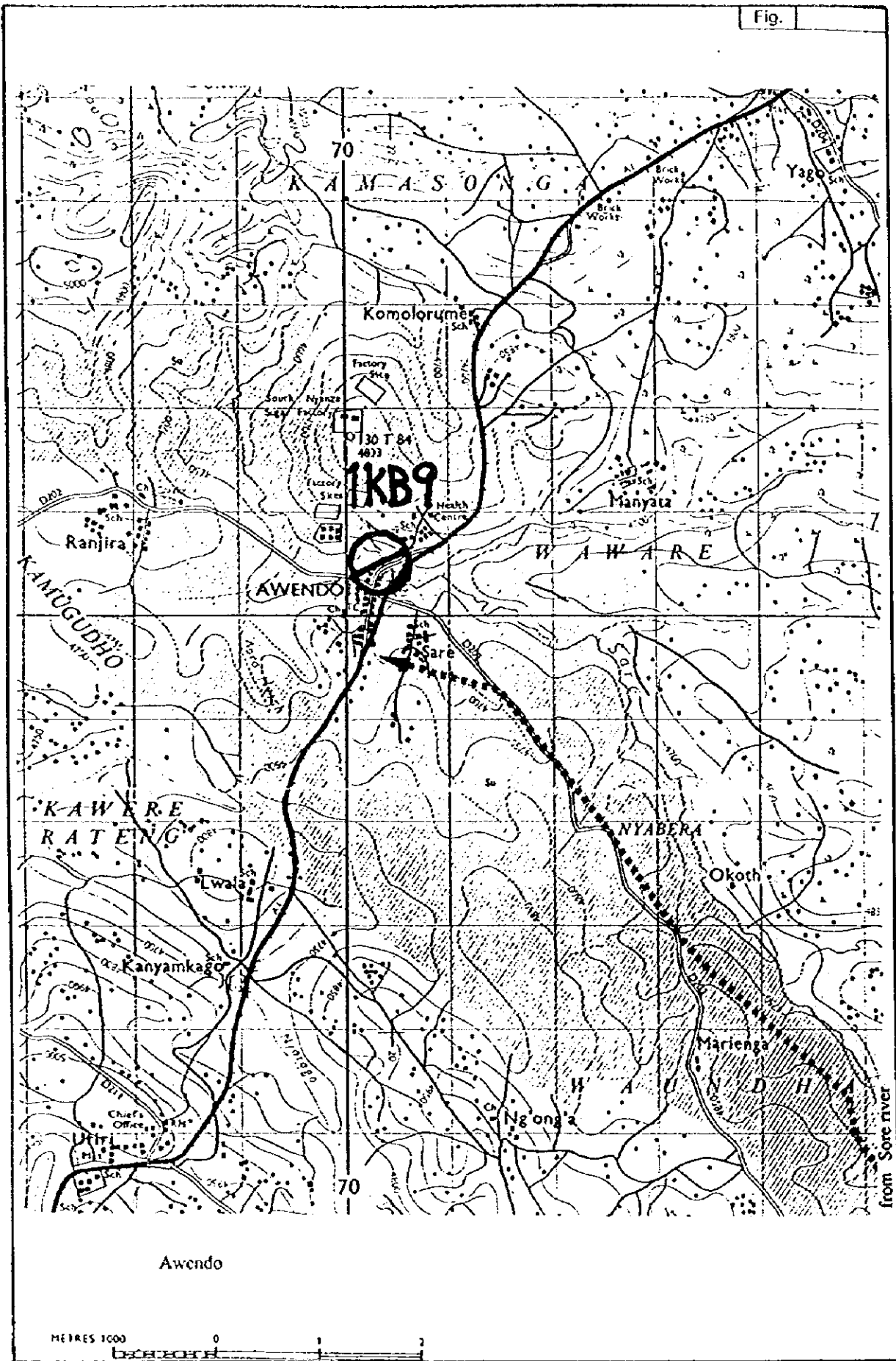
Design year :

Design population :

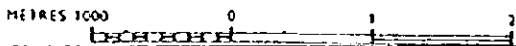
**Remarks**

*There is no existing water supply system in Awendo. A scheme with River Sare is under design with full conventional treatment. Estimated cost KShs. 14,650,000. The Institutions like Schools, etc., get water from their own boreholes and large factories (Sony Sugar Company) has own river intake.*

Fig.



Awendo



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

**KEHANCHA (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Kehancha*

Organisation/Water Undertaker : *Ministry of Water Resources*

District : *Kuria*

Location : *Bukira East*

Map (1/50,000) Ref. no : *144/1*

Co-ordinates X : *34° 37' E*

Y : *01° 10' S*

Drainage Sub-basin : *1KC*

**Existing facilities**

Source : *Orawe Dam / River (under construction)*

Type of Intake : *Direct Abstraction*

Elevation : *1440 m*

Raw water system : *Pumping*

H : *30 m*

Dia : *80 mm*

Treatment Process : *None at present*

*A composite filtration unit is under construction; expected to be commissioned in 1998*

Designed Capacity : *358 m<sup>3</sup>/d (once commissioned)*

Treated water/Distribution system -

Area covered : *km<sup>2</sup>*

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

Total length : *km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no :

Working Meters:

Metered :

Unmetered :

Water production : *44 m<sup>3</sup>/d*

Remark :

Service area population : *9,000*

Population served : *3,800*

**Financial/Revenue**

O & M costs :Kshs *334,660*

Revenue earned :Kshs *122,000*

Revenue collected :Kshs *61,920*

**Rehabilitation required/costs**

Estimated Cost

Kshs

i) *Rehabilitation and expansion is currently going on together with the composite filtration unit*

ii)

iii)

iv)

Total

**Future development plan**

Source : *River Tebest*

Treatment : *Composite Filtration Unit*

Capacity : *358 m<sup>3</sup>/d*

Design year : *2017*

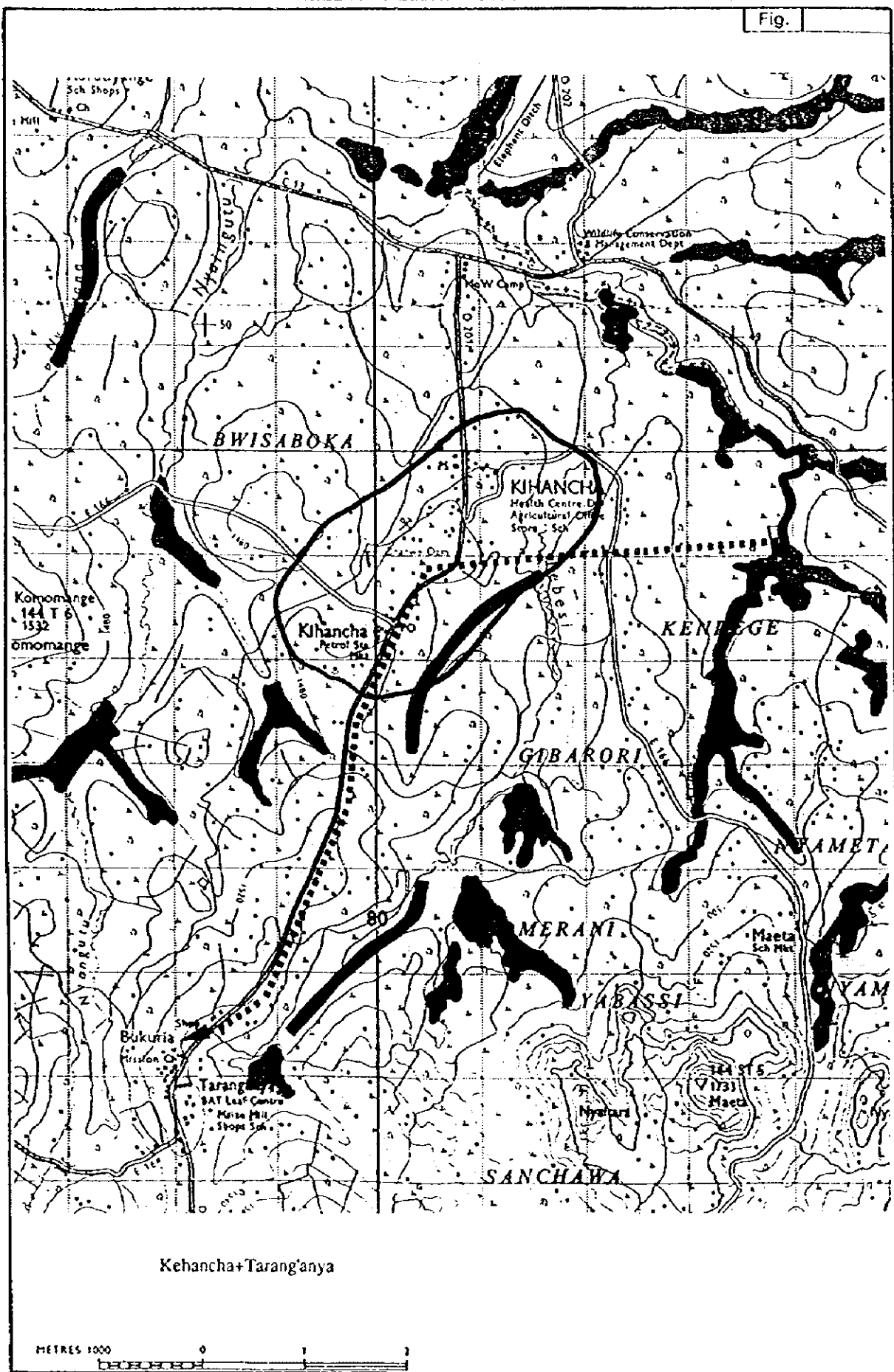
Design population : *8,251*

**Remarks**

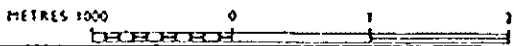
*Once the on-going construction of the Composite Filtration Unit and rehabilitation is complete, production will increase from 44 m<sup>3</sup>/day to 358 m<sup>3</sup>/day. The distribution network will require to be extended too.*



Fig.



Kehancha+Taranganya



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

**ISEBANIA (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Isebania*  
 Organisation/Water Undertaker : *Ministry of Water Resources*  
 District : *Kuria* Location : *Bugembe West*  
 Map (1/50,000) Ref. no : *143/2* Co-ordinates X : *34° 29'E* Y : *01° 14'S*  
 Drainage Sub-basin :

**Existing facilities**

Source : *River Ragana* Type of Intake : *Weir* Elevation : *1595 m*  
 Raw water system : *Pumping* H : *150 m* Dia : *80 mm*  
 Treatment Process : *None*  
*Raw water is directly distributed to the consumers.*

Designed Capacity :  
 Treated water/Distribution system - Area covered : *3 km<sup>2</sup>*  
 Distribution mains (80mm and above): *80 mm to 80 mm*  
 Total length : *0.4 KI (No records available)*

UFW (Estimated) : *m<sup>3</sup>/d*  
 Consumers - Total no : *8* Working Meters:  
 Metered : -  
 Unmetered : *8*

Water production : - *m<sup>3</sup>/d* Remark :  
 Service area population :  
 Population served :

**Financial/Revenue**

O & M costs : *Kshs 201,180*  
 Revenue earned : *Kshs*  
 Revenue collected : *Kshs*

**Rehabilitation required/costs**

	Kshs
i) <i>Rising Main, T.Works, Pumping and distribution</i>	<i>6,000,000</i>
ii)	
iii)	
iv)	
v)	
vi)	
<b>Total estimated cost</b>	<b><i>6,000,000</i></b>

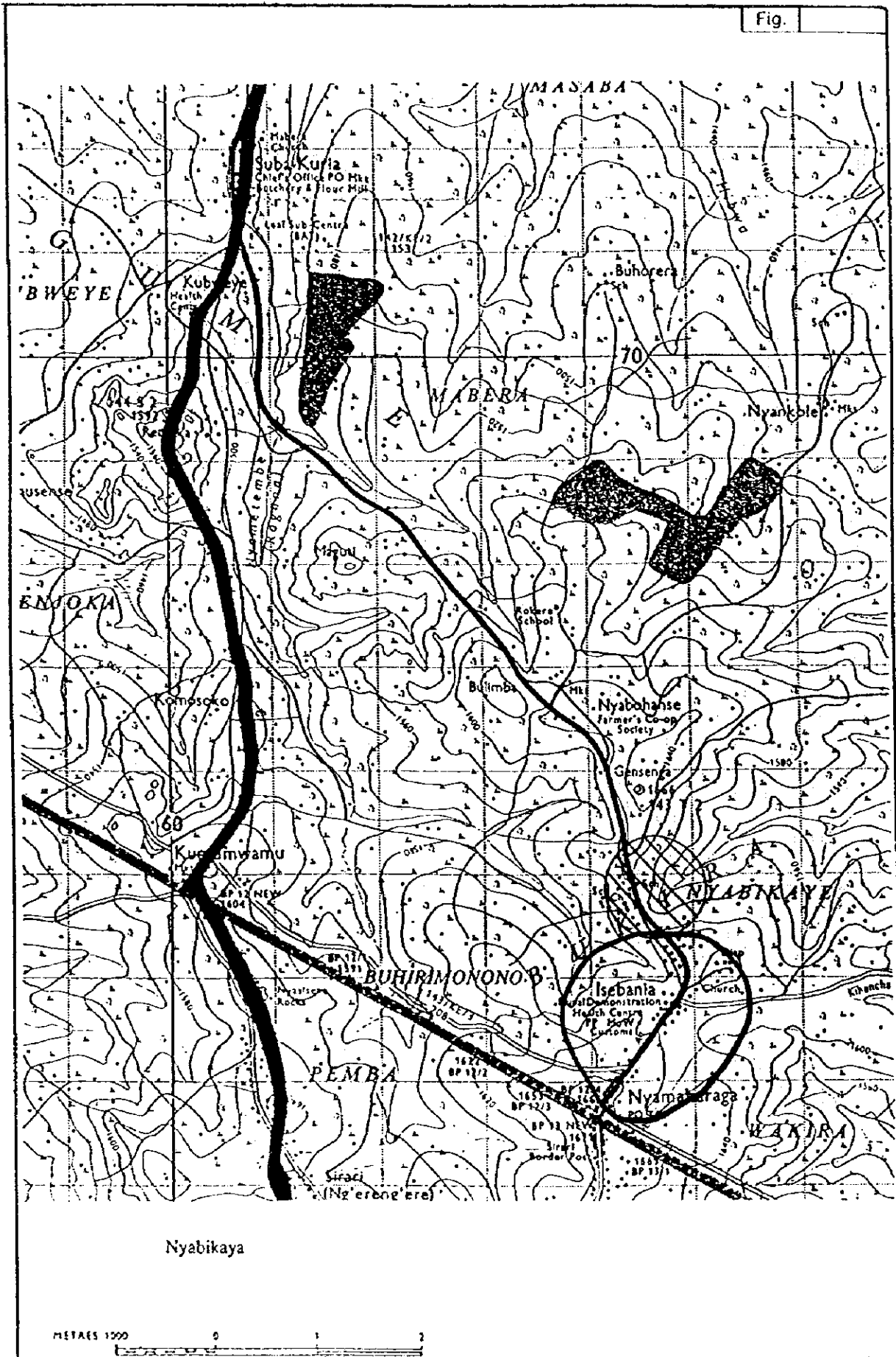
**Future development plan**

Source : *River Ragana*  
 Treatment : *Full Treatment* Capacity : *270 m<sup>3</sup>/d*  
 Design year : *2017*  
 Design population : *8,000*

**Remarks**

*Isebania together with Nyabikaye and Nyamaharaga area supplied from one common source. This scheme was constructed in 1978. During 1996/97, 1.5 km. of additional 75 mm dia. pipe laying began, but is yet to be completed. Treatment is of utmost necessity since raw water quality is not good and prone to contamination.*

Fig.



Nyabikaya

METRES 1000

**MBP**  
+ PARTNERS  
CONSULTING ENGINEERS

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

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The Aftercare Study on  
the National Water Master Plan

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

OYUGIS (1/1)

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Oyugis*  
 Organisation/Water Undertaker : *Ministry of Water Resources*  
 District : *Rachuonyo* Location : *Central Kasipul*  
 Map (1/50,000) Ref. no : *105/4* Co-ordinates X : *34° 42' E* Y : *00° 30' S*  
 Drainage Sub-basin : *1HD*

**Existing facilities**

Source : *River Awach* Type of Intake : *Swamp* Elevation : *1480 m*  
 Raw water system : *Pumping Main* H : *m* Dia : *300 mm*  
 Treatment Process :

*Full Conventional Treatment - Coagulation, Sedimentation Tanks, Filtration and Disinfection by Chlorination.*

*Dosage Rates:- Chlorine = 2 kg/day, Alum = 50 kg/day, Soda Ash = 20 kg/day*

Designed Capacity : *5760 m<sup>3</sup>/d*

Treated water/Distribution system - Area covered : *4 km<sup>2</sup>*  
 Distribution mains (80mm and above): *100 mm to 200 mm*  
 Total length : *22 km*

UFW (Estimated) : *N/A m<sup>3</sup>/d*

Consumers - Total no : Working Meters: *No records*  
 Metered :  
 Unmetered :

Water production : *m<sup>3</sup>/d* Remark :

Service area population :

Population served :

**Financial/Revenue**

O & M costs :Kshs *2,065,880*

Revenue earned :Kshs

Revenue collected :Kshs

**Rehabilitation required/costs**

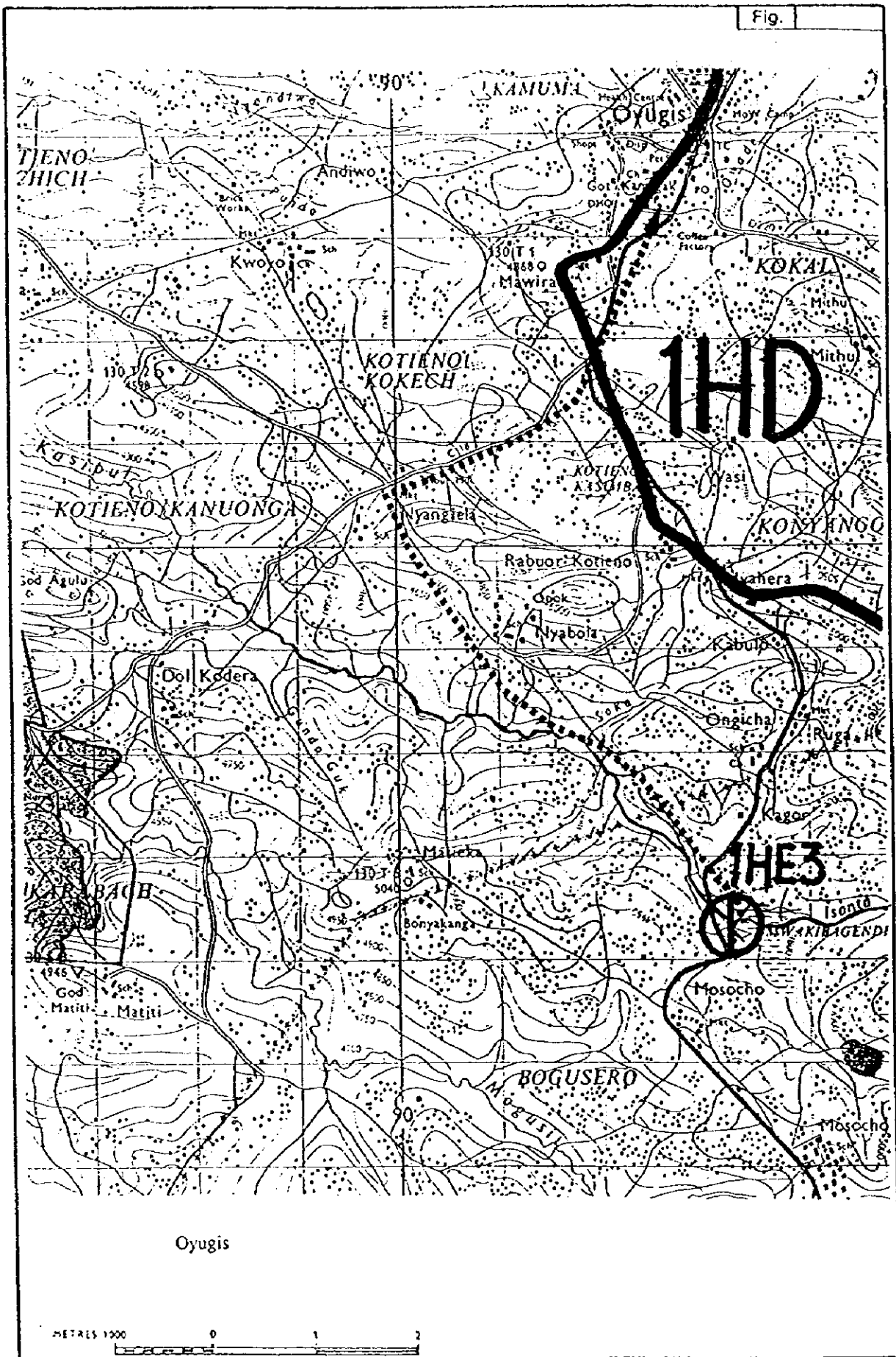
	Estimated Cost	Kshs
i) Storage tanks - 2 No. of 225 m <sup>3</sup> capacity		1,000,000
ii) Extensions to distribution mains - 6 km		3,500,000
iii) Operation and maintenance equipment		1,000,000
iv) Meters - repair and new		1,000,000
v) Miscellaneous		1,500,000
	<b>Total</b>	<b>8,000,000</b>

**Future development plan**

Source : *River Awach*  
 Treatment : *Full* Capacity : *m<sup>3</sup>/d*  
 Design year :  
 Design population :

**Remarks**

*There are plans to change intake from pumping to gravity by moving it upstream. Minimum rehabilitation works are necessary to operate the scheme efficiently. A lot of revenue is lost due to faulty meters.*



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

**KENDU BAY (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Kendu Bay*

Organisation/Water Undertaker : *Ministry of Water Resources*

District : *Rachuonyo* Location : *648.1*

Map (1/50,000) Ref. no : *116/3*

Co-ordinates X : *34° 39' E*

Y : *00° 20'*

Drainage Sub-basin : *1HD*

**Existing facilities**

Source : *Awach River*

Type of Intake : *Weir*

Elevation : m

Raw water system : *Pumping*

H : *15 m* Dia : *75 mm*

Treatment Process :

*Full Conventional Treatment - Coagulation, Sedimentation, Filtration and Disinfection by Chlorine.*

*Dosage Rates:- Chlorine = 1 kg/d, Alum = 30 kg/d, Soda Ash = 10 kg/d*

Designed Capacity : *720 m<sup>3</sup>/d*

Treated water/Distribution system -

Area covered : *km<sup>2</sup>*

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

Total length : *6.8 km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : )

Metered : ) *No records*

Unmetered : )

Working Meters:

Water production : *m<sup>3</sup>/d*

Remark :

Service area population :

Population served :

**Financial/Revenue**

O & M costs :Kshs )

Revenue earned :Kshs ) *No details*

Revenue collected :Kshs )

**Rehabilitation required/costs**

Estimated Cost

Kshs

i) *Expansion of treatment works*

*2,000,000*

ii) *Provision of vehicles*

*1,500,000*

iii) *Operation and maintenance equipment*

*300,000*

iv) *Rehabilitation / extension of distribution mains*

*2,000,000*

v) *Miscellaneous*

*1,000,000*

vi)

Total

*6,800,000*

**Future development plan**

Source : *River Awach*

Treatment : Capacity : *m<sup>3</sup>/d* )

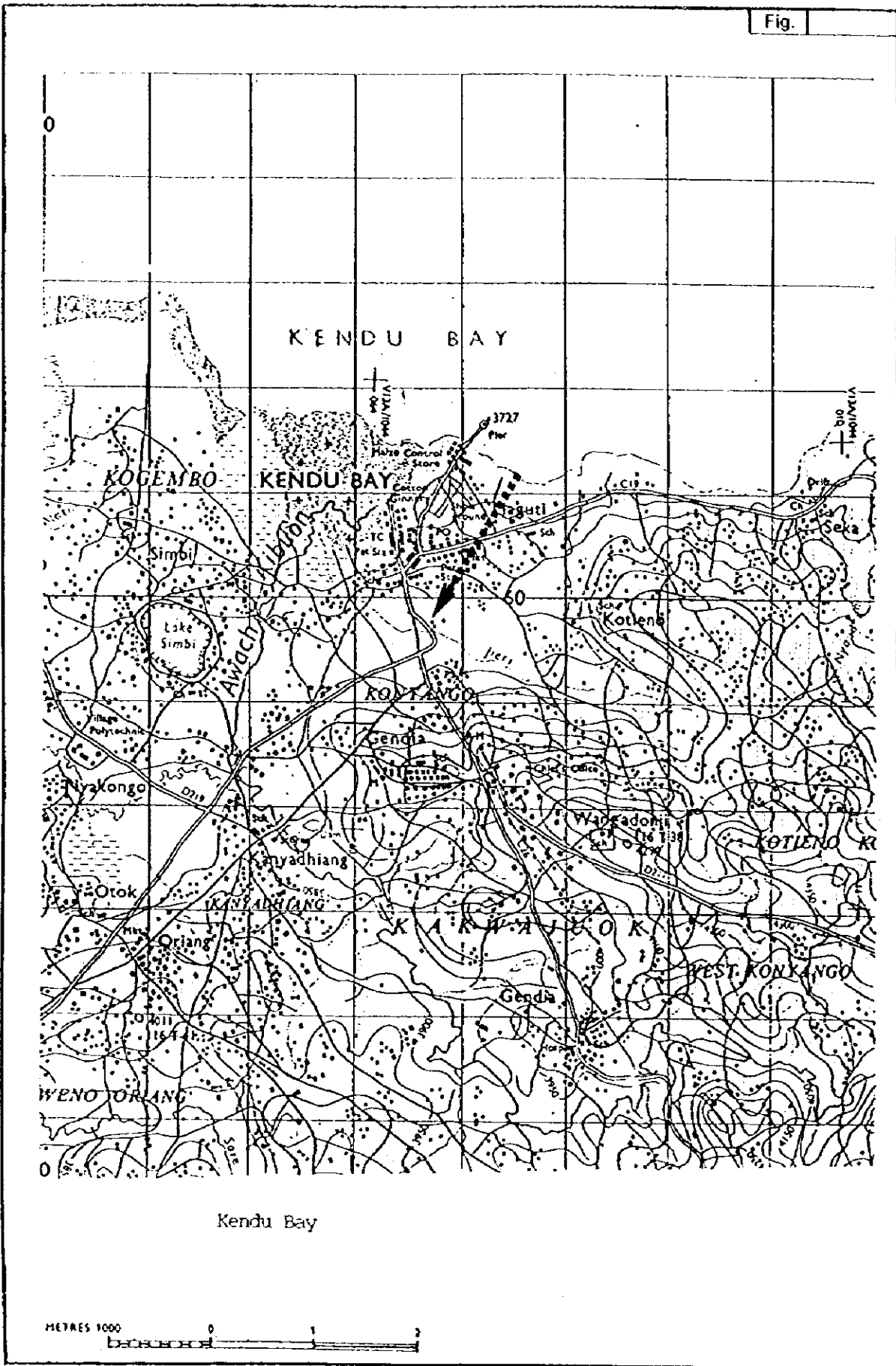
Design year : ) *No details provided*

Design population : )

**Remarks**

*The existing water supply is inadequate to cater for present population. Rationing is done 7 days a week. The no communal water points, nor records available / kept of service connections. The existing production capacity given is 30 m<sup>3</sup>/hr i.e. 720 m<sup>3</sup>/day.*

Fig.



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

**OLOITOKITOK (1/1)**

**Urban Water Supply  
System Survey**

**General**

Name of Urban Centre : *Oloitokitok*

Organisation/Water Undertaker : *National Water Conservation & Pipeline Corporation*

District : *Kajiado* Location : *Odomongi*

Map (1/50,000) Ref. no : *182/3*

Co-ordinates X : *37° 30' E* Y : *02° 55' S*

Drainage Sub-basin : *3G*

**Existing facilities**

Source : *Nol Turesh Springs*

Type of Intake : *Sump*

Elevation : *1514 m*

Raw water system : *Two Stage Pumping* H : *327 m* Dia : *200 mm*

Treatment Process : *Only preventative chlorination is applied to the spring water before being pumped to the intermediate pump station which then boosts the water to the high level reservoir. The raw spring water has been found to be well mineralised and thus only chlorination is done*

Designed Capacity : *2400 m<sup>3</sup>/d*

Treated water/Distribution system -

Area covered : *40 km<sup>2</sup>*

Distribution mains (80mm and above): *80 mm to 200 mm*

Total length : *8.1 km*

UFW (Estimated) : *575 m<sup>3</sup>/d - 1995*

Consumers - Total no : *1491 - 1995*

Metered : *1491*

Unmetered :

Working Meters: *Data not available*

Water production : *1440 m<sup>3</sup>/d - 1995*

Service area population :

Population served : *20,000*

Remark *Water production is obtained from the pumping rate on the basis of both pumps running for 23 hrs per day @ 100 m<sup>3</sup>/hr*

**Financial/Revenue**

O & M costs : *Kshs 4,919,000*

Revenue earned : *Kshs*

Revenue collected : *Kshs*

**Rehabilitation required/costs**

Estimated Cost

Kshs

i) *2 No. pumps with 50 m<sup>3</sup>/hr @ 170m head capacity*

*1,000,000*

ii) *1 No. pump (booster) 50 m<sup>3</sup>/hr @ 170m head capacity*

*500,000*

iii) *Service of 2 No. master meters - 200mm dia.*

*100,000*

Total

*1,600,000*

**Future development plan**

Source : *Nol Turesh*

Treatment : *Chlorination* Capacity : *7,476 m<sup>3</sup>/d*

Design year : *2010*

Design population :

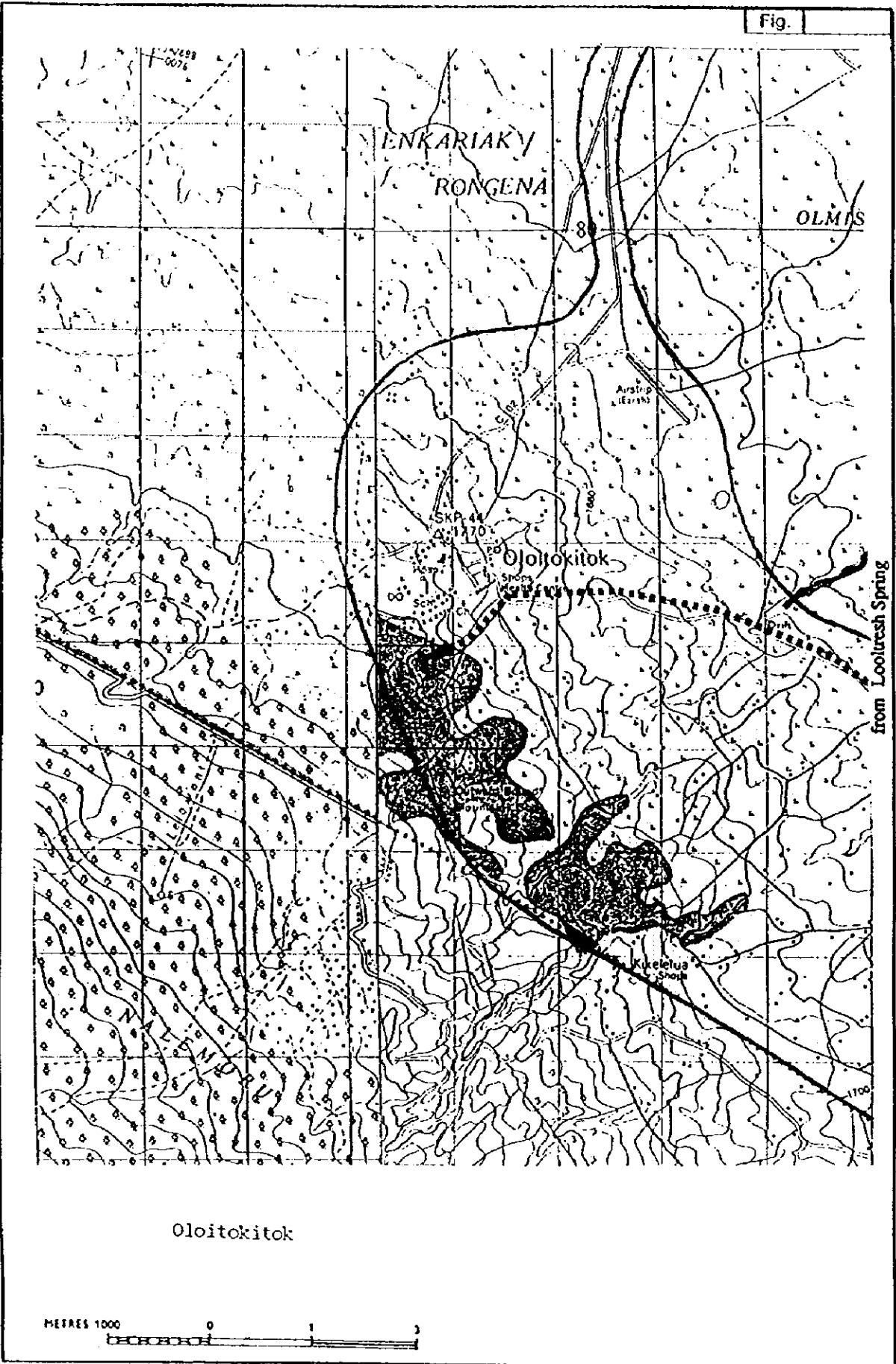
**Remarks**

*Loitokitok was previously supplied from a spring emanating from Tanzania, across the border. This spring has since been impounded by the Tanzanians and Nol Turesh was harnessed to supply Loitokitok as well as Machakos and Athi River in 1989.*

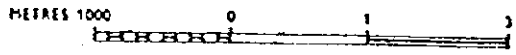
*The existing source is already providing to be inadequate and plans are underway to identify sources to supply Loitokitok Township.*



Fig.



Oloitokitok



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

**NGONG (1/1)**

*Data Book III Result of Survey on  
Existing Urban Water Supply Systems  
Urban Water Supply  
System Survey*

**General**

Name of Urban Centre : *Ngong*

Organisation/Water Undertaker : *MOWA*

District : *Kajiado* Location: *Ngong*

Map (1/50,000) Ref. no : *148/3*

Co-ordinates *X 36° 38' Y S 01° 21'*

Drainage Sub-basin : *2H*

**Existing facilities:**

Source : *3 No boreholes*

Type of Intake : *Boreholes* Elevation : *2020m*

Raw water system : *Pumping*

H : *m* Dia : *100mm*

Treatment Process : *None.*

*3 No boreholes No. C2500, C3937, C588 transmit directly to consumer and 2 No. pump water to distribution tank. From this tank water is boosted to higher area distribution tank.*

Designed Capacity :

Treated water/Distribution system -

Area covered: *19km<sup>2</sup> of Isiolo urban*

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

Total length : *6 km*

UFW (Estimated) : *m<sup>3</sup>/d*

Consumers - Total no : *2076 year 1996*

Working Meters: *150*

Metered : *300 removed*

Unmetered : *1776*

Water production : *1260 m<sup>3</sup>/d - 1996*

Remark : *Many illegal connections were reported.*

Service area population : *45,000*

Population served : *6,000*

**Financial/Revenue 1996**

O & M costs : *Ksh 991,889*

Revenue earned : *Kshs 1,382,628*

Revenue collected : *Kshs 888,171*

**Rehabilitation required/costs**

*i) Dam on river Mbagathi and new treatment works*

**Kshs Estimated**

*50,000,000*

*ii) distribution system*

*30,000,000*

*iii) Storage*

*5,000,000*

**Total**

*85,000,000*

**Future development plan**

Source : *River Mbagathi*

Treatment : *Full*

Capacity : *6,100 m<sup>3</sup>/d*

Design year :

Design population:

**Remarks**

*Current water supply is not able to serve the large population boreholes will not be able to supply the demand. A completely large supply system is required.*

Fig.

