

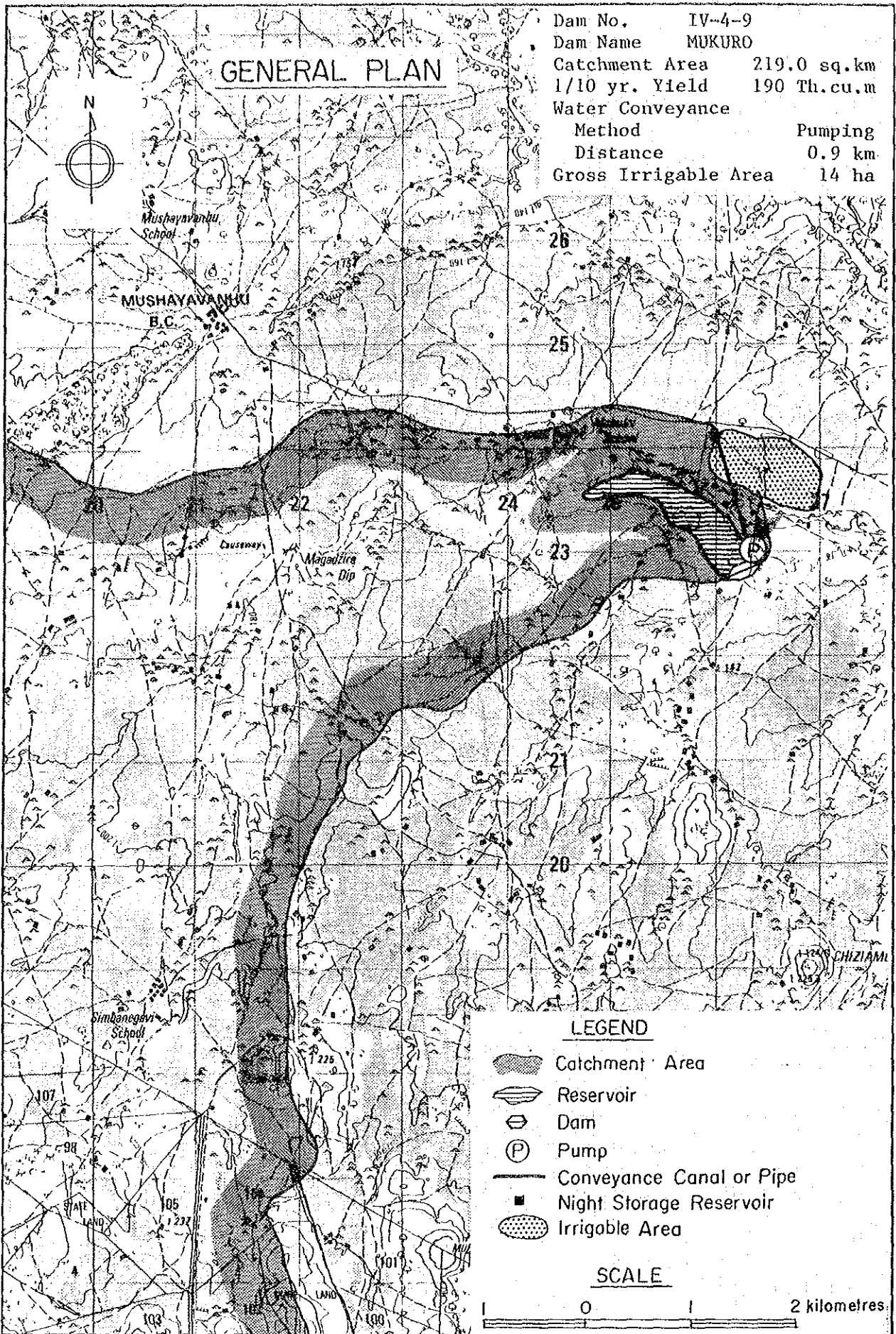
No. IV-4-9

Name of Dam Mukuro

Location	District Gutu		Communal Land Gutu		
	Map Ref. 1931C2		Coordinates UP263228		
Geology	Granite, massive and very hard.				
Hydrology	River Mukuro		Hydrological Zone E-S4		
	Catchment Area	219.0 sq.km	M.A. Rainfall	760 mm	
	M.A. Runoff	87 mm	Sediment	320 tonnes km ² /yr.	
Reservoir	Effective Capacity	0.130 MCM	1/10 Yr. Yield	0.190 MCM	
	Dead Capacity	1.040 MCM	D.W.S.	1 130 m	
	Total Capacity	1.170 MCM	N.W.S.	1 130 m	
Dam	Height	11 m	Length	600 m	
	Embankment Volume	62 000 cu.m	Spillway	432 m	
Agriculture	Natural Region IV		Soil SL		
	Potential Irrigable Area		100 ha		
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 11.2ha		Dist. 0.9 km by Pump, H=10.0 m		
	Topography	Area	Steep slope		
		Conveyance	Slightly sloping		
Rural Water Supply	Population 1 572 person		31 cu.m/day		
	Livestock 736 unit		33 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 754 000	Z\$ 716 000	Z\$ 1 470 000	B	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$ 25 132 /year	Z\$ 292 000	0.5 per cent		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks					

Present Condition on the Ward








Ward Name	26, 27		Area(11 940+4 400) ha	
Demography	Population Density		52.4 persons/sq.km	
	Family Size		4.8 Persons/household	
Agriculture	Arable Area (8 239+3 784) ha		Grazing Area (3 701+616) ha	
	Maize	N.A ha/household	13	bags/ha
	Sorghum	N.A ha/household	10	bags/ha
	Livestock	3.1 LSUs/household	36.8	LSUs/sq.km
Rural Water Supply	Borehole	0.06 units/sq.km	1 800	persons/unit
	Well	6.36 units/sq.km	9	persons/unit



GENERAL PLAN

Dam No. IV-4-9
 Dam Name MUKURO
 Catchment Area 219.0 sq.km
 1/10 yr. Yield 190 Th.cu.m
 Water Conveyance Method Pumping
 Distance 0.9 km
 Gross Irrigable Area 14 ha

LEGEND

-  Catchment Area
-  Reservoir
-  Dam
-  Pump
-  Conveyance Canal or Pipe
-  Night Storage Reservoir
-  Irrigable Area

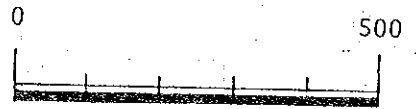
SCALE

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MUKURO

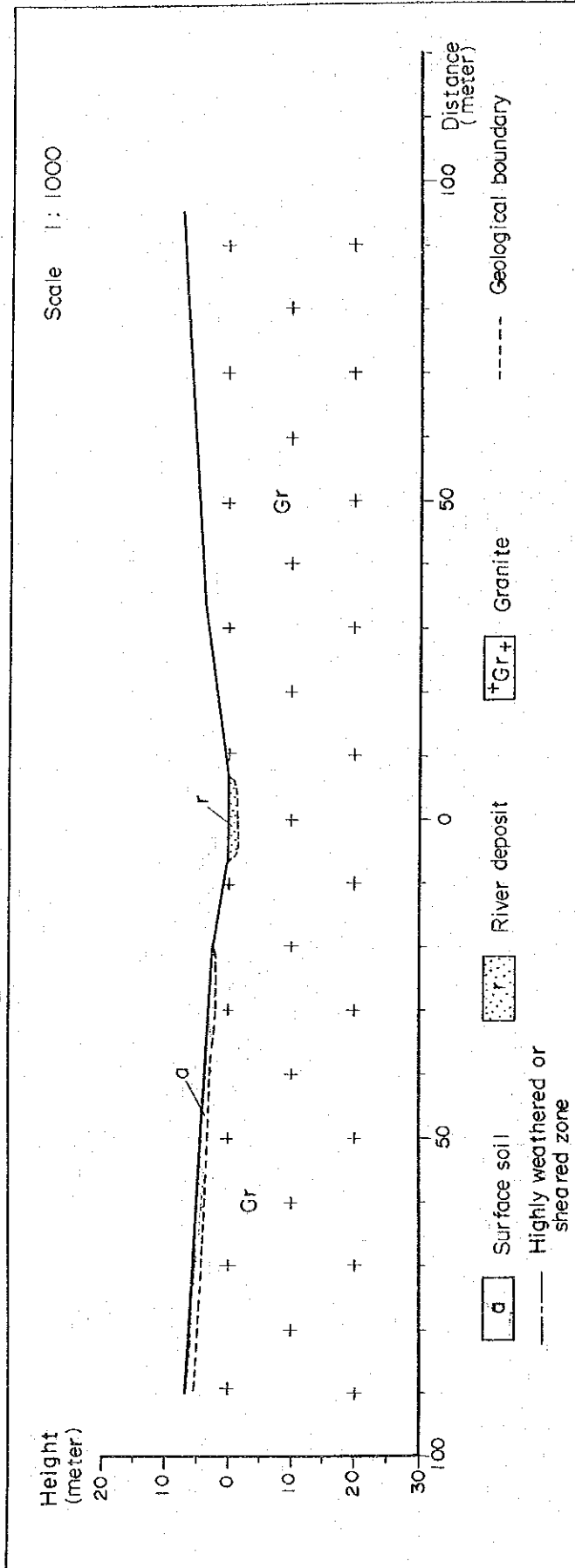
PLAN OF DAM

Dam No.	IV- 4 - 9
District	Gutu
Communal L.	Gutu
River	Mukuro
Map Ref.	1931 C2
Coordinate	UP 263228
Catchment A.	219.0 sq.km
Design Flood	777 cum/sec
N.W.S.	EL.1,130.0 m
D.W.S.	EL.1,130.0 m
Capacity of Res.	1.17 M.C.M.
Dam Top	EL.1,132.0 m
Dam Height	11.0 m
Dam Length	600 m
Dam Vol.	62,000 cum



SCALE 1:10 000

IV-4-9 Mukuro



The bedrock consists of granite, and it is porphyritic, massive and very hard. Partly it is soft by weathering, however the thickness of the weathering layer is not deep. It seems to be not necessary to cut off the bedrock in the foundation strata.

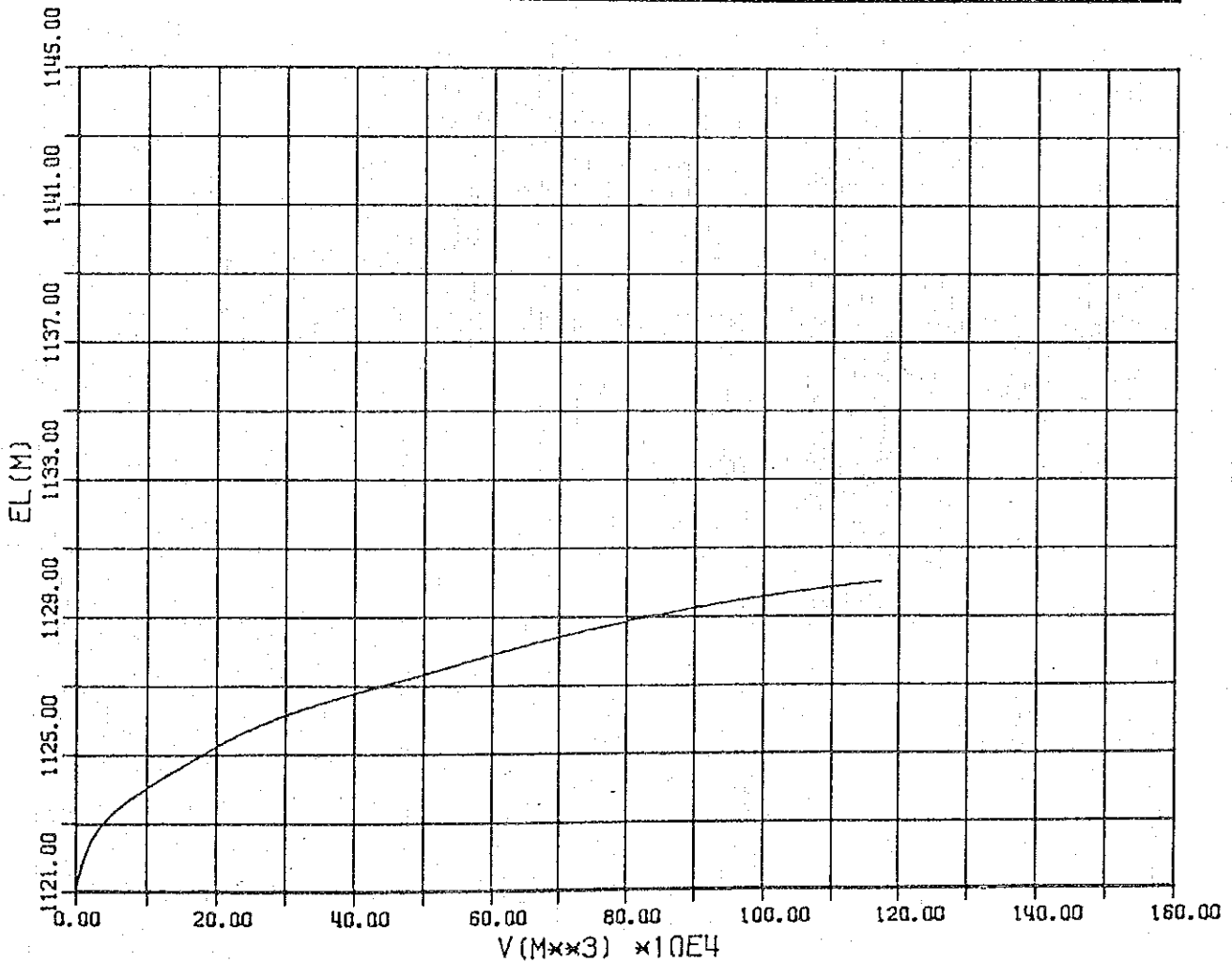
The estimated thickness of unconsolidated deposits is maximum 2 meters at the left bank.

The bedrock is suitable for dam foundation from the geological point of view.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
IV-4-9	1931C2	UP	263	228

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
1121.0	0.0	0	0	0	0.00	
1122.5	1.5	28764	14382	21573	21.57	
1125.0	2.5	97096	62930	157325	178.90	
1127.5	2.5	183656	140376	350940	529.84	
1130.0	2.5	330324	256990	642475	1172.31	



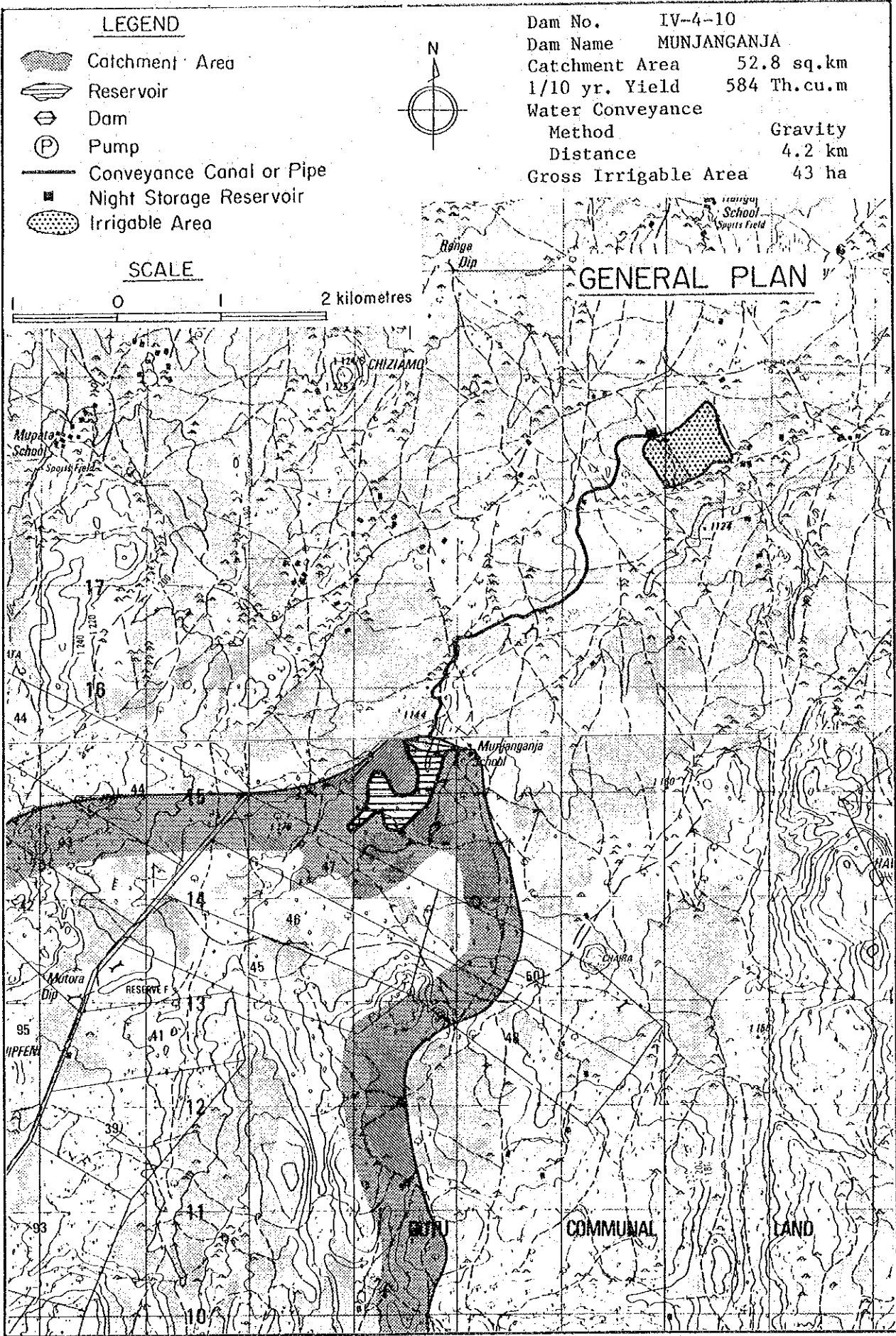
No. IV-4-10

Name of Dam Munjangaria

Location	District Gutu		Communal Land Gutu		
	Map Ref. 1931C4		Coordinates UP278155		
Geology	Granite, highly weathering and fracturing, in the surface.				
Hydrology	River Mutora		Hydrological Zone E-S4		
	Catchment Area	52.8 sq.km	M.A. Rainfall	740 mm	
	M.A. Runoff	79 mm	Sediment	320 tonnes km ² /yr.	
Reservoir	Effective Capacity	0.990 MCM	1/10 Yr. Yield	0.584 MCM	
	Dead Capacity	0.250 MCM	D.W.S.	1 144 m	
	Total Capacity	1.240 MCM	N.W.S.	1 150 m	
Dam	Height	18 m	Length	850 m	
	Embankment Volume	133 000 cu.m	Spillway	194 m	
Agriculture	Natural Region IV		Soil SCL-CL		
	Potential Irrigable Area		150 ha		
	Proposed Cropping Pattern A				
Irrigation	Net Irrigable Area 34.4ha		Dist. 4.2 km by Gravity		
	Topography	Area	Flat		
		Conveyance	Slightly sloping		
Rural Water Supply	Population 1 509 person		30 cu.m/day		
	Livestock 450 unit		20 cu.m/day		
Cost and Benefit	Dam		Irrigation Facilities	Total Cost	Class
	Z\$ 1 370 000		Z\$ 1 076 000	Z\$ 2 446 000	A
	Annual Increment Benefit		Net Present Value	Economic Internal Rate of Return	
	Z\$128 912/year		Z\$ 1 499 000	9.5 per cent	
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks					

Present Condition on the Ward

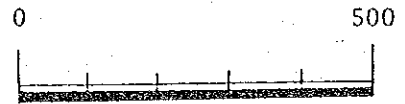
Ward Name	26		Area	11 940 ha	
Demography	Population Density		50.3	persons/sq.km	
	Family Size		5.5	Persons/household	
Agriculture	Arable Area		8 239 ha	Grazing Area 3 701 ha	
	Maize	N.A	ha/household	10	bags/ha
	Sorghum	N.A	ha/household	N.A	bags/ha
	Livestock	2.4	LSUs/household	22.5	LSUs/sq.km
Rural Water Supply	Borehole		0.02	3 000	persons/unit
	Well		N.A	N.A	persons/unit



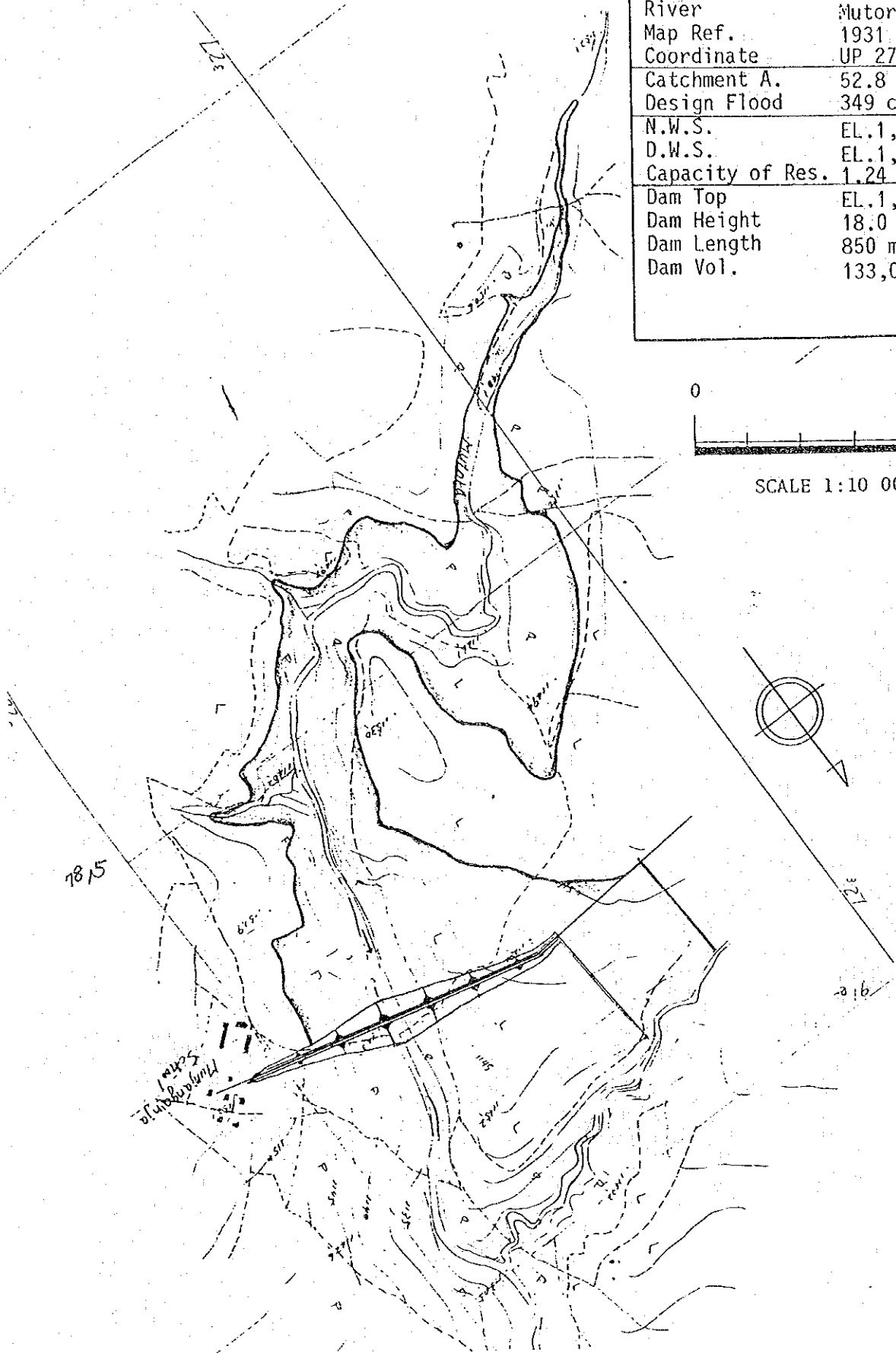
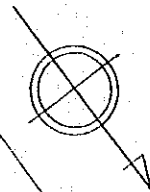
PLAN OF DAM

MUNJANGANJA

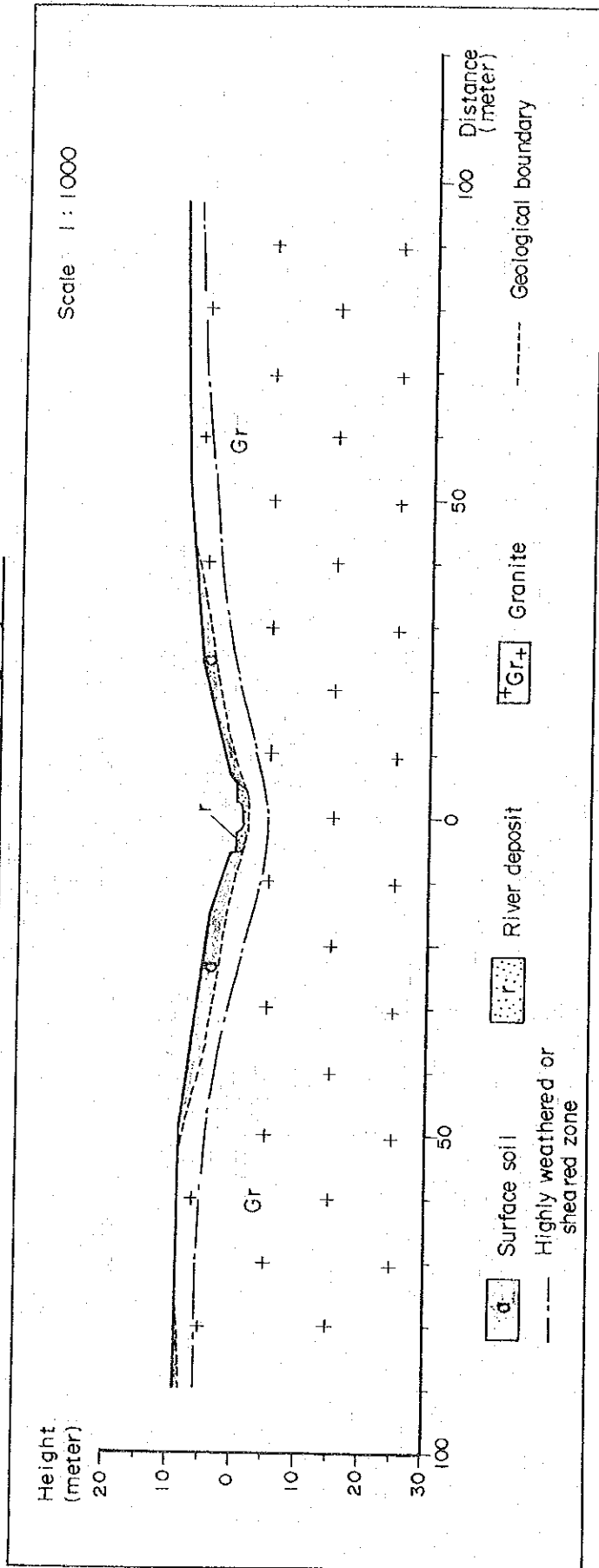
Dam No.	IV- 4 -10
District	Gutu
Communal L.	Gutu
River	Mutora
Map Ref.	1931 C4
Coordinate	UP 278155
Catchment A.	52.8 sq.km
Design Flood	349 cum/sec
N.W.S.	EL.1,150.0 m
D.W.S.	EL.1,144.0 m
Capacity of Res.	1.24 M.C.M.
Dam Top	EL.1,152.0 m
Dam Height	18.0 m
Dam Length	850 m
Dam Vol.	133,000 cum



SCALE 1:10 000



IV-4-10 Munjanganja



The Mutero River in the area forms relatively a narrow and deep valley.

The bedrock consists of granite. It is generally massive and very hard, however around the damsite it is very soft and well jointed at intervals of 50 to 10 centimeters. The thickness of the weathering rock is estimated 5 meters.

Leakage through the bedrock seems to be large, therefore it seems to be necessary to carry out foundation treatment.

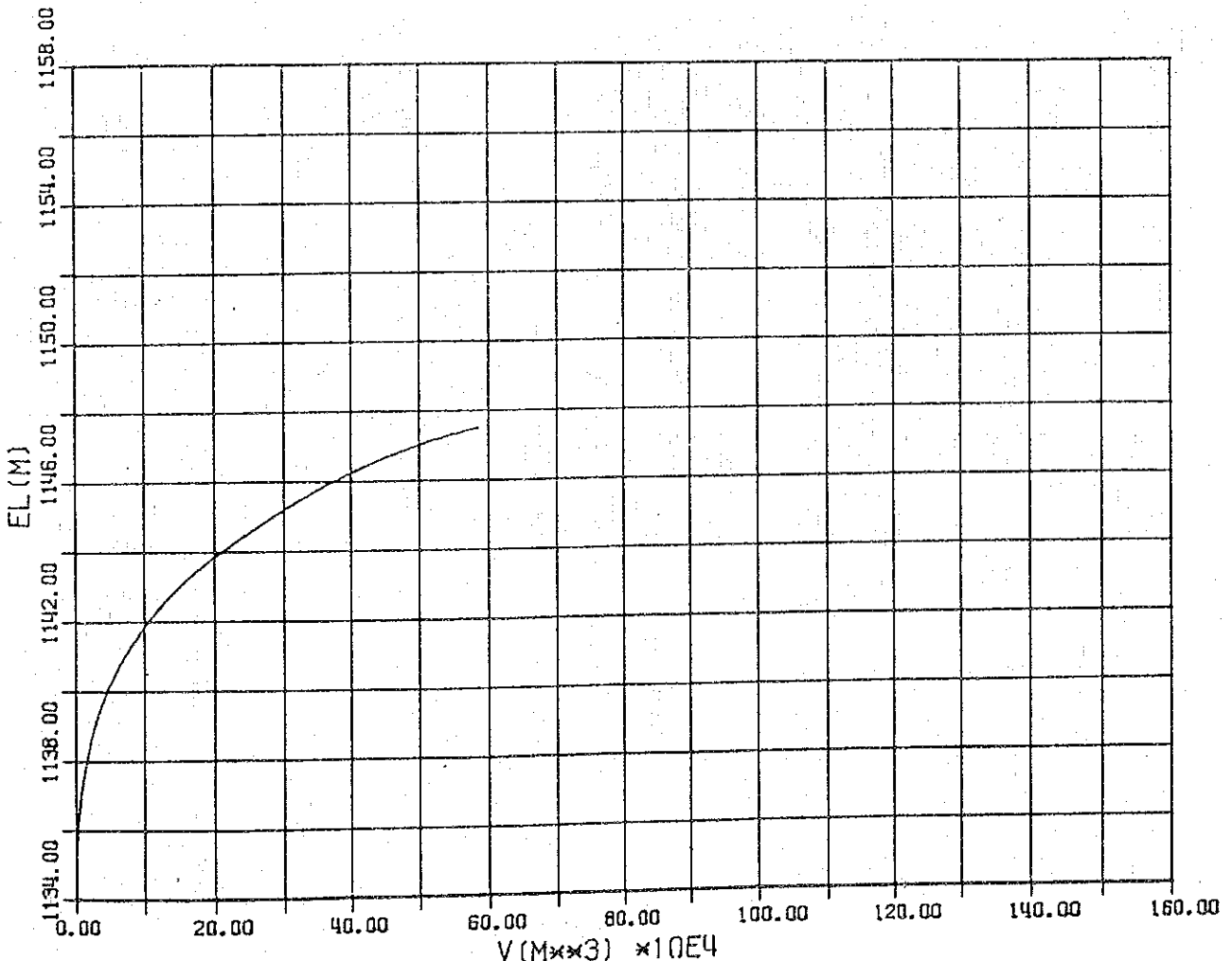
The estimated thickness of unconsolidated deposits is maximum 2 meters.

The bedrock is less suitable for dam foundation from the geological point of view.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
IV-4-10	1931C4	UP	278	155

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
1134.3	0.0	0	0	0	0.00	
1135.0	0.7	1132	566	396	0.40	
1137.5	2.5	7794	4463	11158	11.55	
1140.0	2.5	19683	13739	34346	45.90	
1142.5	2.5	44897	32290	80725	126.62	
1145.0	2.5	81465	63181	157953	284.58	
1147.5	2.5	158820	120143	300356	584.93	



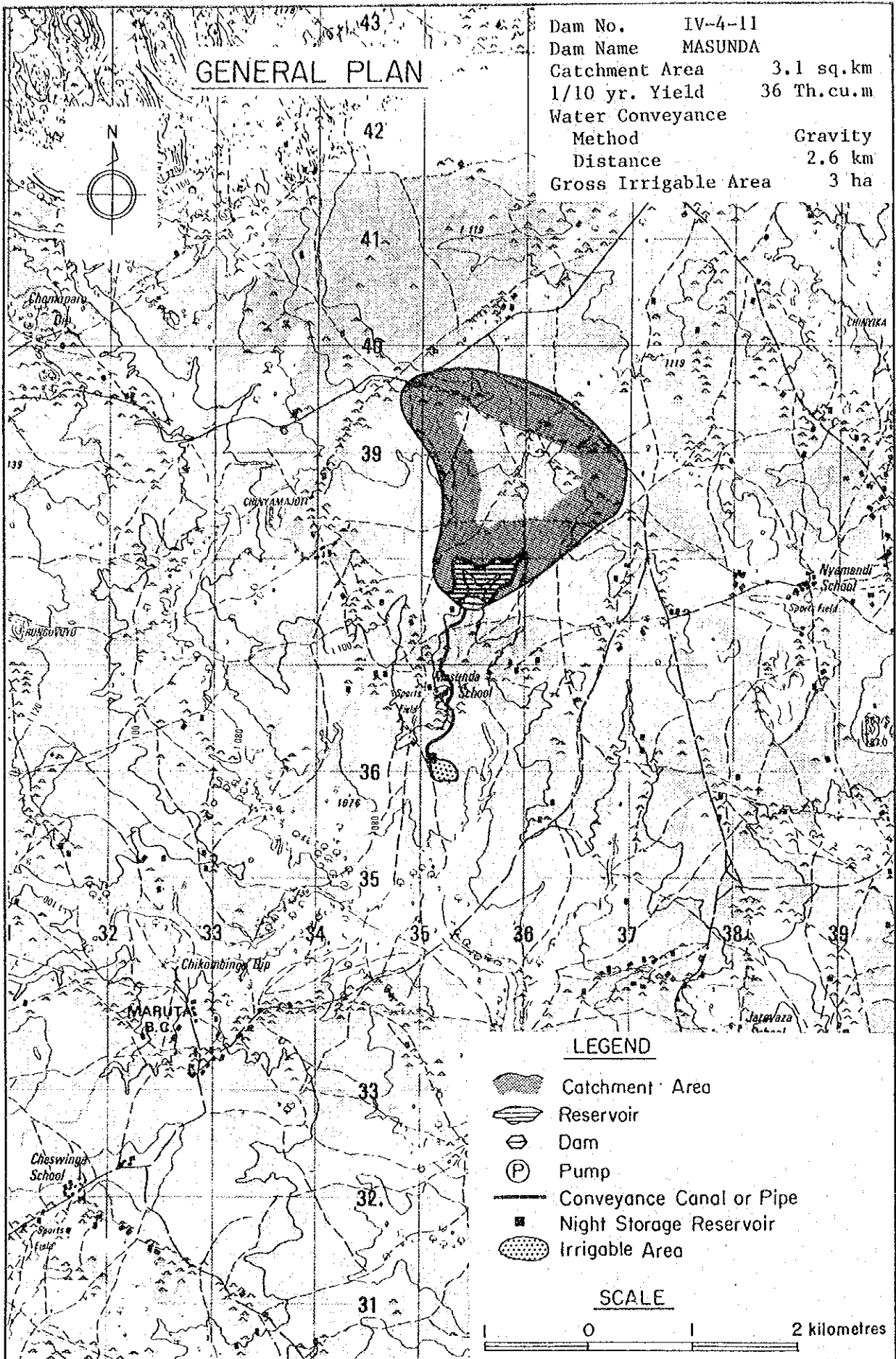
No. IV-4-11

Name of Dam Masunda

Location	District Gutu		Communal Land Gutu		
	Map Ref. 1931C2		Coordinates UP355375		
Geology	Granite, generally massive and hard. Partly weathering, soft, and joint well developed.				
Hydrology	River (T) Sote		Hydrological Zone E-S4		
	Catchment Area 3.1 sq.km		M.A. Rainfall 720 mm		
	M.A. Runoff 72 mm		Sediment 320 tonnes km ² /yr.		
Reservoir	Effective Capacity 0.440 MCM		1/10 Yr. Yield 0.036 MCM		
	Dead Capacity 0.010 MCM		D.W.S. 1 099 m		
	Total Capacity 0.450 MCM		N.W.S. 1 105 m		
Dam	Height 10 m		Length 590 m		
	Embankment Volume 61 000 cu.m		Spillway 31 m		
Agriculture	Natural Region IV		Soil SL		
	Potential Irrigable Area		40 ha		
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 2.1 ha		Dist. 2.6 km by Gravity		
	Topography	Area		Undulated, gently sloping	
		Conveyance		Slightly sloping	
Rural Water Supply	Population 2 535 person		51 cu.m/day		
	Livestock 2 530 unit		114 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 693 000	Z\$ 476 000	Z\$ 1 169 000	C	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$ 5 416/year	Z\$ 63 000	-		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks					

Present Condition on the Ward

Ward Name	15		Area 5 900 ha	
Demography	Population Density		84.5 persons/sq.km	
	Family Size		8.0 Persons/household	
Agriculture	Arable Area 3 400 ha		Grazing Area 2 500 ha	
	Maize N.A ha/household		20 bags/ha	
	Sorghum N.A ha/household		15 bags/ha	
	Livestock 4.8 LSUs/household		50.6 LSUs/sq.km	
Rural Water Supply	Borehole 0.12 units/sq.km		712 persons/unit	
	Well 0.47 units/sq.km		178 persons/unit	

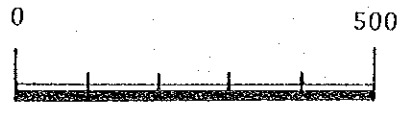
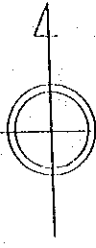


MASUNDA

PLAN OF DAM

Dam No.	IV- 4 - 11
District	Gutu
Communal L.	Gutu
River	(T)Sote
Map Ref.	1931 C2
Coordinate	UP 355375
Catchment A.	3.1 sq.km
Design Flood	56 cum/sec
N.W.S.	EL.1,105.0 m
D.W.S.	EL.1,099.0 m
Capacity of Res.	0.45 M.C.M.
Dam Top	EL.1,107.0 m
Dam Height	10.0 m
Dam Length	590 m
Dam Vol.	61,000 cum

335

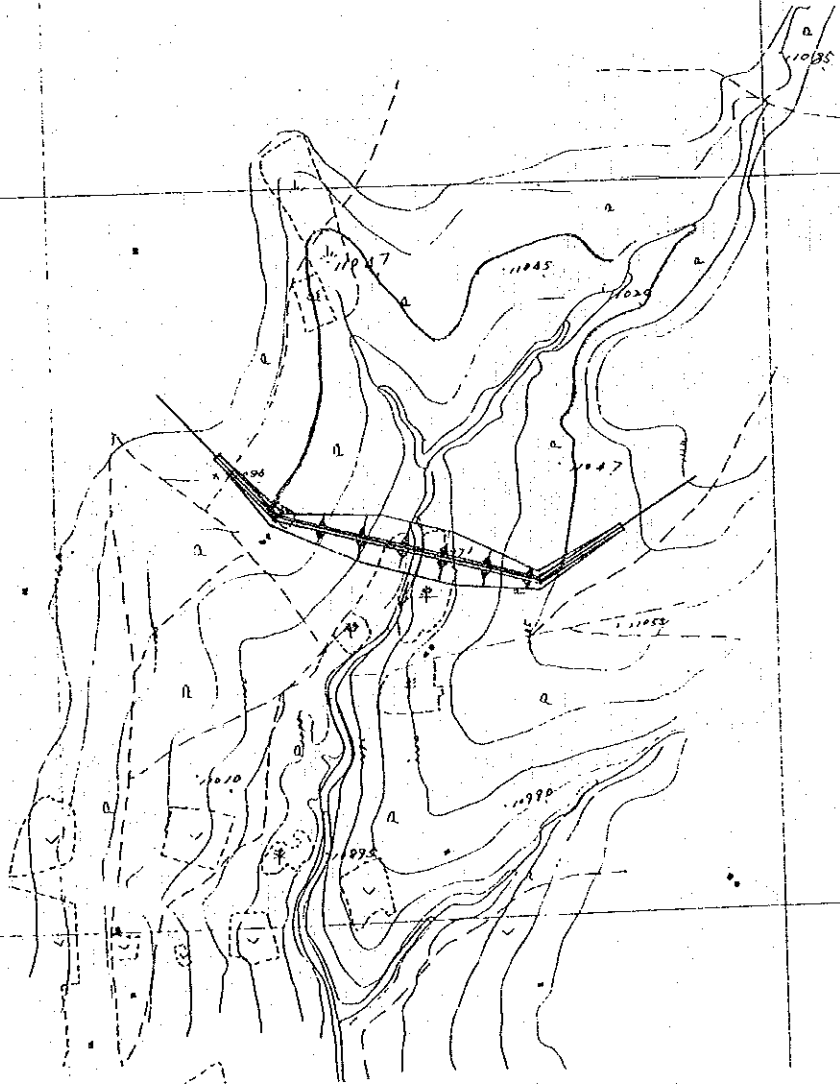


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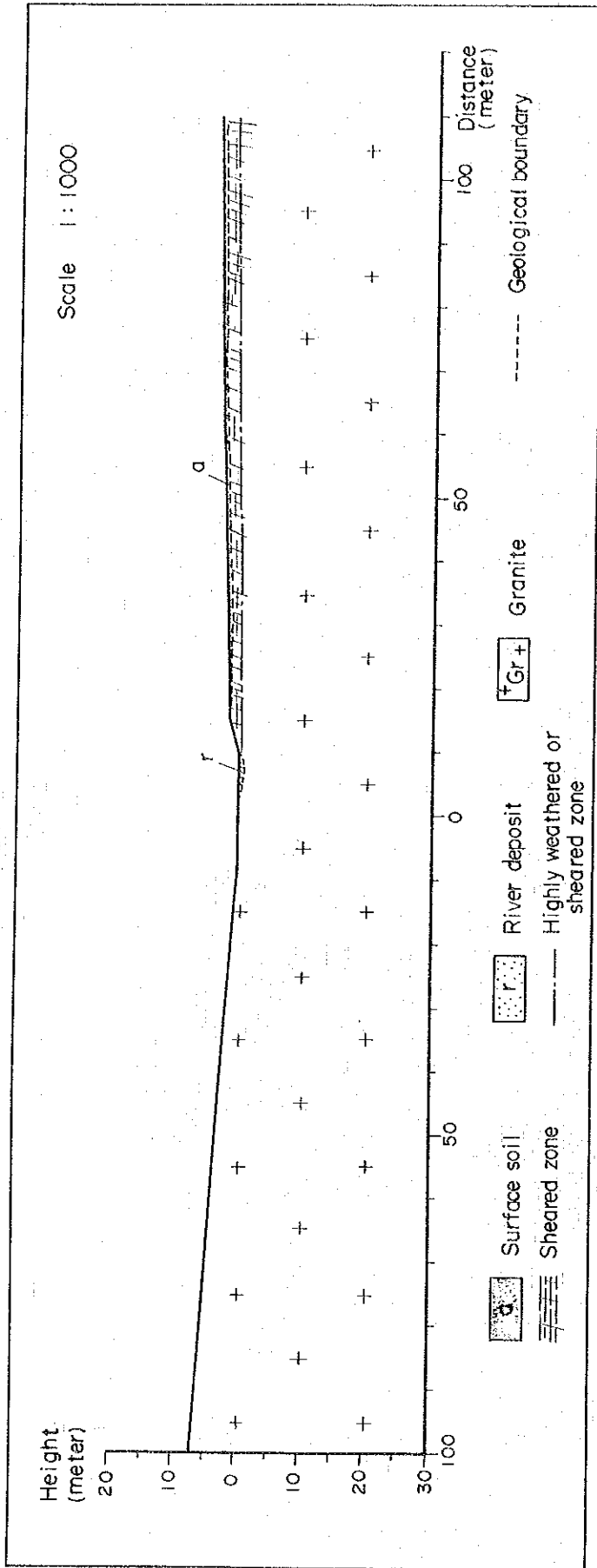
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IV-4-11 Masunda

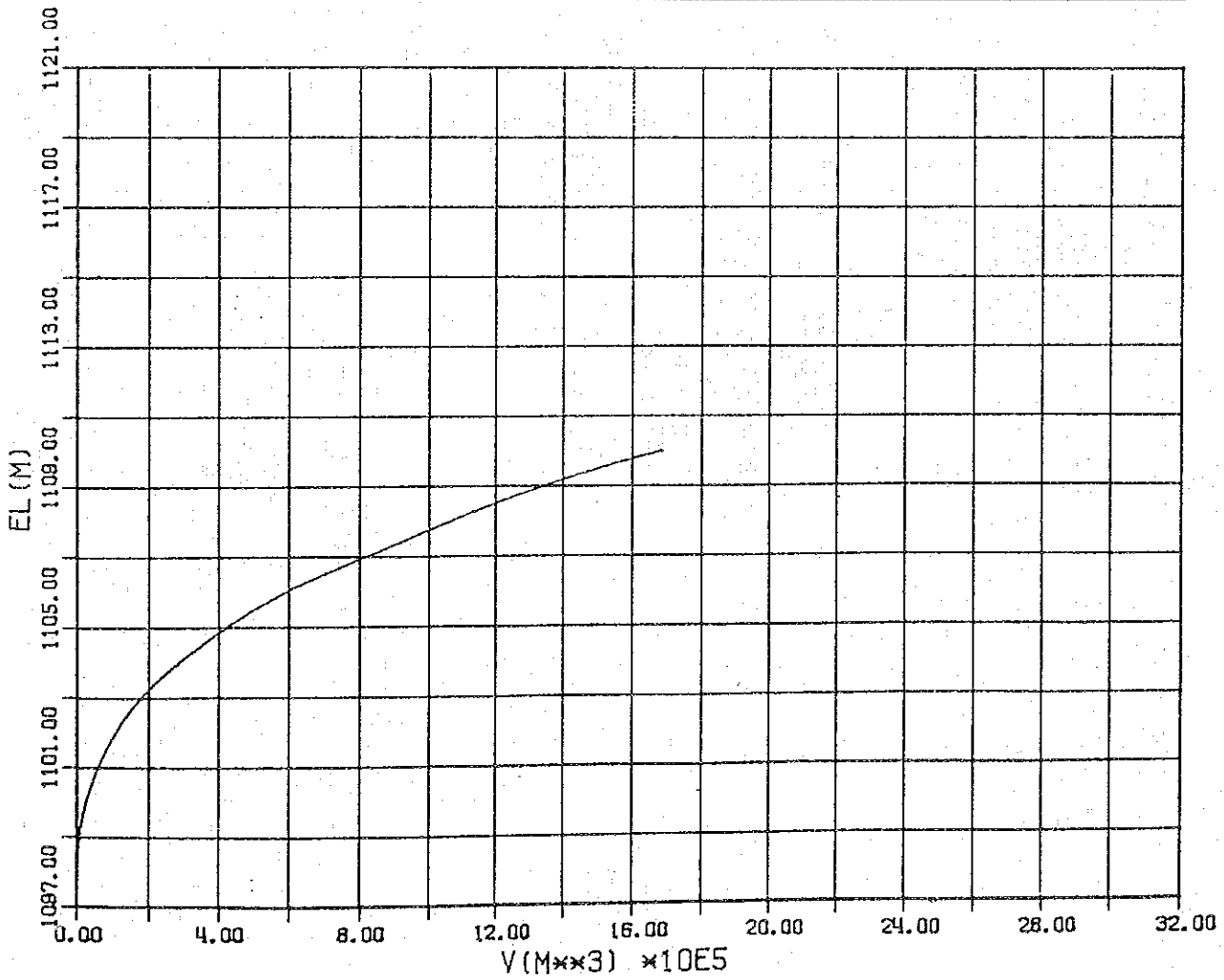


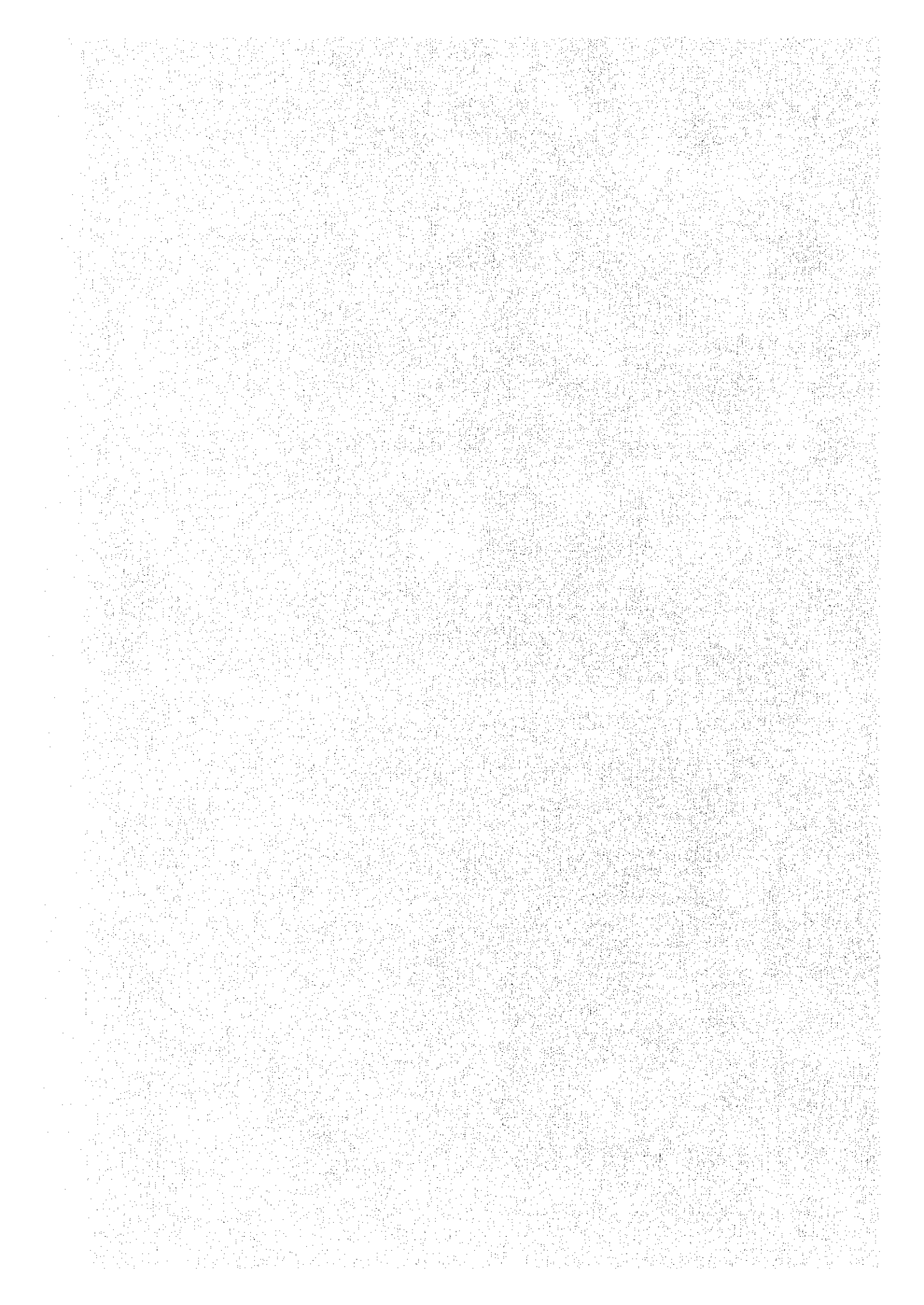
The bedrock consists of porphyritic granite. It is massive and very hard and generally poorly jointed. However at the left bank it is well jointed and very soft. Therefore it seems to be necessary to cut off the weathering layer 3 to 2 meters thick to construct for the dam safety. The estimated thickness of unconsolidated deposits is less than 1 meter.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
IV-4-11	1931C2	UP	355	375

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
1097.1	0.0	0	0	0	0.00	
1097.5	0.4	801	401	160	0.16	
1100.0	2.5	19545	10173	25433	25.59	
1102.5	2.5	70098	44822	112054	137.65	
1105.0	2.5	156221	11315	282899	420.54	
1107.5	2.5	257820	207021	517551	938.10	
1110.0	2.5	338625	298223	745556	1683.65	





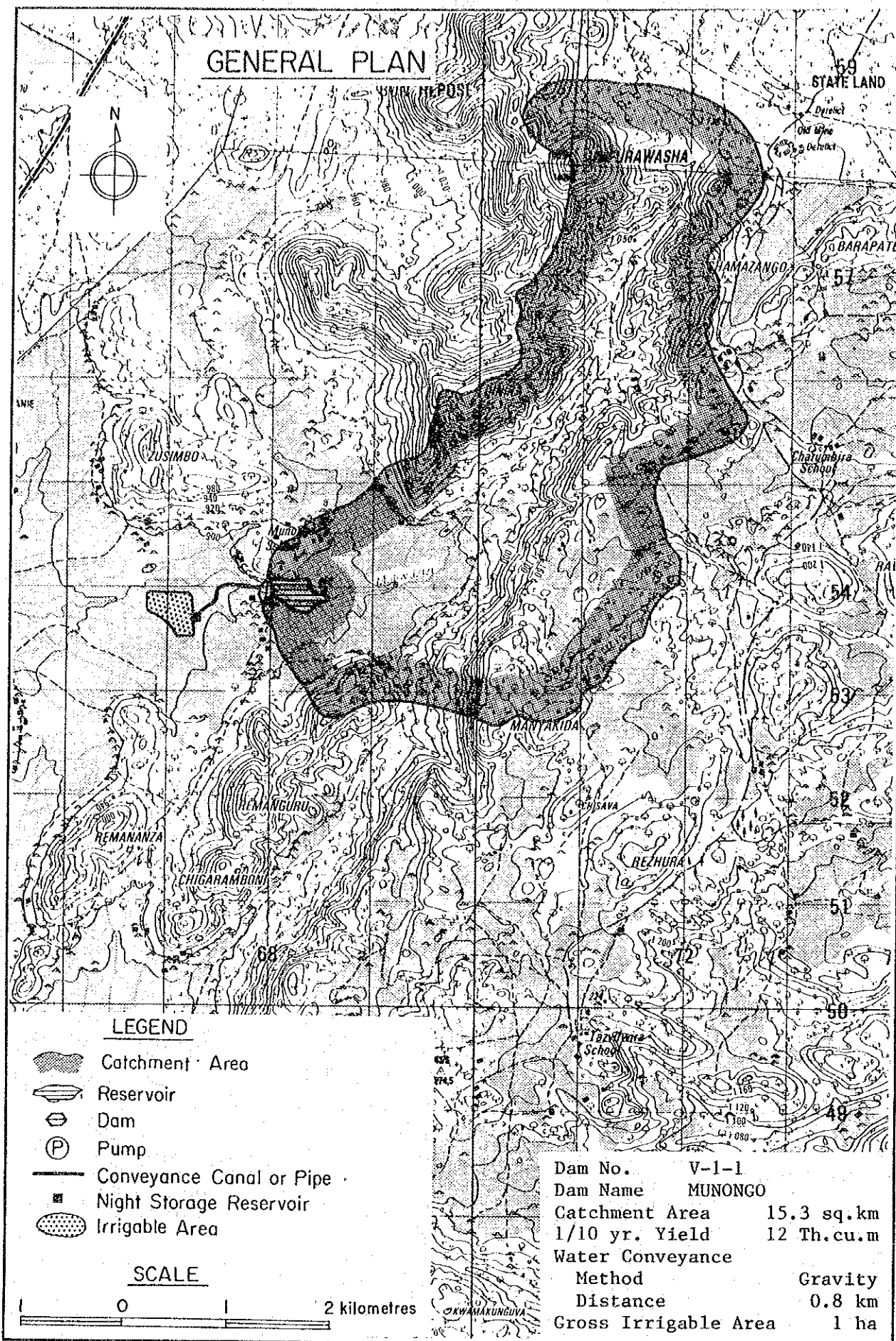
No. V-1-1

Name of Dam Munongo

Location	District Masvingo		Communal Land Masvingo		
	Map Ref. 2030B4		Coordinates TN680540		
Geology	Dolerite, all rock at the surface has been changed into boulders.				
Hydrology	River Mutiwazizi		Hydrological Zone E-T2		
	Catchment Area	15.3 sq.km	M.A. Rainfall	740 mm	
	M.A. Runoff	79 mm	Sediment	530 tonnes km ² /yr.	
Reservoir	Effective Capacity	0.180 MCM	1/10 Yr. Yield	0.012 MCM	
	Dead Capacity	0.120 MCM	D.W.S.	905 m	
	Total Capacity	0.300 MCM	N.W.S.	907 m	
Dam	Height	11 m	Length	210 m	
	Embankment Volume	45 000 cu.m	Spillway	87 m	
Agriculture	Natural Region IV		Soil SCL		
	Potential Irrigable Area			50 ha	
	Proposed Cropping Pattern A				
Irrigation	Net Irrigable Area 0.7 ha		Dist. 0.8 km by Gravity		
	Topography	Area	Flat		
		Conveyance	Slightly sloping		
Rural Water Supply	Population	4 071 person	81 cu.m/day		
	Livestock	2 560 unit	115 cu.m/day		
Cost and Benefit	Dam		Irrigation Facilities	Total Cost	Class C
	Z\$ 491 000		Z\$ 166 000	Z\$ 657 000	
	Annual Increment Benefit		Net Present Value	Economic Internal Rate of Return	
	Z\$ 3 194/year		Z\$ 37 000		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	N	N
Remarks	Storage Ratio < 0.1 Water right (No. 3672) ... 0.3 km				

Present Condition on the Ward

Ward Name	Charumbia		Area	4 880 ha
Demography	Population Density		135.7	persons/sq.km
	Family Size		5.6	Persons/household
Agriculture	Arable Area	1 880 ha	Grazing Area	3 000 ha
	Maize	N.A ha/household	18	bags/ha
	Sorghum	N.A ha/household	10	bags/ha
	Livestock	2.1 LSUs/household	51.2	LSUs/sq.km
Rural Water Supply	Borehole	0.27 units/sq.km	509	persons/unit
	Well	N.A. units/sq.km	N.A	persons/unit

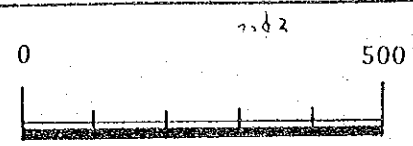
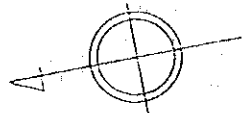


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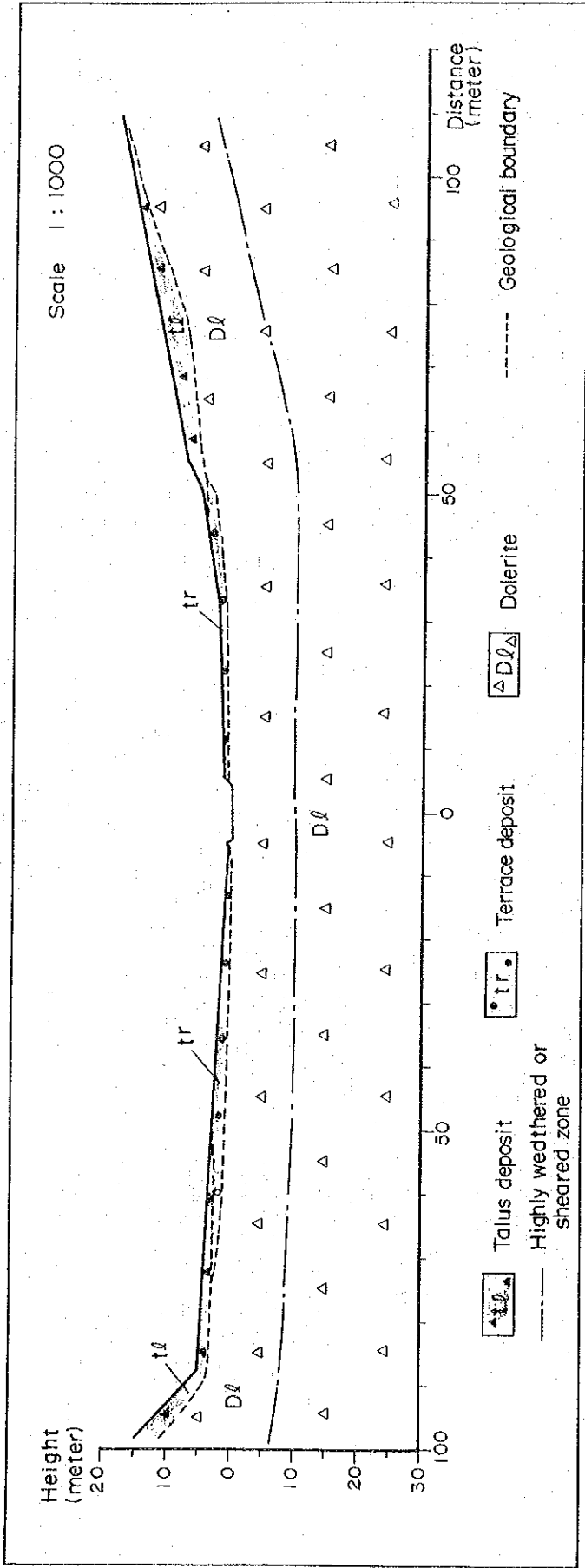
PLAN OF DAM

MUNONGO

Dam No.	V - 1 - 1
District	Masvingo
Communal L.	Masvingo
River	Mutiwazizi
Map Ref.	2030 B4
Coordinate	TN 680540
Catchment A.	15.3 sq.km
Design Flood	156 cum/sec
N.W.S.	EL.907.0 m
D.W.S.	EL.905.0 m
Capacity of Res.	0.30 M.C.M.
Dam Top	EL.909.0 m
Dam Height	11.0 m
Dam Length	210 m
Dam Vol.	45,000 cum



V-1-1 Munongo



The Mutiwatiti River in the area forms wide flood plane and steep slope. Talus and terrace are distributed on the both banks.

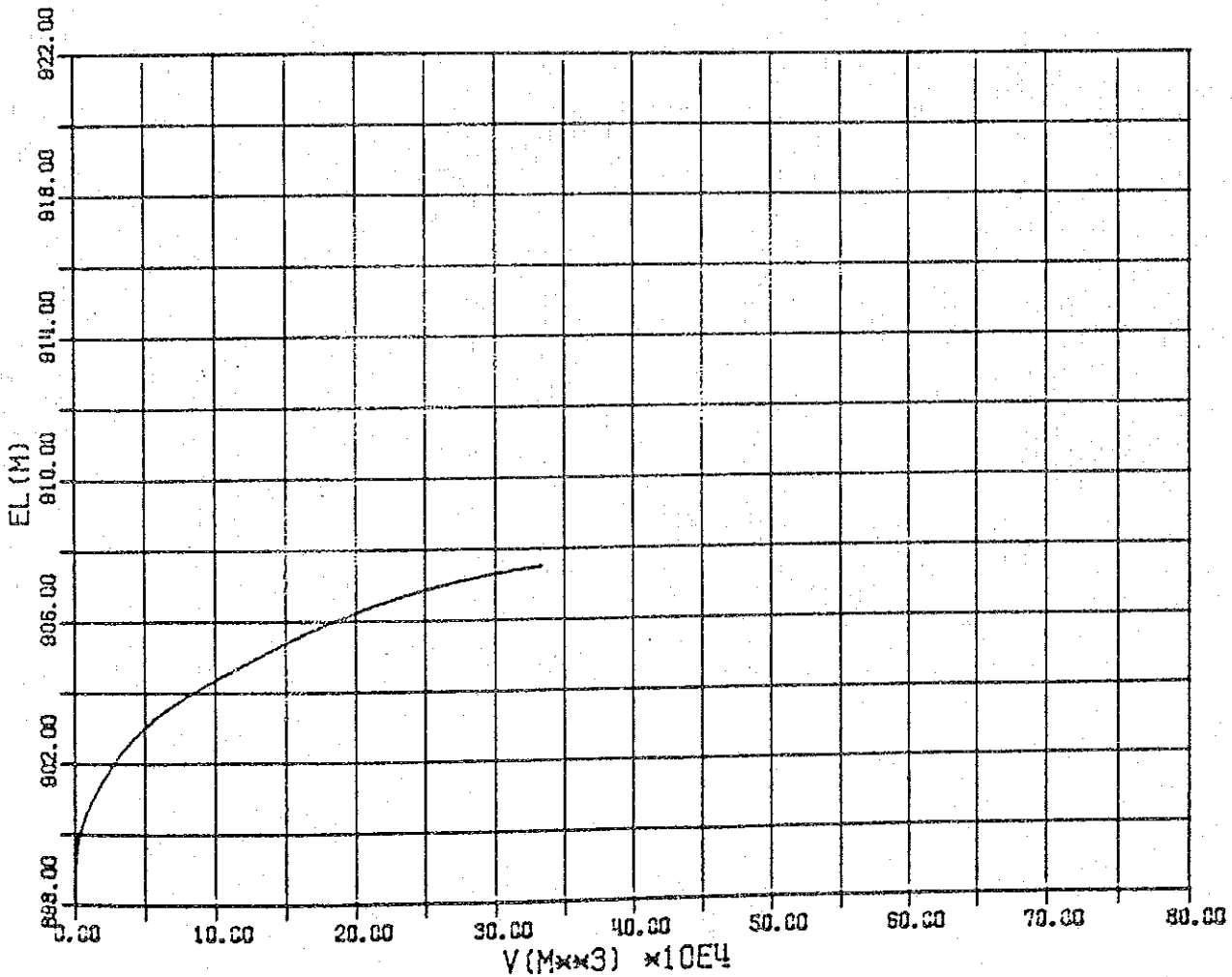
The bedrock consists of dolerite, and it is fine grained and usually very hard. However it is well jointed, and all rock at the surface has been changed into boulders. It seems that the well jointed strata persist to a great depth, therefore leakage through the bedrock and cost of foundation treatments are great.

The bedrock is less suitable for the dam foundation from the geological point of view.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HCR
V-1-1	2030B4	TN	680	540

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	SV (1000M ³)	NOTE
898.0	0.0	0	0	0	0.00	
900.0	2.0	3713	1857	3713	3.71	
902.5	2.5	23357	13535	33838	37.55	
905.0	2.5	50945	37151	92878	130.43	
907.5	2.5	111440	81193	202981	333.41	



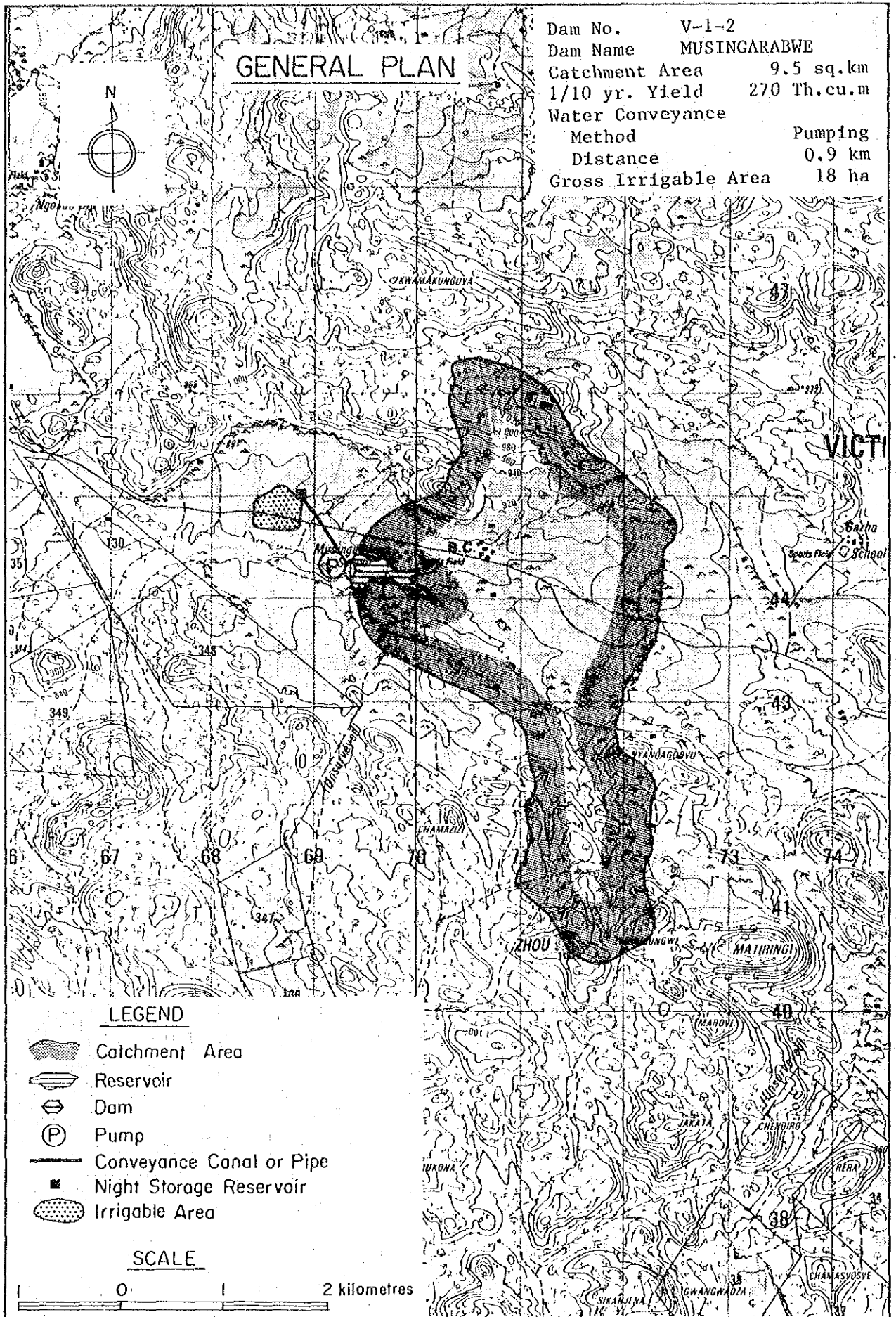
No. V-1-2

Name of Dam Musingarabwe

Location	District Masvingo		Communal Land Masvingo		
	Map Ref. 2030B4		Coordinates TN694443		
Geology	Granitic greiss, generally massive and hard, partly weathering.				
Hydrology	River Govorowe		Hydrological Zone E-T1		
	Catchment Area	9.5 sq.km	M.A. Rainfall	780 mm	
	M.A. Runoff	95 mm	Sediment	530 tonnes km ² /yr.	
Reservoir	Effective Capacity	0.690 MCM	1/10 Yr. Yield	0.270 MCM	
	Dead Capacity	0.070 MCM	D.W.S.	871 m	
	Total Capacity	0.760 MCM	N.W.S.	878 m	
Dam	Height	17 m	Length	730 m	
	Embankment Volume	142 000 cu.m	Spillway	67 m	
Agriculture	Natural Region	III	Soil	LS-SL	
	Potential Irrigable Area		60 ha		
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 14.5ha		Dist. 0.9 km by Pump, H=9.0 m		
	Topography	Area	Flat		
		Conveyance	Gently sloping, one river crossing		
Rural Water Supply	Population	885 person	18 cu.m/day		
	Livestock	545 unit	25 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 1 448 000	Z\$ 726 000	Z\$ 2 174 000	C	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$ 30 472 /year	Z\$ 354 000	-		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks	Water right (No. 10915) ... 8 km				

Present Condition on the Ward








Ward Name	Musingarawi		Area	5 866 ha
Demography	Population Density		29.5	persons/sq.km
	Family Size		3.3	Persons/household
Agriculture	Arable Area	1 609 ha	Grazing Area	4 257 ha
	Maize	N.A ha/household	6	bags/ha
	Sorghum	N.A ha/household	4	bags/ha
	Livestock	1.2 LSUs/household	10.9	LSUs/sq.km
Rural Water Supply	Borehole	0.05 units/sq.km	578	persons/unit
	Well	0.08 units/sq.km	347	persons/unit



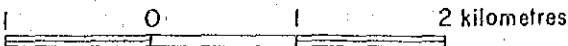
GENERAL PLAN

Dam No.	V-1-2
Dam Name	MUSINGARABWE
Catchment Area	9.5 sq.km
1/10 yr. Yield	270 Th.cu.m
Water Conveyance Method	Pumping
Distance	0.9 km
Gross Irrigable Area	18 ha

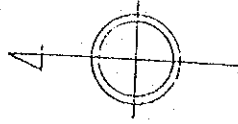
LEGEND

-  Catchment Area
-  Reservoir
-  Dam
-  Pump
-  Conveyance Canal or Pipe
-  Night Storage Reservoir
-  Irrigable Area

SCALE



7745

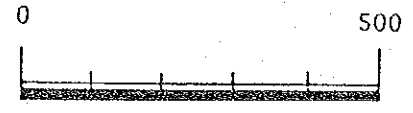


MUSINGARABWE

PLAN OF DAM

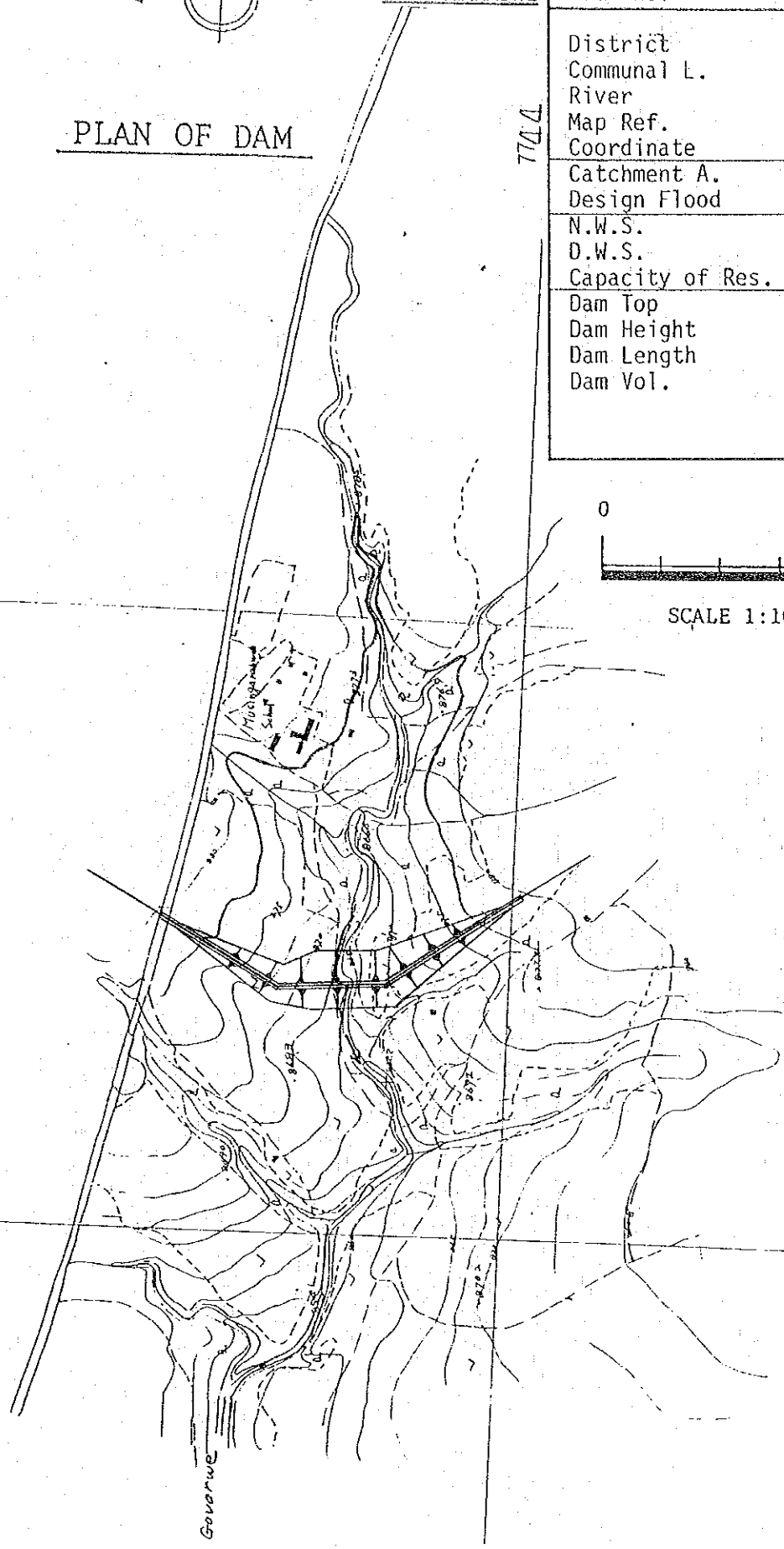
7777

Dam No.	V - 1 - 2
District	Masvingo
Communal L.	Masvingo
River	Govorowe
Map Ref.	2030 B4
Coordinate	TN 694443
Catchment A.	9.5 sq.km
Design Flood	120 cum/sec
N.W.S.	EL.878.0 m
D.W.S.	EL.871.0 m
Capacity of Res.	0.76 M.C.M.
Dam Top	EL.880.0 m
Dam Height	17.0 m
Dam Length	730 m
Dam Vol.	142,000 cum



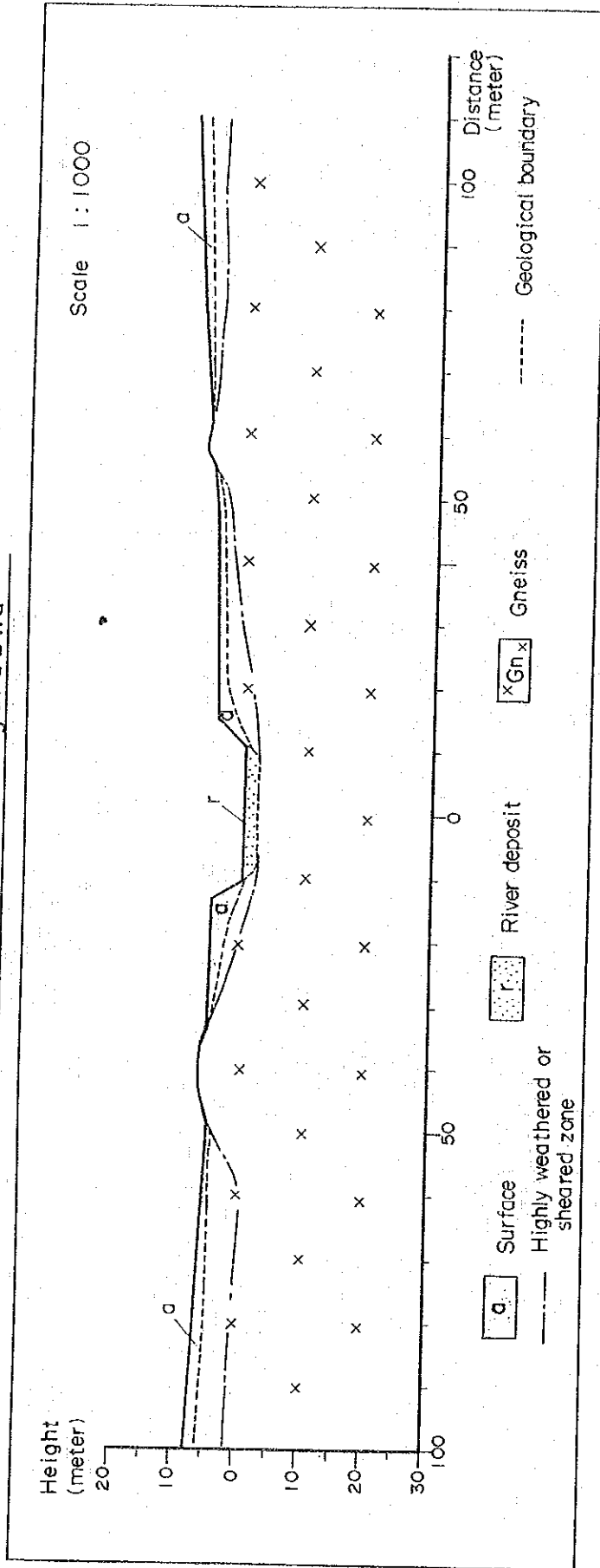
SCALE 1:10 000

270



269

V-1-2 Musingarabwa



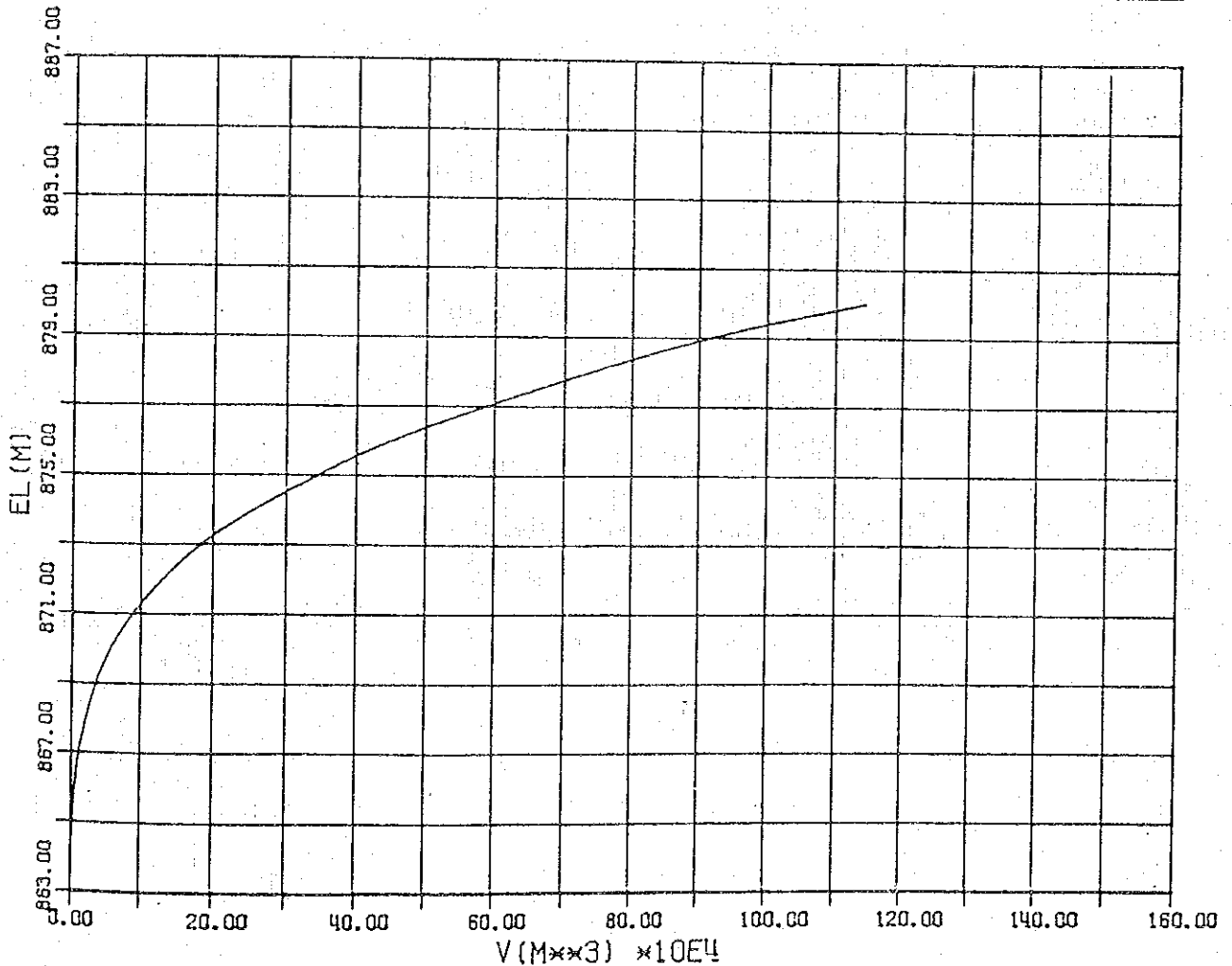
The bedrock consists of granite gneiss, and it is generally massive and hard. However it is well jointed and very soft at the surface by highly weathering. The estimated thickness of the weathering layer is maximum 5 meters.

The estimated thickness of unconsolidated deposits is maximum 2 meters at the riverbed and maximum 1.5 meters at both banks.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
V-1-2	2030B4	TN	694	443

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
863.0	0.0	0	0	0	0.00	
865.0	2.0	2400	1200	2400	2.40	
867.5	2.5	8400	5400	13500	15.90	
870.0	2.5	24600	16500	41250	57.15	
872.5	2.5	53700	39150	97875	155.02	
875.0	2.5	96600	75150	187875	342.90	
877.5	2.5	156700	126650	316625	659.52	
880.0	2.5	230400	193550	483875	1143.40	



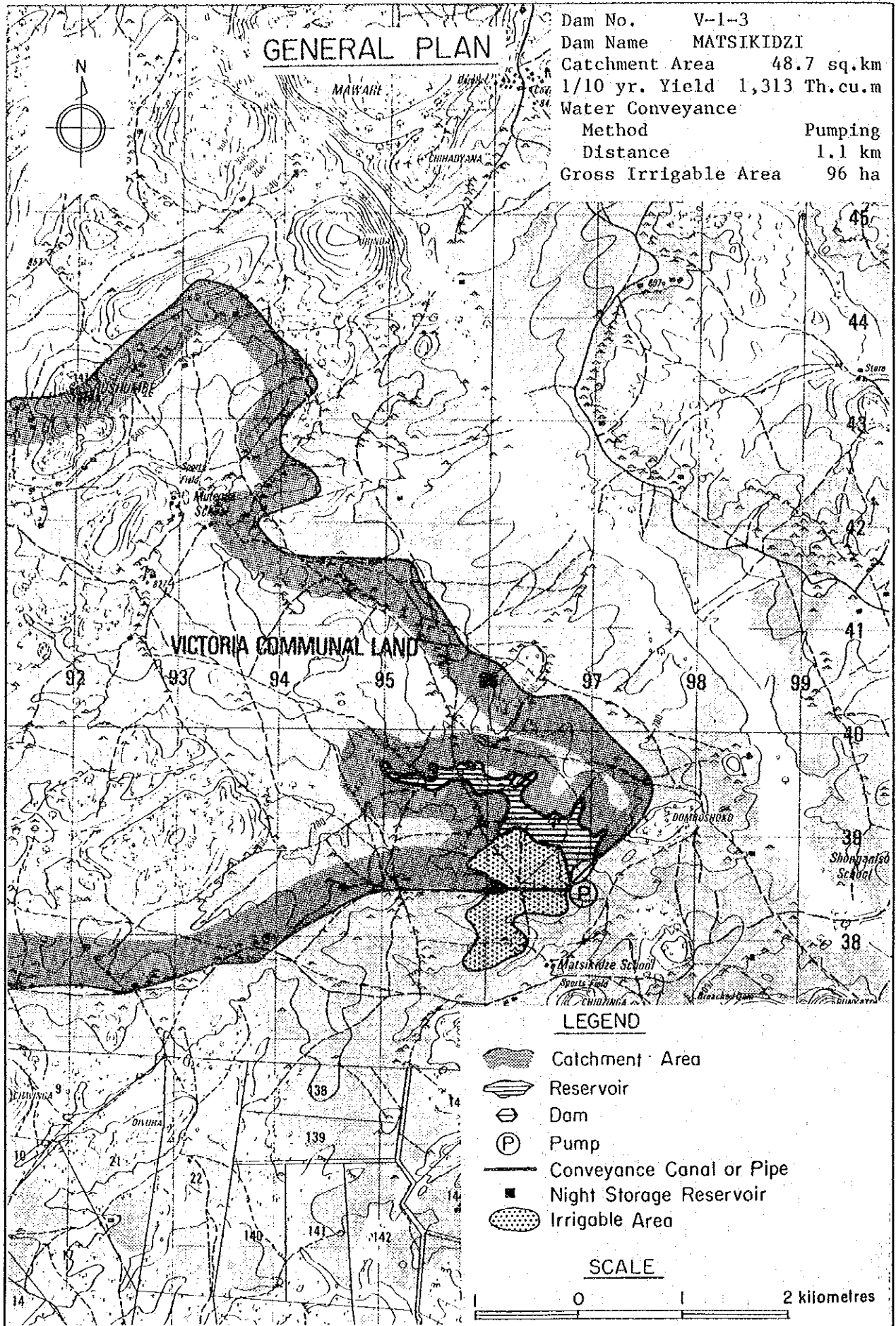
No. V-1-3

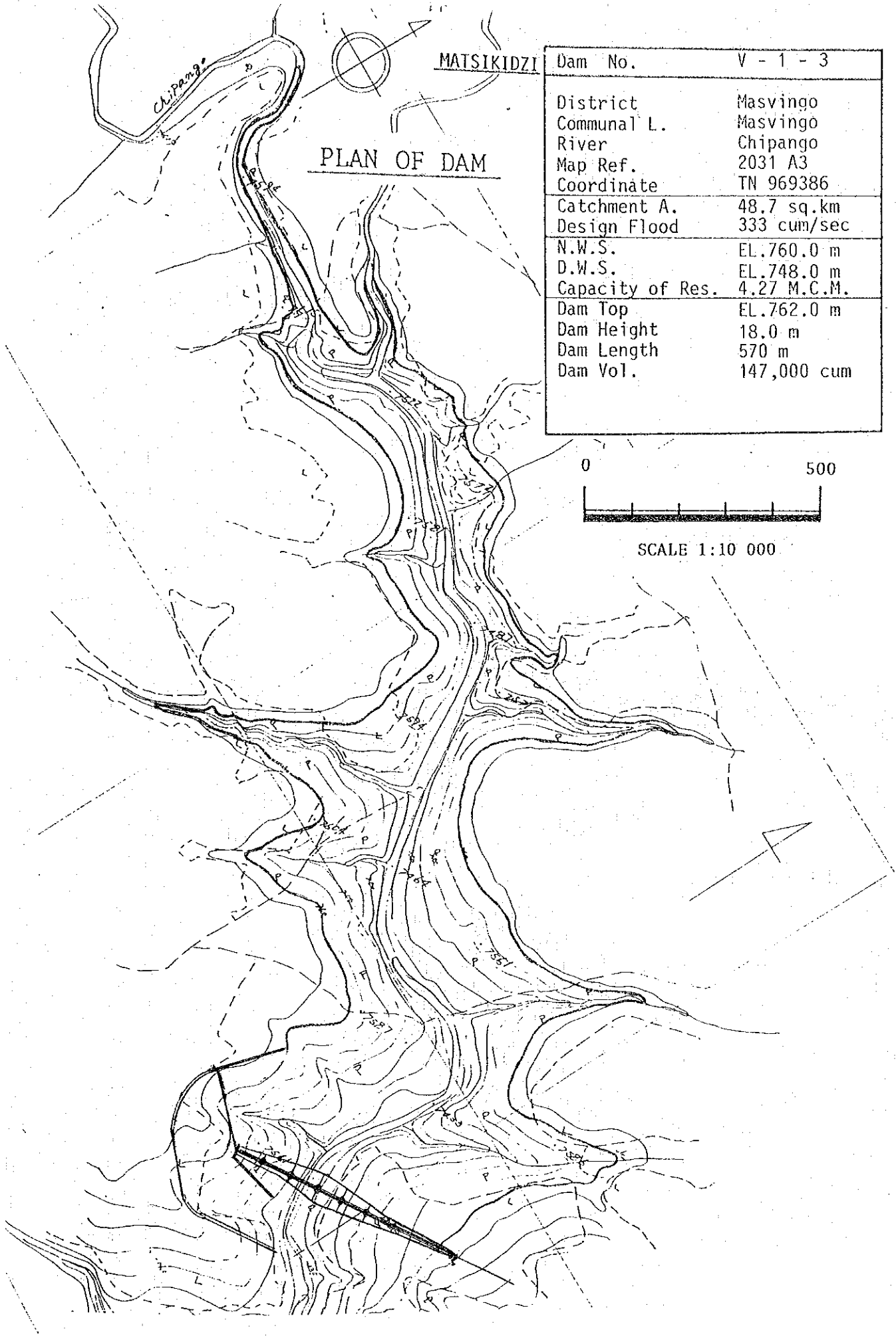
Name of Dam Matsikidzi

Location	District Masvingo		Communal Land Masvingo		
	Map Ref. 2031A3		Coordinates TN969386		
Geology	Granite, hard, however joints and cracks are well developed by weathering.				
Hydrology	River Chipanga		Hydrological Zone E-UT2		
	Catchment Area	48.7 sq.km	M.A. Rainfall	760 mm	
	M.A. Runoff	87 mm	Sediment	230 tonnes km ² /yr.	
Reservoir	Effective Capacity	4.100 MCM	1/10 Yr. Yield	1.313 MCM	
	Dead Capacity	0.170 MCM	D.W.S.	748 m	
	Total Capacity	4.270 MCM	N.W.S.	760 m	
Dam	Height	18 m	Length	570 m	
	Embankment Volume	147 000 cu.m	Spillway	185 m	
Agriculture	Natural Region	IV	Soil	LS-SL	
	Potential Irrigable Area			200 ha	
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 77.2ha		Dist. 1.1 km by Pump, H=32.0 m		
	Topography	Area	Complicated		
		Conveyance	Complicated		
Rural Water Supply	Population	643 person	13 cu.m/day		
	Livestock	1 350 unit	61 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 1 505 000	Z\$ 2 058 000	Z\$ 3 563 000	A	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$ 191 364/year	Z\$ 2 225 000	8.8 per cent		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks					

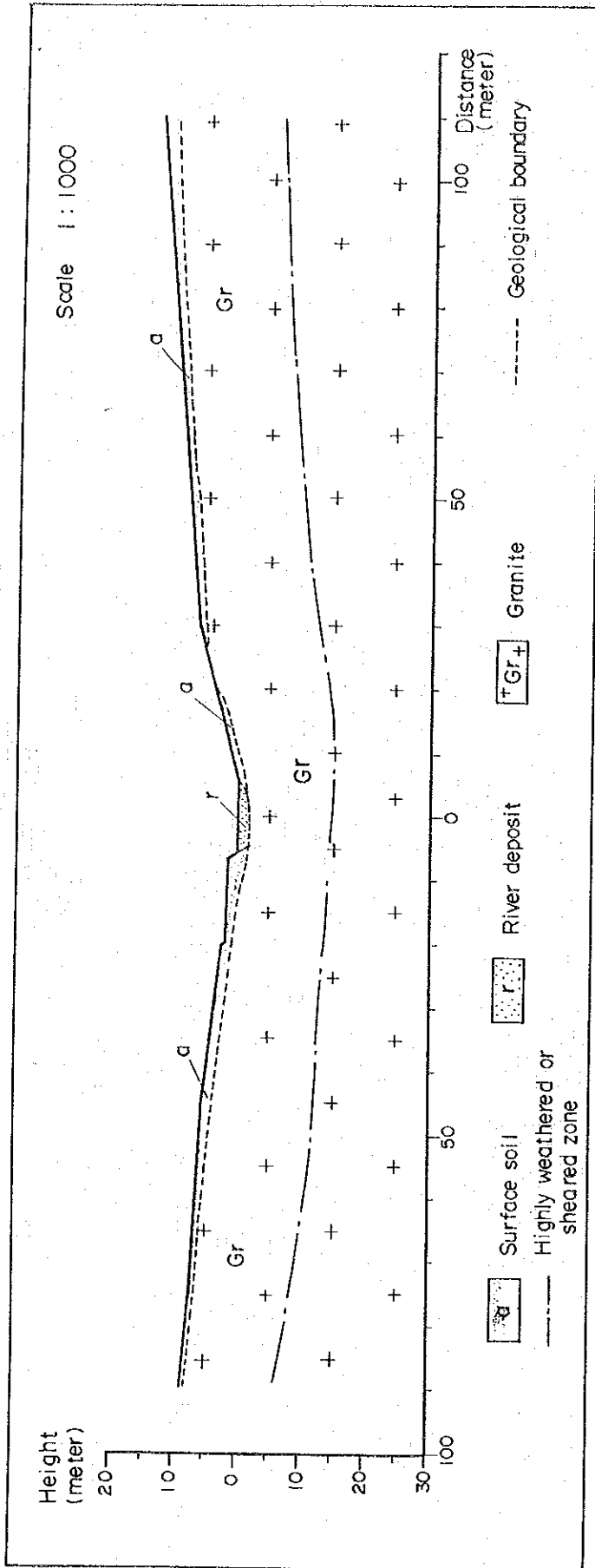
Present Condition on the Ward

Ward Name	Shumba		Area	8 223 ha
Demography	Population Density		64.3	persons/sq.km
	Family Size		3.7	Persons/household
Agriculture	Arable Area	5 600 ha	Grazing Area	2 623 ha
	Maize	N.A ha/household	15	bags/ha
	Sorghum	N.A ha/household	8	bags/ha
	Livestock	1.6 LSUs/household	27.0	LSUs/sq.km
Rural Water Supply	Borehole	0.10 units/sq.km	661	persons/unit
	Well	0.12 units/sq.km	529	persons/unit





V-1-3 Matsikidzi



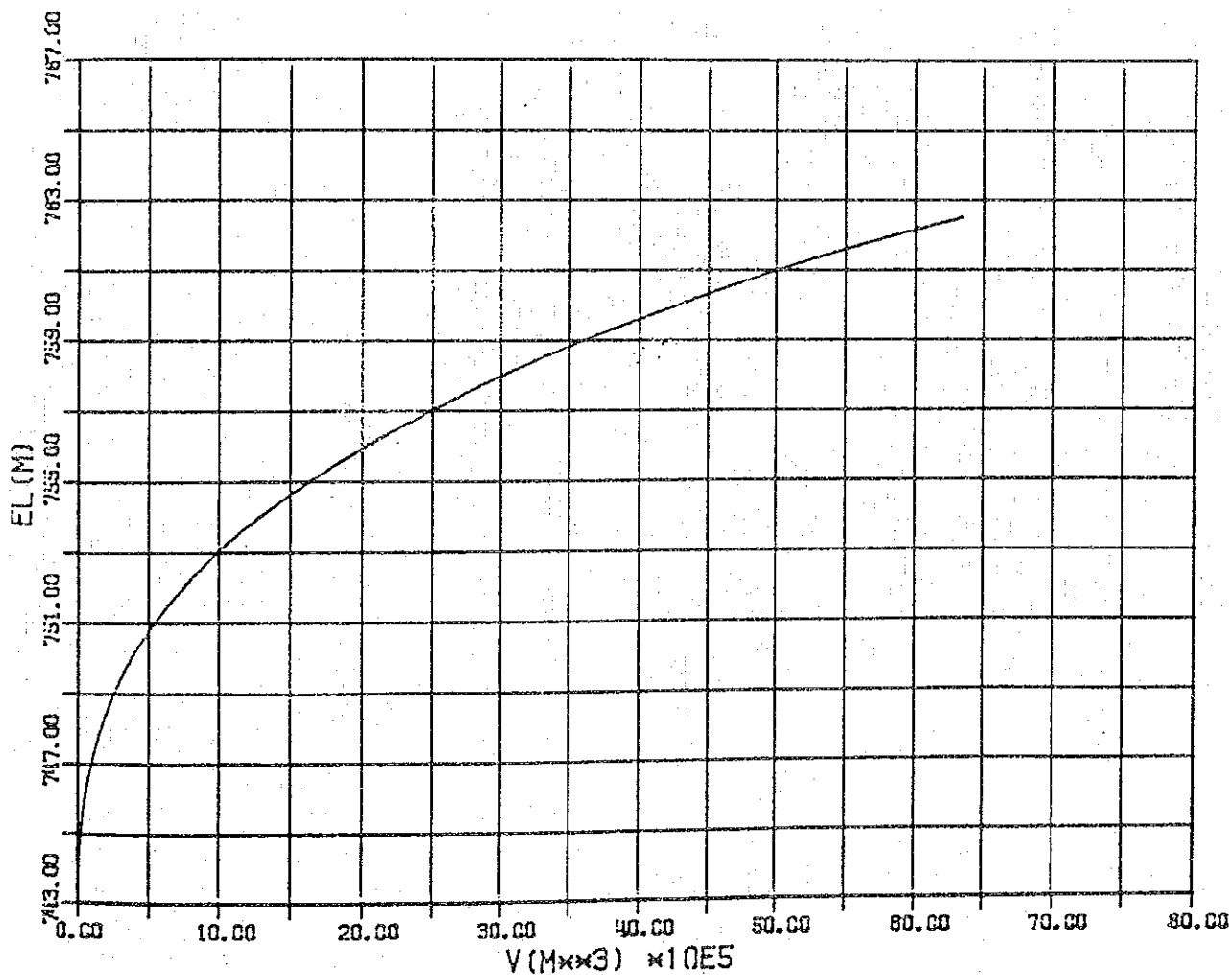
The bedrock consists of granite, and it is usually hard, but it is well jointed at intervals of more than 50 centimeters. A part of the bedrock at the surface has been changed into boulders by weathering. Therefore it seems that leakage through the bedrock is large.

The estimated thickness of unconsolidated deposits is maximum 2 meters in the riverbed and at the both banks. The bedrock in this area is less suitable for dam foundations from the geological point of view.

TABLE STORAGE VOLUME OF RESERVOIR

N ^o	MAP	GRID	VER	HCR
V-1-3	2031A3	TN	969	386

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
743.5	0.0	0	0	0	0.00	
745.0	1.5	24304	12152	18228	18.23	
747.5	2.5	60243	42274	105684	123.91	
750.0	2.5	140567	100405	251013	374.92	
752.5	2.5	243667	192117	480293	855.22	
755.0	2.5	371773	307720	769300	1624.52	
757.5	2.5	516407	444090	1110225	2734.74	
760.0	2.5	711156	613782	1534453	4269.19	
762.5	2.5	939749	825453	2063631	6332.82	



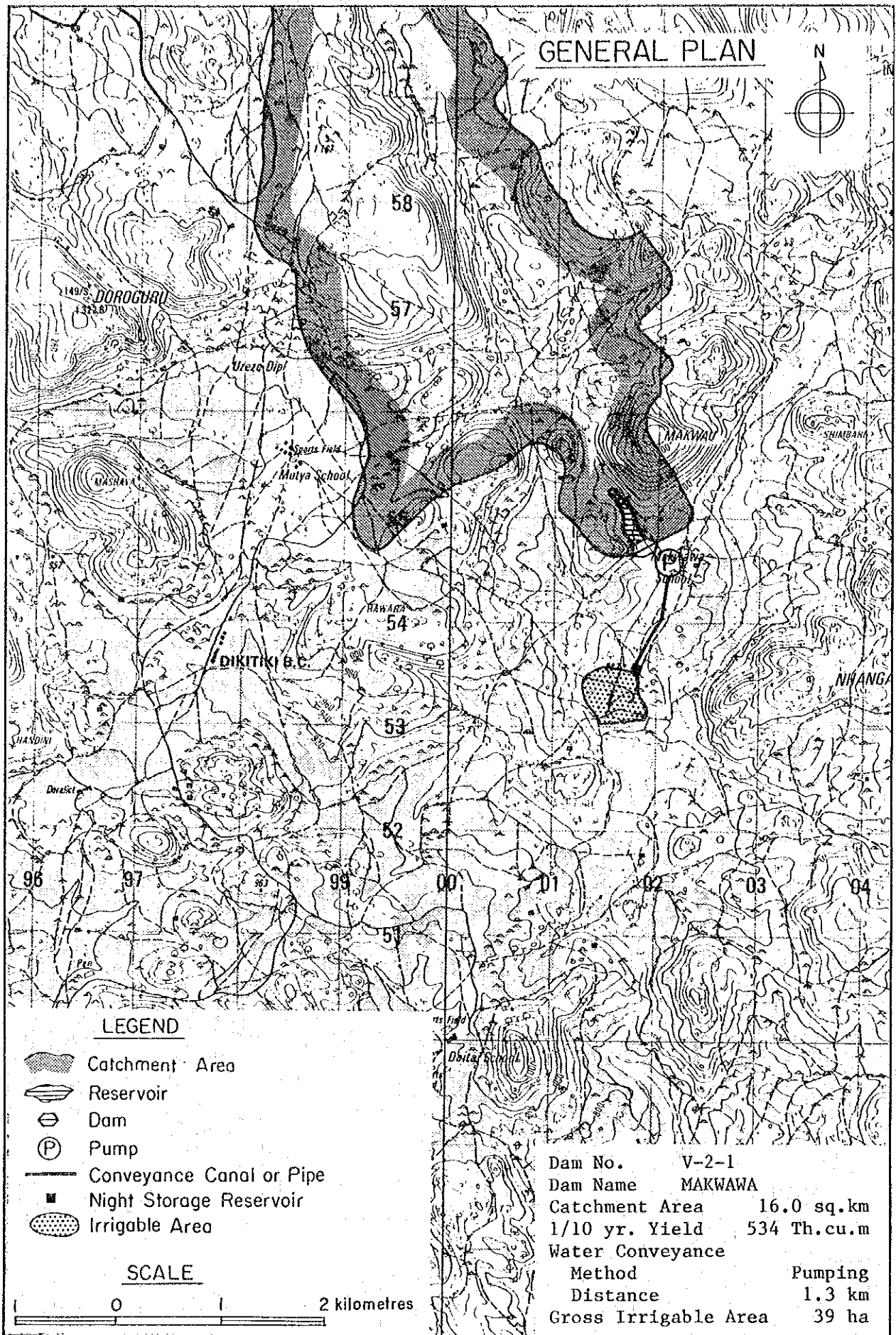
No. V-2-1

Name of Dam Makwawa

Location	District Masvingo		Communal Land Mtilikwe	
	Map Ref. 2031A3		Coordinates UN019546	
Geology	Granite, it is very hard and poorly jointed.			
Hydrology	River (T) Chivaka		Hydrological Zone E-UT2	
	Catchment Area	16.0 sq.km	M.A. Rainfall	890 mm
	M.A. Runoff	145 mm	Sediment	230 tonnes km ² /yr.
Reservoir	Effective Capacity	0.650 MCM	1/10 Yr. Yield	0.534 MCM
	Dead Capacity	0.050 MCM	D.W.S.	868 m
	Total Capacity	0.700 MCM	N.W.S.	878 m
Dam	Height	18 m	Length	310 m
	Embankment Volume	53 000 cu.m	Spillway	91 m
Agriculture	Natural Region III		Soil CL	
	Potential Irrigable Area			40 ha
	Proposed Cropping Pattern A			
Irrigation	Net Irrigable Area 31.4 ha		Dist. 1.3 km by Pump, H=12.0 m	
	Topography	Area	Flat	
		Conveyance	Gently sloping	
Rural Water Supply	Population 518 person		10 cu.m/day	
	Livestock 1 232 unit		55 cu.m/day	
Cost and Benefit	Dam		Irrigation Facilities	Total Cost
	Z\$ 1 227 000		Z\$ 1 297 000	Z\$ 2 524 000
	Annual Increment Benefit		Net Present Value	Economic Internal Rate of Return
	Z\$ 111 034/year		Z\$ 1 291 000	7.3 per cent
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist
	Y	N	Y	Y
Remarks				

Present Condition on the Ward

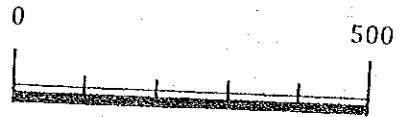
Ward Name	Chikuwanda		Area 4 681 ha	
Demography	Population Density		51.8 persons/sq.km	
	Family Size		4.5 Persons/household	
Agriculture	Arable Area 1 704 ha		Grazing Area 2 977 ha	
	Maize	0.9 ha/household	12	bags/ha
	Sorghum	0. ha/household	10	bags/ha
	Livestock	5.3 LSUs/household	61.6	LSUs/sq.km
Rural Water Supply	Borehole	0.13 units/sq.km	404	persons/unit
	Well	0.51 units/sq.km	101	persons/unit



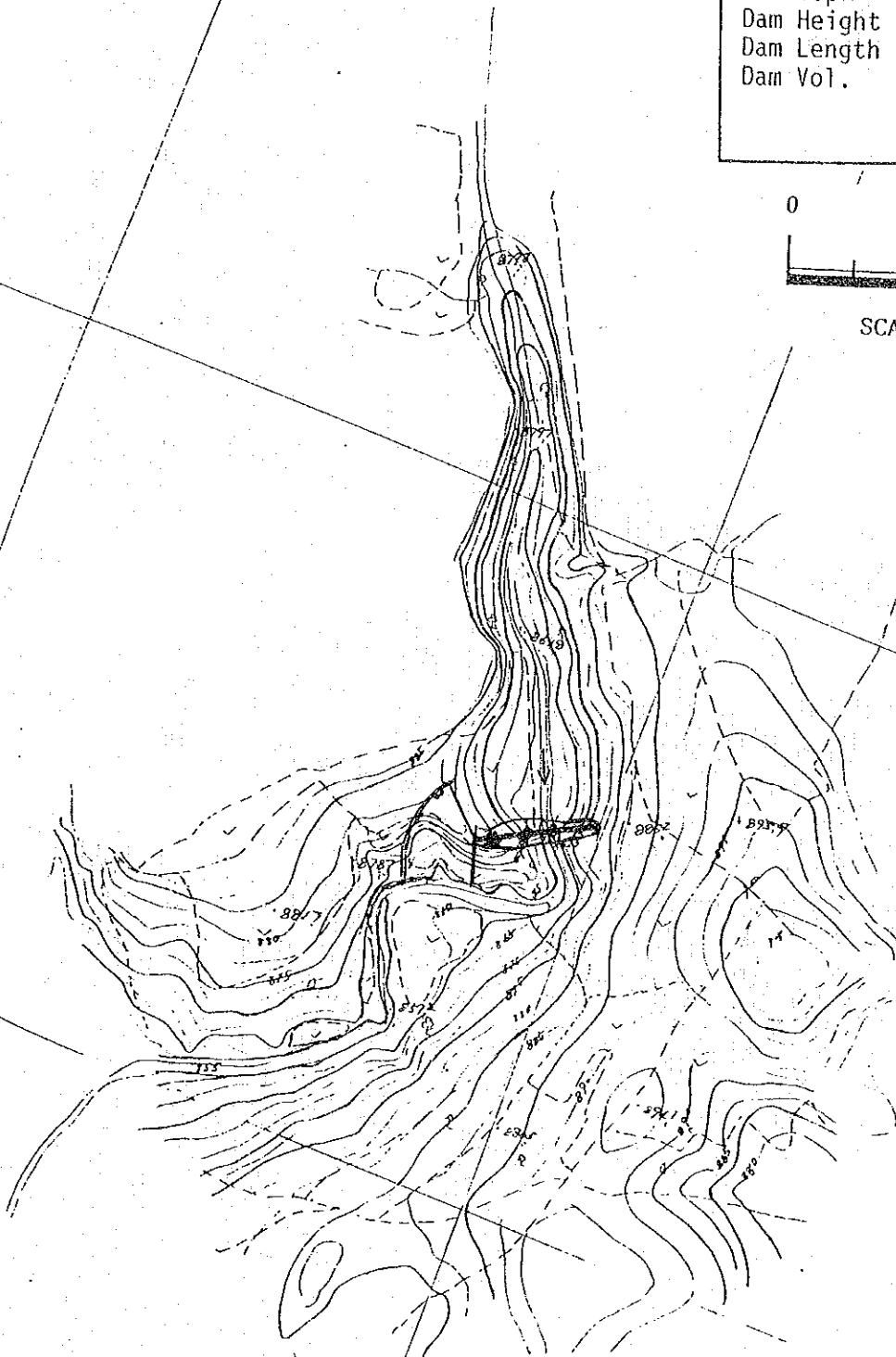
MAKWAWA

PLAN OF DAM

Dam No.	V - 2 - 1
District.	Masvingo
Communal L.	Mtilikwe
River	(T)Chivaka
Map Ref.	2031 A3
Coordinate	UN 019546
Catchment A.	16.0 sq.km
Design Flood	163 cum/sec
N.W.S.	EL.878.0 m
D.W.S.	EL.868.0 m
Capacity of Res.	0.70 M.C.M.
Dam Top	EL.880.0 m
Dam Height	18.0 m
Dam Length	310 m
Dam Vol.	53,000 cum



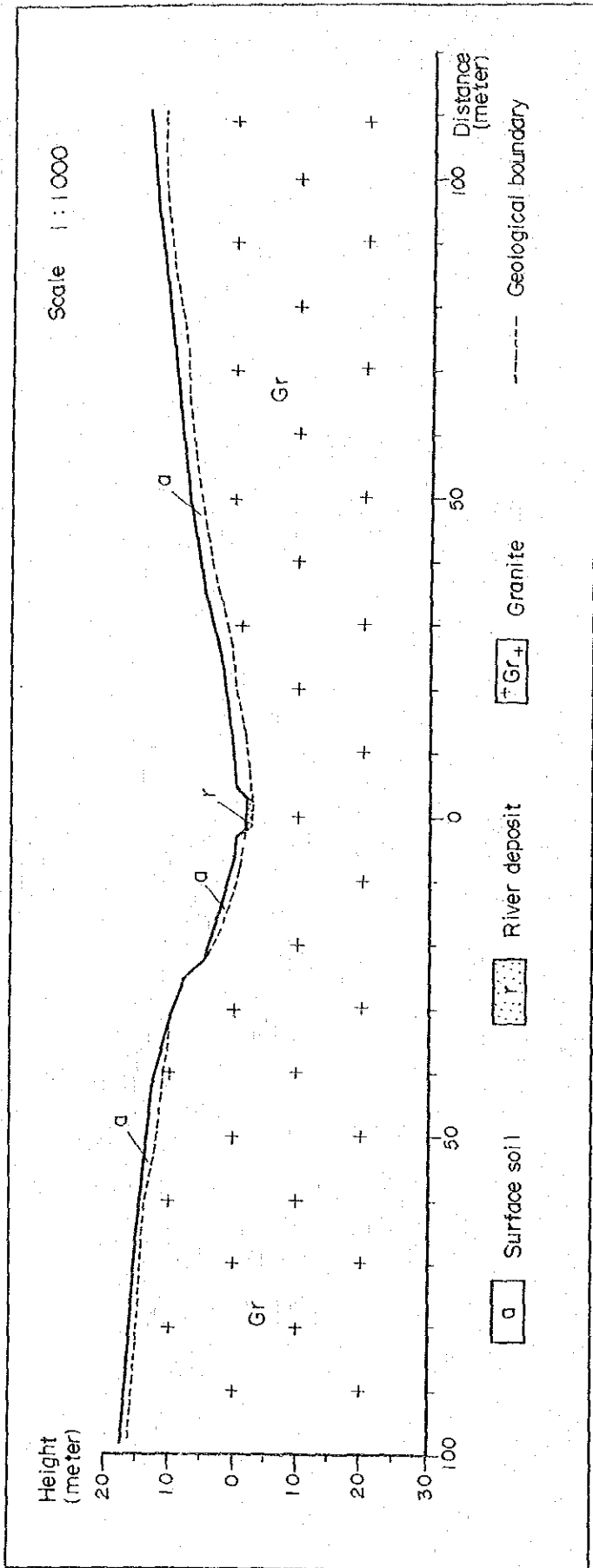
SCALE 1:10 000



7755

303

V-2-1 Makwawa



The ground survey was not carried out in this area, therefore the geophysical and the geological conditions were studied from existing data.

The area is hilly land, and many "dwalas" and "whale backs" are distributed. The Chivaka River forms a deep and narrow valley.

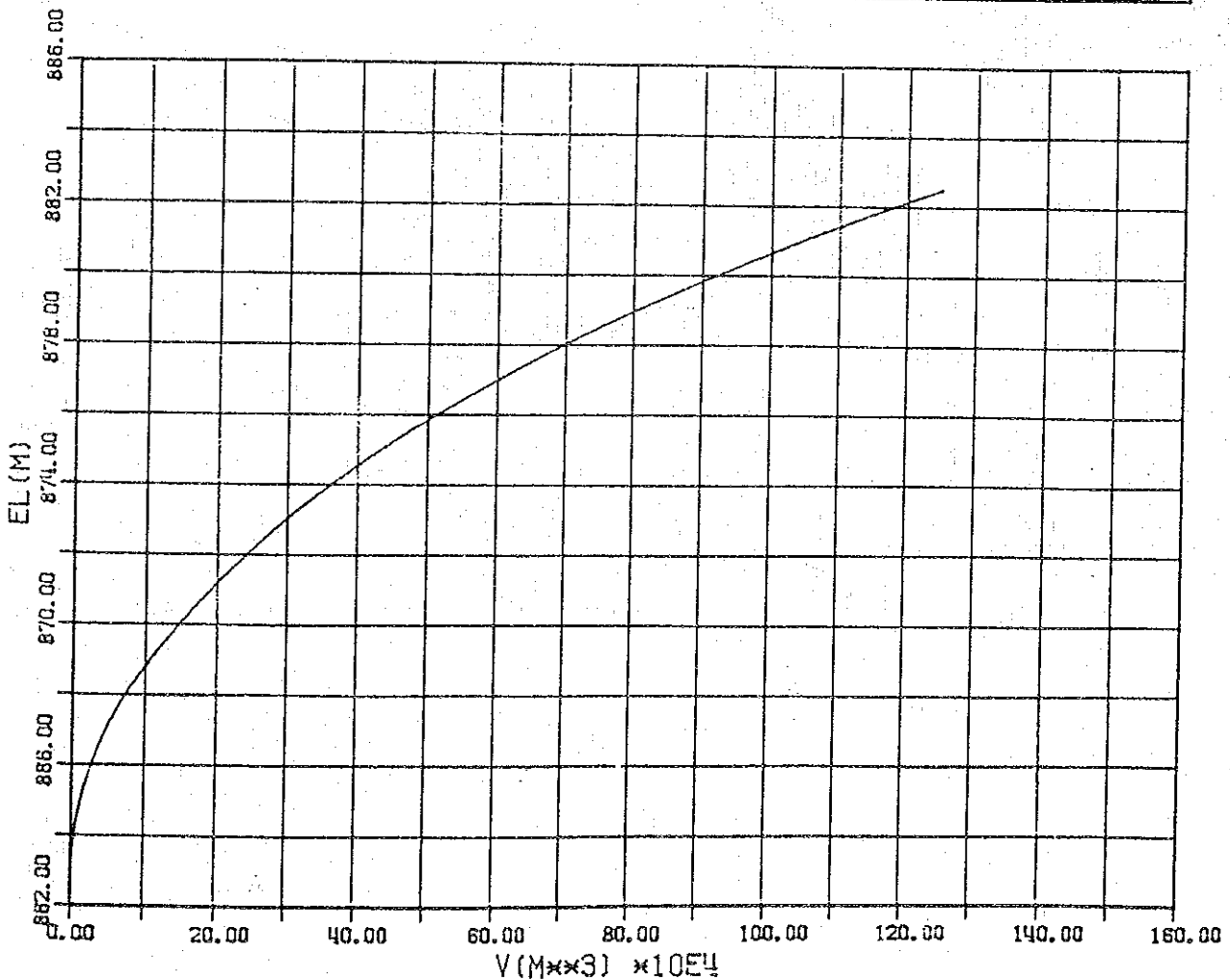
The bedrock consists of granite. Outcrops around the damsite are well, and the bedrock seems to be hard and poorly jointed.

The bedrock seems to be suitable for dam foundation from the geological point of view.

TABLE STORAGE VOLUME OF RESERVOIR

NØ	MAP	GRID	VER	HØR
V-2-1	2031A3	UN	019	546

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VØL (M ³)	ΣV (1000M ³)	NOTE
862.4	0.0	0	0	0	0.00	
862.5	0.1	156	78	8	0.01	
865.0	2.5	9820	4988	12470	12.48	
867.5	2.5	27300	18560	46400	58.88	
870.0	2.5	42322	34811	87028	145.91	
872.5	2.5	55459	48891	122226	268.13	
875.0	2.5	75922	65691	164226	432.36	
877.5	2.5	95645	85784	214459	646.82	
880.0	2.5	122147	108896	272240	919.06	
882.5	2.5	141581	131864	329660	1248.72	



V (M³) × 10⁴

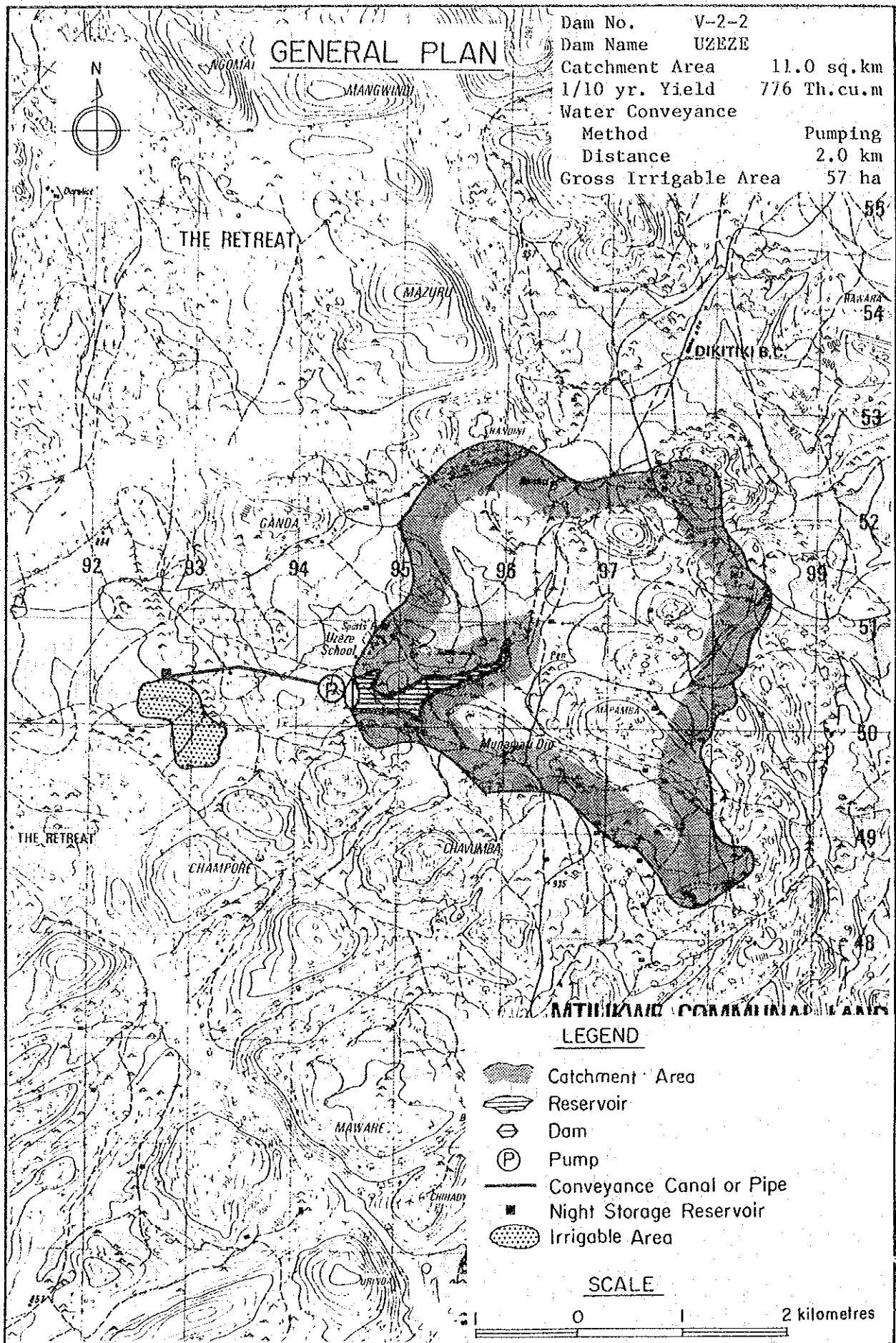
No. V-2-2

Name of Dam Uzeze

Location	District Masvingo		Communal Land Mtilikwe		
	Map Ref. 2031A3		Coordinates TN945503		
Geology	Granite, massive and hard.				
Hydrology	River (T) Mtilikwe		Hydrological Zone E-UT2		
	Catchment Area	11.0 sq.km	M.A. Rainfall	900 mm	
	M.A. Runoff	150 mm	Sediment	230 tonnes km ² /yr.	
Reservoir	Effective Capacity	1.860 MCM	1/10 Yr. Yield	0.776 MCM	
	Dead Capacity	0.040 MCM	D.W.S.	864 m	
	Total Capacity	1.900 MCM	N.W.S.	877 m	
Dam	Height	18 m	Length	380 m	
	Embankment Volume	104 000 cu.m	Spillway	71 m	
Agriculture	Natural Region	III	Soil	SL	
	Potential Irrigable Area			80 ha	
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 45.6ha		Dist. 2.0 km by Pump, H=36.0 m		
	Topography	Area	Undulated and complicated		
		Conveyance	Complicated, one river crossing		
Rural Water Supply	Population	1 512 person	30 cu.m/day		
	Livestock	708 unit	32 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 1 050 000	Z\$ 2 013 000	Z\$ 3 063 000	B	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$ 91 711/year	Z\$ 1 066 000	4.3 per cent		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	N	N
Remarks					

Present Condition on the Ward

Ward Name	Murinye		Area	8 270 ha
Demography	Population Density		50.4	persons/sq.km
	Family Size		5.7 Persons/household	
Agriculture	Arable Area	3 085 ha	Grazing Area	5 185 ha
	Maize	1.5 ha/household	15	bags/ha
	Sorghum	0. ha/household	15	bags/ha
	Livestock	4.0 LSUs/household	35.4	LSUs/sq.km
Rural Water Supply	Borehole	0.05 units/sq.km	1 041	persons/unit
	Well	0.36 units/sq.km	139	persons/unit





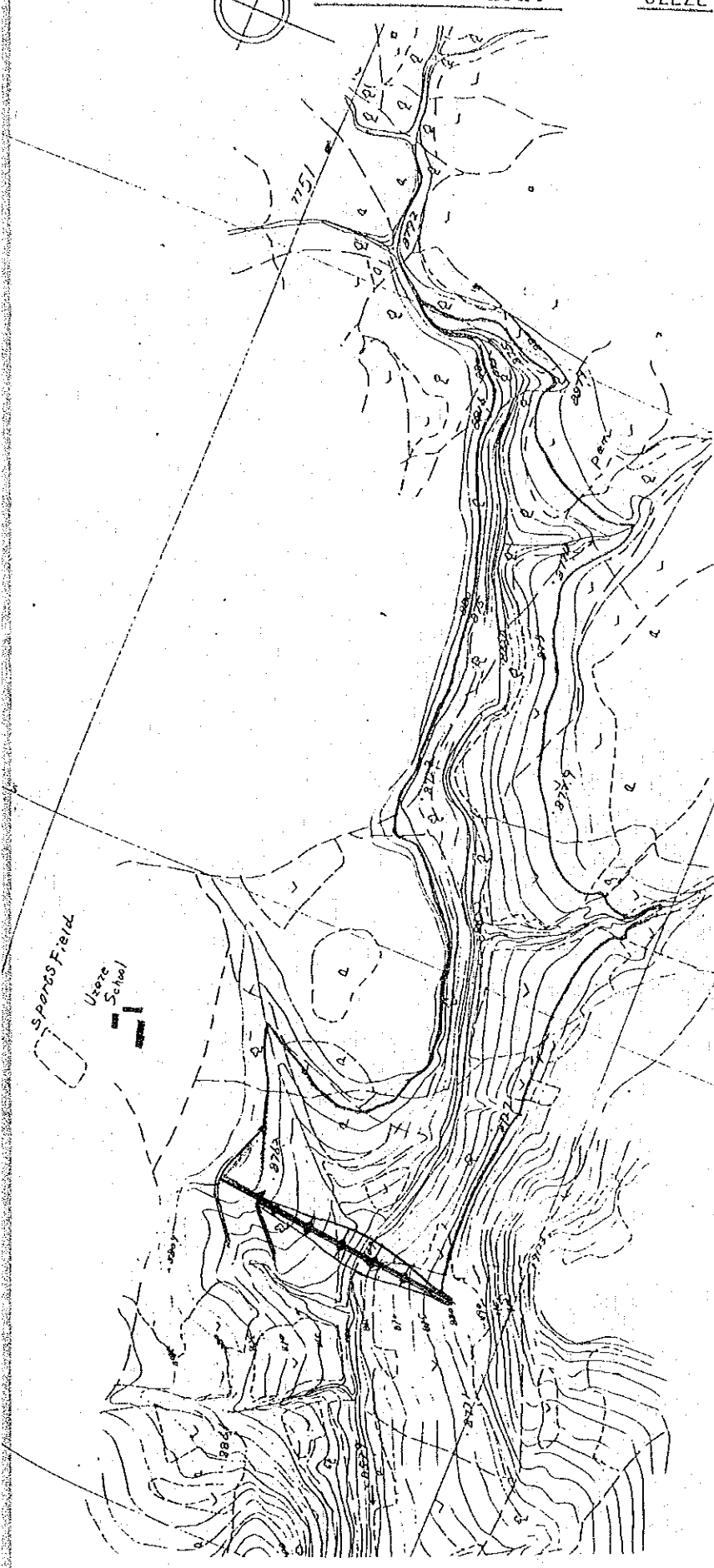
PLAN OF DAM

UZEZE

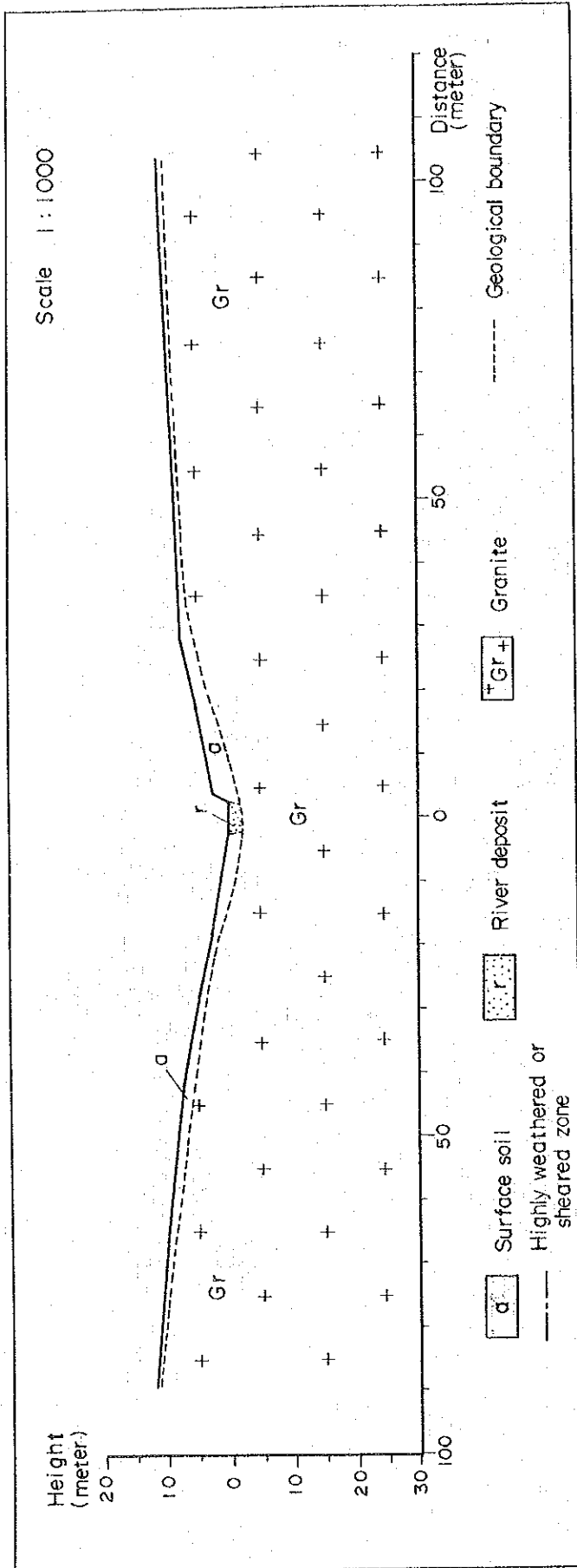
Dam No.	V - 2 - 2
District	Masvingo
Communal L.	Mtilikwe
River	(T)Mtilikwe
Map Ref.	2031 A3
Coordinate	TN 945503
Catchment A.	11.0 sq.km
Design Flood	128 cum/sec
N.W.S.	EL.877.0 m
D.W.S.	EL.864.0 m
Capacity of Res.	1.90 M.C.M.
Dam Top	EL.879.0 m
Dam Height	18.0 m
Dam Length	380 m
Dam Vol.	104,000 cum



SCALE 1:10 000



V-2-2 Uzeze

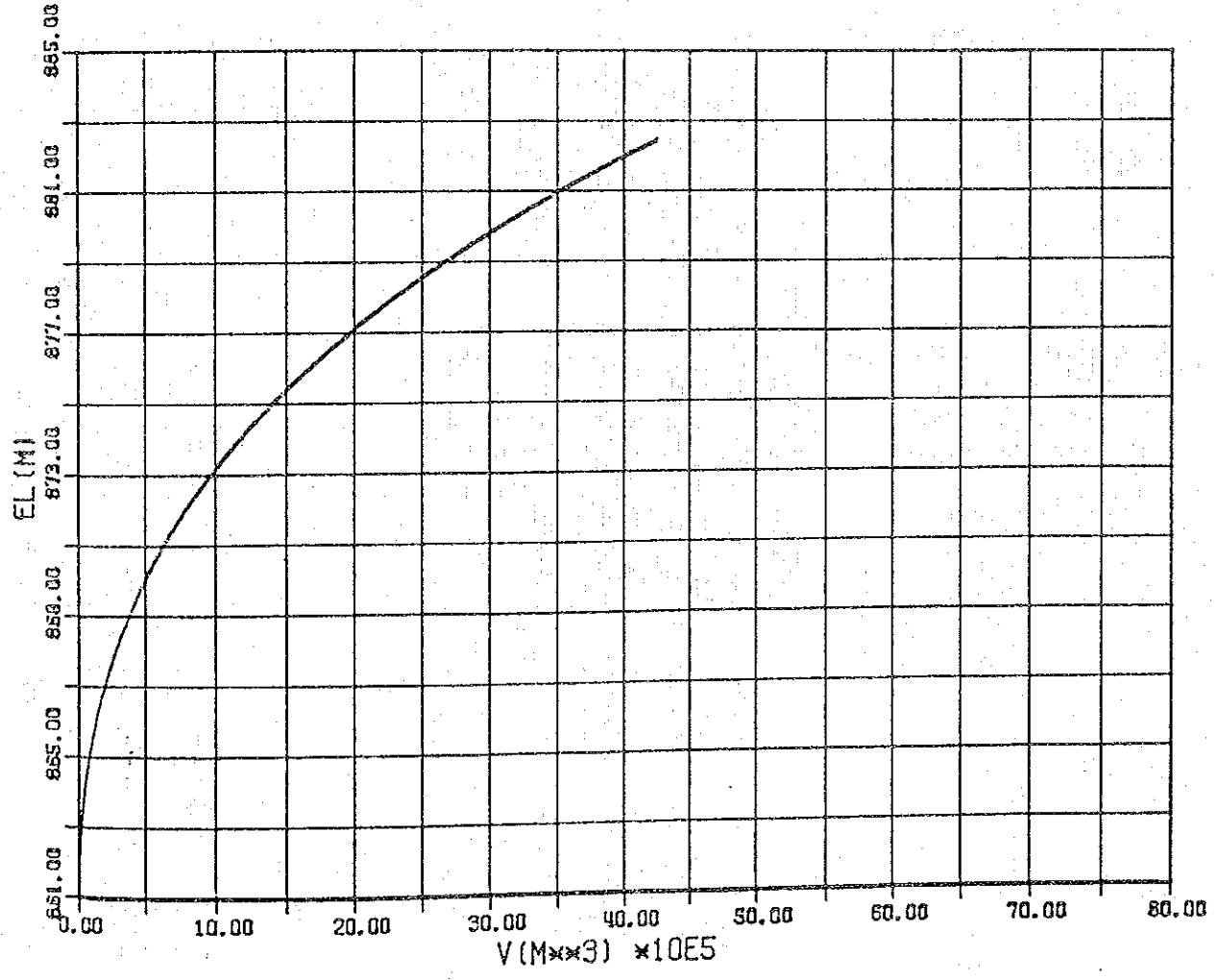


The Mutilikwe River flows among hilly land and forms relatively wide flood plane and steep slope. The bedrock consists of granite and it is porphyritic, massive and hard. It is poorly jointed and leakage through the bedrock is small. The bedrock is suitable for the dam foundations from the geological point of view. The estimated thickness of unconsolidated deposits is maximum 2 meters in the riverbed and maximum 3 meters at the both banks.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
V-2-2	2031A3	TN	945	503

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
861.0	0.0	0	0	0	0.00	
862.5	1.5	15000	7500	11250	11.25	
865.0	2.5	40500	27750	69375	80.62	
867.5	2.5	80000	60250	150625	231.25	
870.0	2.5	125000	102500	256250	487.50	
872.5	2.5	176000	150500	376250	863.75	
875.0	2.5	244000	210000	525000	1388.75	
877.5	2.5	331500	287750	719375	2108.12	
880.0	2.5	425000	378250	945625	3053.75	
882.5	2.5	532000	478500	1196250	4250.00	



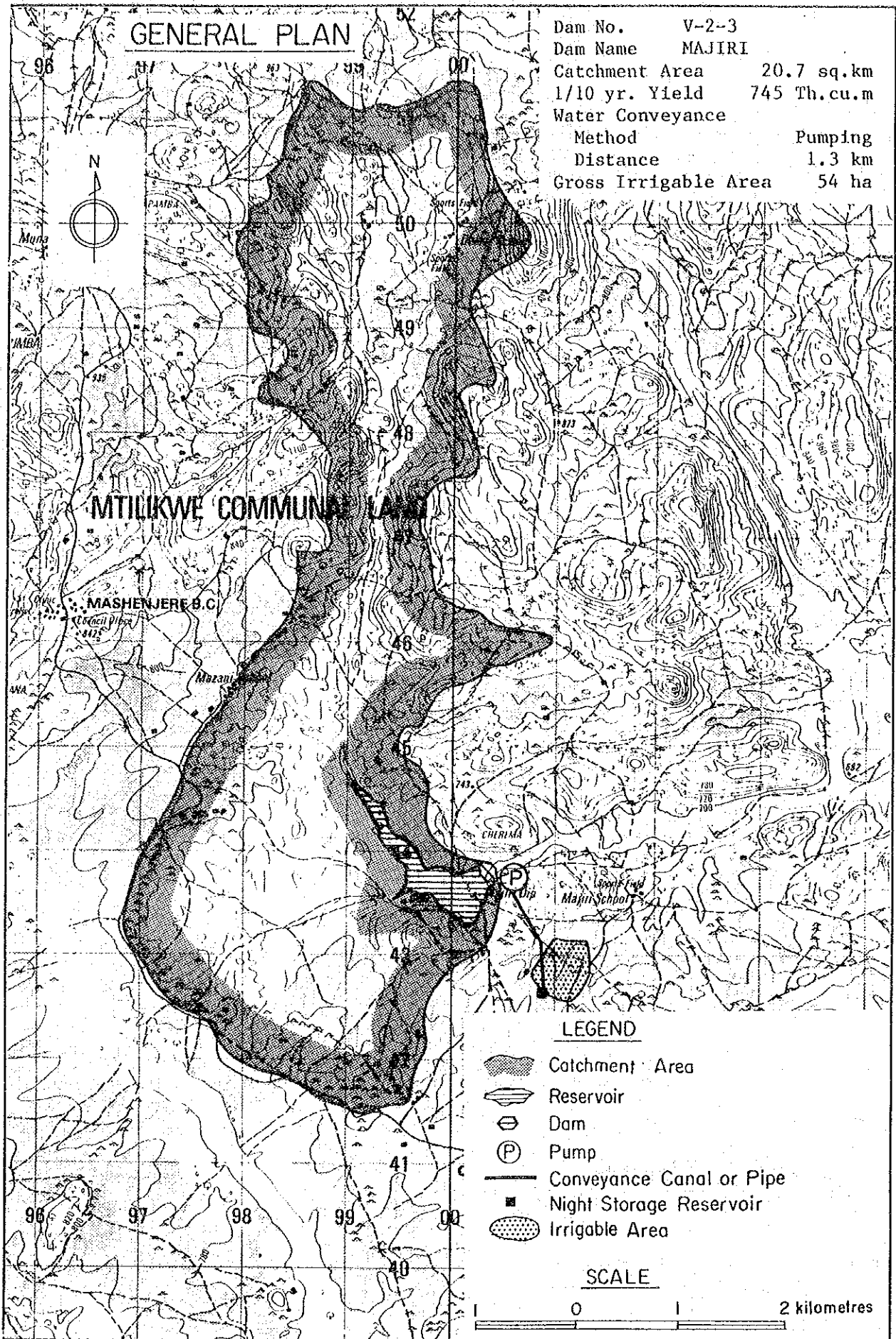
No. V-2-3

Name of Dam Majiri

Location	District Masvingo		Communal Land Mtilikwe		
	Map Ref. 2031A3		Coordinates UN004438		
Geology	Granitic gneiss, generally massive and hard, partly weathered.				
Hydrology	River Mavidze		Hydrological Zone E-UT2		
	Catchment Area 20.7 sq.km		M.A. Rainfall 900 mm		
	M.A. Runoff 150 mm		Sediment 230 tonnes km ² /yr.		
Reservoir	Effective Capacity 1.280 MCM		1/10 Yr. Yield 0.745 MCM		
	Dead Capacity 0.070 MCM		D.W.S. 707 m		
	Total Capacity 1.350 MCM		N.W.S. 715 m		
Dam	Height 18 m		Length 250 m		
	Embankment Volume 81 000 cu.m		Spillway 108 m		
Agriculture	Natural Region IV		Soil SL		
	Potential Irrigable Area		80 ha		
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 43.8ha		Dist. 1.3 km by Pump, H=28.0 m		
	Topography	Area	Very complicated		
		Conveyance	Gentle slope, one river crossing		
Rural Water Supply	Population 1 659 person		33 cu.m/day		
	Livestock 916 unit		41 cu.m/day		
Cost and Benefit	Dam		Irrigation Facilities		
	Z\$ 820 000		Z\$ 1 648 000		
	Annual Increment Benefit		Net Present Value		
	Z\$ 85 431/year		Z\$ 993 000		
		Total Cost		Class	
		Z\$ 2 468 000		B	
		Economic Internal Rate of Return			
		4.8 per cent			
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	N	N
Remarks					

Present Condition on the Ward

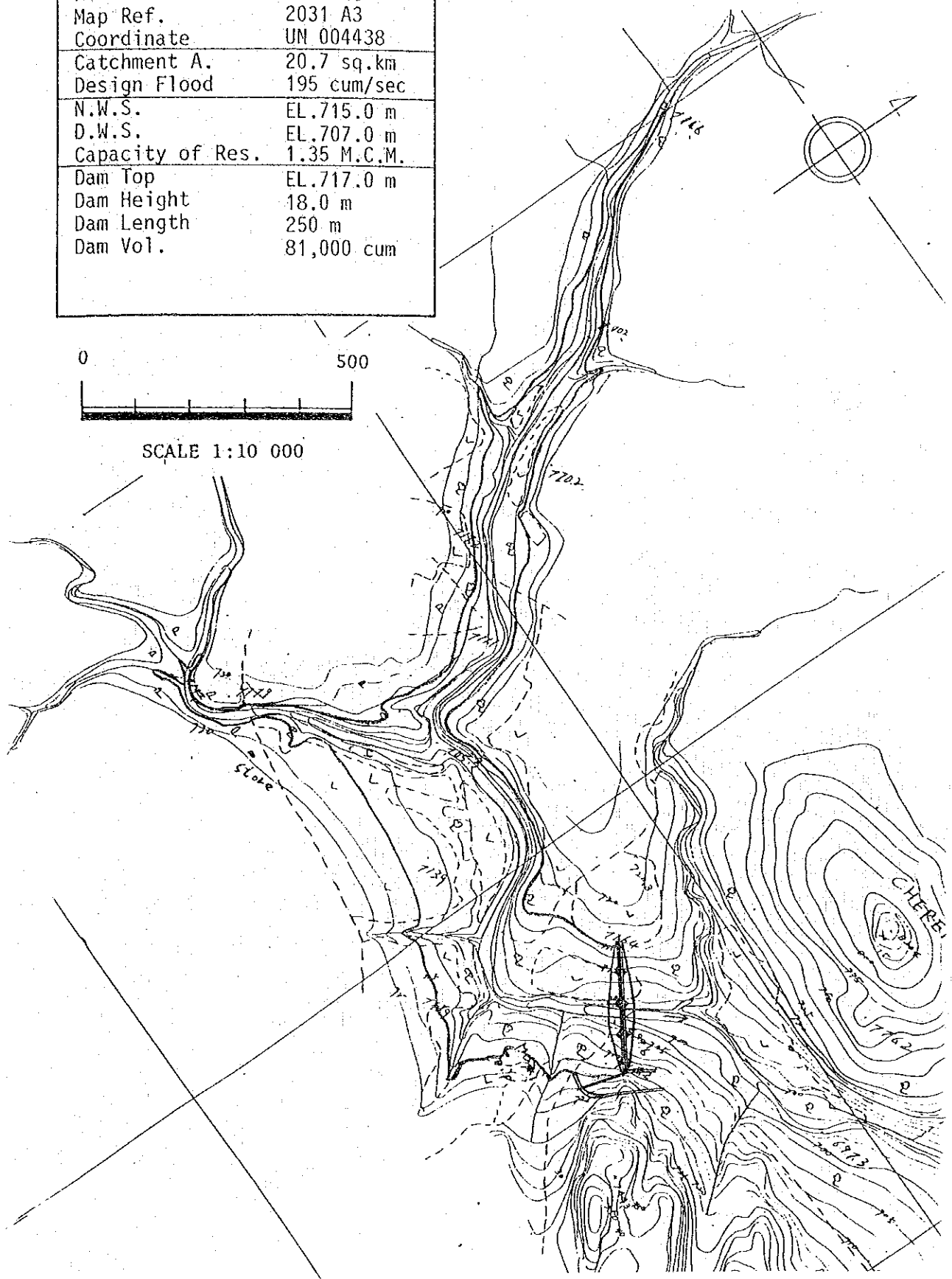
Ward Name	Murinye B		Area	8,675 ha	
Demography	Population Density		55.3	persons/sq.km	
	Family Size		5.6	Persons/household	
Agriculture	Arable Area		6 156 ha	Grazing Area 2 519 ha	
	Maize	1.4	ha/household	18	bags/ha
	Sorghum	0.1	ha/household	15	bags/ha
	Livestock	4.6	LSUs/household	45.8	LSUs/sq.km
Rural Water Supply	Borehole		0.07	units/sq.km 800 persons/unit	
	Well		0.16	units/sq.km 343 persons/unit	



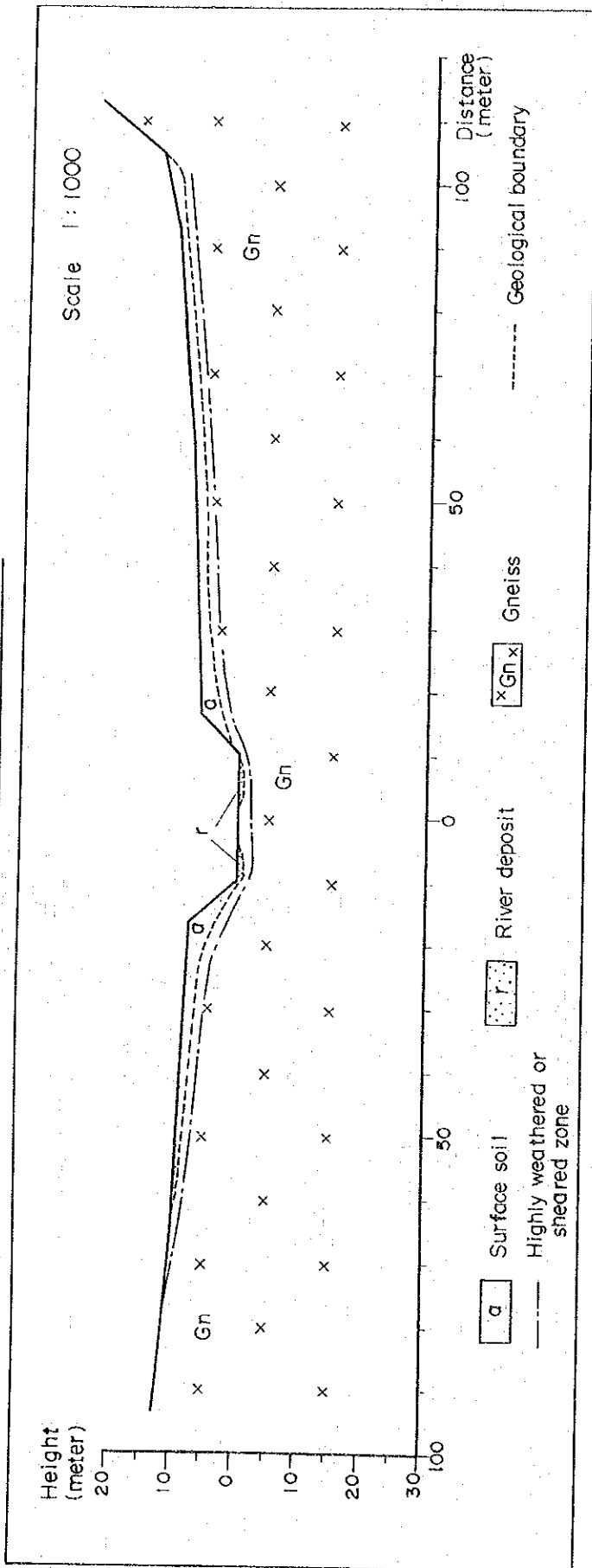
MAJIRI

Dam No.	V - 2 - 3
District	Masvingo
Communal L.	Mtilikwe
River	Mavidze
Map Ref.	2031 A3
Coordinate	UN 004438
Catchment A.	20.7 sq.km
Design Flood	195 cum/sec
N.W.S.	EL.715.0 m
D.W.S.	EL.707.0 m
Capacity of Res.	1.35 M.C.M.
Dam Top	EL.717.0 m
Dam Height	18.0 m
Dam Length	250 m
Dam Vol.	81,000 cum

PLAN OF DAM



V-2-3 Majiri



The bedrock consists of granite gneiss, and it is generally massive and hard, however it is partly very soft and well jointed.

A sheared zone about 40 meters wide trending in a northwesterly direction is distributed 150 meters above the damsite, and photo-lineaments go parallel with the damsite. Therefore it seems that leakage through the bedrock is large and treatments for the foundation strata is necessary.

The estimated thickness of unconsolidated deposits is maximum 1 meter in the riverbed and maximum 4 meters at the both banks.

TABLE STORAGE VOLUME OF RESERVOIR

NØ	MAP	GRID	VER	HØR
V-2-3	2031A3	UN	004	438

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VØL (M ³)	ΣV (1000M ³)	NOTE
699.0	0.0	0	0	0	0.00	
700.0	1.0	2000	1000	1000	1.00	
702.5	2.5	3000	2500	6250	7.25	
705.0	2.5	18000	10500	26250	33.50	
707.5	2.5	49000	33500	83750	117.25	
710.0	2.5	106000	77500	193750	311.00	
712.5	2.5	213000	159500	398750	709.75	
715.0	2.5	296000	254500	636250	1346.00	
717.5	2.5	441000	368500	921250	2267.25	
720.0	2.5	585000	513000	128249	3549.75	

