

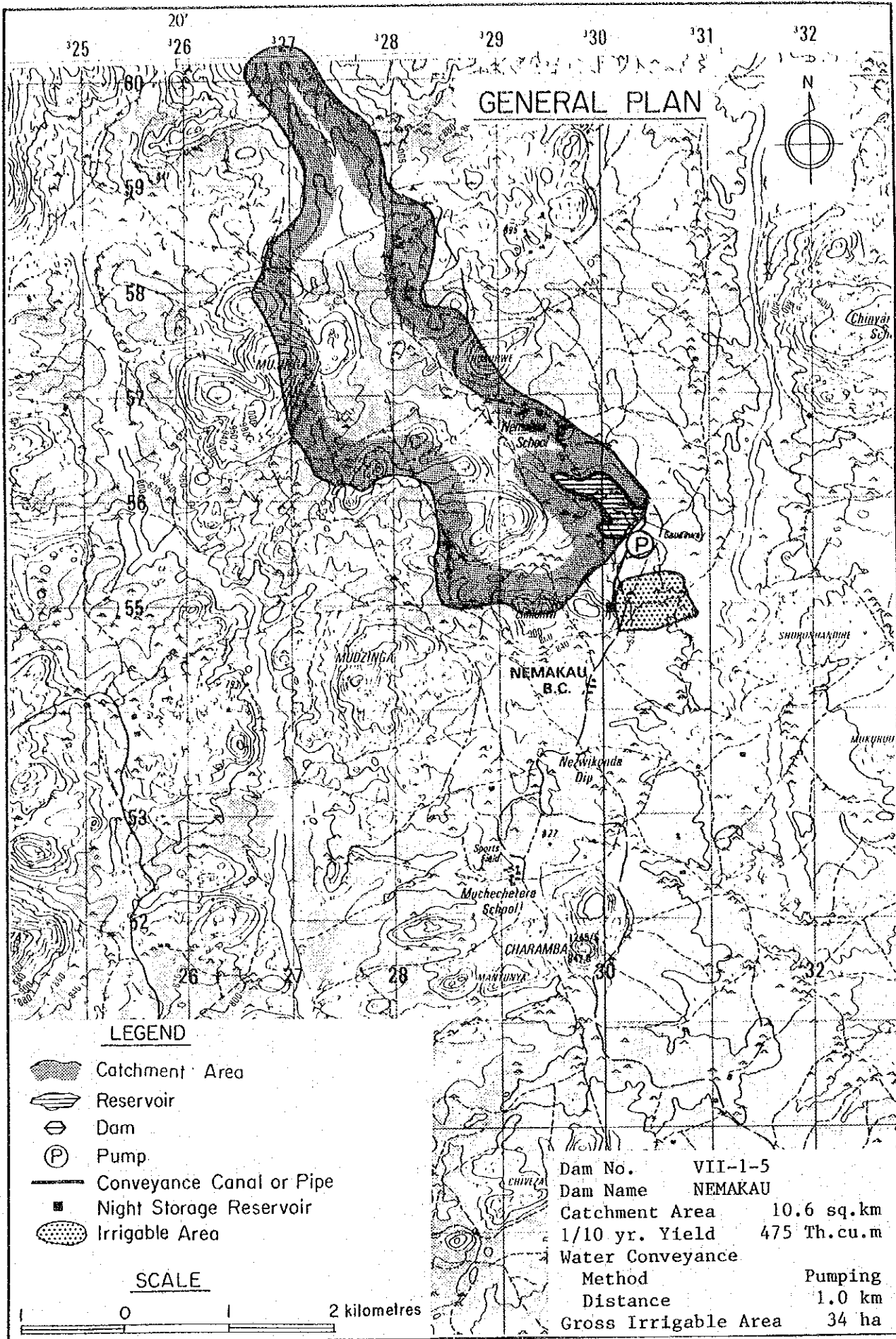
No. VII-1-5

Name of Dam Nemakau

Location	District Zaka		Communal Land Ndanga		
	Map Ref. 2031A4		Coordinates UN303557		
Geology	Granite, generally massive and very hard. Partly weathering.				
Hydrology	River Kakorwe		Hydrological Zone E-C2		
	Catchment Area	10.6 sq.km	M.A. Rainfall	820 mm	
	M.A. Runoff	112 mm	Sediment	320 tonnes km ² /yr.	
Reservoir	Effective Capacity	1.100 MCM	1/10 Yr. Yield	0.475 MCM	
	Dead Capacity	0.050 MCM	D.W.S.	801 m	
	Total Capacity	1.150 MCM	N.W.S.	810 m	
Dam	Height	15 m	Length	560 m	
	Embankment Volume	118 000 cu.m	Spillway	71 m	
Agriculture	Natural Region IV		Soil LS-SL		
	Potential Irrigable Area			80 ha	
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 27.6ha		Dist. 1.0 km by Pump, H=39.0 m		
	Topography	Area	Undulated with gullys		
		Conveyance	Slightly sloping		
Rural Water Supply	Population	3 864 person	77 cu.m/day		
	Livestock	1 475 unit	66 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 1 913 000	Z\$1 076 000	Z\$ 2 989 000	B	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$ 60 529/year	Z\$ 704 000	0.7		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks	Water right ... 5 km (No. 10421)				

Present Condition on the Ward

Ward Name	Nemaruku		Area	4 813 ha
Demography	Population Density		128.8	persons/sq.km
	Family Size		10.0	Persons/household
Agriculture	Arable Area		813 ha	Grazing Area 4 000 ha
	Maize	0.5	ha/household	10 bags/ha
	Sorghum	0.	ha/household	5 bags/ha
	Livestock	2.3	LSUs/household	29.5 LSUs/sq.km
Rural Water Supply	Borehole	0.17	units/sq.km	775 persons/unit
	Well	0.06	units/sq.km	2 067 persons/unit

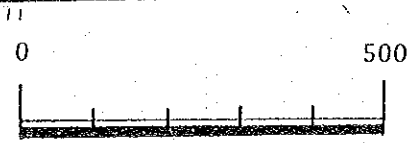


PLAN OF DAM

NEMAKOU

Dam No.	VII- 1 - 5
District	Zaka
Communal L.	Ndanga
River	Kakorwe
Map Ref.	2031 A4
Coordinate	UN 303557
Catchment A.	10.6 sq.km
Design Flood	128 cum/sec
N.W.S.	EL.810.0 m
D.W.S.	EL.801.0 m
Capacity of Res.	1.15 M.C.M.
Dam Top	EL.812.0 m
Dam Height	15.0 m
Dam Length	560 m
Dam Vol.	118,000 cum

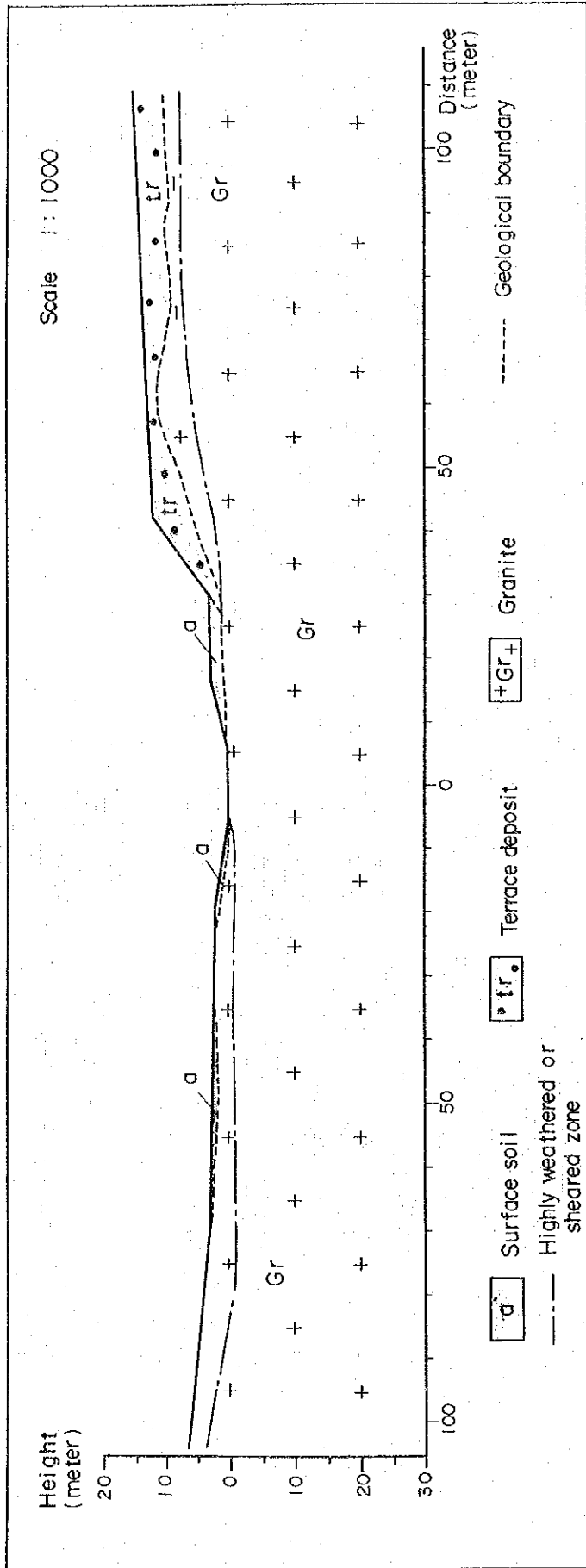
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Scale



SCALE 1:10 000



VII-1-5 Nemaikau



The area is gently sloped land, and the Kokorwe River forms a narrow valley and a terrace on the right bank.

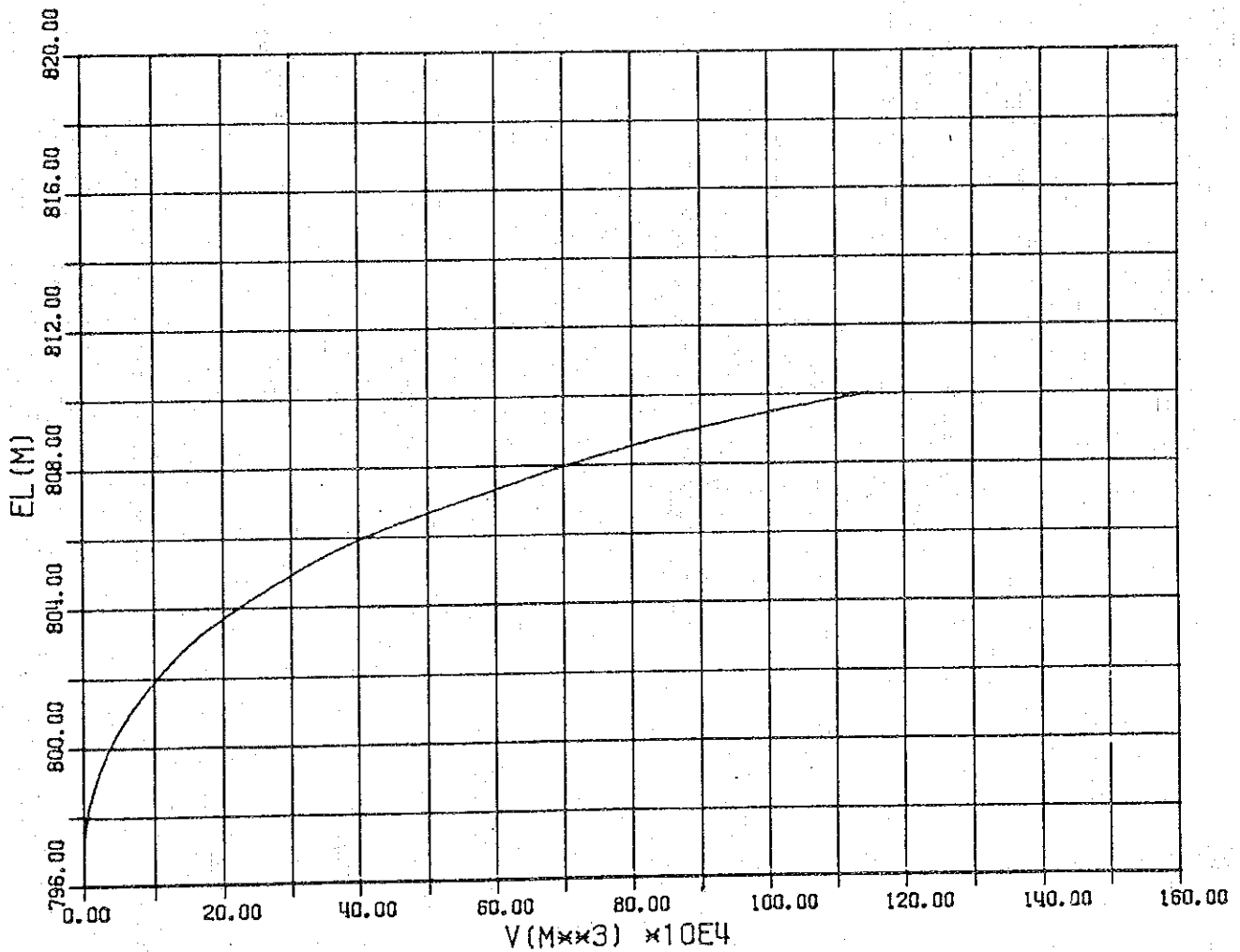
The bedrock consists of porphyritic granite, and it is massive, very hard in the riverbed and poorly jointed, however, at the both banks it is very soft and well jointed by highly weathering. The thickness of the weathering layer seems to be more than 5 meters below surface soil. Because it seems that leakage through the bedrock is large and bearing strength in the foundation strata is small, removing of the weathering layer in the foundation seems to be necessary.

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

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
VI-1-5	2031A4	UN	303	557

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
796.5	0.0	0	0	0	0.00	
797.5	1.0	3500	1750	1750	1.75	
800.0	2.5	25000	14250	35625	37.37	
802.5	2.5	47000	36000	90000	127.37	
805.0	2.5	95500	71250	178125	305.50	
807.5	2.5	161000	128250	320625	626.12	
810.0	2.5	256000	208500	521250	1147.37	



No. VII-1-6

Name of Dam Siyawarewa

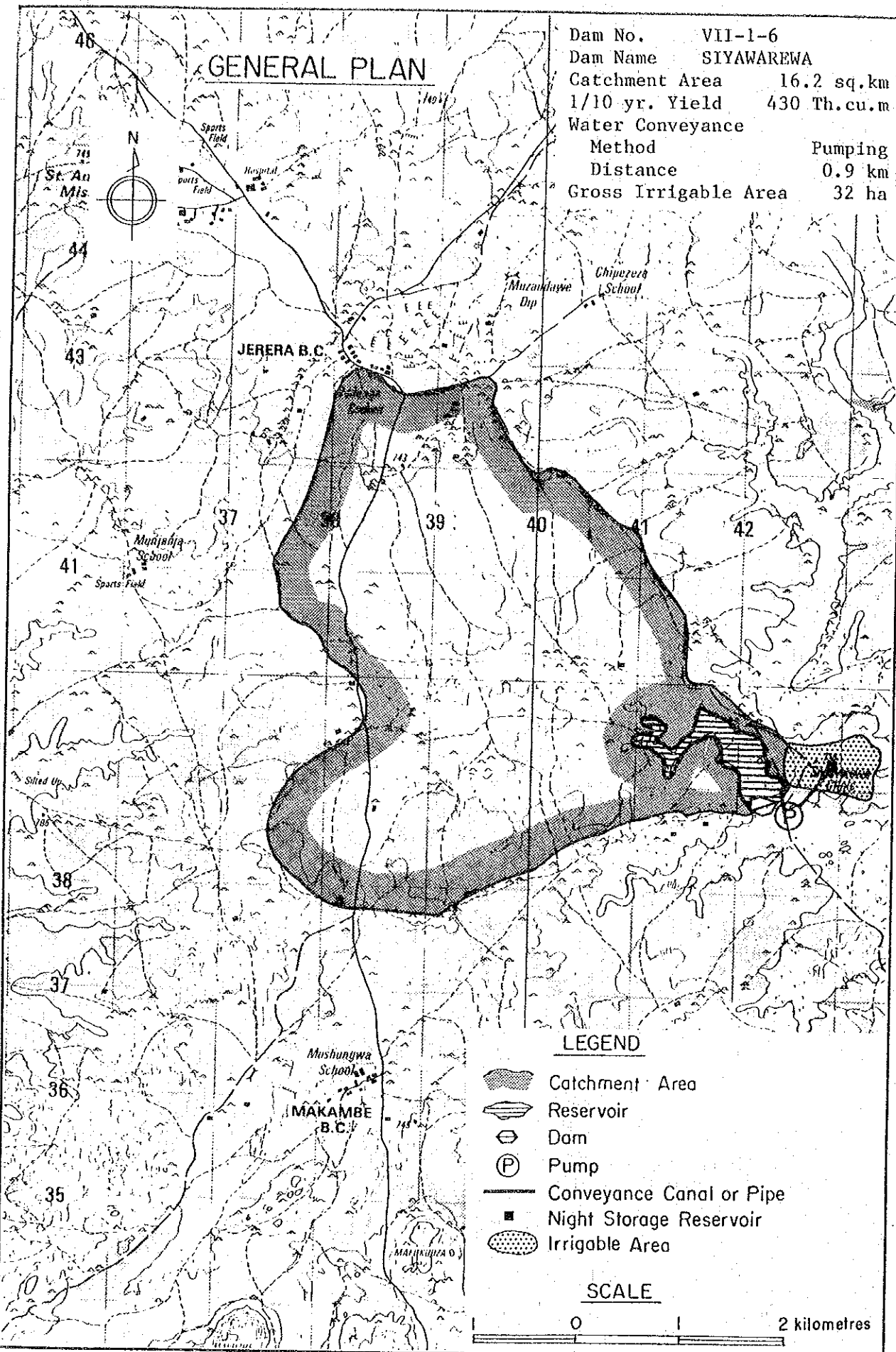
Location	District Zaka		Communal Land Ndanga		
	Map Ref. 2031A4		Coordinates UN423388		
Geology	Granite, surface weathered, joints are well developed and has been changed into boulders.				
Hydrology	River Makambe		Hydrological Zone E-C2		
	Catchment Area 16.2 sq.km		M.A. Rainfall 750 mm		
	M.A. Runoff 83 mm		Sediment 320 tonnes km ² /yr.		
Reservoir	Effective Capacity 1.030 MCM		1/10 Yr. Yield 0.430 MCM		
	Dead Capacity 0.070 MCM		D.W.S. 692 m		
	Total Capacity 1.100 MCM		N.W.S. 698 m		
Dam	Height 13 m		Length 360 m		
	Embankment Volume 65.000 cu.m		Spillway 91 m		
Agriculture	Natural Region IV		Soil SL		
	Potential Irrigable Area		60 ha		
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 25.3 ha		Dist. 0.9 km by Pump, H=13.0 m		
	Topography	Area		Flat	
		Conveyance		Gently sloping	
Rural Water Supply	Population 3 456 person		69 cu.m/day		
	Livestock 540 unit		24 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 707 000	Z\$ 1 022 000	Z\$ 1 720 000	B	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
Z\$ 56 839/year	Z\$ 661 000	4.4 per cent			
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks					

Present Condition on the Ward








Ward Name	Chidzurira		Area 6 638 ha	
Demography	Population Density		115.2 persons/sq.km	
	Family Size		10.0 Persons/household	
Agriculture	Arable Area 1 043 ha		Grazing Area 5 595 ha	
	Maize 0.7 ha/household		11 bags/ha	
	Sorghum 0. ha/household		6 bags/ha	
	Livestock 0.9 LSUs/household		10.8 LSUs/sq.km	
Rural Water Supply	Borehole 0.06 units/sq.km		1 913 persons/unit	
	Well 0.06 units/sq.km		1 913 persons/unit	

GENERAL PLAN

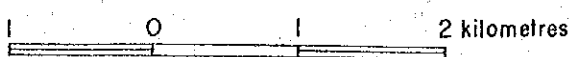
Dam No. VII-1-6
 Dam Name SIYAWAREWA
 Catchment Area 16.2 sq.km
 1/10 yr. Yield 430 Th.cu.m
 Water Conveyance Method Pumping
 Distance 0.9 km
 Gross Irrigable Area 32 ha



LEGEND

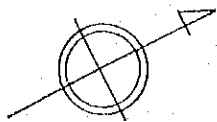
-  Catchment Area
-  Reservoir
-  Dam
-  Pump
-  Conveyance Canal or Pipe
-  Night Storage Reservoir
-  Irrigable Area

SCALE

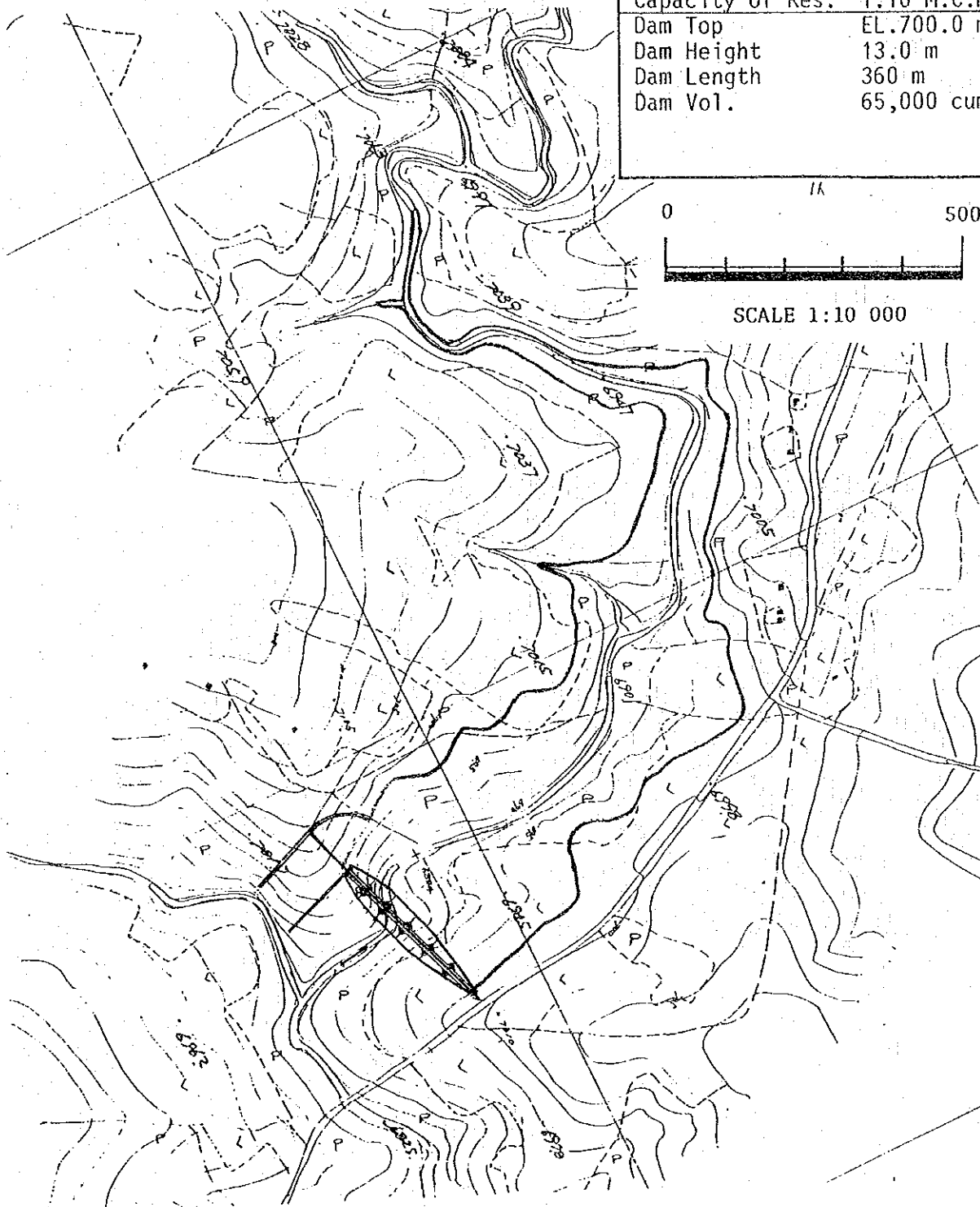


PLAN OF DAM

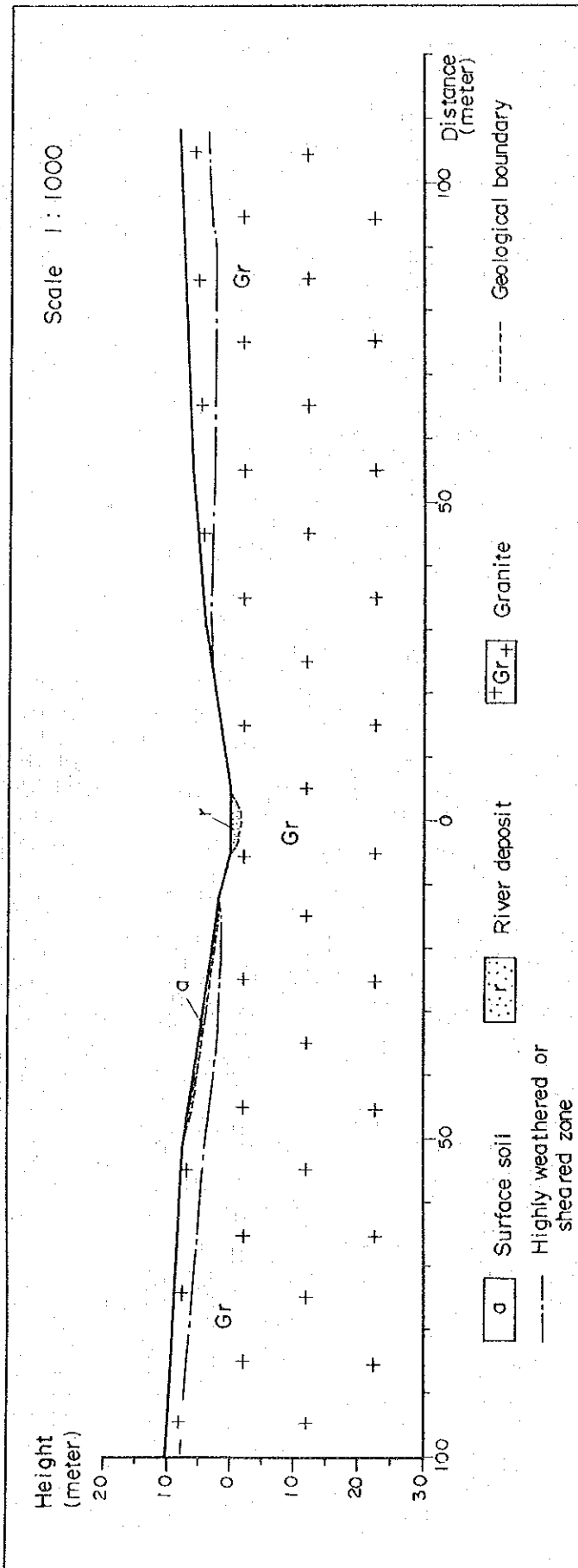
SIYAWAREWA



Dam No.	VII- 1 - 6
District	Zaka
Communal L.	Ndanga
River	Makambe
Map Ref.	2031 A4
Coordinate	UN 423388
Catchment A.	16.2 sq.km
Design Flood	163 cum/sec
N.W.S.	EL.698.0 m
D.W.S.	EL.692.0 m
Capacity of Res.	1.10 M.C.M.
Dam Top	EL.700.0 m
Dam Height	13.0 m
Dam Length	360 m
Dam Vol.	65,000 cum



VII-1-6 Siyawarewa



The area is undulated land, and the Makambe River forms a narrow and deep valley.

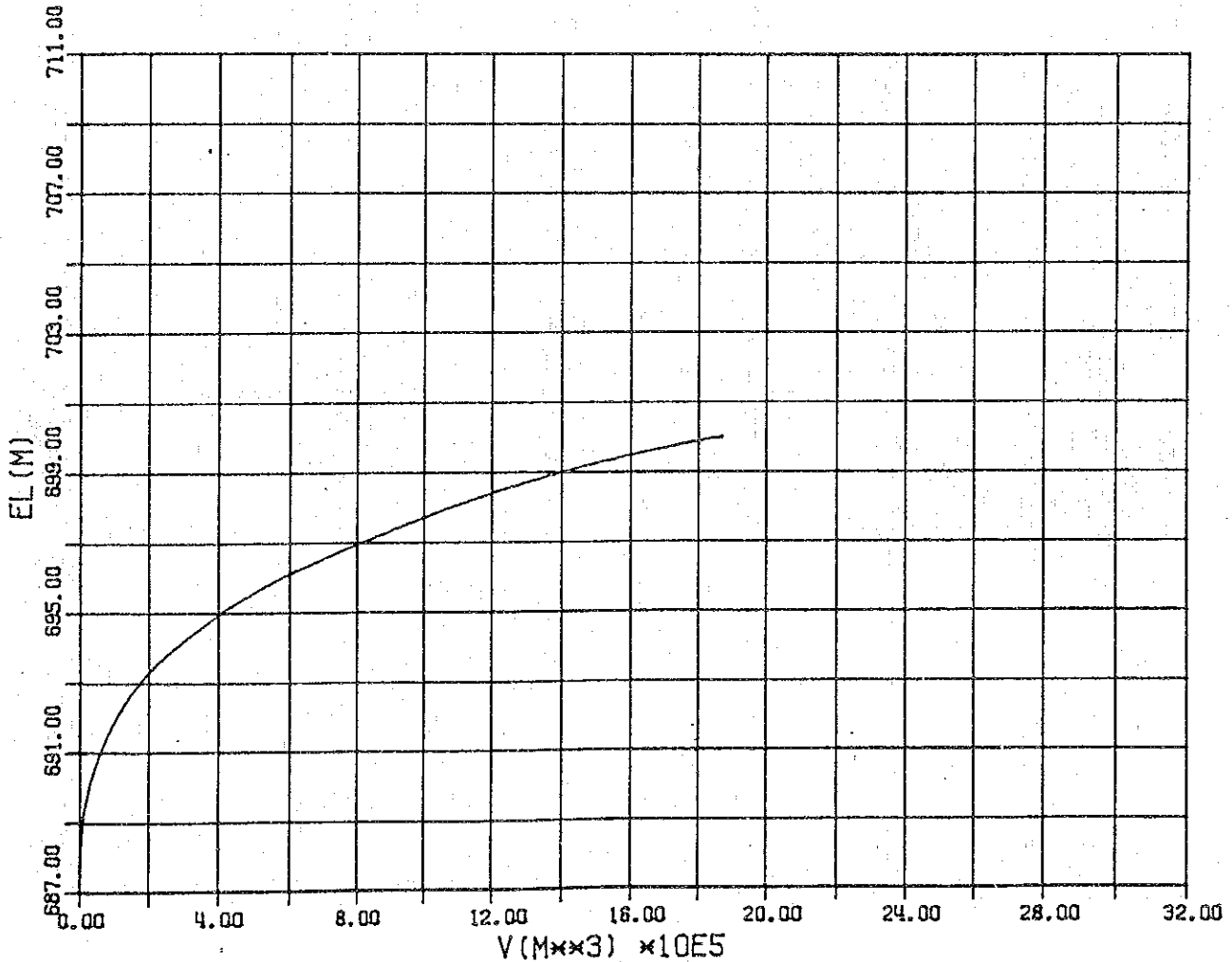
The bedrock consists of granite, and although it is partly very hard and massive, generally it is well jointed and partly it has been changed into boulders by highly weathering. Leakage through the bedrock seems to be very large. The depth of the weathered layer seems to be maximum 5 meters below surface soil.

The estimated thickness of unconsolidated deposits is maximum 2 meters in the river bed and maximum 1 meter at the both banks.

TABLE STORAGE VOLUME OF RESERVOIR

NØ	MAP	GRID	VER	HØR
VII-1-6	2031A4	UN	423	388

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VØL (M ³)	ΣV (1000M ³)	NOTE
687.0	0.0	0	0	0	0.00	
687.5	0.5	2000	1000	500	0.50	
690.0	2.5	18500	10250	25625	26.12	
692.5	2.5	69000	43750	109375	135.50	
695.0	2.5	148000	108500	271250	406.75	
697.5	2.5	281000	214500	536250	943.00	
700.0	2.5	460000	370500	926250	1869.25	



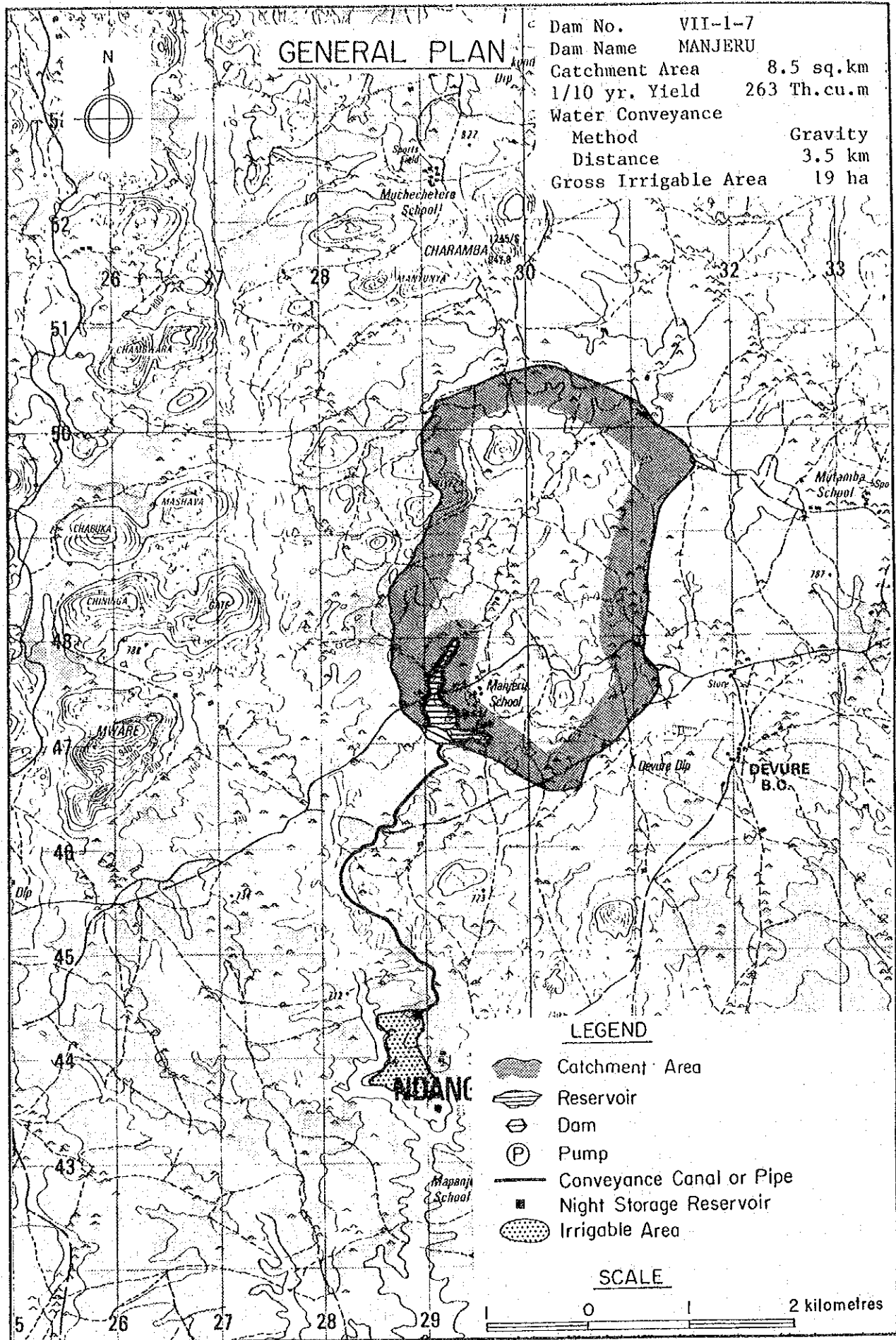
No. VII-1-7

Name of Dam Manjeru

Location	District	Zaka	Communal Land	Ndanga	
	Map Ref.	2031A4	Coordinates	UN291471	
Geology	Granite, generally massive and hard, partly weathered and soft.				
Hydrology	River	Mawonga	Hydrological Zone	E-UT1	
	Catchment Area	8.5 sq.km	M.A. Rainfall	800 mm	
	M.A. Runoff	103 mm	Sediment	270 tonnes km ² /yr.	
Reservoir	Effective Capacity	1.010 MCM	1/10 Yr. Yield	0.263 MCM	
	Dead Capacity	0.030 MCM	D.W.S.	731 m	
	Total Capacity	1.040 MCM	N.W.S.	740 m	
Dam	Height	15 m	Length	540 m	
	Embankment Volume	65 000 cu.m	Spillway	60 m	
Agriculture	Natural Region	IV	Soil	SL	
	Potential Irrigable Area	40 ha			
	Proposed Cropping Pattern	B			
Irrigation	Net Irrigable Area	15.5 ha	Dist. 3.5 km by Gravity		
	Topography	Area	Undulated and steep slope		
		Conveyance	Complicated, one river crossing		
Rural Water Supply	Population	2 028 person	41 cu.m/day		
	Livestock	1 170 unit	53 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 1 367 000	Z\$ 790 000	Z\$ 2 157 000	B	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$ 35 086/year	Z\$ 408 000	1.0 per cent		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks					

Present Condition on the Ward

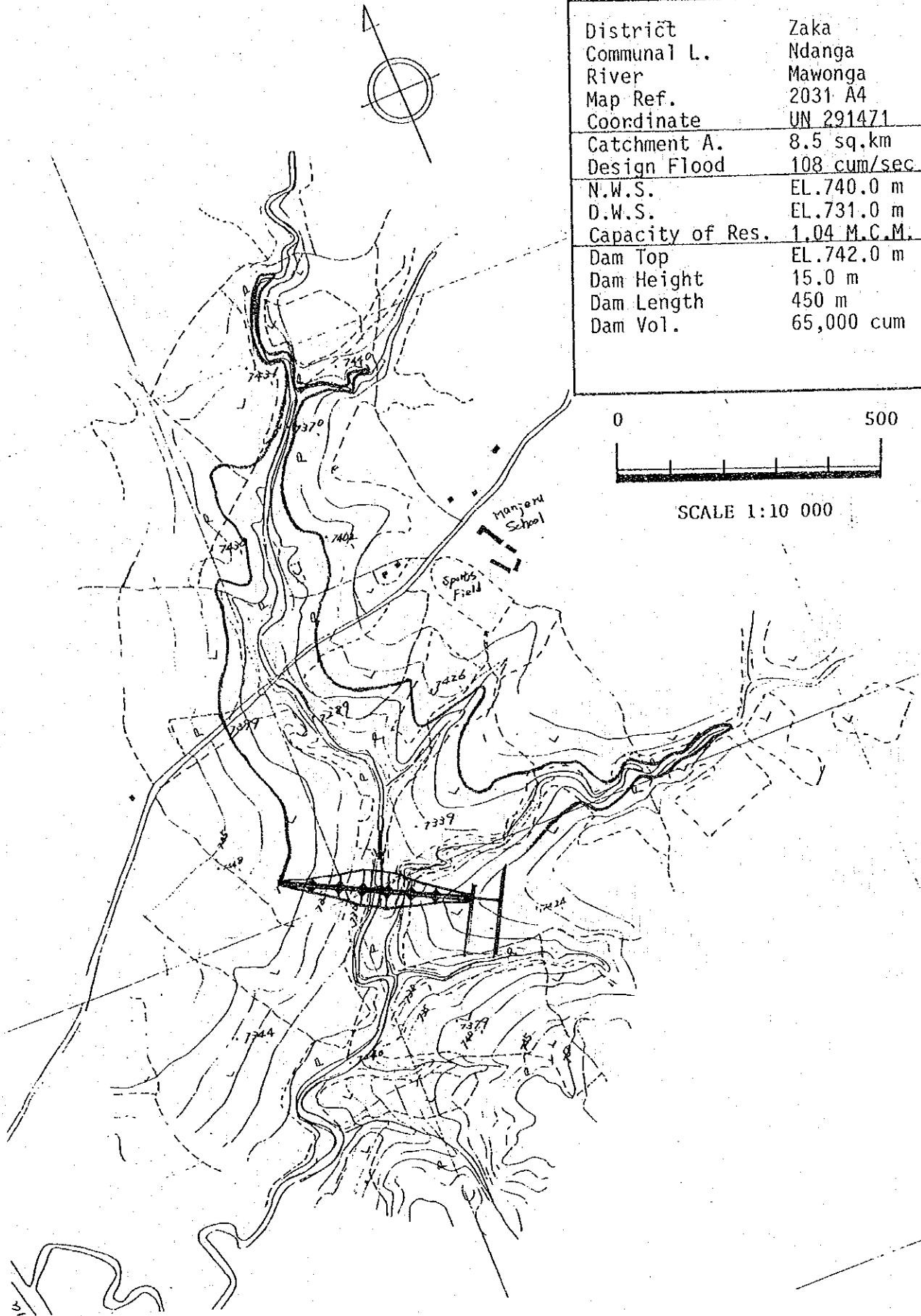
Ward Name	Bota North	Area	8 875 ha
Demography	Population Density	67.6	persons/sq.km
	Family Size	10.0	Persons/household
Agriculture	Arable Area	5 593 ha	Grazing Area 3 282 ha
	Maize	1.7 ha/household	10 bags/ha
	Sorghum	0. ha/household	5 bags/ha
	Livestock	3.5 LSUs/household	23.4 LSUs/sq.km
Rural Water Supply	Borehole	0.09 units/sq.km	750 persons/unit
	Well	0.17 units/sq.km	400 persons/unit



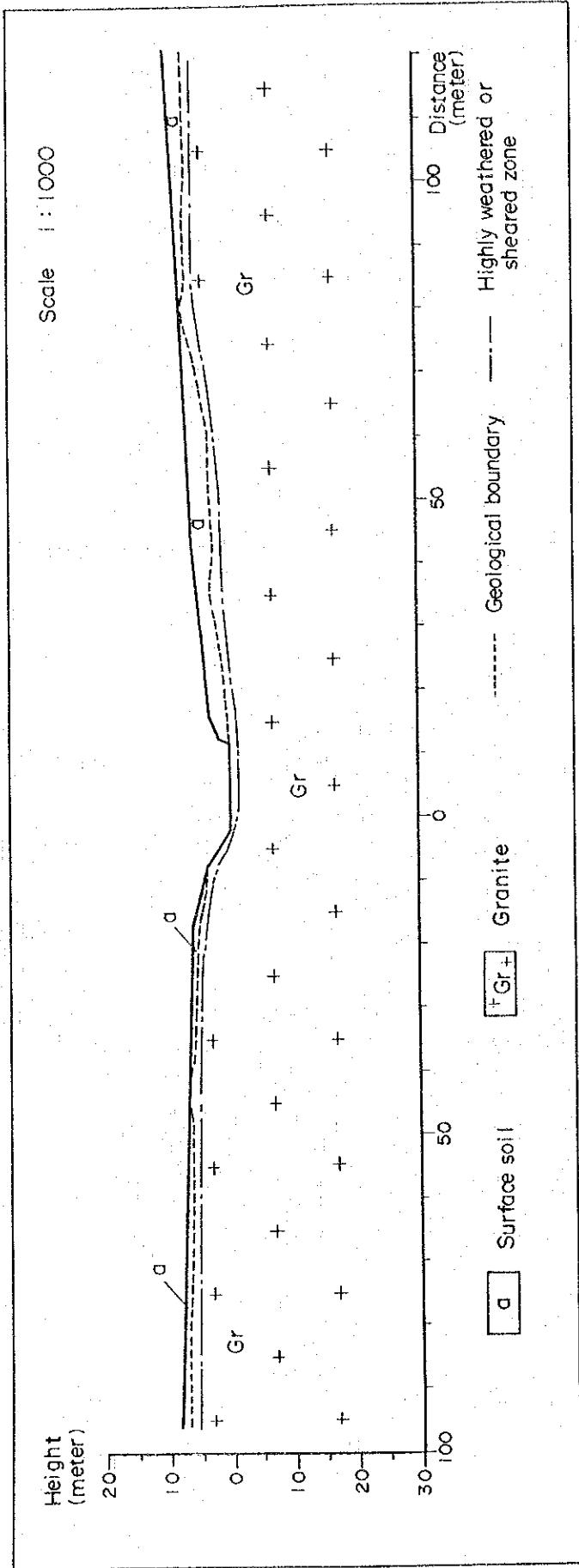
PLAN OF DAM

MANJERU

Dam No.	VII- 1 - 7
District	Zaka
Communal L.	Ndanga
River	Mawonga
Map Ref.	2031 A4
Coordinate	UN 291471
Catchment A.	8.5 sq.km
Design Flood	108 cum/sec
N.W.S.	EL.740.0 m
D.W.S.	EL.731.0 m
Capacity of Res.	1.04 M.C.M.
Dam Top	EL.742.0 m
Dam Height	15.0 m
Dam Length	450 m
Dam Vol.	65,000 cum



VII-1-7 Manjeru

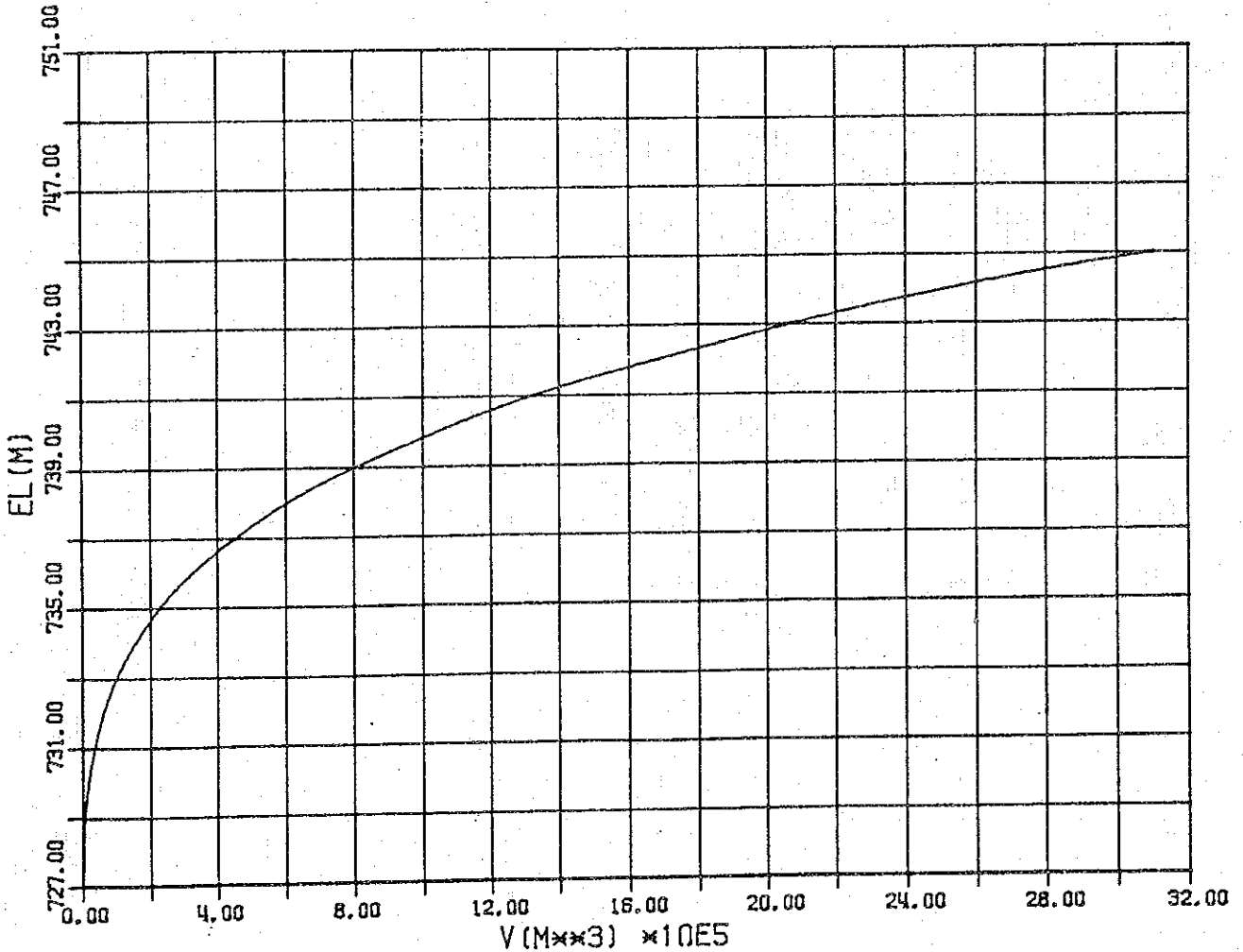


The Mawonga River in the area forms narrow flood plane and gentle slopes, and flows relatively straight. The bedrock consists of granite, and it is porphyritic, massive, soft and poorly jointed. Leakage through the bedrock seems to be small. Because the bedrock is weathered about 2 meters thick below surface, it is necessary to cut off the weathering layer for the dam safety. However the bedrock is suitable for dam foundation from the geological point of view. The estimated thickness of unconsolidated deposits is maximum 1 meter in the riverbed and maximum 4 meters at both banks.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
VI-1-7	2031A4	UN	291	471

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
727.1	0.0	0	0	0	0.00	
730.0	2.9	10843	5422	15722	15.72	
732.5	2.5	37824	24334	60834	76.56	
735.0	2.5	81558	59691	149228	225.78	
737.5	2.5	155576	118567	296418	522.20	
740.0	2.5	258636	207106	517765	1039.97	
742.5	2.5	403876	331256	828140	1868.10	
745.0	2.5	582645	493261	1233151	3101.26	



No. VII-1-8

Name of Dam Chenyu

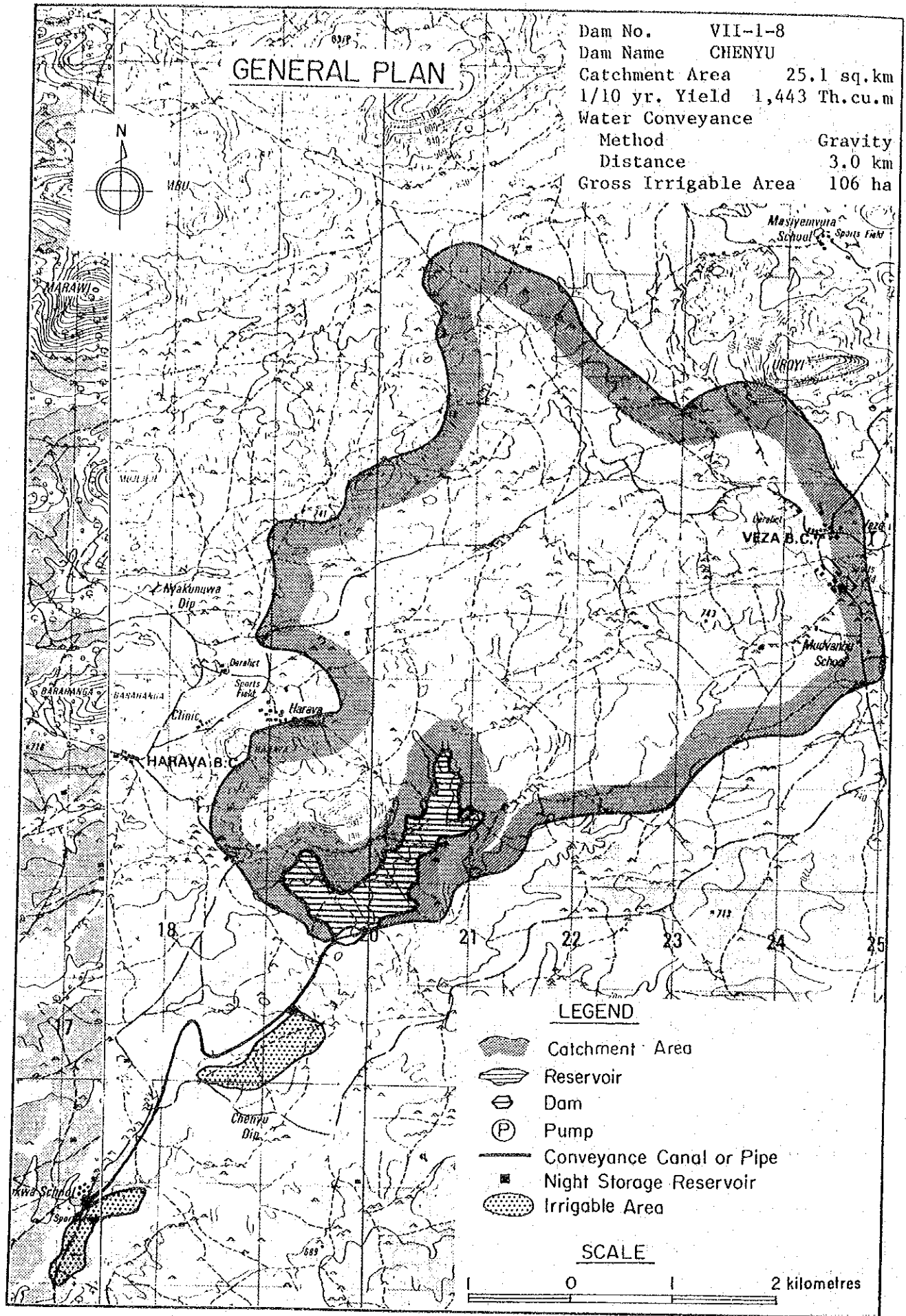
Location	District	Zaka	Communal Land	Ndanga	
	Map Ref.	2031A4	Coordinates	UN197404	
Geology	Granite, it seems to be soft and well jointed, the surface soil is deep.				
Hydrology	River	Masekana	Hydrological Zone	E-UT2	
	Catchment Area	25.1 sq.km	M.A. Rainfall	850 mm	
	M.A. Runoff	125 mm	Sediment	230 tonnes km ² /yr.	
Reservoir	Effective Capacity	4.410 MCM	1/10 Yr. Yield	1.443 MCM	
	Dead Capacity	0.090 MCM	D.W.S.	676 m	
	Total Capacity	4.500 MCM	N.W.S.	687 m	
Dam	Height	18 m	Length	1 000 m	
	Embankment Volume	220 000 cu.m	Spillway	121 m	
Agriculture	Natural Region	IV	Soil	SL	
	Potential Irrigable Area	90 ha			
	Proposed Cropping Pattern	B			
Irrigation	Net Irrigable Area	84.9 ha	Dist. 3.0 km by Gravity		
	Topography	Area	Steep slope with gullys		
		Conveyance	Complicated, one river crossing		
Rural Water Supply	Population	2 769 person	55 cu.m/day		
	Livestock	1 825 unit	82 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 3 235 000	Z\$ 1 214 000	Z\$ 4 449 000	A	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$187 858/year	Z\$ 2 184 000	7.4 per cent		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	N	Y	N	N
Remarks					

Present Condition on the Ward








Ward Name	Mutonhuri	Area	6 503 ha
Demography	Population Density	92.3	persons/sq.km
	Family Size	10.0	Persons/household
Agriculture	Arable Area	3 403 ha	Grazing Area 3 100 ha
	Maize	N.A	ha/household 8 bags/ha
	Sorghum	N.A	ha/household 4 bags/ha
	Livestock	4.0	LSUs/household 36.5 LSUs/sq.km
Rural Water Supply	Borehole	0.11	units/sq.km 857 persons/unit
	Well	0.11	units/sq.km 857 persons/unit

GENERAL PLAN

Dam No. VII-1-8
 Dam Name CHENYU
 Catchment Area 25.1 sq.km
 1/10 yr. Yield 1,443 Th.cu.m
 Water Conveyance
 Method Gravity
 Distance 3.0 km
 Gross Irrigable Area 106 ha



LEGEND

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

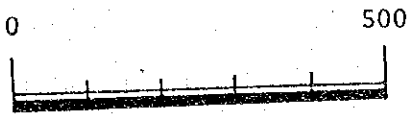
SCALE



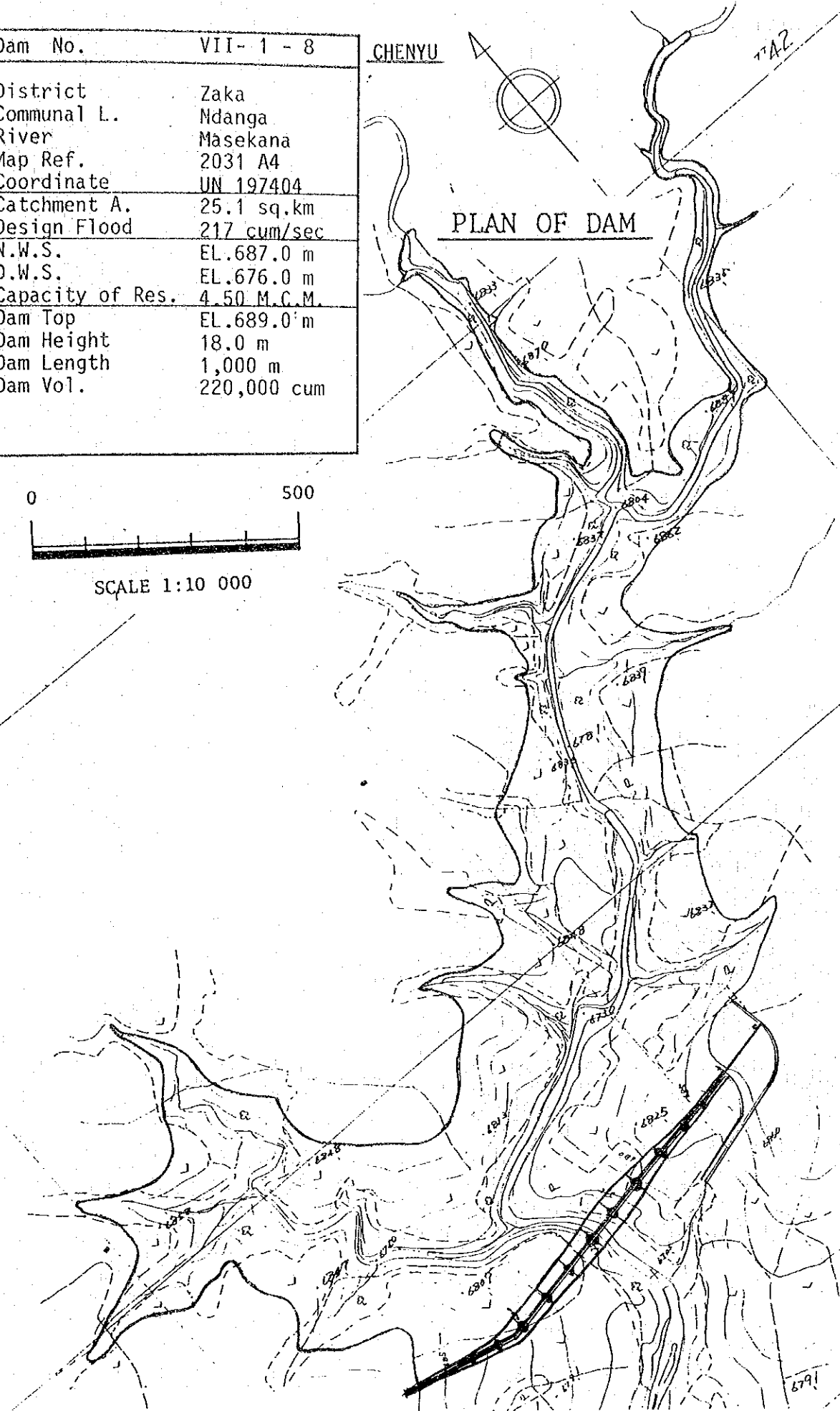
Dam No.	VII- 1 - 8
District	Zaka
Communal L.	Ndanga
River	Masekana
Map Ref.	2031 A4
Coordinate	UN 197404
Catchment A.	25.1 sq.km
Design Flood	217 cum/sec
N.W.S.	EL.687.0 m
D.W.S.	EL.676.0 m
Capacity of Res.	4.50 M.C.M.
Dam Top	EL.689.0 m
Dam Height	18.0 m
Dam Length	1,000 m
Dam Vol.	220,000 cum

CHENYU

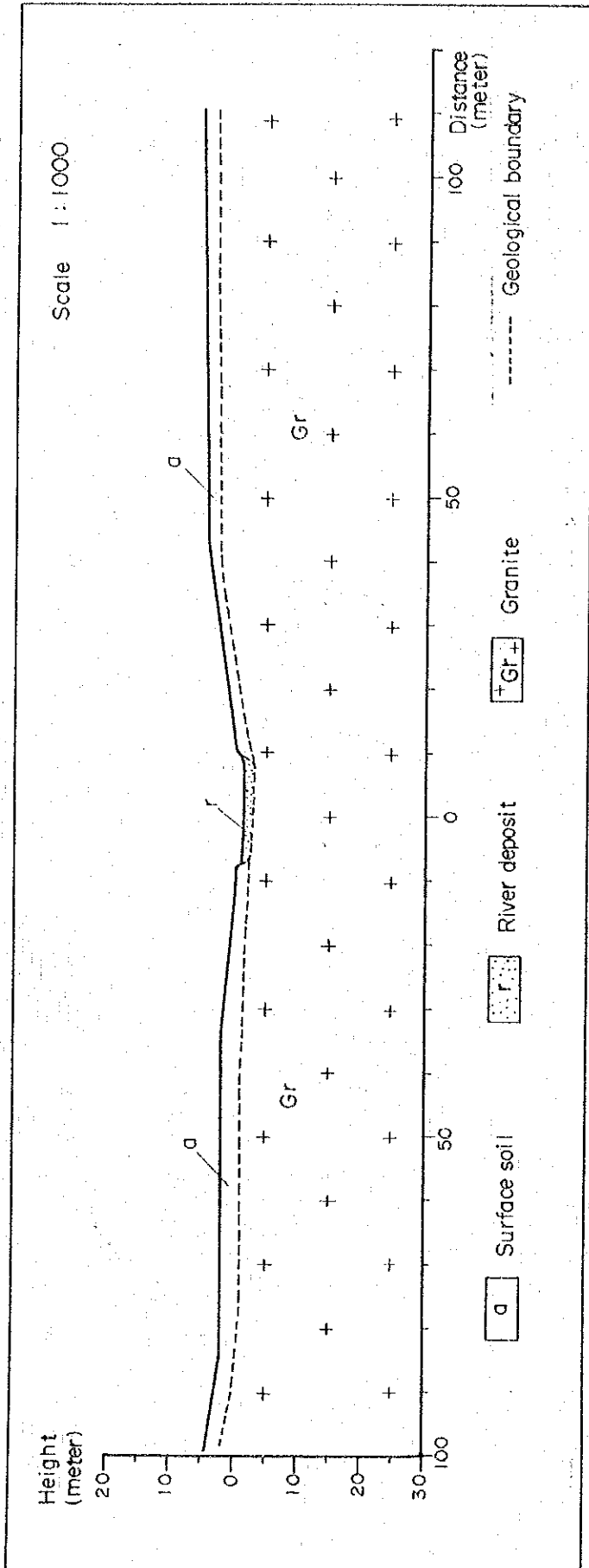
PLAN OF DAM



SCALE 1:10 000



VII-1-8 Chenyu



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

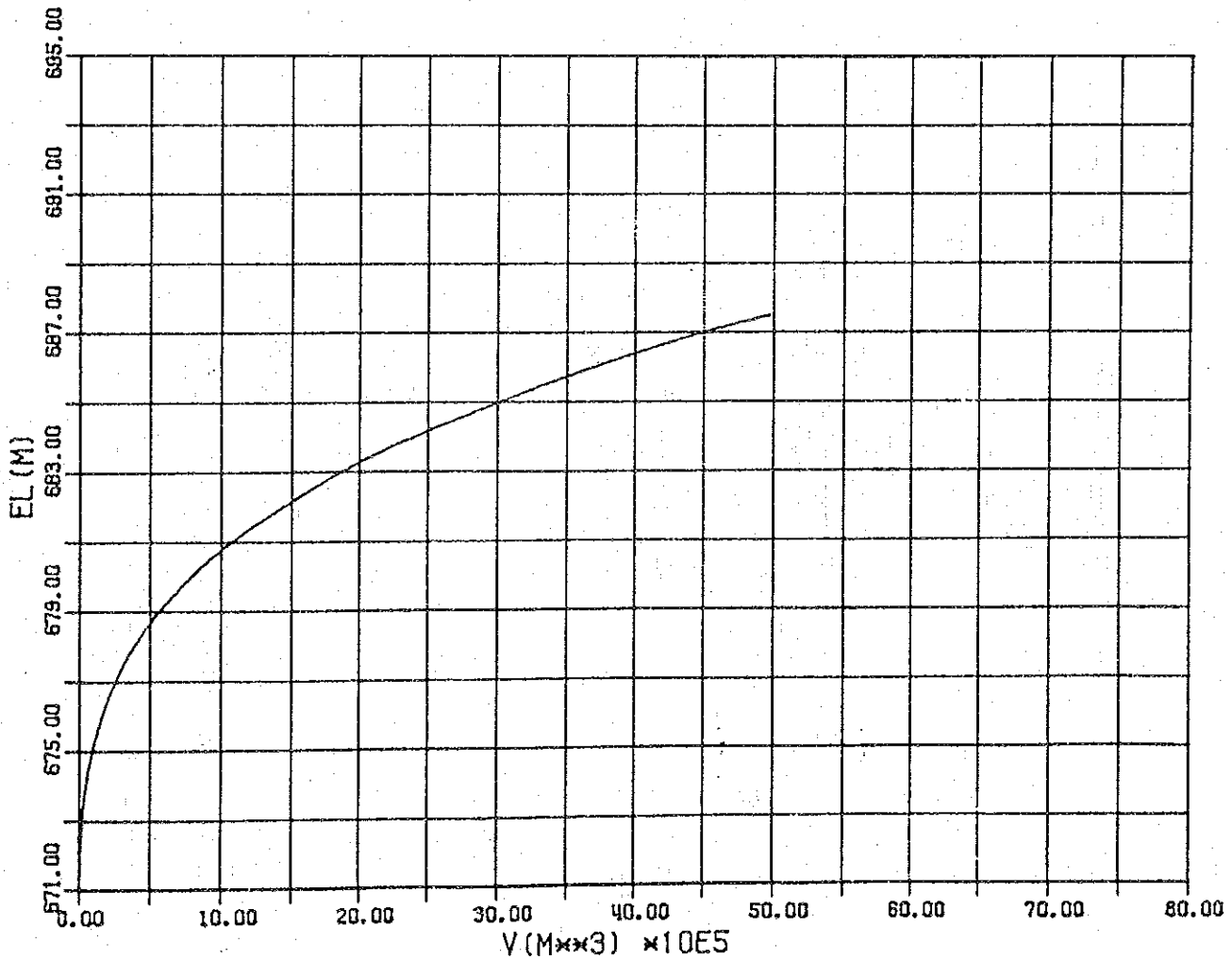
The area is flat land and slopes gently towards the Masekana River that forms relatively deep and wide valley.

The bedrock consists of granite, however the outcrops are a few and the surface soil seems to be thick. Because the bedrock is highly weathered, it seems to be well jointed and soft.

TABLE STORAGE VOLUME OF RESERVOIR

NØ	MAP	GRID	VER	HØR
VII-1-8	2031A4	UN	197	404

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
671.0	0.0	0	0	0	0.00	
672.5	1.5	14465	7233	10849	10.85	
675.0	2.5	47360	30913	77281	88.13	
677.5	2.5	131032	89196	222990	311.12	
680.0	2.5	244513	187773	469431	780.55	
682.5	2.5	437954	341234	853084	1633.63	
685.0	2.5	658902	548428	137106	3004.70	
687.5	2.5	908881	783892	1959728	4964.43	



No. VII-1-9

Name of Dam Maraire

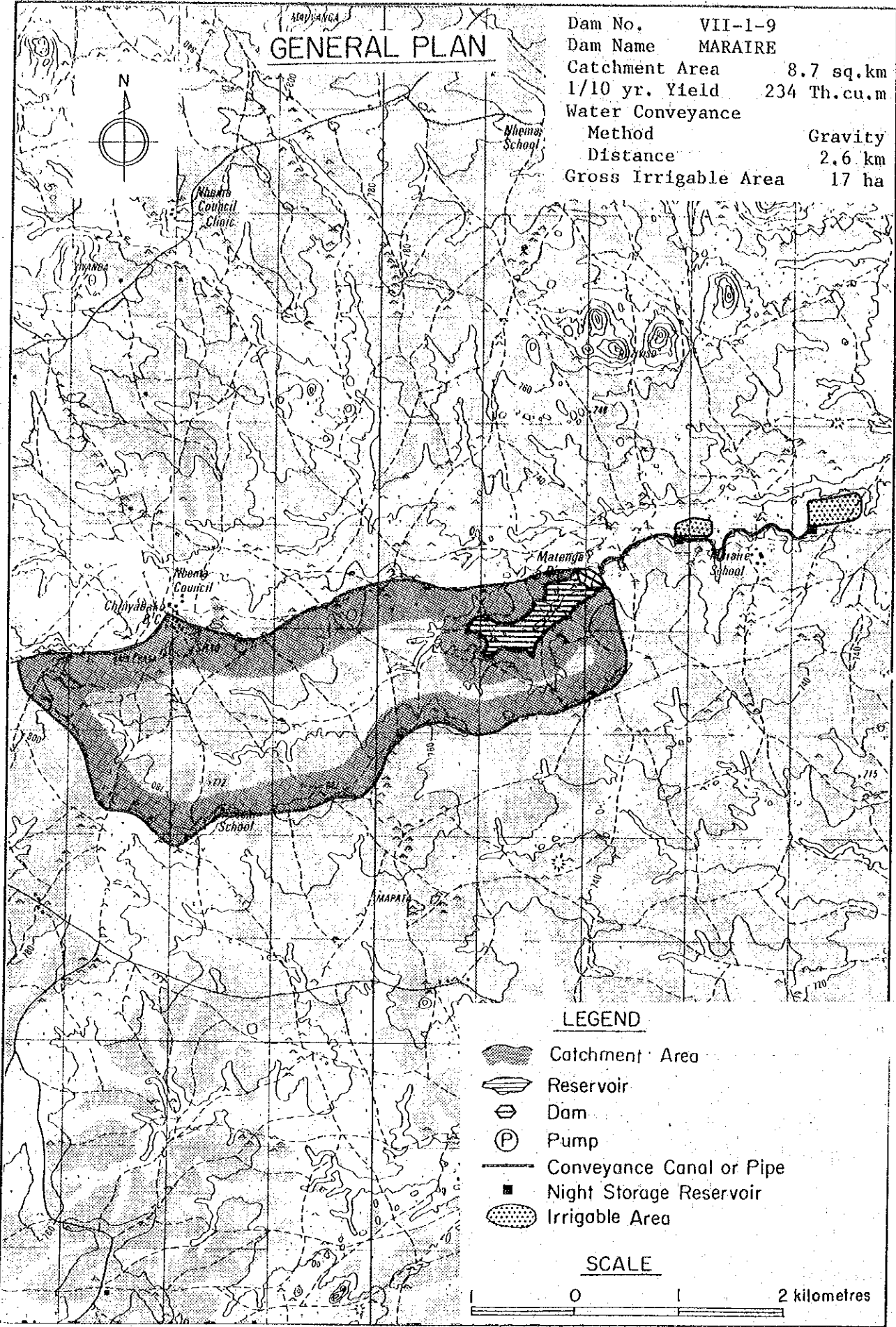
Location	District Zaka		Communal Land Ndanga	
	Map Ref. 2031B3		Coordinates UN520545	
Geology	Granite and the dyke of dolerite, highly weathering, very soft, changed into boulders or soils.			
Hydrology	River (T) Kwerasimba		Hydrological Zone E-S3	
	Catchment Area	8.7 sq.km	M.A. Rainfall	740 mm
	M.A. Runoff	79 mm	Sediment	320 tonnes km ² /yr.
Reservoir	Effective Capacity	0.940 MCM	1/10 Yr. Yield	0.234 MCM
	Dead Capacity	0.040 MCM	D.W.S.	718 m
	Total Capacity	0.980 MCM	N.W.S.	727 m
Dam	Height	17 m	Length	380 m
	Embankment Volume	81 000 cu.m	Spillway	61 m
Agriculture	Natural Region IV		Soil SL	
	Potential Irrigable Area			20 ha
	Proposed Cropping Pattern B			
Irrigation	Net Irrigable Area 13.8ha		Dist. 2.6 km by Gravity	
	Topography	Area	Complicated	
		Conveyance	Gently sloping	
Rural Water Supply	Population 1 920 person		38 cu.m/day	
	Livestock 2 195 unit		99 cu.m/day	
Cost and Benefit	Dam		Irrigation Facilities	Total Cost
	Z\$ 1 611 000		Z\$ 605 000	Z\$ 2 216 000
	Annual Increment Benefit		Net Present Value	Economic Internal Rate of Return
	Z\$ 30 651 /year		Z\$ 356 000	0.4 per cent
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist
	Y	Y	Y	N
Remarks				

Present Condition on the Ward








Ward Name	Mushadirapamwe		Area	6 563 ha
Demography	Population Density		64.0	persons/sq.km
	Family Size		6.0	Persons/household
Agriculture	Arable Area		3 565 ha	Grazing Area 2 998 ha
	Maize	N.A	ha/household	7 bags/ha
	Sorghum	N.A	ha/household	4 bags/ha
	Livestock	4.1	LSUs/household	43.9 LSUs/sq.km
Rural Water Supply	Borehole	0.08	units/sq.km	840 persons/unit
	Well	0.05	units/sq.km	1 400 persons/unit

GENERAL PLAN

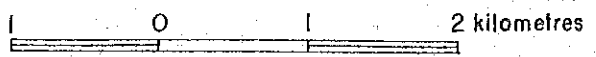
Dam No. VII-1-9
 Dam Name MARAIRE
 Catchment Area 8.7 sq.km
 1/10 yr. Yield 234 Th.cu.m
 Water Conveyance Method Gravity
 Distance 2.6 km
 Gross Irrigable Area 17 ha



LEGEND

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

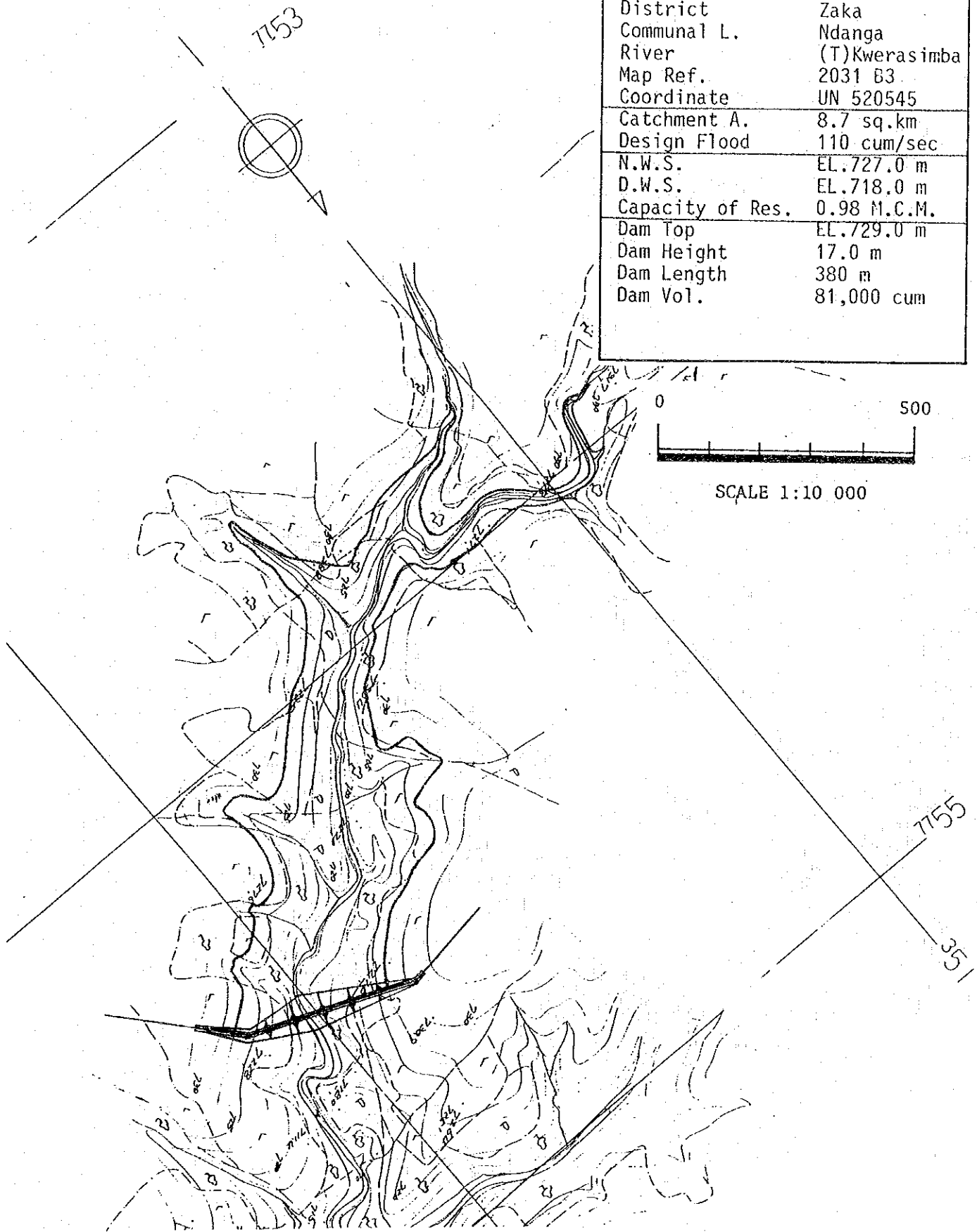
SCALE



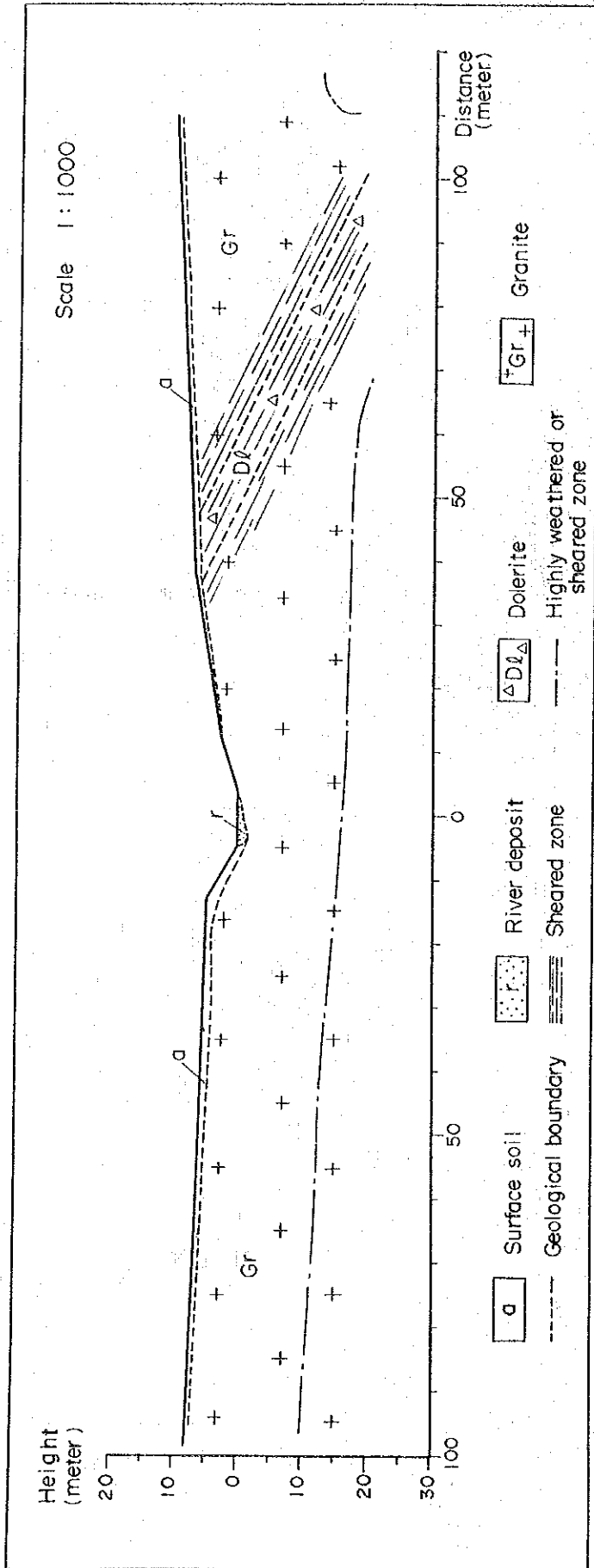
MARAIRE

PLAN OF DAM

Dam No.	VII- 1 - 9
District	Zaka
Communal L.	Ndanga
River	(T)Kwerasimba
Map Ref.	2031 B3
Coordinate	UN 520545
Catchment A.	8.7 sq.km
Design Flood	110 cum/sec
N.W.S.	EL.727.0 m
D.W.S.	EL.718.0 m
Capacity of Res.	0.98 M.C.M.
Dam Top	EL.729.0 m
Dam Height	17.0 m
Dam Length	380 m
Dam Vol.	81,000 cum



VII-1-9 Maraire

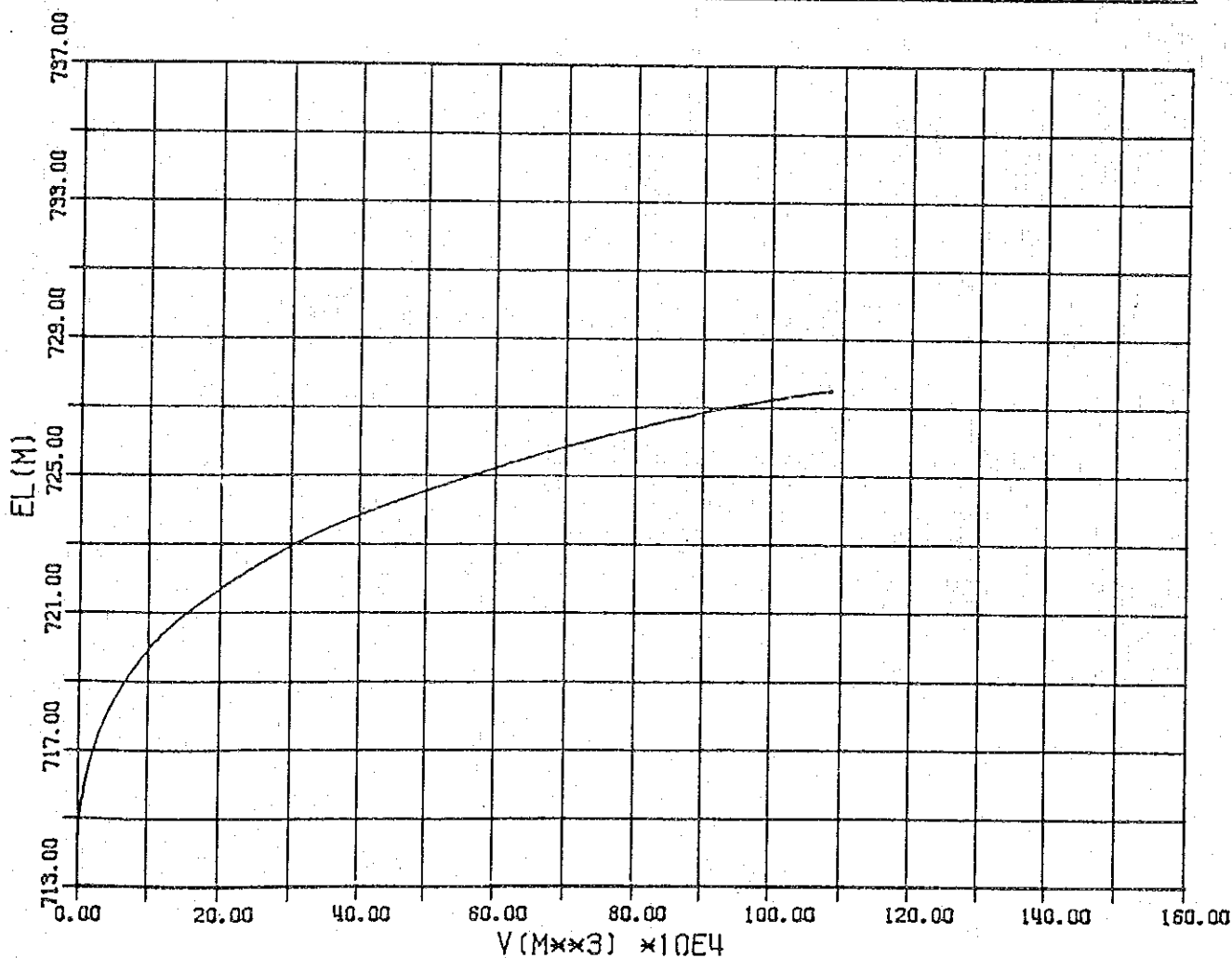


The Kwerasimba River in the area forms flat land and gentle slopes. The bedrock consists of granite, and it is generally coarse grained and massive, however, around the damsite it is highly weathered and well jointed, and has been changed into patches of soils. A dyke of dolerite about 5 meters wide is distributed near the damsite, and it is very hard, however it has been changed into boulders. The thickness of the weathered dyke seems to be very deep. Therefore it seems that leakage through the bedrock is large and bearing strength in the foundation strata is small. The estimated thickness of unconsolidated deposits is maximum 2 meters in the river bed and maximum 4 meters at the both abutments.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HØR
VI-1-9	2031B3	UN	520	545

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
713.0	0.0	0	0	0	0.00	
715.0	2.0	2700	1350	2700	2.70	
717.5	2.5	18900	10800	27000	29.70	
720.0	2.5	39900	29400	73500	103.20	
722.5	2.5	87300	63600	159000	262.20	
725.0	2.5	156200	121750	304375	566.57	
727.5	2.5	257200	206700	516750	1083.32	



No. VII-1-10

Name of Dam Chivamba

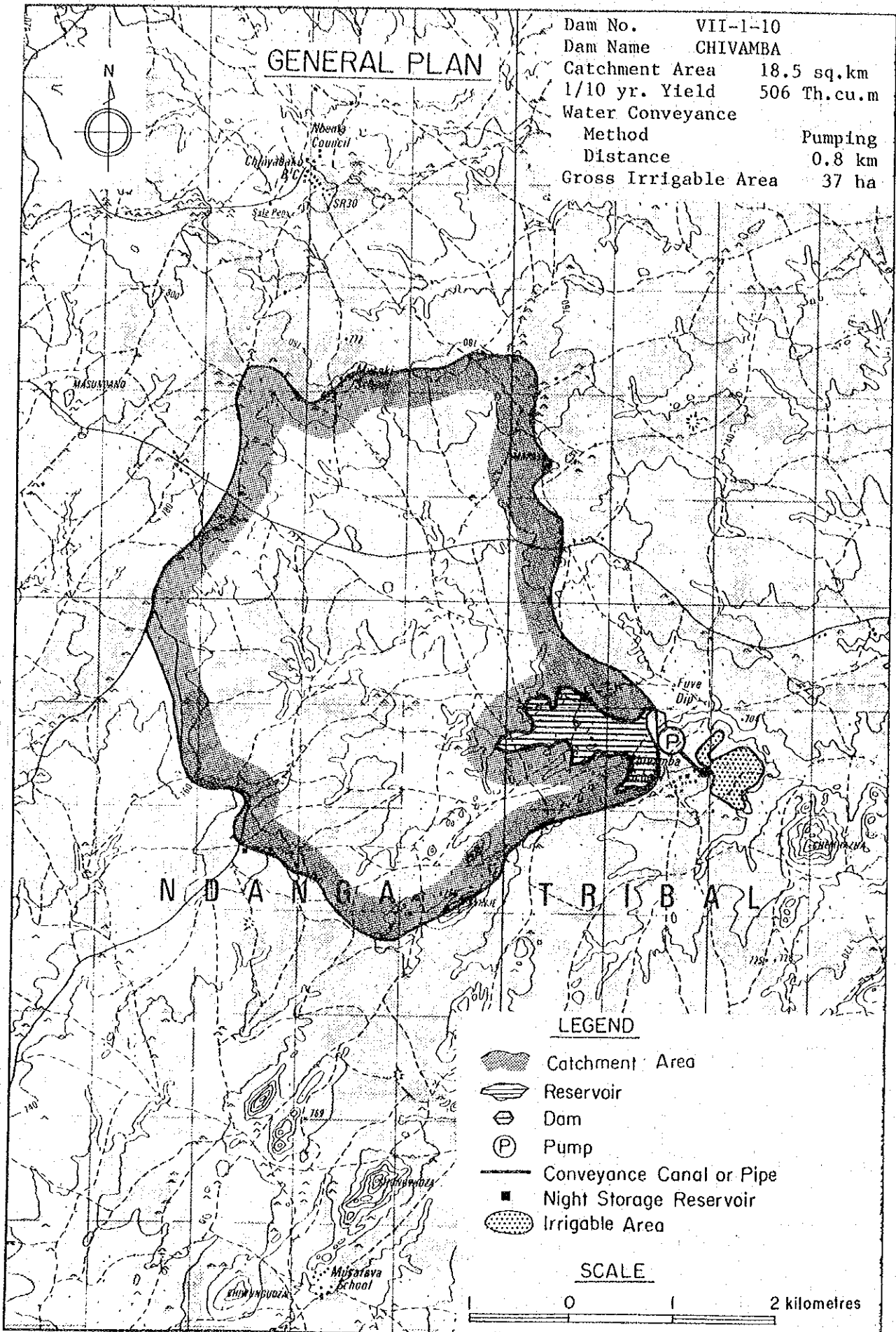
Location	District Zaka		Communal Land Ndanga	
	Map Ref. 2031B3		Coordinates UN515482	
Geology	Granite, highly weathering, very soft and joints are well developed.			
Hydrology	River Fuve		Hydrological Zone E-S3	
	Catchment Area 18.5 sq.km		M.A. Rainfall 720 mm	
	M.A. Runoff 72 mm		Sediment 320 tonnes km ² /yr.	
Reservoir	Effective Capacity 1.860 MCM		1/10 Yr. Yield 0.506 MCM	
	Dead Capacity 0.090 MCM		D.W.S. 704 m	
	Total Capacity 1.950 MCM		N.W.S. 713 m	
Dam	Height 14 m		Length 700 m	
	Embankment Volume 113 000 cu.m		Spillway 99 m	
Agriculture	Natural Region IV		Soil SL	
	Potential Irrigable Area		50 ha	
	Proposed Cropping Pattern B			
Irrigation	Net Irrigable Area 29.8ha		Dist. 0.8 km by Pump, H=16.0 m	
	Topography	Area	Slightly sloping	
		Conveyance	Slightly sloping	
Rural Water Supply	Population 1 920 person		38 cu.m/day	
	Livestock 2 195 unit		99 cu.m/day	
Cost and Benefit	Dam		Irrigation Facilities	Total Cost
	Z\$ 1 173 000		Z\$ 812 000	Z\$ 1 985 000
	Annual Increment Benefit		Net Present Value	Economic Internal Rate of Return
Z\$ 65 844/year		Z\$ 766 000	4.5 per cent	B
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist
	Y	Y	Y	Y
Remarks				

Present Condition on the Ward

Ward Name	Mushadirapamwe		Area 6 563 ha	
Demography	Population Density		64.0 persons/sq.km	
	Family Size		6.0 Persons/household	
Agriculture	Arable Area 3 565 ha		Grazing Area 2 998 ha	
	Maize N.A ha/household		7 bags/ha	
	Sorghum N.A ha/household		4 bags/ha	
	Livestock 4.1 LSUs/household		43.9 LSUs/sq.km	
Rural Water Supply	Borehole 0.08 units/sq.km		840 persons/unit	
	Well 0.05 units/sq.km		1 400 persons/unit	

GENERAL PLAN

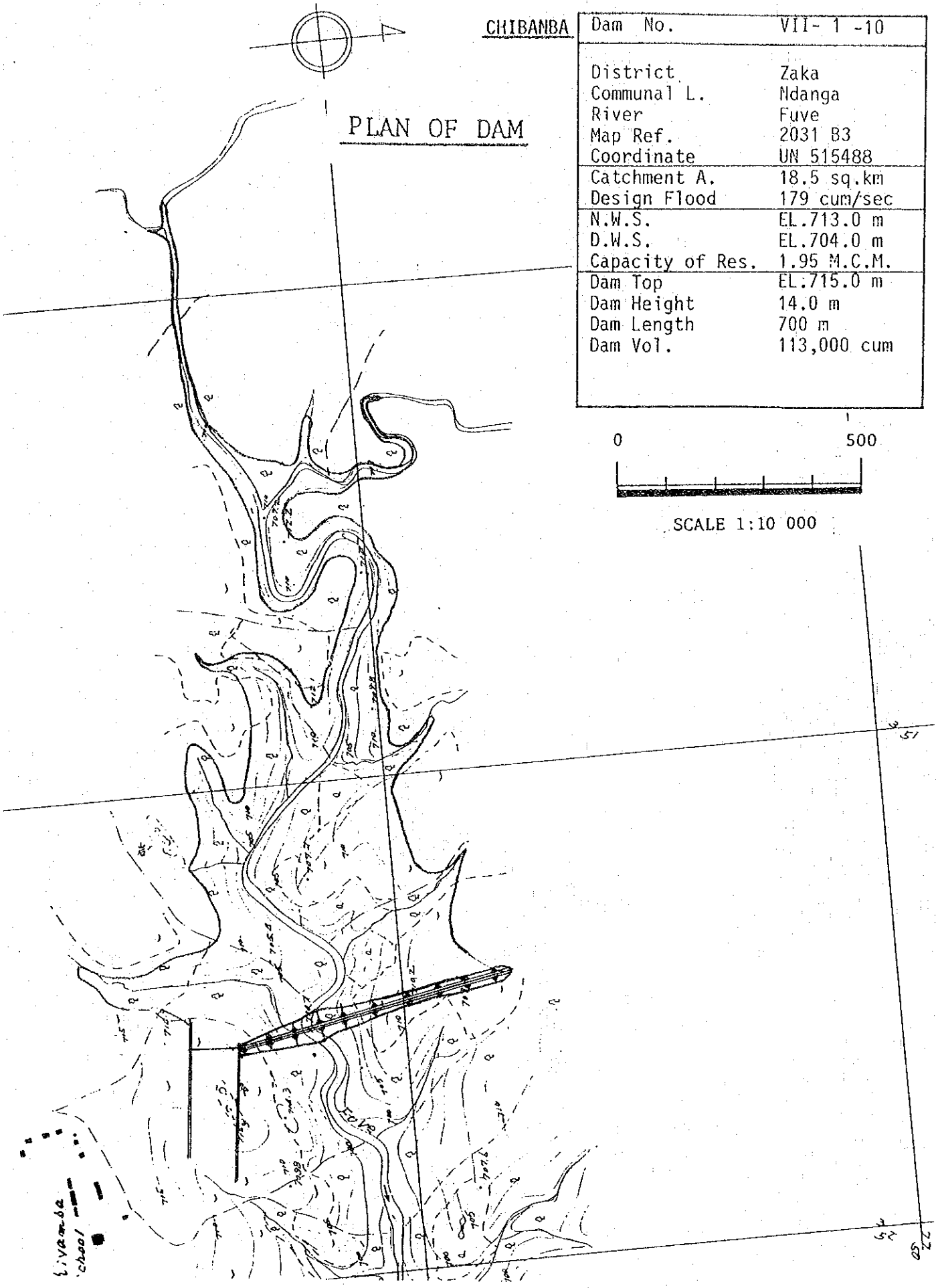
Dam No. VII-1-10
 Dam Name CHIVAMBA
 Catchment Area 18.5 sq.km
 1/10 yr. Yield 506 Th.cu.m
 Water Conveyance Method Pumping
 Distance 0.8 km
 Gross Irrigable Area 37 ha



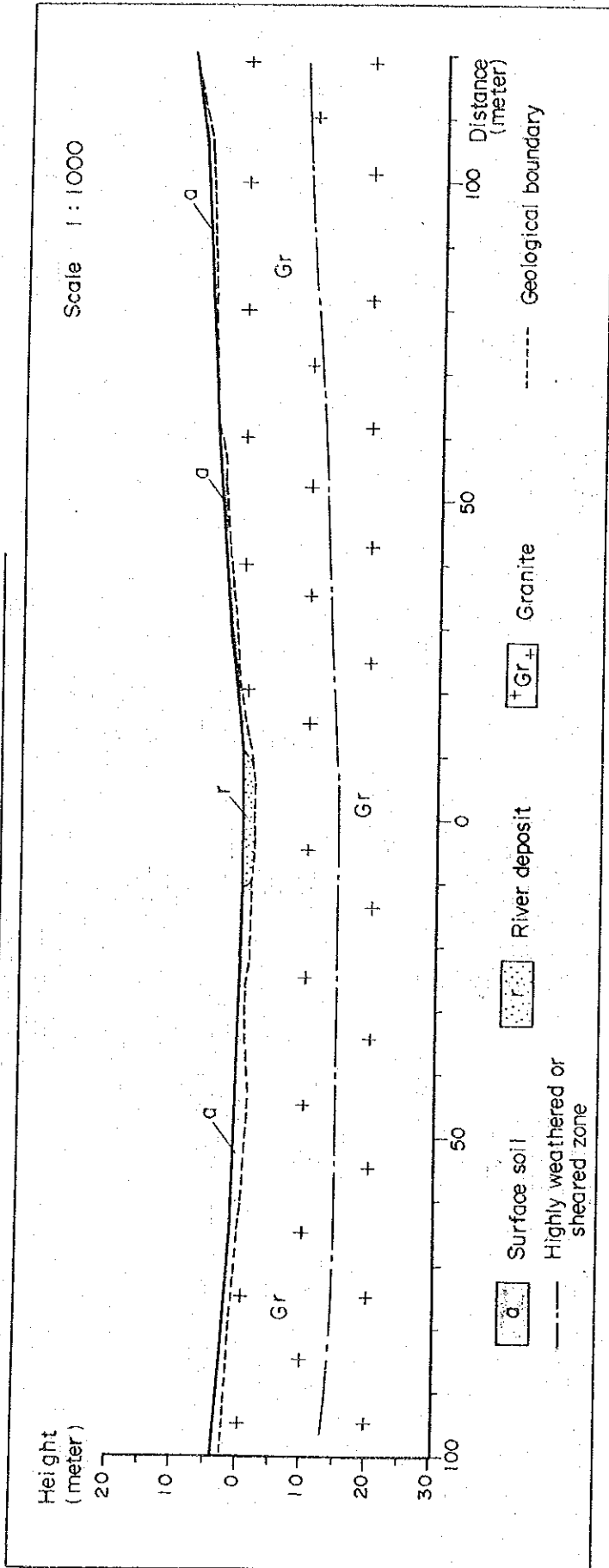
CHIBANBA

Dam No.	VII- 1 -10
District	Zaka
Communal L.	Ndanga
River	Fuve
Map Ref.	2031 B3
Coordinate	UN 515488
Catchment A.	18.5 sq.km
Design Flood	179 cum/sec
N.W.S.	EL.713.0 m
D.W.S.	EL.704.0 m
Capacity of Res.	1.95 M.C.M.
Dam Top	EL:715.0 m
Dam Height	14.0 m
Dam Length	700 m
Dam Vol.	113,000 cum

PLAN OF DAM



VII-1-10 Chivanba



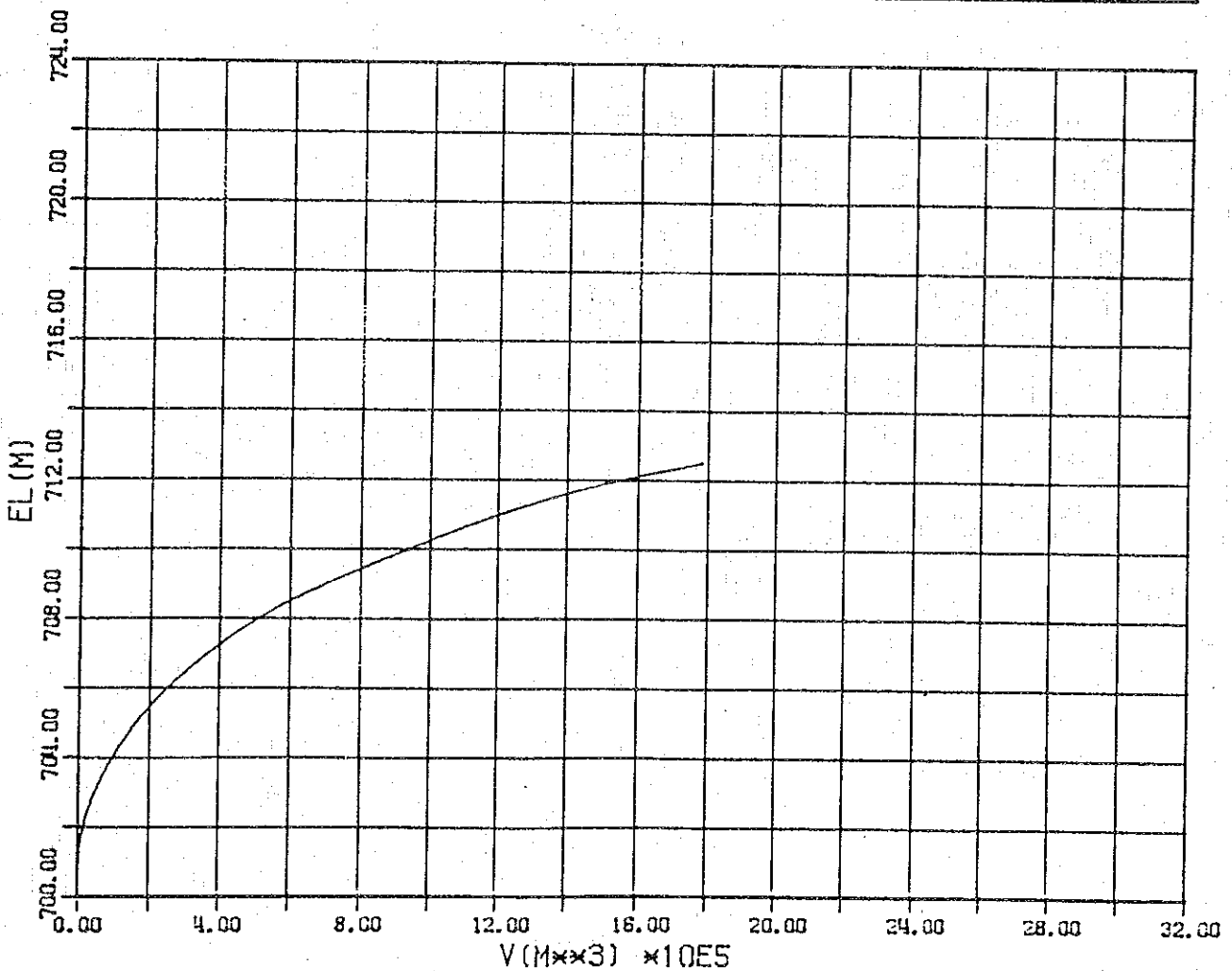
The area is very flat terrain and the Fube River forms a wide valley and very gentle slopes. The bedrock consists of granite, and partly it is massive and hard, however, generally it is very soft and well jointed by highly weathering. A photo-lineament goes across the damsite and it is very wide. It seems that the weathering layer is very deep and leakage through the bedrock is large. The bedrock is less suitable for dam foundation from the geological point of view.

The estimated thickness of unconsolidated deposits is maximum 2 meters in the riverbed and maximum 1 meter at the both banks.

TABLE STORAGE VOLUME OF RESERVOIR

Nº	MAP	GRID	VER	HØR
VII-1-10	2031B3	UN	515	488

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VØL (M ³)	ΣV (1000M ³)	NOTE
700.8	0.0	0	0	0	0.00	
702.5	1.7	32000	16000	27199	27.20	
705.0	2.5	75000	53500	133750	160.95	
707.5	2.5	144000	109500	273750	434.70	
710.0	2.5	258000	201000	502500	937.20	
712.5	2.5	418000	338000	845000	1782.20	



No. VII-1-11

Name of Dam Fuve

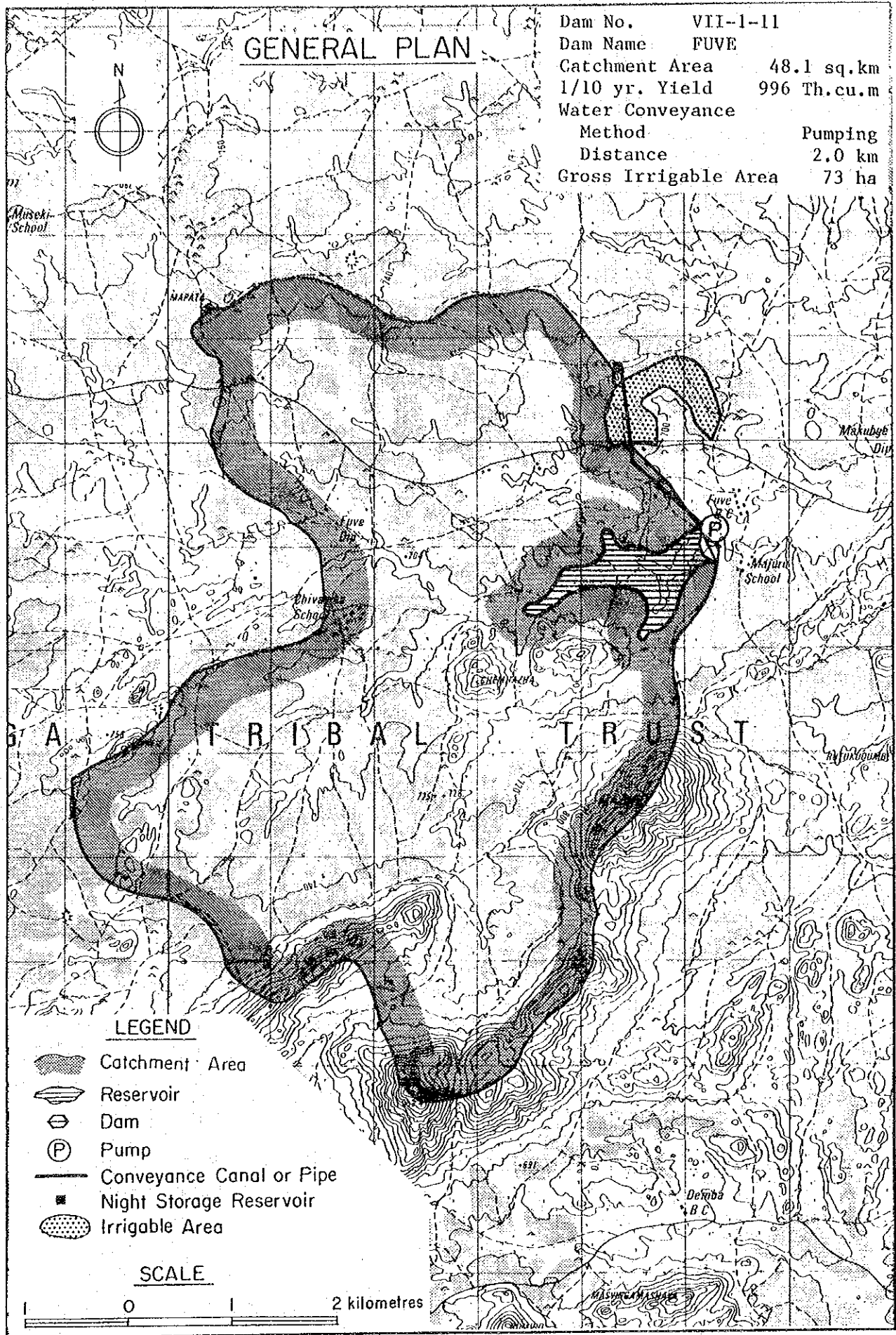
Location	District Zaka		Communal Land Ndanga		
	Map Ref. 2031B3		Coordinates UN552490		
Geology	Gneiss, generally massive and hard, partly weathered.				
Hydrology	River Fuve		Hydrological Zone E-S3		
	Catchment Area	48.1 sq.km	M.A. Rainfall	710 mm	
	M.A. Runoff	69 mm	Sediment	320 tonnes km ² /yr.	
Reservoir	Effective Capacity	2.560 MCM	1/10 Yr. Yield	0.996 MCM	
	Dead Capacity	0.230 MCM	D.W.S.	681 m	
	Total Capacity	2.790 MCM	N.W.S.	688 m	
Dam	Height	15 m	Length	580 m	
	Embankment Volume	89 000 cu.m	Spillway	183 m	
Agriculture	Natural Region IV		Soil SL		
	Potential Irrigable Area		120 ha		
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 58.6ha		Dist.2.0 km by Pump, H=39.0 m		
	Topography	Area	Slightly sloping		
		Conveyance	Slightly sloping		
Rural Water Supply	Population	1 920 person	38 cu.m/day		
	Livestock	2 195 unit	99 cu.m/day		
Cost and Benefit	Dam	Irrigation Facilities	Total Cost	Class	
	Z\$ 954 000	Z\$ 2 239 000	Z\$ 3 193 000	A	
	Annual Increment Benefit	Net Present Value	Economic Internal Rate of Return		
	Z\$ 127 483/year	Z\$ 1 482 000	5.7 per cent		
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks					

Present Condition on the Ward








Ward Name	Mushadirapamwe		Area	6 563 ha
Demography	Population Density		64.0	persons/sq.km
	Family Size		6.0	Persons/household
Agriculture	Arable Area		3 565 ha	Grazing Area 2 998 ha
	Maize	N.A	ha/household	7 bags/ha
	Sorghum	N.A	ha/household	4 bags/ha
	Livestock	4.1	LSUs/household	43.9 LSUs/sq.km
Rural Water Supply	Borehole	0.08	units/sq.km	840 persons/unit
	Well	0.05	units/sq.km	1 400 persons/unit

GENERAL PLAN

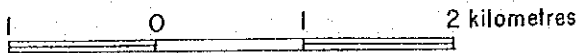
Dam No.	VII-1-11
Dam Name	FUVE
Catchment Area	48.1 sq.km
1/10 yr. Yield	996 Th.cu.m
Water Conveyance Method	Pumping
Distance	2.0 km
Gross Irrigable Area	73 ha



LEGEND

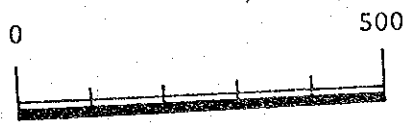
-  Catchment Area
-  Reservoir
-  Dam
-  Pump
-  Conveyance Canal or Pipe
-  Night Storage Reservoir
-  Irrigable Area

SCALE

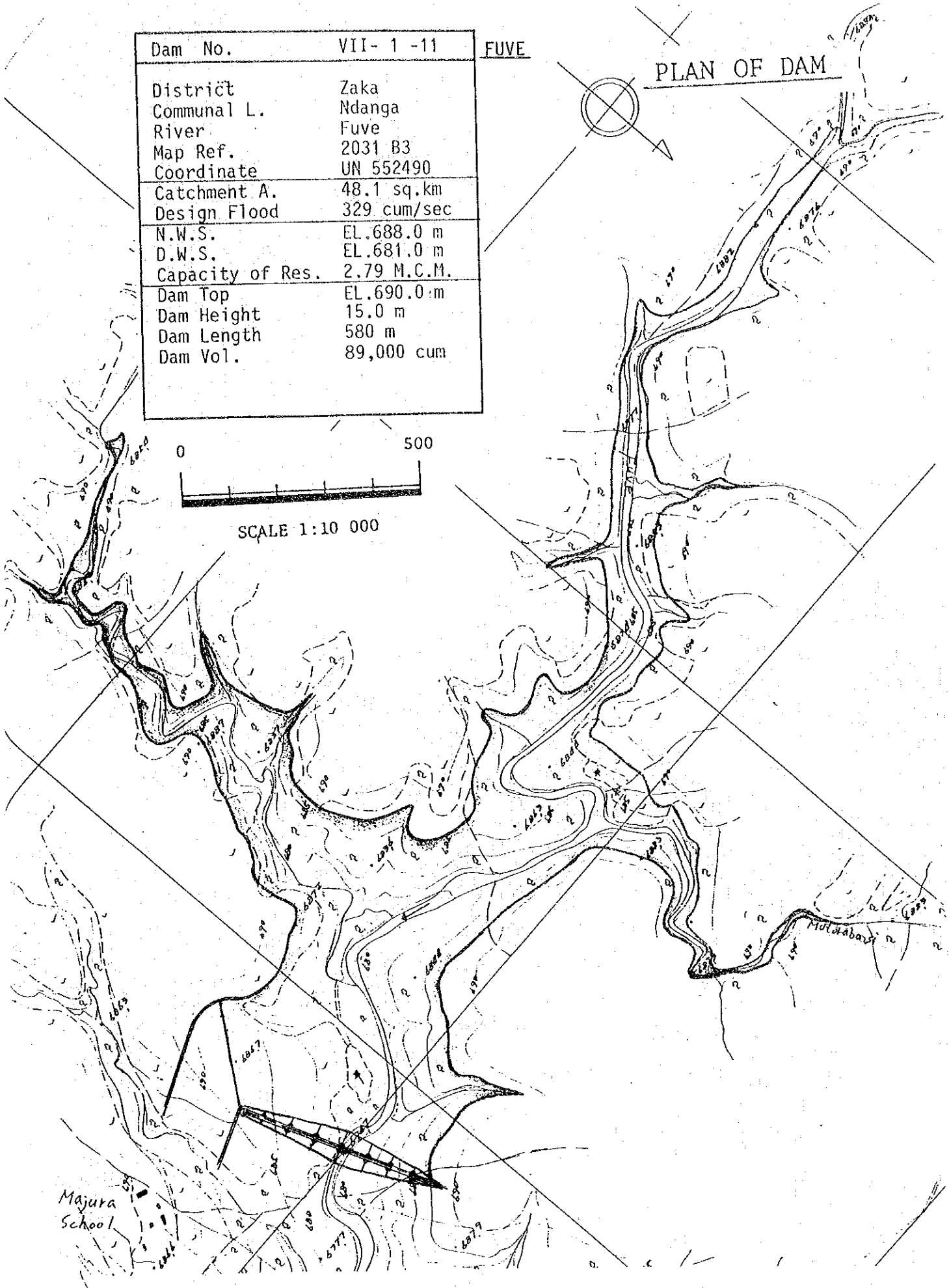


Dam No.	VII- 1 -11	FUVE
District	Zaka	
Communal L.	Ndanga	
River	Fuve	
Map Ref.	2031 B3	
Coordinate	UN 552490	
Catchment A.	48.1 sq.km	
Design Flood	329 cum/sec	
N.W.S.	EL.688.0 m	
D.W.S.	EL.681.0 m	
Capacity of Res.	2.79 M.C.M.	
Dam Top	EL.690.0 m	
Dam Height	15.0 m	
Dam Length	580 m	
Dam Vol.	89,000 cum	

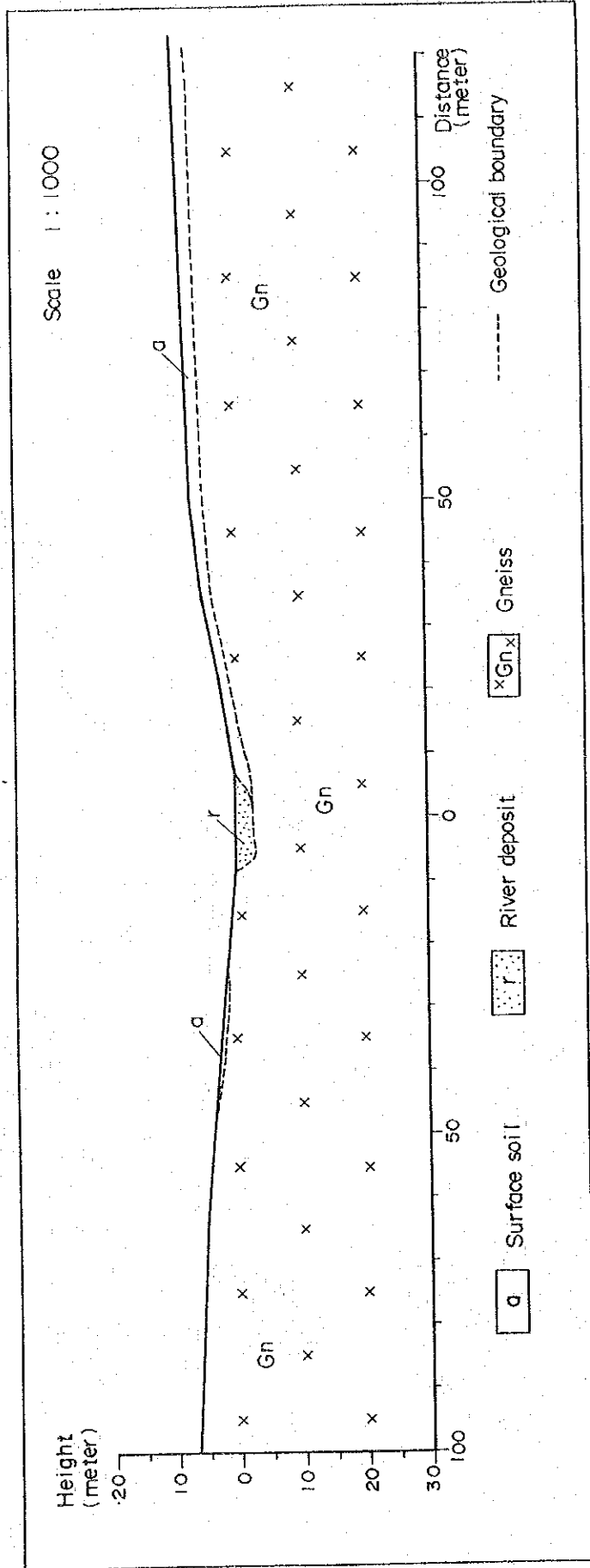
PLAN OF DAM



SCALE 1:10 000



VII - I - 11 Fuve



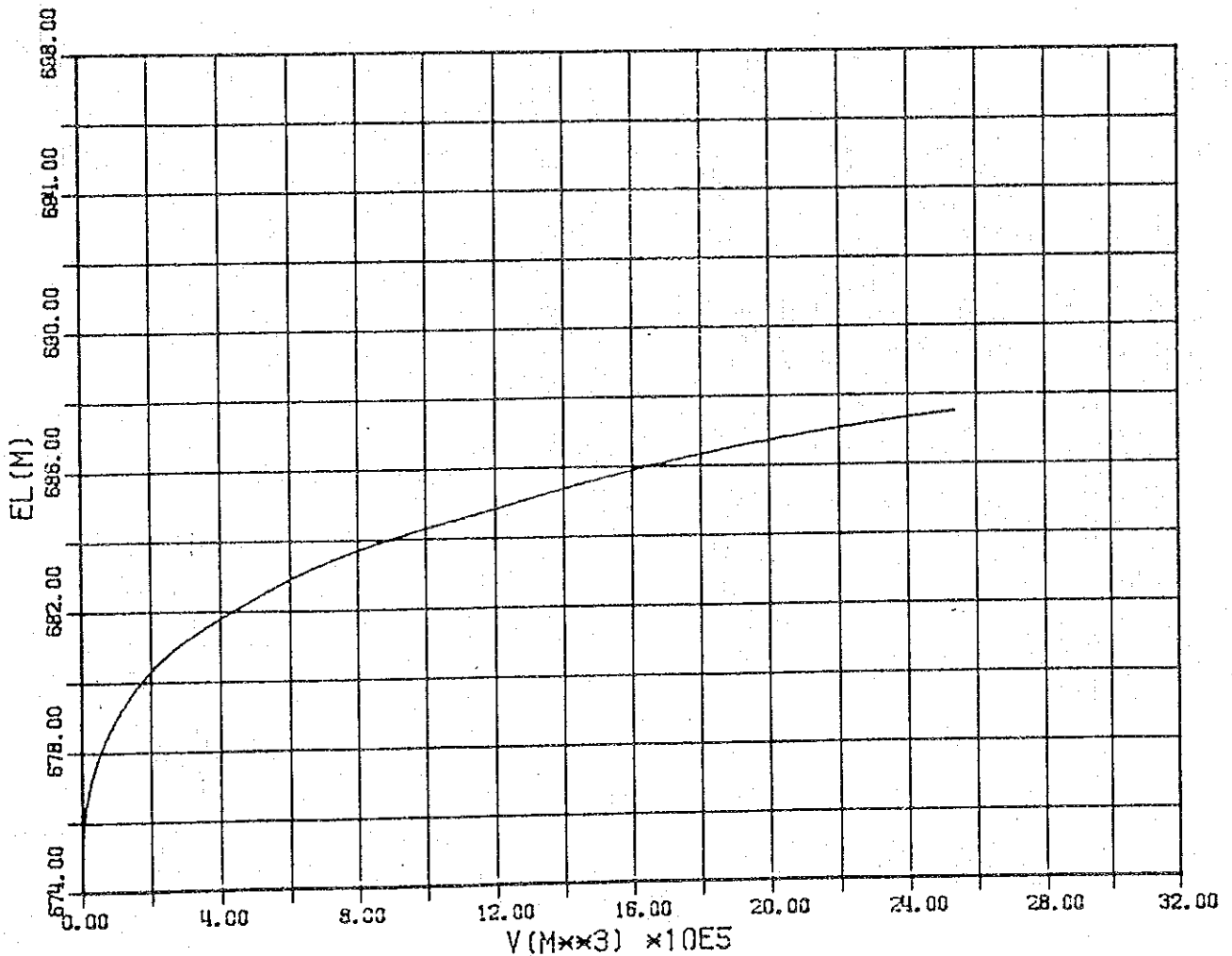
The Fuve River forms a wide valley and very gentle slopes, and flows straightly around the damsite. The bedrock consists of granite gneiss, and partly it is soft, however generally it is massive, hard and poorly jointed. It seems that leakage through the bedrock is small and bearing strength is large. The bedrock is suitable for dam foundation from the geological point of view.

The thickness of unconsolidated layers is maximum 3 meters in the riverbed and maximum 2 meters at the both banks.

TABLE STORAGE VOLUME OF RESERVOIR

NØ	MAP	GRID	VER	HØR
VI-1-11	2031B3	UN	552	490

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VØL (M ³)	ΣV (1000M ³)	NØTE
674.8	0.0	0	0	0	0.00	
675.0	0.2	2000	1000	200	0.20	
677.5	2.5	27000	14500	36250	36.45	
680.0	2.5	82000	54500	136250	172.70	
682.5	2.5	198000	140000	350000	522.70	
685.0	2.5	391000	294500	736250	1258.95	
687.5	2.5	630000	510500	127624	2535.20	



No. VII-1-12

Name of Dam Mabvuti

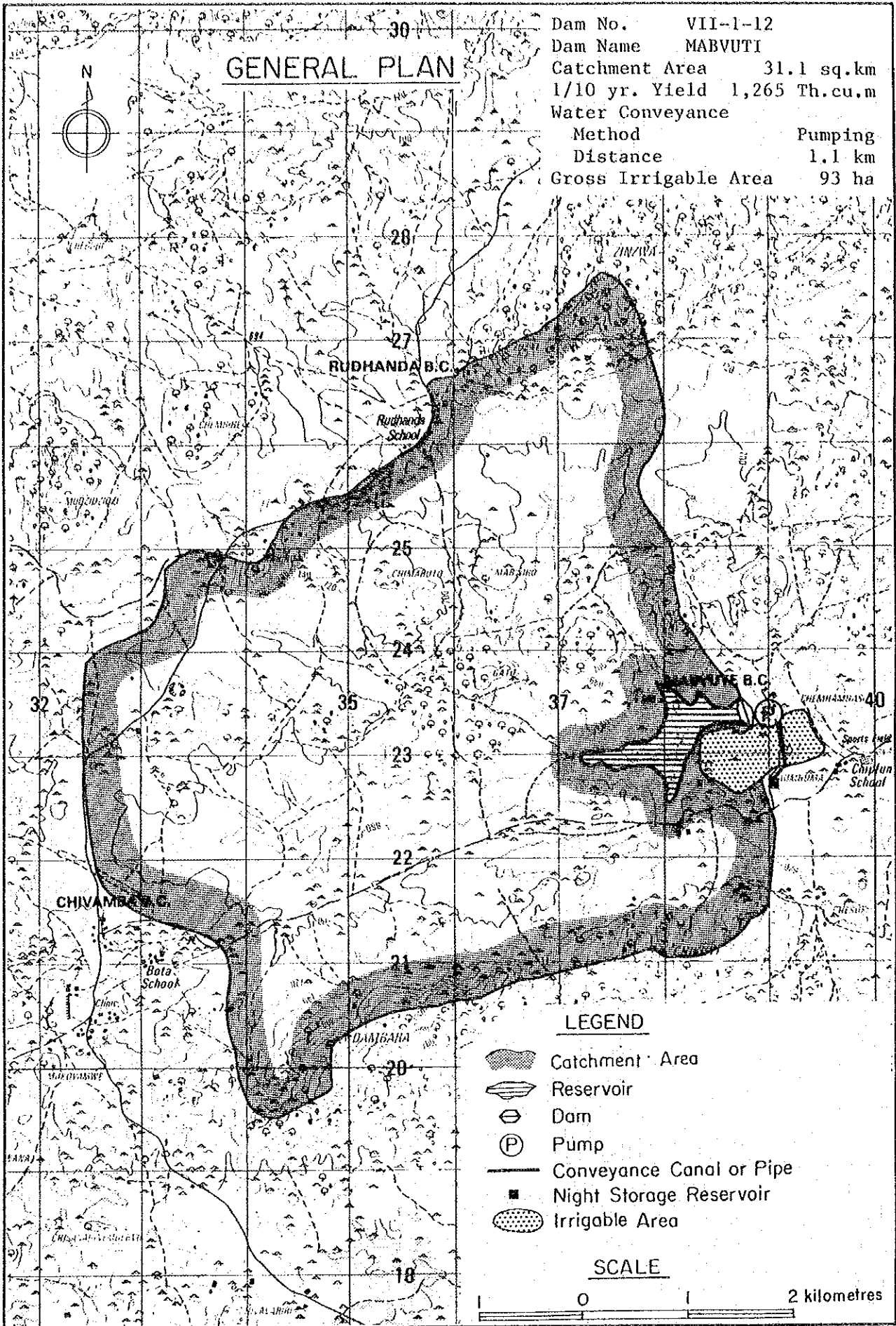
Location	District Zaka		Communal Land Ndanga		
	Map Ref. 2031C2		Coordinates UN388234		
Geology	Dolerite, highly weathering and fracturing, has been changed into boulders.				
Hydrology	River Musuche		Hydrological Zone E-C2		
	Catchment Area 31.1 sq.km		M.A. Rainfall 810 mm		
	M.A. Runoff 107 mm		Sediment 320 tonnes km ² /yr.		
Reservoir	Effective Capacity 2.780 MCM		1/10 Yr. Yield 1.265 MCM		
	Dead Capacity 0.150 MCM		D.W.S. 635 m		
	Total Capacity 2.930 MCM		N.W.S. 645 m		
Dam	Height 17 m		Length 530 m		
	Embankment Volume 99 000 cu.m		Spillway 138 m		
Agriculture	Natural Region IV		Soil L-CL		
	Potential Irrigable Area		120 ha		
	Proposed Cropping Pattern A				
Irrigation	Net Irrigable Area 74.4 ha		Dist. 1.1 km by Pump, H=45.0 m		
	Topography	Area	Steep slope with gullys		
		Conveyance	Steep slope		
Rural Water Supply	Population 6 021 person		120 cu.m/day		
	Livestock 3 740 unit		168 cu.m/day		
Cost and Benefit	Dam		Irrigation Facilities	Total Cost	Class
	Z\$ 1 812 000		Z\$ 1 961 000	Z\$ 3 773 000	A
	Annual Increment Benefit		Net Present Value	Economic Internal Rate of Return	
	Z\$ 285 525/year		Z\$ 3 320 000	12.1 per cent	
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	Y	Y	Y	Y
Remarks					

Present Condition on the Ward








Ward Name	Dzoro North		Area 2 990 ha	
Demography	Population Density		200.7 persons/sq.km	
	Family Size		10.0 Persons/household	
Agriculture	Arable Area 1 972 ha		Grazing Area 1 018 ha	
	Maize 1.9 ha/household		8 bags/ha	
	Sorghum 0.1 ha/household		4 bags/ha	
	Livestock 3.7 LSUs/household		74.8 LSUs/sq.km	
Rural Water Supply	Borehole 0.20 units/sq.km		1 000 persons/unit	
	Well 0.40 units/sq.km		500 persons/unit	

GENERAL PLAN

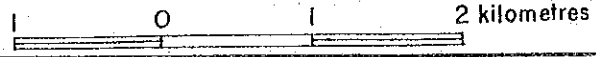
Dam No. VII-1-12
 Dam Name MABVUTI
 Catchment Area 31.1 sq.km
 1/10 yr. Yield 1,265 Th.cu.m
 Water Conveyance
 Method Pumping
 Distance 1.1 km
 Gross Irrigable Area 93 ha



LEGEND

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

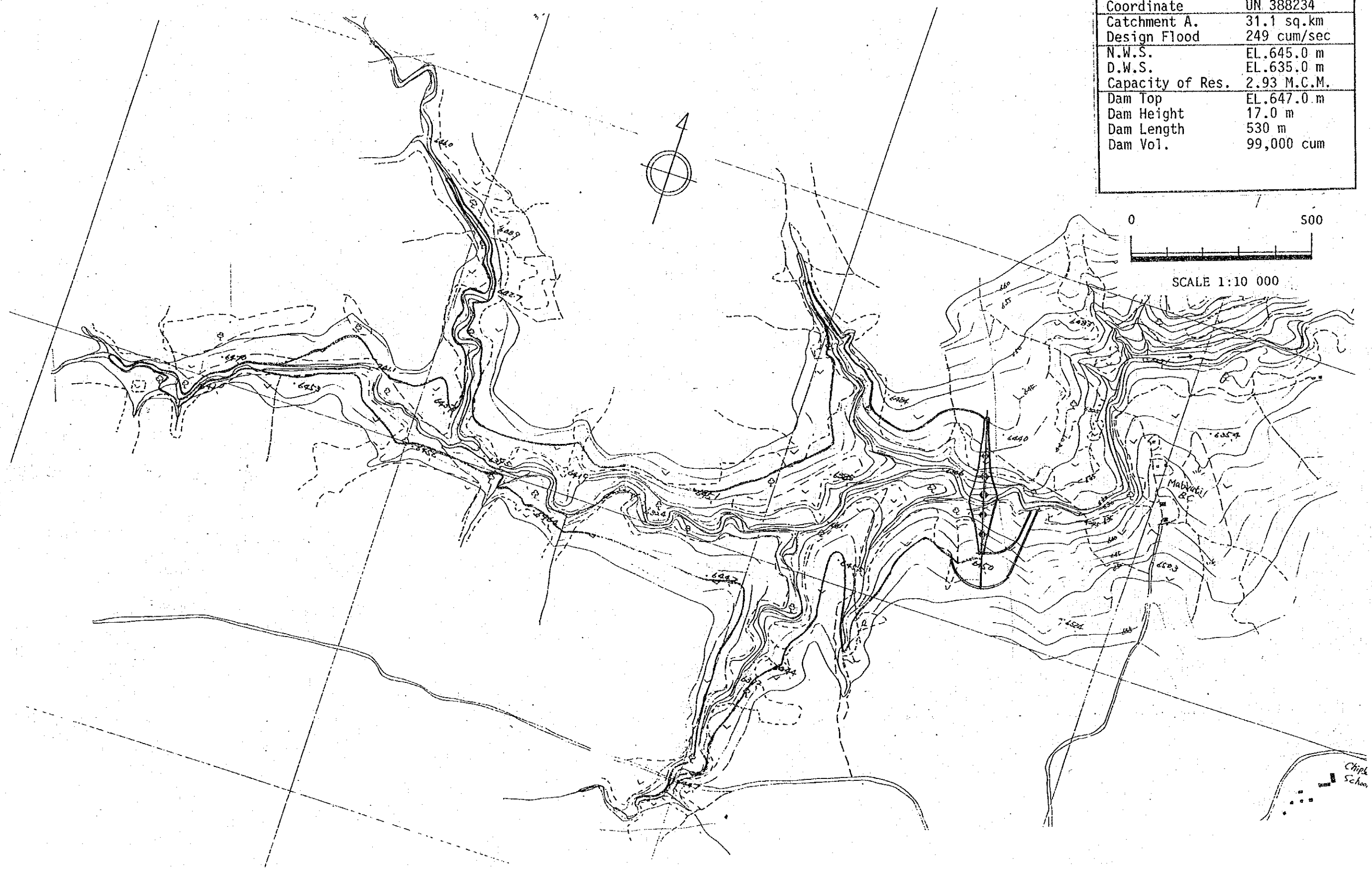
SCALE



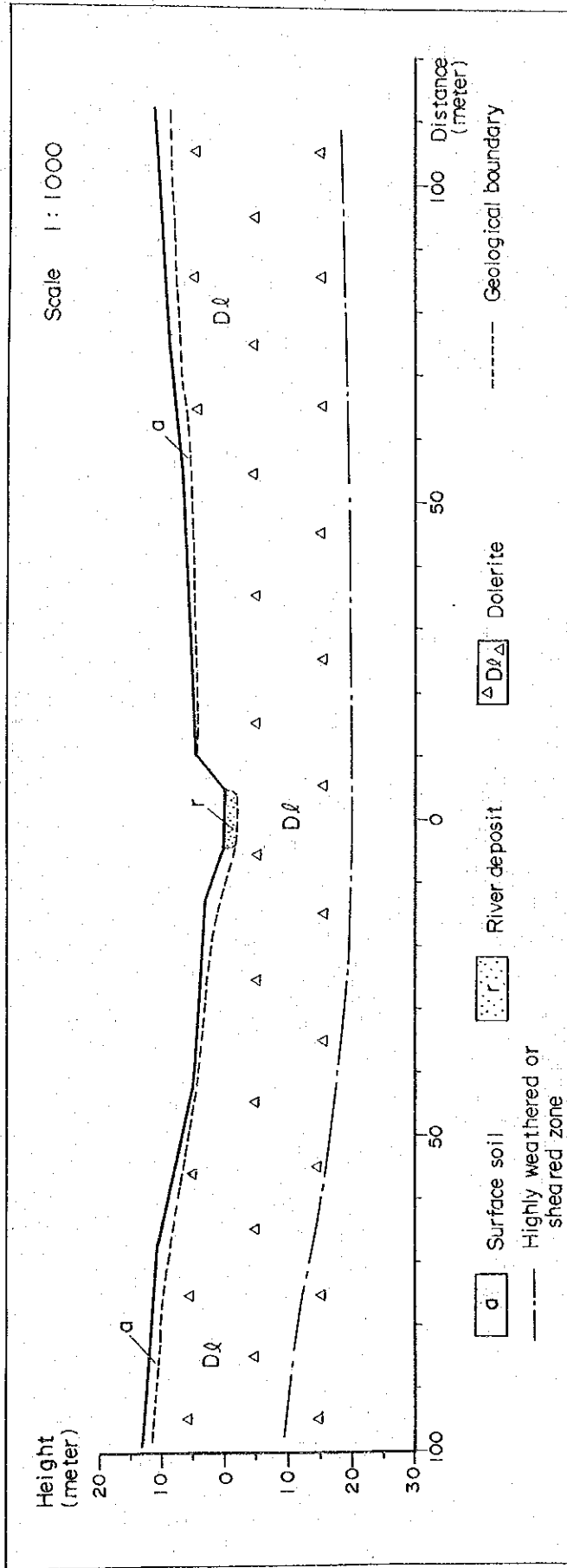
MABVUTE

PLAN OF DAM

Dam No.	VII- 1 -12
District	Zaka
Communal L.	Ndanga
River	Musuche
Map Ref.	2031 C2
Coordinate	UN 388234
Catchment A.	31.1 sq.km
Design Flood	249 cum/sec
N.W.S.	EL.645.0 m
D.W.S.	EL.635.0 m
Capacity of Res.	2.93 M.C.M.
Dam Top	EL.647.0 m
Dam Height	17.0 m
Dam Length	530 m
Dam Vol.	99,000 cum



VII-1-12 Mabvuti

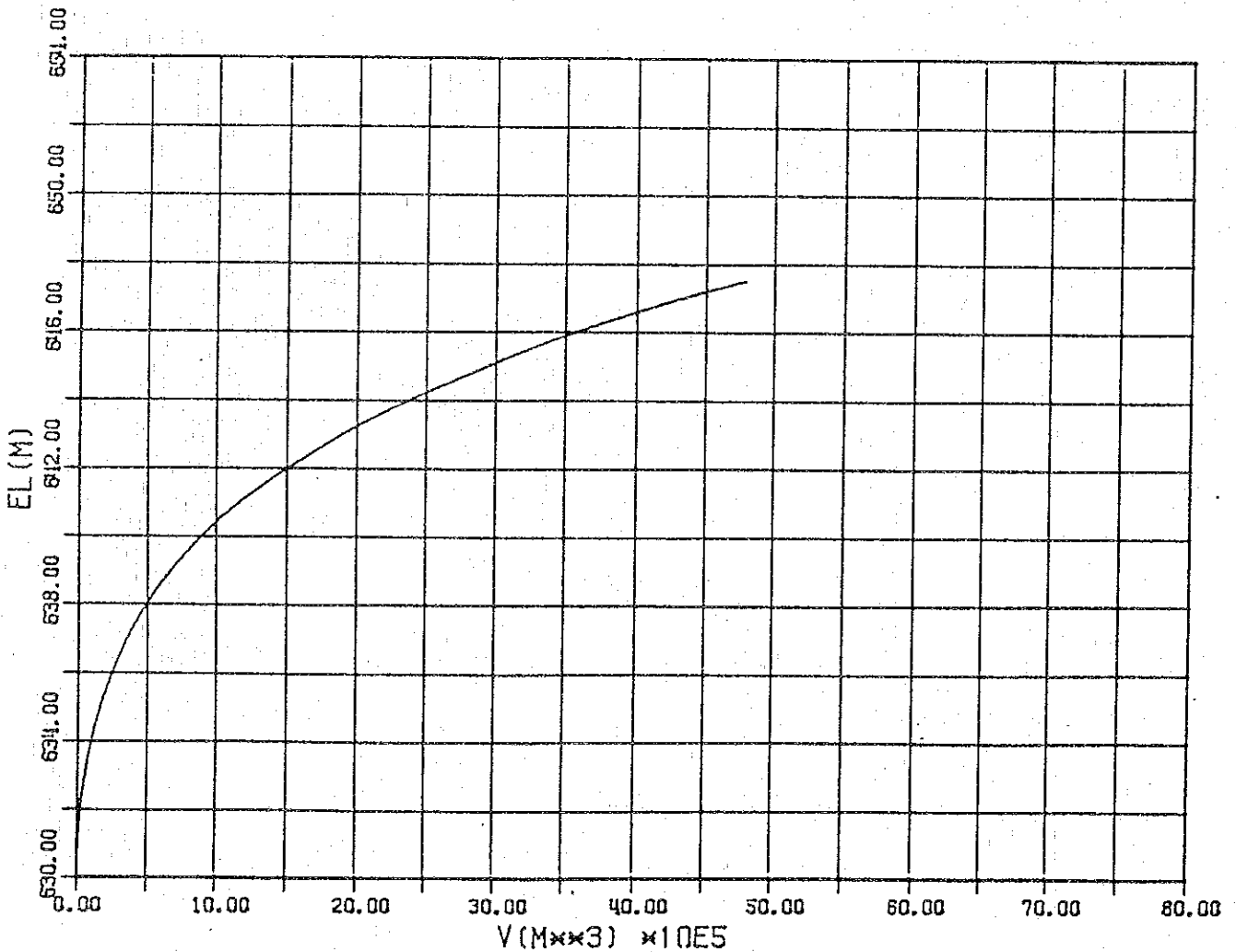


The bedrock consists of a very wide dolerite dyke, and generally it is fine and very hard, however all rock at the surface has been changed into boulders. The depth of the weathering dyke seems to be more than 10 meters. It seems that leakage through the bedrock is large and bearing strength in the foundation strata is small. Therefore the bedrock is less suitable for dam foundation from the geological point of view.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
VII-1-12	2031C2	UN	388	234

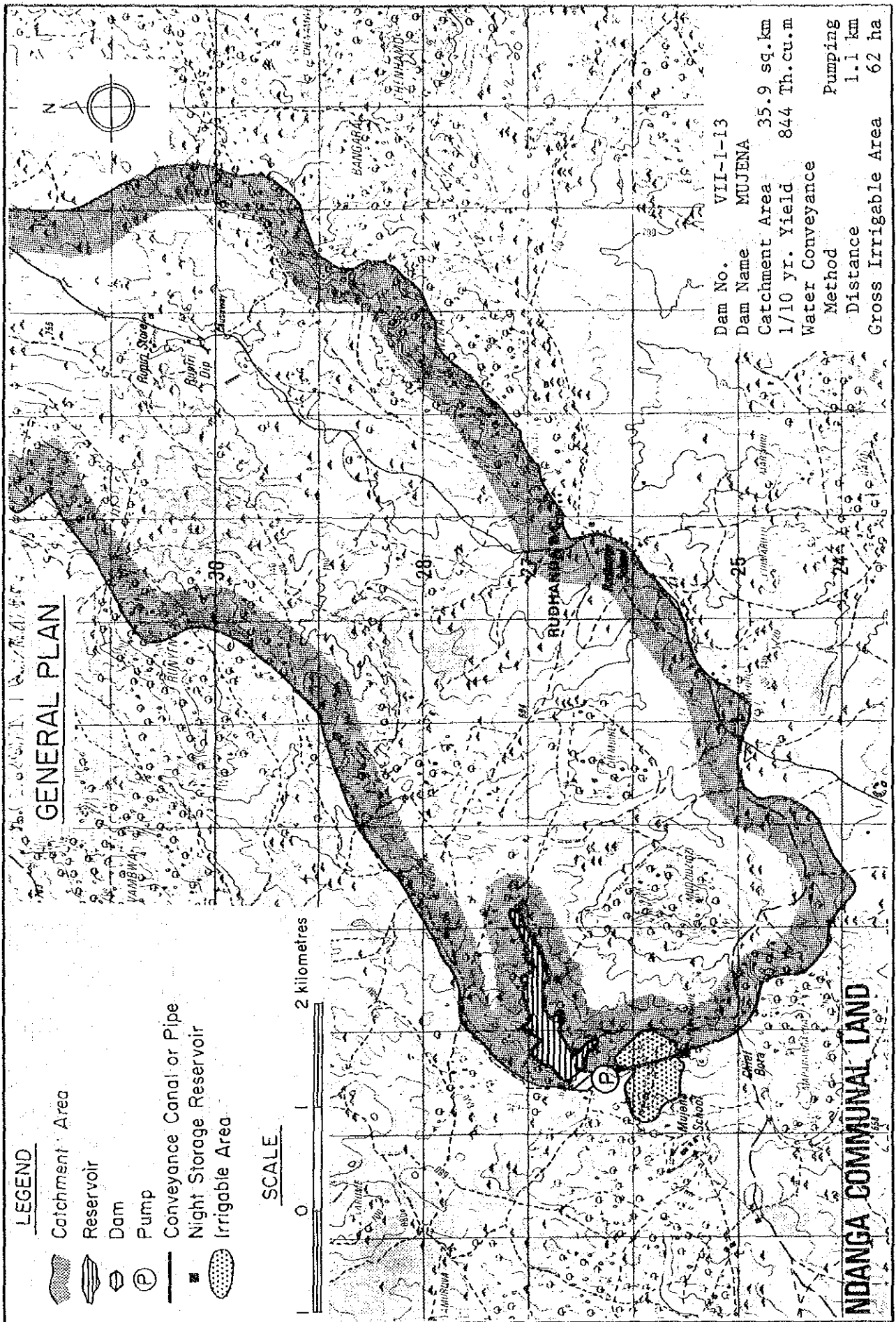
EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
630.3	0.0	0	0	0	0.00	
632.5	2.2	28460	14230	31305	31.31	
635.0	2.5	69990	49225	123063	154.37	
637.5	2.5	140286	105138	262845	417.21	
640.0	2.5	239351	189819	474546	891.76	
642.5	2.5	395992	317672	794179	1685.94	
645.0	2.5	600860	498426	1246065	2932.00	
647.5	2.5	880841	740851	1852126	4784.12	



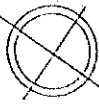
Location	District Zaka		Communal Land Ndanga		
	Map Ref. 2031C2		Coordinates UN306265		
Geology	Gneiss, the surface soil is thin, the bedrock seems to be hard and poorly jointed.				
Hydrology	River Rupuri		Hydrological Zone E-UT1		
	Catchment Area	35.9 sq.km	M.A. Rainfall	820 mm	
	M.A. Runoff	112 mm	Sediment	270 tonnes km ² /yr.	
Reservoir	Effective Capacity	1.560 MCM	1/10 Yr. Yield	0.844 MCM	
	Dead Capacity	0.140 MCM	D.W.S.	613 m	
	Total Capacity	1.700 MCM	N.W.S.	621 m	
Dam	Height	18 m	Length	270 m	
	Embankment Volume	87 000 cu.m	Spillway	152 m	
Agriculture	Natural Region IV		Soil LS-SL		
	Potential Irrigable Area			150 ha	
	Proposed Cropping Pattern B				
Irrigation	Net Irrigable Area 49.6 ha		Dist. 1.1 km by Pump, H=67.0 m		
	Topography	Area	Complicated		
		Conveyance	Steep slope		
Rural Water Supply	Population 2 790 person		56 cu.m/day		
	Livestock 1 635 unit		74 cu.m/day		
Cost and Benefit	Dam		Irrigation Facilities	Total Cost	Class
	Z\$ 1 294 000		Z\$ 1 573 000	Z\$ 2 867 000	B
	Annual Increment Benefit		Net Present Value	Economic Internal Rate of Return	
	Z\$ 110 660/year		Z\$ 1 287 000	4.6 per cent	
Visit	Dam Engineer	Geologist	Irrigation Engineer	Agronomist	Economist
	Y	N	Y	Y	Y
Remarks					

Present Condition on the Ward

Ward Name	Bota South		Area 6 452 ha	
Demography	Population Density		93.0	persons/sq.km
	Family Size		10.0	Persons/household
Agriculture	Arable Area 4 353 ha		Grazing Area 2 099 ha	
	Maize	3.2 ha/household	8	bags/ha
	Sorghum	0.2 ha/household	5	bags/ha
	Livestock	3.5 LSUs/household	32.7	LSUs/sq.km
Rural Water Supply	Borehole	0.06 units/sq.km	1 500	persons/unit
	Well	0.25 units/sq.km	375	persons/unit

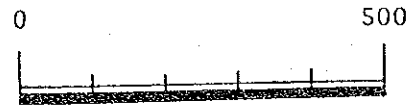


PLAN OF DAM

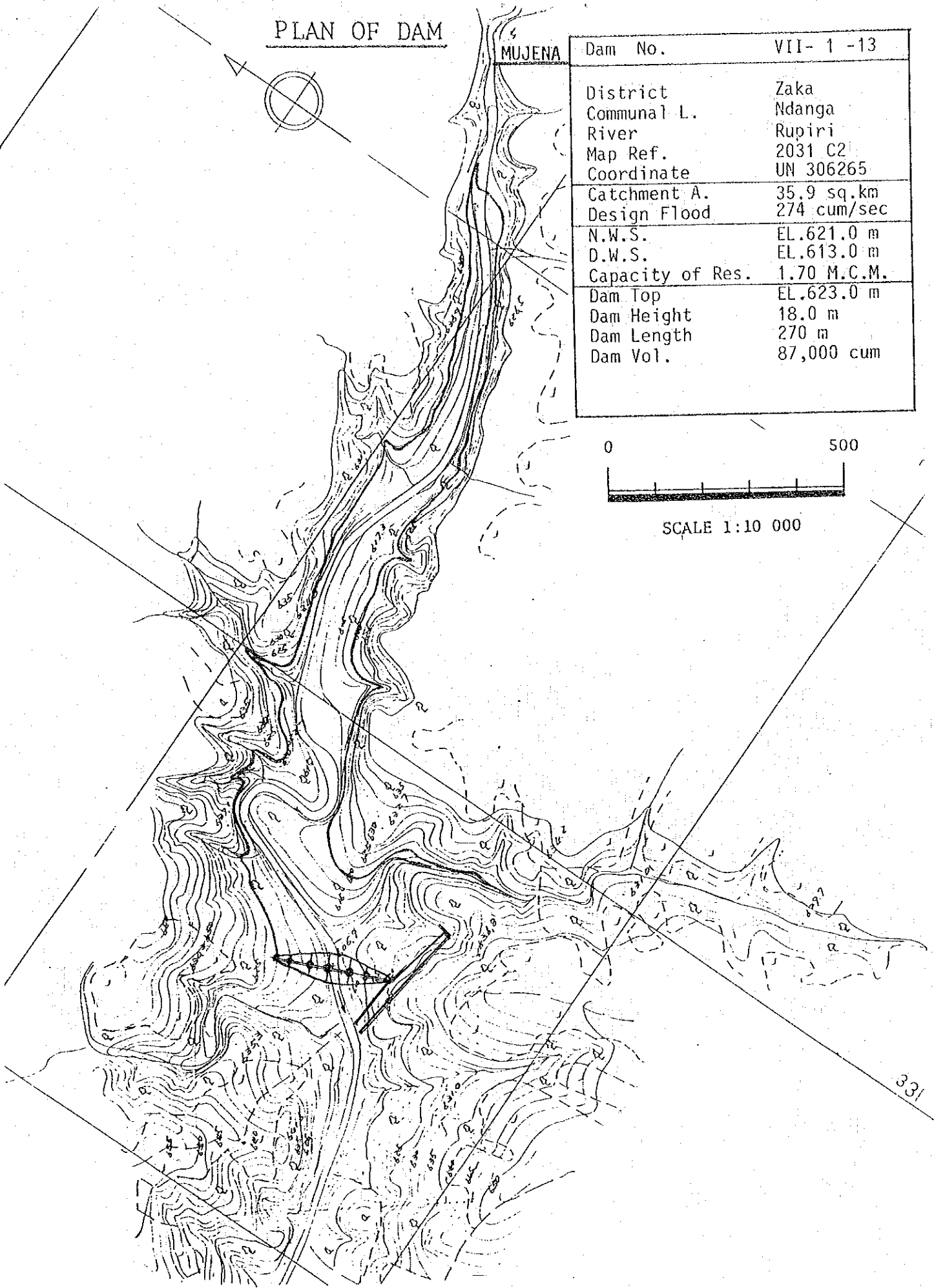


MUJENA

Dam No.	VII- 1 -13
District	Zaka
Communal L.	Ndanga
River	Rupiri
Map Ref.	2031 C2
Coordinate	UN 306265
Catchment A.	35.9 sq.km
Design Flood	274 cum/sec
N.W.S.	EL.621.0 m
D.W.S.	EL.613.0 m
Capacity of Res.	1.70 M.C.M.
Dam Top	EL.623.0 m
Dam Height	18.0 m
Dam Length	270 m
Dam Vol.	87,000 cum

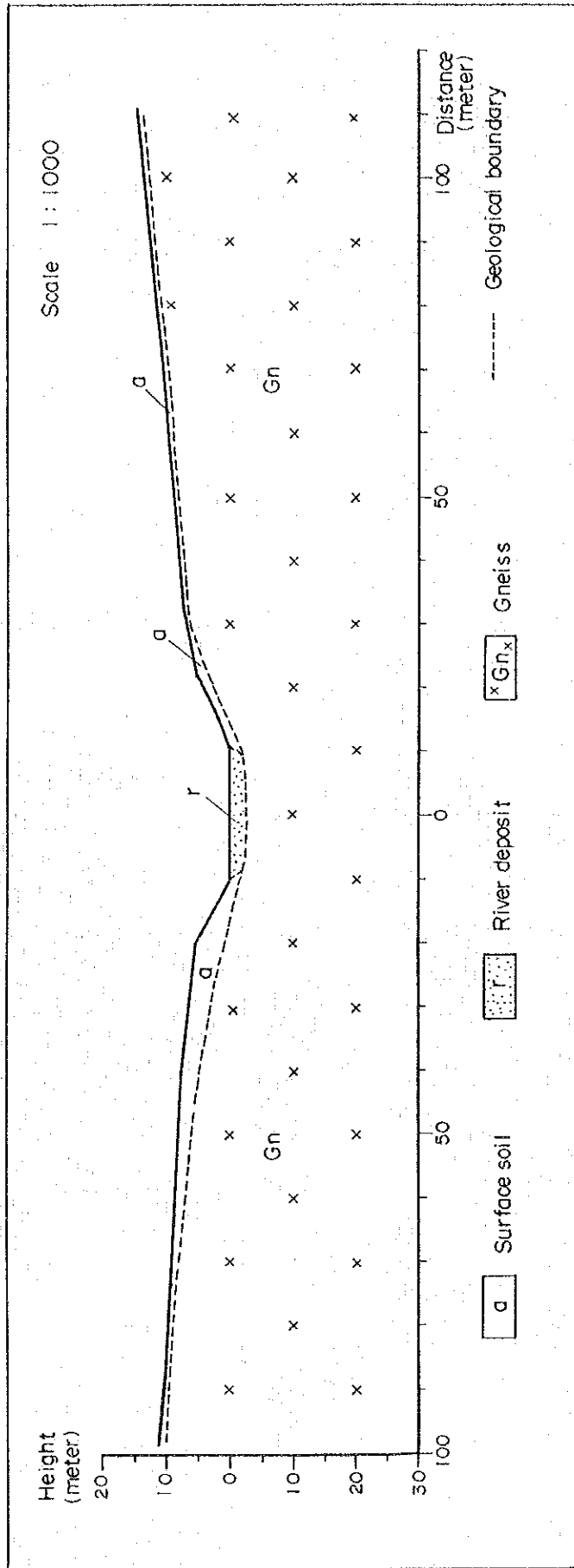


SCALE 1:10 000



331

VII-1-13 Mujena



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 steep slopes continue to the Rupiri River that forms relatively wide and deep valley. The bedrock consists of gneiss and the surface soil is very thin. Photo lineament are not recognized and there are many outcrops in this area, therefore it seems to be to find easily a good damsite.

TABLE STORAGE VOLUME OF RESERVOIR

NO	MAP	GRID	VER	HOR
VI-1-13	2031C2	UN	306	265

EL (M)	ΔH (M)	AREA (M ²)	AVE (M ²)	VOL (M ³)	ΣV (1000M ³)	NOTE
604.8	0.0	0	0	0	0.00	
605.0	0.2	2500	1250	250	0.25	
607.5	2.5	8000	5250	13125	13.37	
610.0	2.5	16000	12000	30000	43.37	
612.5	2.5	77500	46750	116875	160.25	
615.0	2.5	141000	109250	273125	433.37	
617.5	2.5	192000	166500	416250	849.62	
620.0	2.5	254000	223000	557500	1407.12	
622.5	2.5	310000	282000	705000	2112.12	

