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**APPENDIX A**

**GEOLOGY BY ADMINISTRATIVE BOUNDARY**

		1.0	2.0	3.0	4.0	5.0
		Kimberlite	Carbonatite	Basic igneous and meta igneous rocks, amphibolites	Syenite, syenodiorite, diorite and metamorphic equivalents	Granite
PROVINCE	DISTRICT					
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	0.0	3,438.8	11,013.9	0.0	28,696.2
	LUANGWA	0.0	6,488.6	0.0	0.0	8,496.1
COPPERBELT	NDOLA-URBAN	0.0	0.0	0.0	0.0	0.0
	NDOLA-RURAL	0.0	0.0	29,895.0	0.0	666.3
	CHILILABOMBWE	0.0	0.0	0.0	0.0	0.0
	CHINGOLA	0.0	0.0	0.0	0.0	9,821.1
	MUFULIRA	0.0	0.0	0.0		0.0
	KALULUSHI	0.0	0.0	3,440.7	0.0	0.0
	KITWE	0.0	0.0	0.0	0.0	0.0
	LUANSHYA	0.0	0.0	136.0	0.0	0.0
CENTRAL	KABWE-URBAN	0.0	0.0	0.0	0.0	0.0
	KABWE-RURAL	0.0	0.0	0.0	0.0	0.0
	MUMBWA	3,222.6	0.0	1,866.5	24,830.1	564,181.7
	MAUSHI	0.0	0.0	3,761.9	0.0	0.0
	SERENJE	0.0	0.0	0.0	4,969.0	0.0
NORTHWESTERN	SOLWEZI	0.0	0.0	4,206.4	568.3	0.0
	MWINILUNGA	0.0	0.0	30,087.4	0.0	0.0
	ZAMBEZI	0.0	0.0	0.0	0.0	0.0
	KABOMPO	0.0	0.0	0.0	0.0	0.0
	MFLAMBWE	0.0	0.0	0.0	0.0	52,339.9
	KASEMPA	0.0	0.0	0.0	0.0	32,436.9
WESTERN	MONGU	0.0	0.0	0.0	0.0	0.0
	LUKULU	0.0	0.0	0.0	0.0	0.0
	KALABO	0.0	0.0	0.0	0.0	0.0
	KAOMA	0.0	0.0	0.0	0.0	10,949.0
	SEANGA	0.0	0.0	0.0	0.0	0.0
	SESHEKE	0.0	0.0	0.0	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	0.0	0.0
	NAMVALA	0.0	0.0	0.0	1,350.1	428,210.4
	MONZE	0.0	0.0	0.0	0.0	0.0
	CHOMA	0.0	0.0	0.0	0.0	191,460.5
	MAZABUKA	0.0	0.0	555.6	0.0	590.9
	KALOMO	0.0	0.0	7,685.0	0.0	636,727.9
	SIAYONGA	0.0	0.0	0.0	0.0	0.0
	GWEMBE	0.0	0.0	0.0	0.0	0.0
	SINAZONGWE	0.0	0.0	3.5	0.0	0.0
LUAPULA	MANSA	0.0	0.0	0.0	0.0	795,696.9
	NCHELENGE	0.0	0.0	0.0	0.0	133,818.2
	KAWAMBWA	0.0	0.0	0.0	3,753.6	9,717.3
	MWENSE	0.0	0.0	0.0	0.0	103,443.9
	SAMFYA	0.0	0.0	0.0	0.0	122,213.2
NORTHERN	KASAMA	0.0	0.0	0.0	0.0	1,052,987.0
	KAPUTA	0.0	0.0	0.0	0.0	61.1
	MBALA	0.0	0.0	19,800.5	0.0	412,169.0
	MPOROKOSO	0.0	0.0	0.0	0.0	231,171.3
	LUWENGU	0.0	0.0	0.0	0.0	651,933.7
	CHILUBI	0.0	0.0	0.0	0.0	157,434.5
	ISOKA	0.0	537.2	3,294.9	0.0	489,445.0
	CHENSALI	0.0	0.0	0.0	0.0	144,336.5
	MPIKA	0.0	0.0	15,123.4	0.0	98,952.5
EASTERN	CHEPATA	0.0	0.0	0.0	23,142.5	252,397.5
	CHAMA	0.0	0.0	0.0	2,241.7	51,939.6
	LUNDAZI	0.0	0.0	0.0	0.0	28,747.7
	CHADIZA	0.0	0.0	0.0	0.0	226,952.5
	KATETE	0.0	0.0	0.0	13,425.9	99,124.0
	PETAUNKE	0.0	0.0	8,337.1	44,933.6	257,936.9
TOTAL		3,222.6	10,464.6	139,207.8	119,214.8	7,285,074.2

		6.0	7.0	8.0	9.0	10.0
		Mylonite and Bisdtonylonite	Quartz veins	Meta-quartzites of various ages	Calc-silicate rocks undifferentiated	Meta-carbonate rocks of various ages
PROVINCE	DISTRICT					
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0	20,151.3
	LUSAKA-RURAL	0.0	0.0	114,692.1	0.0	140,699.7
	LUANGWA	0.0	0.0	13,042.8	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	0.0	0.0	0.0	0.0
	NDOLA-RURAL	0.0	0.0	15,849.6	0.0	0.0
	CHILILABOMBWE	0.0	0.0	0.0	0.0	0.0
	CHINGOLA	0.0	0.0	0.0	0.0	0.0
	MUFULERA	0.0	0.0	6,657.0	0.0	0.0
	KALULUSHI	0.0	0.0	1,790.9	0.0	0.0
	KITWE	0.0	0.0	0.0	0.0	0.0
	LUANSHYA	0.0	0.0	0.0	0.0	0.0
CENTRAL	KABWE-URBAN	0.0	0.0	2,595.2	0.0	0.0
	KABWE-RURAL	0.0	0.0	50,005.5	0.0	20,519.1
	MUMBWA	0.0	0.0	12,007.0	0.0	67,031.6
	MKUSHI	0.0	0.0	214,811.5	0.0	0.0
	SERENJE	0.0	0.0	176,184.4	0.0	0.0
NORTHWESTERN	SOLWEZI	0.0	0.0	3,126.1	0.0	6,423.3
	MWINILUNGA	0.0	0.0	0.0	0.0	0.0
	ZAMBEZI	0.0	0.0	0.0	0.0	0.0
	KABOMPO	0.0	0.0	0.0	0.0	0.0
	MFUMBWE	0.0	0.0	0.0	0.0	0.0
	KASEMPA	0.0	0.0	0.0	0.0	0.0
WESTERN	MONGU	0.0	0.0	0.0	0.0	0.0
	LUKULU	0.0	0.0	0.0	0.0	0.0
	KALABO	0.0	0.0	0.0	0.0	0.0
	KAOMA	0.0	0.0	0.0	0.0	0.0
	SENANGA	0.0	0.0	0.0	0.0	0.0
	SESHEKE	0.0	0.0	0.0	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	0.0	0.0
	NAMWALA	0.0	0.0	0.0	35,141.8	46.6
	MONZE	0.0	0.0	13,750.5	22,905.9	12,151.4
	CHOMA	1,140.7	0.0	0.0	27,090.9	0.0
	MAZABUKA	0.0	0.0	9,094.3	210,844.0	32,518.5
	KALOMO	7,848.5	0.0	0.0	41,205.3	1,719.3
	SIAYONGA	0.0	0.0	2,184.5	0.0	2,794.9
	GWEMBE	0.0	0.0	0.0	2,168.0	1,993.9
	SENAZONGWE	0.0	0.0	0.0	0.0	0.0
LUAPULA	MANSA	0.0	0.0	0.0	0.0	0.0
	NCHELENGE	0.0	0.0	48,185.2	0.0	0.0
	KAWAMBWA	0.0	0.0	20,219.0	0.0	0.0
	MWENSE	0.0	0.0	0.0	0.0	0.0
	SANFYA	0.0	0.0	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	0.0	0.0	0.0	0.0
	KAPUTA	0.0	5,395.0	646,281.1	0.0	0.0
	MBALA	0.0	2,916.9	892,775.1	0.0	0.0
	MPOROKOSO	0.0	465.2	2,426.2	0.0	0.0
	LUWINGU	0.0	0.0	0.0	0.0	0.0
	CHILUBI	0.0	0.0	0.0	0.0	0.0
	ISOKA	0.0	0.0	31,706.7	0.0	0.0
	CHINSALI	0.0	0.0	208,765.0	0.0	0.0
	MPIKA	0.0	0.0	118,416.8	0.0	0.0
EASTERN	CHIPATA	0.0	0.0	6,098.6	0.0	2,591.4
	CHAMA	0.0	0.0	19,591.7	0.0	0.0
	LUNDAZI	0.0	0.0	30,669.7	0.0	4,714.6
	CHADIZA	0.0	0.0	0.0	0.0	0.0
	KATETE	0.0	0.0	3,909.6	0.0	0.0
	PETAUKE	0.0	0.0	218,198.6	0.0	52,047.8
TOTAL		8,989.2	8,807.1	2,793,034.7	339,355.9	365,403.4

PROVINCE	DISTRICT	11.0 Volcanics and meta-volcanics	12.0 Undifferentiated Basement Complex; mainly granitic gneisses and migmatites with some granite	13.0 Granulite facies rocks (excluding chamockites)	14.0 Pre-katanga schists, undifferentiated Includes Lufubu Schists of Copperbelt (interlayered gneiss and schist) and various groups in Southern and Northwestern Provinces
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	67,972.0	585,441.9	0.0	0.0
	LUANGWA	2,248.3	176,099.4	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	4,351.0	0.0	15,556.3
	NDOLA-RURAL	0.0	271,917.1	0.0	0.0
	CHILILABOMBWE	0.0	30,063.7	0.0	1,185.2
	CHINGOLA	0.0	34,396.3	0.0	2,899.0
	MUFULIRA	0.0	14,622.4	0.0	33,412.8
	KALLUSHI	0.0	16,032.7	0.0	4,480.3
	KITWE	0.0	5,347.0	0.0	29,131.2
	LUANSHYA	0.0	0.0	0.0	9,138.6
CENTRAL	KABWE-URBAN	3,936.8	59,507.7	0.0	0.0
	KABWE-RURAL	7,568.5	533,782.7	0.0	0.0
	MUMBWA	0.0	11,584.9	0.0	0.0
	MKUSHI	39,362.0	1,194,359.8	0.0	0.0
	SERENJE	0.0	968,353.7	0.0	0.0
NORTHWESTERN	SOLWEZI	0.0	206,435.0	0.0	8,629.9
	MWINILUNGA	0.0	234,677.0	0.0	51,083.3
	ZAMBEZI	0.0	0.0	0.0	0.0
	KABOMPO	0.0	13,542.0	0.0	0.0
	MFUMBWE	0.0	0.0	0.0	0.0
	KASENPA	0.0	0.0	0.0	0.0
WESTERN	MONGU	0.0	0.0	0.0	0.0
	LUKULU	0.0	0.0	0.0	0.0
	KALABO	0.0	0.0	0.0	0.0
	KAOMA	0.0	0.0	0.0	0.0
	SENANGA	0.0	0.0	0.0	0.0
	SESHEKE	0.0	2,154.1	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	14,747.7
	NAMWALA	0.0	0.0	0.0	0.0
	MONZE	0.0	147,105.3	0.0	11,857.0
	CHOMA	0.0	231,534.6	0.0	183,023.2
	MAZABUKA	13,475.6	111,957.2	0.0	0.0
	KALOMO	0.0	880,058.2	0.0	139,364.8
	SIAYONGA	0.0	58,409.9	0.0	0.0
	GWEMBE	0.0	128,534.5	0.0	1,359.6
	SNAZONGWE	0.0	89,730.7	0.0	29,278.1
LUAPULA	MANSA	177,142.4	0.0	0.0	0.0
	NCHELENGE	128,606.4	0.0	0.0	0.0
	KAWAMBWA	12,082.0	0.0	0.0	0.0
	MWENSE	104,508.9	0.0	0.0	0.0
	SAMFYA	0.0	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	100,977.3	0.0	0.0
	KAPUTA	139,309.1	0.0	0.0	0.0
	MBALA	35,370.7	61,229.4	0.0	0.0
	MPOROKOSO	0.0	25,807.7	0.0	0.0
	LWINGU	34,125.8	0.0	0.0	0.0
	CHILUBI	0.0	0.0	0.0	0.0
	ISOKA	0.0	388,238.1	0.0	0.0
	CHINSALI	0.0	0.0	0.0	0.0
	MPIKA	0.0	731,137.2	0.0	0.0
EASTERN	CHIPATA	11,910.5	495,484.7	229,974.1	0.0
	CHAMA	0.0	407,842.1	43,853.8	0.0
	LUNDALI	0.0	1,040,817.5	19,834.2	0.0
	CHIADIZA	0.0	19,216.8	3,986.5	0.0
	KATETE	0.0	250,628.4	17,067.9	0.0
	PETAUKE	10,559.3	860,254.4	459.1	0.0
TOTAL		788,378.3	10,391,632.4	315,205.6	535,147.2

		15.0	16.0	17.0	18.0	19.0
		Metamorphosed pelite, quartzite-pelite and psam-mite sequences, some with associated meta-volcanic rocks. Includes Chisamba Formation.	Quartzite-pelite sequences	Lower quartzite	Lower shales	Upper quartzite
PROVINCE	DISTRICT					
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	210,946.5	0.0	0.0	0.0	0.0
	LUANGWA	22,097.3	0.0	0.0	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	10,127.7	0.0	0.0	0.0
	NDOLA-RURAL	0.0	265,300.3	0.0	0.0	0.0
	CHILILABOMBWE	0.0	0.0	0.0	0.0	0.0
	CHINGOLA	0.0	3,452.9	0.0	0.0	0.0
	MUFULIRA	0.0	0.0	0.0	0.0	0.0
	KALULUSHI	0.0	6,448.8	0.0	0.0	0.0
	KITWE	0.0	3,673.3	0.0	0.0	0.0
	LUANSHYA	0.0	5,169.3	0.0	0.0	0.0
CENTRAL	KABWE-URBAN	13,256.2	0.0	0.0	0.0	0.0
	KABWE-RURAL	169,848.0	35,356.3	0.0	0.0	0.0
	MUMBWA	0.0	0.0	0.0	0.0	0.0
	MKUSHI	138,908.8	314,933.9	0.0	0.0	0.0
	SERENJE	21,000.8	451,676.9	0.0	0.0	0.0
NORTHWESTERN	SOLWEZI	0.0	0.0	0.0	0.0	0.0
	MVENI LUNGA	0.0	0.0	0.0	0.0	0.0
	ZAMBEZI	0.0	0.0	0.0	0.0	0.0
	KABOMPO	0.0	0.0	0.0	0.0	0.0
	MFUMBWE	0.0	0.0	0.0	0.0	0.0
	KASEMPA	0.0	0.0	0.0	0.0	0.0
WESTERN	MONGU	0.0	0.0	0.0	0.0	0.0
	LUKULU	0.0	0.0	0.0	0.0	0.0
	KALABO	0.0	0.0	0.0	0.0	0.0
	KAOMA	0.0	0.0	0.0	0.0	0.0
	SENANGA	0.0	0.0	0.0	0.0	0.0
	SEHEKE	0.0	0.0	0.0	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	0.0	0.0
	NAMWALA	0.0	0.0	0.0	0.0	0.0
	MONZE	0.0	0.0	0.0	0.0	0.0
	CHOMA	0.0	0.0	0.0	0.0	0.0
	MAZABUKA	0.0	0.0	0.0	0.0	0.0
	KALOMO	0.0	0.0	0.0	0.0	0.0
	SIYONGA	0.0	0.0	0.0	0.0	0.0
	GWEMBE	0.0	0.0	0.0	0.0	0.0
	SINAZONGWE	0.0	0.0	0.0	0.0	0.0
LUAPULA	MANSA	0.0	0.0	18,624.8	24,094.8	26,040.1
	NCHELENGE	0.0	0.0	12,973.5	905.9	0.0
	KAWAMBWA	0.0	0.0	143,905.0	88,127.7	335,896.2
	MWENSE	0.0	0.0	73,661.3	41,440.0	189,533.3
	SAMFYA	0.0	0.0	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	0.0	334,901.5	0.0	0.0
	KAPUTA	0.0	0.0	29,627.4	151,059.8	14,144.2
	MBALA	0.0	0.0	229,980.2	92,192.4	23,930.4
	MPOROKOSO	0.0	0.0	258,639.1	93,355.6	414,181.6
	LUWINGU	0.0	0.0	37,572.4	0.0	0.0
	CHILUBI	0.0	0.0	0.0	0.0	0.0
	ISOKA	0.0	0.0	123,920.4	0.0	0.0
	CHENSALI	0.0	763,440.7	187,641.2	0.0	0.0
	MPICA	0.0	255,461.8	0.0	0.0	0.0
EASTERN	CHIPATA	537.0	0.0	0.0	0.0	0.0
	CHAMA	0.0	152,768.1	822.7	0.0	0.0
	LUNDAZI	0.0	0.0	0.0	0.0	0.0
	CHADIZA	0.0	0.0	0.0	0.0	0.0
	KATETE	0.0	0.0	0.0	0.0	0.0
	PETAUKE	64,800.7	0.0	0.0	0.0	0.0
TOTAL		641,395.3	2,267,810.4	1,457,339.5	491,176.2	1,003,725.8

		20.0	21.0	22.0
		Upper shales	Mine 'Series' undifferentiated. Upper Roan plus Mwasha in Northwestern Province and at western end of Copperbelt; probably Lower and Upper Roan around Luswishi Dome. Status uncertain south of Copperbelt.	Lower Roan with basal conglomerate, the main copper-bearing unit. Includes quartzites, conglomerates, argillites, arkoses, and some dolomite.
PROVINCE	DISTRICT			
LUSAKA	LUSAKA-URBAN	0.0	23,953.8	0.0
	LUSAKA-RURAL	0.0	360,004.5	0.0
	LUANGWA	0.0	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	0.0	11,314.8
	NDOLA-RURAL	0.0	101,524.2	296,732.7
	CHILILABOMBWE	0.0	0.0	9,884.5
	CHINGOLA	0.0	14,833.4	9,248.5
	MUFULIRA	0.0	0.0	5,774.1
	KALULUSHI	0.0	9,316.7	24,817.7
	KITWE	0.0	911.3	2,379.1
	LUANSHYA	0.0	0.0	5,271.1
CENTRAL	KABWE-URBAN	0.0	54,666.4	0.0
	KABWE-RURAL	0.0	216,907.2	86,983.0
	MUMBWA	0.0	235,114.9	0.0
	MKUSHI	0.0	8,676.1	0.0
	SERENJE	0.0	0.0	0.0
NORTHWESTERN	SOLWEZI	0.0	307,265.5	106,028.6
	MVINILUNGA	0.0	205,959.7	51,341.2
	ZAMBEZI	0.0	0.0	0.0
	KABOMPO	0.0	43,748.6	2,381.9
	MFUMBWE	0.0	0.0	0.0
	KASEMPA	0.0	0.0	0.0
WESTERN	MONGU	0.0	0.0	0.0
	LUKULU	0.0	0.0	0.0
	KALABO	0.0	0.0	0.0
	KAOMA	0.0	0.0	0.0
	SENANGA	0.0	0.0	0.0
	SESEKE	0.0	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0
	NAMWALA	0.0	102,494.2	0.0
	MONZE	0.0	226,384.1	0.0
	CHOMA	0.0	37,209.8	0.0
	MAZABUKA	0.0	131,736.1	0.0
	KALOMO	0.0	64,555.2	0.0
	SIAYONGA	0.0	11,950.0	0.0
	GWEMBE	0.0	37,622.5	0.0
	SEVAZONGWE	0.0	0.0	0.0
LUAPULA	MANSA	0.0	0.0	0.0
	NCHELENJE	0.0	0.0	0.0
	KAWAMBWA	119,029.5	0.0	0.0
	MWENSE	33,955.8	0.0	0.0
	SAMFYA	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	0.0	0.0
	KAPUTA	0.0	0.0	0.0
	MBALA	0.0	0.0	0.0
	MPOROKOSO	96,301.5	0.0	0.0
	LUWINGU	0.0	0.0	0.0
	CHILUBI	0.0	0.0	0.0
	ISOKA	0.0	0.0	0.0
	CHENSALI	0.0	0.0	0.0
	MPICA	0.0	0.0	0.0
EASTERN	CHIPATA	0.0	0.0	0.0
	CHAMA	0.0	0.0	0.0
	LONDASI	0.0	0.0	0.0
	CHADIZA	0.0	0.0	0.0
	KATETE	0.0	0.0	0.0
	PETAUKE	0.0	0.0	0.0
TOTAL		249,286.8	2,194,836.2	612,359.2



		23.0	24.0	25.0	26.0
		Upper Roan - typically dolomite and argillite	Niwashia - typically carbonaceous shale and argillite	Kundelungu undifferentiated; may include some Mine 'Series' in the northwest predominantly shales, siltstones, sandstones and mixtures	Kundelungu carbonate rocks; may be Niwashia in part in some areas
PROVINCE	DISTRICT				
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	0.0	0.0	0.0	0.0
	LUANGWA	0.0	0.0	0.0	0.0
COPPERBELT	NDOLA-URBAN	6,991.6	2,784.6	2,969.2	45,237.3
	NDOLA-RURAL	111,694.1	4,915.6	691,265.6	299,360.2
	CHILILABOMBWE	4,965.3	12,685.4	21,199.3	14,563.3
	CHINGOLA	4,619.2	1,994.0	72,806.8	14,523.6
	MUFULIRA	7,003.7	5,842.1	34,308.1	19,690.8
	KALULUSHI	20,729.2	8,334.0	6,421.4	11,696.0
	KITWE	1,997.3	1,546.9	21.1	30,064.1
CENTRAL	LUANSHYA	0.0	4,743.9	0.0	67,809.4
	KABWE-URBAN	0.0	0.0	0.0	19,028.5
	KABWE-RURAL	12,116.9	0.0	603,469.2	141,019.4
	MUMBWA	0.0	0.0	592,892.1	31,386.6
	MKUSHI	0.0	0.0	28,638.1	0.0
NORTHWESTERN	SERENJE	0.0	0.0	320,015.3	0.0
	SOLWEZI	15,071.5	39,582.3	1,792,670.6	302,639.2
	MWINILUNGA	0.0	0.0	541,835.9	5,081.4
	ZAMBEZI	0.0	0.0	0.0	0.0
	KABOMPO	0.0	0.0	148,391.4	0.0
	MFLUMBWE	0.0	0.0	777,209.2	0.0
	KASEMPA	0.0	0.0	1,714,213.1	64,306.5
WESTERN	MONGU	0.0	0.0	0.0	0.0
	LUKULU	0.0	0.0	15,401.0	0.0
	KALABO	0.0	0.0	0.0	0.0
	KAOMA	0.0	0.0	50,082.6	0.0
	SENANGA	0.0	0.0	0.0	0.0
	SESHEKE	0.0	0.0	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	0.0
	NAMWALA	0.0	0.0	185,133.8	0.0
	MONZE	0.0	0.0	0.0	0.0
	CHOMA	0.0	0.0	0.0	0.0
	MAZABUKA	0.0	0.0	0.0	0.0
	KALOMO	0.0	0.0	0.0	0.0
	SIYONGA	0.0	0.0	0.0	0.0
	GWEMBE	0.0	0.0	0.0	0.0
	SINAZONGWE	0.0	0.0	0.0	0.0
	LUAPULA	MANSA	0.0	0.0	228,976.8
NCHELENGE		0.0	0.0	34,579.2	0.0
KAWAMBWA		0.0	0.0	0.0	0.0
MWENSE		0.0	0.0	0.0	0.0
SAMFYA		0.0	0.0	128,133.9	0.0
NORTHERN	KASAMA	0.0	0.0	190,602.2	0.0
	KAPUTA	0.0	0.0	0.0	0.0
	MBALA	0.0	0.0	0.0	0.0
	MPOROKOSO	0.0	0.0	0.0	0.0
	LUWINGU	0.0	0.0	40,205.9	0.0
	CHILUBI	0.0	0.0	30,939.8	0.0
	ISOKA	0.0	0.0	0.0	0.0
	CHINSALI	0.0	0.0	54,981.8	0.0
	MPIKA	0.0	0.0	1,110,156.5	0.0
	EASTERN	CHIPATA	0.0	0.0	0.0
CHAMA		0.0	0.0	0.0	0.0
LUNDAZI		0.0	0.0	0.0	0.0
CHADZA		0.0	0.0	0.0	0.0
KATETE		0.0	0.0	0.0	0.0
TOTAL	PETAUKE	0.0	0.0	0.0	0.0
		185,189.0	82,428.8	9,377,519.9	1,071,276.1

		27.0	28.0	29.0	30.0
		Lower Kundelungu Shales (Luapula Province)	Kundelungu Psammite and rudite formations (includes Petit Conglomerat in Luapula Province)	Upper Kundelungu shales (Luapula Province)	Basal Formation and Coal Measure
PROVINCE	DISTRICT				
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	0.0	0.0	0.0	0.0
	LUANGWA	0.0	0.0	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	0.0	0.0	0.0
	NDOLA-RURAL	0.0	0.0	0.0	0.0
	CHILILABOMBWE	0.0	0.0	0.0	0.0
	CHINGOLA	0.0	0.0	0.0	0.0
	MUFULIRA	0.0	0.0	0.0	0.0
	KALULUSHI	0.0	0.0	0.0	0.0
	KITWE	0.0	0.0	0.0	0.0
	LUANSHYA	0.0	0.0	0.0	0.0
CENTRAL	KABWE-URBAN	0.0	0.0	0.0	0.0
	KABWE-RURAL	0.0	17,252.7	0.0	0.0
	MUMBWA	0.0	3,692.2	0.0	0.0
	MKUSHI	0.0	0.0	0.0	0.0
	SERENJE	0.0	0.0	0.0	0.0
NORTHWESTERN	SOLWEZI	0.0	0.0	0.0	0.0
	MWENILUNGA	0.0	0.0	0.0	0.0
	ZAMBEZI	0.0	0.0	0.0	0.0
	KADOMPO	0.0	0.0	0.0	0.0
	MFUMBWE	0.0	28,913.7	0.0	0.0
	KASEMPA	0.0	9,756.3	0.0	0.0
WESTERN	MONGU	0.0	0.0	0.0	0.0
	LUXULU	0.0	0.0	0.0	0.0
	KALABO	0.0	0.0	0.0	0.0
	KAOMA	0.0	0.0	0.0	0.0
	SEVANOA	0.0	0.0	0.0	0.0
	SESHEKE	0.0	0.0	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	0.0
	NAMWALA	0.0	0.0	0.0	0.0
	MONZE	0.0	0.0	0.0	0.0
	CHOMA	0.0	0.0	0.0	49.8
	MAZABUKA	0.0	0.0	0.0	0.0
	KALOMO	0.0	0.0	0.0	1,951.6
	SIYONGA	0.0	0.0	0.0	578.1
	GWEMBE	0.0	0.0	0.0	4,802.9
	SINAZONGWE	0.0	0.0	0.0	3,516.4
LUAPULA	MANSA	65,238.7	174,035.4	41,500.4	0.0
	NCHENGE	0.0	93,041.2	0.0	0.0
	KAWAMBWA	0.0	44,238.3	0.0	0.0
	MWENSE	1,769.8	58,086.0	0.0	0.0
	SAMFYA	0.0	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	0.0	0.0	0.0
	KAPUTA	0.0	0.0	0.0	0.0
	MBALA	0.0	0.0	0.0	0.0
	MPOROKOSO	0.0	0.0	0.0	0.0
	LUWENGU	0.0	0.0	0.0	0.0
	CHILUBI	0.0	0.0	0.0	0.0
	ISOKA	0.0	0.0	0.0	12,760.7
	CHINSALI	0.0	0.0	0.0	0.0
	NG'OKA	0.0	0.0	0.0	0.0
EASTERN	CHIPATA	0.0	0.0	0.0	0.0
	CHAMA	0.0	0.0	0.0	1,902.2
	LUNDAZI	0.0	0.0	0.0	0.0
	CHADIZA	0.0	0.0	0.0	0.0
	KATEIE	0.0	0.0	0.0	0.0
	PETAUKE	0.0	0.0	0.0	1,327.2
TOTAL		67,008.5	429,015.8	41,500.4	26,888.9

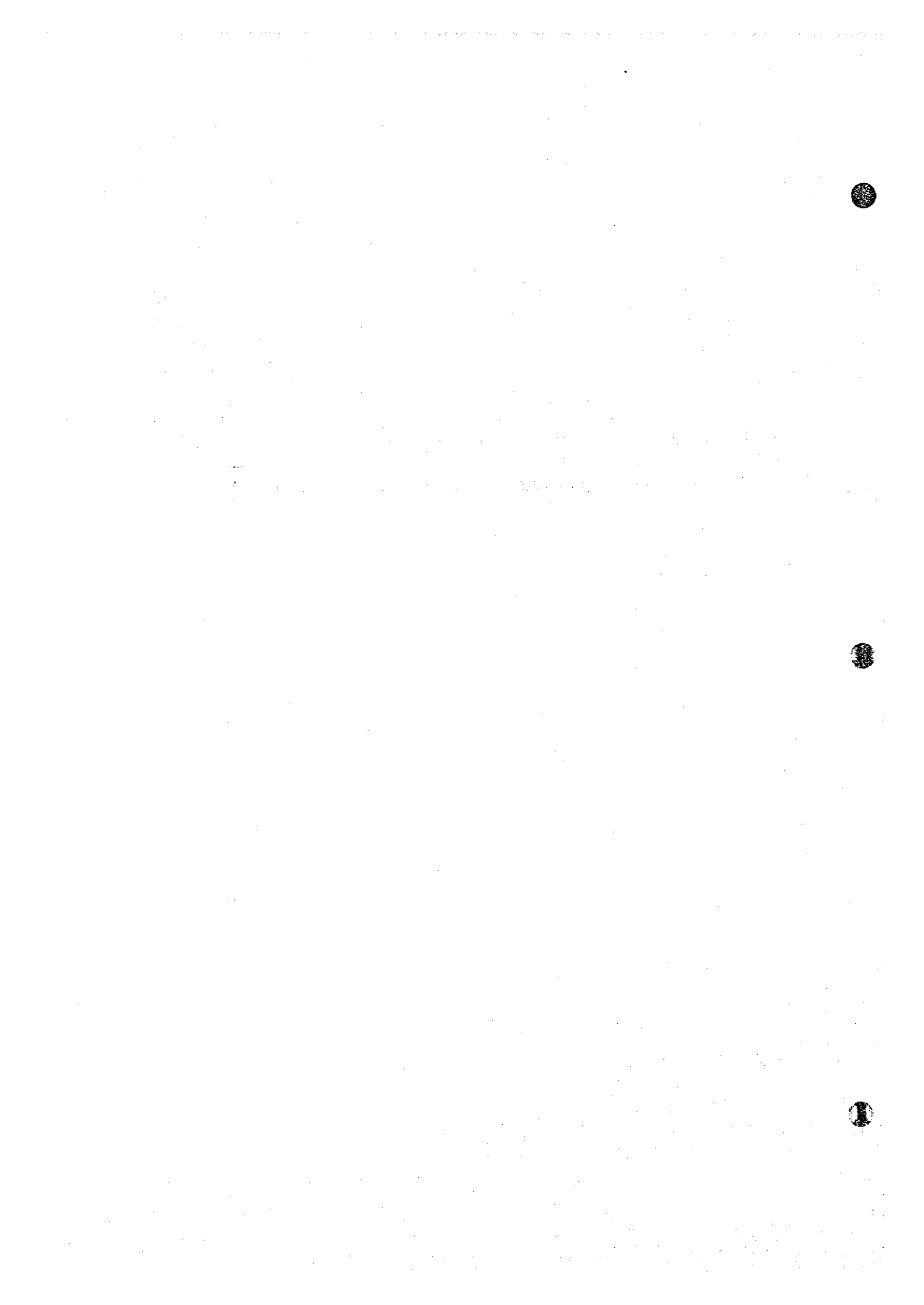
		31.0	32.0	33.0	34.0
		Lower Karroo, undifferentiated	Upper Karroo (Zambesi Valley). Karoo undifferentiated (elsewhere)	Basalts	Kalahari Group with fossil scif dunes
PROVINCE	DISTRICT				
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	49,434.1	163,603.1	5,390.9	0.0
	LUANGWA	0.0	131,580.3	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	0.0	0.0	0.0
	NDOLA-RURAL	0.0	0.0	0.0	38,843.5
	CHILILABOMBWE	0.0	0.0	0.0	0.0
	CHENGOLA	0.0	0.0	0.0	0.0
	MUFULIRA	0.0	0.0	0.0	0.0
	KALULUSHI	0.0	0.0	0.0	0.0
	KITWE	0.0	0.0	0.0	0.0
	LUANSHYA	0.0	0.0	0.0	0.0
CENTRAL	KABWE-URBAN	0.0	0.0	0.0	0.0
	KABWE-RURAL	18,407.6	5.5	0.0	12,810.8
	MUMBWA	0.0	349,549.9	0.0	0.0
	MKUSHI	48,100.1	235,085.6	0.0	0.0
	SERENJE	0.0	296,204.8	0.0	0.0
NORTHWESTERN	SOLWEZI	0.0	0.0	0.0	107,883.6
	MWENILUNGA	0.0	0.0	0.0	858,776.7
	ZAMBEZI	0.0	0.0	0.0	1,515,892.5
	KABOMPO	0.0	18,838.4	3,869.6	1,135,151.1
	MFULMBWE	0.0	60,018.9	0.0	648,216.7
	KASEMPA	0.0	233,454.9	0.0	100,432.8
WESTERN	MONGU	0.0	0.0	0.0	0.0
	LUKULU	0.0	14,844.1	1,948.5	98,900.6
	KALABO	0.0	0.0	0.0	0.0
	KAOMA	0.0	0.0	0.0	0.0
	SEVANGA	0.0	0.0	0.0	0.0
	SESHEKE	0.0	0.0	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	62,074.3	20,496.0
	NAMWALA	0.0	123,334.7	0.0	247,957.6
	MONZE	0.0	6,527.4	0.0	0.0
	CHOMA	29,242.8	0.0	0.0	0.0
	MAZABUKA	0.0	14,377.0	2,933.3	0.0
	KALOMO	5,745.7	23,655.0	217,178.0	479,876.6
	SIAYONGA	42,562.2	130,227.2	4,146.5	0.0
	GWEMBE	69,001.8	182,378.5	0.0	0.0
	SINAZONGWE	20,994.2	196,526.6	30,514.5	0.0
LUAPULA	MANSA	0.0	0.0	0.0	0.0
	NCHELENGE	0.0	0.0	0.0	0.0
	KAWAMBWA	0.0	0.0	0.0	0.0
	NGWENSE	0.0	0.0	0.0	0.0
	SAMFYA	0.0	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	0.0	0.0	0.0
	KAPUTA	0.0	0.0	0.0	0.0
	MBALA	0.0	0.0	0.0	0.0
	MPOROKOSO	0.0	0.0	0.0	0.0
	LUWENGU	0.0	0.0	0.0	0.0
	CHILUBI	0.0	0.0	0.0	0.0
	ISOKA	118,466.3	15,168.9	0.0	0.0
	CHENSALI	1,785.8	0.0	0.0	0.0
	MPIKA	40,803.3	1,073,697.0	0.0	0.0
EASTERN	CHIPATA	0.0	191,802.2	0.0	0.0
	CHAMA	365,564.8	642,310.0	0.0	0.0
	LUNDAZI	0.0	236,284.4	0.0	0.0
	CHADIZA	0.0	0.0	0.0	0.0
	KATETE	0.0	0.0	0.0	0.0
	PETAUKE	56,284.1	298,845.2	0.0	0.0
TOTAL		866,392.8	4,638,319.6	328,255.6	5,265,238.5

PROVINCE	DISTRICT	60.0	61.0	62.0	63.0
		Kalahari Group/Basement and Kautanga System	Kalahari Group/Karoo basalt	Kalahari Group/Karoo Clastics	Kalahari Group/Cretaceous
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	0.0	0.0	0.0	0.0
	LUANGWA	0.0	0.0	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	0.0	0.0	0.0
	NDOLA-RURAL	0.0	0.0	0.0	0.0
	CHILILABOMBWE	0.0	0.0	0.0	0.0
	CHINGOLA	0.0	0.0	0.0	0.0
	MUFULIRA	0.0	0.0	0.0	0.0
	KALULUSHI	0.0	0.0	0.0	0.0
	KIWE	0.0	0.0	0.0	0.0
	LUANSHYA	0.0	0.0	0.0	0.0
CENTRAL	KABWE-URBAN	0.0	0.0	0.0	0.0
	KABWE-RURAL	0.0	0.0	0.0	0.0
	MUMBWA	0.0	0.0	165,784.8	0.0
	MKUSHI	0.0	0.0	0.0	0.0
	SERENJE	0.0	0.0	0.0	0.0
NORTHWESTERN	SOLWEZI	0.0	0.0	0.0	0.0
	MWINILUNGA	0.0	0.0	0.0	0.0
	ZAMBEZI	0.0	0.0	86,566.2	0.0
	KADOMPO	0.0	1,962.6	0.0	0.0
	MFULMBWE	176,779.4	0.0	145,848.5	0.0
	KASEMPA	0.0	0.0	0.0	0.0
WESTERN	MONGU	0.0	588,425.8	86,690.8	1,852.3
	LUKULU	144,251.1	590,768.8	379,519.7	0.0
	KALABO	0.0	0.0	369,185.7	1,043,494.7
	KAOMA	428,975.5	1,419,247.2	280,817.3	0.0
	SENANGA	0.0	1,079,085.7	34,245.2	1,560,540.1
	SESEKE	666,529.7	1,829,811.3	149,024.4	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	0.0
	NAMWALA	190,957.5	0.0	338,617.4	0.0
	MONZE	0.0	0.0	0.0	0.0
	CHOMA	0.0	0.0	0.0	0.0
	MAZABUKA	0.0	0.0	0.0	0.0
	KALOMO	170,616.3	0.0	275,030.3	0.0
	SIAYONGA	0.0	0.0	0.0	0.0
	GWEMBE	0.0	0.0	0.0	0.0
	SINAZONGWE	0.0	0.0	0.0	0.0
LUAPULA	MANSA	0.0	0.0	0.0	0.0
	NCHELENGE	0.0	0.0	0.0	0.0
	KAWAMBWA	0.0	0.0	0.0	0.0
	MWENSE	0.0	0.0	0.0	0.0
	SAMFYA	0.0	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	0.0	0.0	0.0
	KAPUTA	0.0	0.0	0.0	0.0
	MBALA	0.0	0.0	0.0	0.0
	MPOROKOSO	0.0	0.0	0.0	0.0
	LUWINGU	0.0	0.0	0.0	0.0
	CHILUBI	0.0	0.0	0.0	0.0
	ISOKA	0.0	0.0	0.0	0.0
	CHINSALI	0.0	0.0	0.0	0.0
	MPIKA	0.0	0.0	0.0	0.0
EASTERN	CHIPATA	0.0	0.0	0.0	0.0
	CHAMA	0.0	0.0	0.0	0.0
	LUNDAZI	0.0	0.0	0.0	0.0
	CHADIZA	0.0	0.0	0.0	0.0
	KATETE	0.0	0.0	0.0	0.0
	PETAUKE	0.0	138.4	0.0	0.0
<b>TOTAL</b>		<b>1,778,109.5</b>	<b>5,509,379.8</b>	<b>2,311,330.3</b>	<b>2,605,887.1</b>

PROVINCE	DISTRICT	100.0	250.0	TOTAL
		Alluvium, Laterite	Water	
LUSAKA	LUSAKA-URBAN	0.0	0.0	44,105.1
	LUSAKA-RURAL	36,807.6	1,049.7	1,779,391.0
	LUANGWA	25,877.3	0.0	385,930.1
COPPERBELT	NDOLA-URBAN	0.0	0.0	99,332.3
	NDOLA-RURAL	214,381.8	0.0	2,342,346.0
	CHILILABOMBWE	5,978.1	460.8	100,983.8
	CHINGOLA	6,073.0	479.7	175,149.3
	MUFULIRA	0.0	704.2	128,015.2
	KALULUSHI	0.0	0.0	113,508.6
	KITWE	0.0	0.0	75,071.3
	LUANSHYA	0.0	0.0	87,268.5
CENTRAL	KABWE-URBAN	0.0	0.0	152,990.8
	KABWE-RURAL	615,418.1	12,168.7	2,553,641.4
	MUMBWA	134,011.2	484.1	2,157,640.2
	MKUSHI	12,837.8	7,485.6	2,246,961.2
	SERENJE	118,800.7	0.0	2,357,205.6
NORTHWESTERN	SÓLWEZI	111,661.2	0.0	3,012,191.5
	MWINILUNGA	110,606.0	0.0	2,089,448.6
	ZAMBEZI	272,157.5	0.0	1,874,616.2
	KABOMPO	85,416.5	0.0	1,453,502.1
	MFUMBWE	18,490.2	0.0	1,907,816.5
	KASEMPA	35,851.6	0.0	2,190,452.1
WESTERN	MONGU	330,116.8	0.0	1,007,085.7
	LUKULU	318,372.6	0.0	1,563,946.4
	KALABO	310,364.0	0.0	1,723,034.4
	KAOMA	112,293.1	0.0	2,302,364.7
	SENANGA	311,836.3	0.0	3,185,707.3
	SESHEKE	304,713.3	0.0	2,952,232.8
SOUTHERN	LIVINGSTONE	6,813.4	0.0	104,131.4
	NAMVALA	461,484.6	38,062.8	2,152,791.5
	MONZE	44,952.0	4,514.2	490,147.8
	CHOMA	0.0	0.0	700,752.3
	MAZABUKA	134,380.4	1.7	662,464.6
	KALOMO	189,235.1	0.0	3,142,472.8
	SIAYONGA	0.0	8,004.3	260,857.6
	GWEMBE	0.0	98,369.3	526,231.0
	SINAZONGWE	0.0	109,445.8	480,009.8
LUAPULA	MANSA	37,905.7	610.2	1,599,736.0
	NCHENGE	66,642.4	275,685.8	794,437.8
	KAWAMBWA	126,999.9	6,868.5	910,837.0
	MWENSE	54,185.0	1,630.0	667,214.0
	SAMFYA	591,392.5	145,482.6	987,222.2
NORTHERN	KASAMA	366,281.8	0.0	2,035,749.8
	KAPUTA	54,798.7	198,157.7	1,238,834.1
	MBALA	34,994.9	133,935.6	1,869,524.1
	MPOROKOSO	70,945.9	0.0	1,193,294.1
	LUVINGU	118,673.3	622.2	883,133.3
	CHILUBI	277,258.6	61,288.9	526,921.8
	ISOKA	193,211.7	0.0	1,376,749.9
	CHINSALI	183,009.8	553.4	1,544,514.2
	MPIKA	606,721.8	0.0	4,050,470.3
EASTERN	CHIPATA	5,004.9	0.0	1,218,933.4
	CHAMA	91,354.4	0.0	1,780,311.1
	LUNDAZI	7,654.5	0.0	1,368,722.6
	CHADIZA	0.0	0.0	250,155.8
	KATETE	0.0	0.0	384,155.8
	PETAUKE	38,216.4	0.0	1,912,338.8
<b>TOTAL</b>		<b>7,454,202.4</b>	<b>1,126,065.8</b>	<b>75,183,076.0</b>

**APPENDIX B**

**GEOMORPHOLOGY BY ADMINISTRATIVE BOUNDARY**



		1A1	1A2	2A1	2A2
PROVINCE	DISTRICT	MONTANE PLATEAU	MONTANE ESCARPMENT	LEVEL TO UNDULATING PLATEAU	DISSECTED PLATEAU
LUSAKA	LUSAKA-URBAN	0.0	0.0	42,326.8	0.0
	LUSAKA-RURAL	0.0	0.0	511,631.8	242,737.5
	LUANGWA	0.0	0.0	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	0.0	97,660.5	0.0
	NDOLA-RURAL	0.0	0.0	1,910,611.3	98,966.4
	CHILILABOMBWE	0.0	0.0	86,200.6	0.0
	CHINGOLA	0.0	0.0	168,596.9	0.0
	MUFULIRA	0.0	0.0	127,190.8	0.0
	KALULUSHI	0.0	0.0	106,690.0	0.0
	KITWE	0.0	0.0	75,071.3	0.0
CENTRAL	LUANSHYA	0.0	0.0	84,040.2	0.0
	KABWE-URBAN	0.0	0.0	147,728.0	0.0
	KABWE-RURAL	0.0	0.0	1,700,990.6	30,074.1
	MUMBWA	0.0	0.0	1,839,694.6	0.0
	MKUSHI	0.0	0.0	1,088,696.0	385,921.9
NORTHWESTERN	SERENJE	0.0	0.0	1,181,505.3	71,286.9
	SOLWEZI	0.0	0.0	2,708,978.5	0.0
	MWINILUNGA	0.0	0.0	978,472.8	0.0
	ZAMBEZI	0.0	0.0	0.0	0.0
	KABOMPO	0.0	0.0	214,563.9	0.0
	MFUAMBWE	0.0	0.0	1,321,620.6	0.0
	KASEMPA	0.0	0.0	1,814,431.6	0.0
WESTERN	MONGU	0.0	0.0	0.0	0.0
	LUKULU	0.0	0.0	34,328.0	0.0
	KALABO	0.0	0.0	0.0	0.0
	SENANGA	0.0	0.0	0.0	0.0
	SESHEKE	0.0	0.0	18,844.2	0.0
	KAOMA	0.0	0.0	95,913.4	0.0
	SOUTHERN	LIVINGSTONE	0.0	0.0	0.0
NAMWALA		0.0	0.0	720,703.9	0.0
MONZE		0.0	0.0	0.0	0.0
CHOMA		0.0	0.0	0.0	0.0
MAZABUKA		0.0	0.0	0.6	0.0
KALOMO		0.0	0.0	12,793.3	0.0
SIAYONGA		0.0	0.0	0.0	0.0
GWENBE		0.0	0.0	0.0	0.0
SINAZONGWE		0.0	0.0	0.0	0.0
LUAPULA		MANSA	0.0	0.0	1,370,377.4
	NCHELENGE	0.0	0.0	0.0	67,226.1
	KAWAMBWA	0.0	0.0	453,931.9	0.0
	MWENSE	0.0	0.0	406,152.4	4,941.0
	SAMFYA	0.0	0.0	250,378.9	0.0
	NORTHERN	KASAMA	0.0	0.0	1,510,198.9
KAPUTA		0.0	0.0	6,904.3	42,974.9
MBALA		0.0	0.0	994,054.5	37,345.7
MPOROKOSO		0.0	0.0	971,060.8	3,257.3
LUWINGU		0.0	0.0	763,932.0	0.0
CHILUBI		0.0	0.0	188,361.8	0.0
ISOKA		30,400.6	1,917.9	383,483.6	250,300.1
CHIENSALI		0.0	0.0	788,206.9	132,017.0
MPIKA		0.0	0.0	1,565,371.4	116,917.3
EASTERN		CHIPATA	0.0	0.0	374,652.6
	CHAMA	12,496.1	3,483.2	16,518.2	89,050.4
	LUNDAZI	0.0	0.0	644,805.0	42,934.9
	CHADIZA	0.0	0.0	58,711.9	0.0
	KATETE	0.0	0.0	221,473.5	1,444.6
	PETAUKE	0.0	0.0	512,925.2	1.8
<b>TOTAL</b>		<b>42,896.7</b>	<b>5,401.1</b>	<b>28,570,791.7</b>	<b>1,834,430.9</b>



PROVINCE	DISTRICT	2A3	2A4	2A5	2A6
		HILLS, RIDGES AND MINOR ESCARPMENTS	SWAMPS	LAKES	FLOODPLAINS
LUSAKA	LUSAKA-URBAN	1,204.2	0.0	0.0	0.0
	LUSAKA-RURAL	10,730.4	32,537.1	1,009.8	1,281.8
	LUANGWA	0.0	0.0	0.0	0.0
COPPERBELT	NDOLA-URBAN	1,672.0	0.0	0.0	0.0
	NDOLA-RURAL	127,204.7	21,272.7	0.0	184,290.9
	CHILILABOMBWE	8,345.1	0.0	460.8	5,979.3
	CHINGOLA	0.0	26.6	479.7	6,046.3
	MUFULIRA	0.0	0.0	824.4	0.0
	KALULUSHI	6,818.6	0.0	0.0	0.0
	KITWE	0.0	0.0	0.0	0.0
	LUANSHYA	3,228.3	0.0	0.0	0.0
CENTRAL	KABWE-URBAN	5,262.8	0.0	0.0	0.0
	KABWE-RURAL	112,860.5	219,669.8	12,138.3	379,184.7
	MUMBWA	153,931.5	64,486.9	484.1	69,524.2
	MKUSHI	177,477.8	0.0	7,484.1	0.0
NORTHWESTERN	SERENJE	323,166.6	28,786.1	0.0	72,574.5
	SOLWEZI	63,194.4	69,817.7	0.0	41,633.7
	MWINILUNGA	28,027.6	2,661.1	0.0	0.0
	ZAMBEZI	0.0	0.0	0.0	0.0
	KABOMPO	4,101.2	13,107.6	0.0	0.0
	MFUNBWE	0.0	0.0	0.0	2,765.7
	KASEMPA	336,735.6	0.0	0.0	30,251.8
	MONGU	0.0	0.0	0.0	0.0
WESTERN	LUKULU	0.0	0.0	0.0	0.0
	KALABO	0.0	0.0	0.0	0.0
	SENASA	0.0	0.0	0.0	0.0
	SESHEKE	105.7	0.0	0.0	59,253.2
	KAOMA	0.0	0.0	0.0	0.0
	LIVINGSTONE	4,087.8	0.0	0.0	6,813.4
	NAMIWALA	156,765.6	109,961.4	38,123.9	352,015.8
	MONZE	26,937.0	27,049.9	4,508.2	17,960.7
SOUTHERN	CHOMA	27,160.4	0.0	0.0	0.0
	MAZABUKA	1,470.1	113,164.2	1.7	21,527.7
	KALOMO	117,364.4	0.0	0.0	186,234.4
	SIYONGA	0.0	0.0	0.0	0.0
	GWEMBE	0.0	0.0	0.0	0.0
	SINAZONGWE	0.0	0.0	0.0	0.0
	MANSI	27,354.8	5,709.2	808.4	30,769.7
	NCHENGE	0.0	0.0	0.0	0.0
LUAPULA	KAWAMBWA	100,813.9	13,624.3	1,233.4	92,068.0
	MWENSE	67,612.7	1,765.5	1,630.0	37,490.4
	SAMFYA	0.0	439,845.1	166,638.5	130,359.7
	KASAMA	168,918.3	18,220.4	0.0	348,412.2
	KAPUTA	0.0	0.0	0.0	328.3
	MBALA	145,412.8	0.0	330.2	5,904.9
	MPOKOSO	73,415.5	0.0	0.0	71,199.6
	LUWINGU	0.0	13,497.7	637.2	105,066.4
NORTHERN	CHULUBI	0.0	78,934.5	61,286.3	198,339.2
	ISOKA	116,483.9	2,910.6	0.0	189,843.0
	CHINSALI	392,689.2	20,851.3	553.4	162,166.5
	MPIKA	235,101.1	222,606.4	0.0	295,357.9
	CHIPATA	89,113.2	0.0	0.0	0.0
	CHAMA	21,674.9	0.0	0.0	0.0
	LUNDAZI	31,525.6	0.0	0.0	0.0
	CHADIZA	29,576.0	0.0	0.0	0.0
EASTERN	KATEIE	60,721.1	0.0	0.0	0.0
	PETAUKE	35,141.2	0.0	0.0	0.0
	TOTAL	3,297,406.5	1,320,506.1	298,852.4	3,104,643.9

		2A7	2B1	2B2	2B3	2B4
PROVINCE	DISTRICT	TERRACES	LINEAR DUNE COMPLEX	PAN COMPLEX	DILUNGUS	SLIGHTLY DISSECTED PLATEAU
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	0.0	0.0	0.0	0.0	0.0
	LUANGWA	0.0	0.0	0.0	0.0	0.0
COPPERBELT	NDOLA-URBAN	0.0	0.0	0.0	0.0	0.0
	NDOLA-RURAL	0.0	0.0	0.0	0.0	0.0
	CHILILABOMBWE	0.0	0.0	0.0	0.0	0.0
	CHINGOLA	0.0	0.0	0.0	0.0	0.0
	MUFULIRA	0.0	0.0	0.0	0.0	0.0
	KALULUSHI	0.0	0.0	0.0	0.0	0.0
	KITWE	0.0	0.0	0.0	0.0	0.0
CENTRAL	LUANSHYA	0.0	0.0	0.0	0.0	0.0
	KABWE-URBAN	0.0	0.0	0.0	0.0	0.0
	KABWE-RURAL	14,804.9	0.0	0.0	0.0	0.0
	MUSOMBA	0.0	0.0	0.0	0.0	29,518.9
	MKUSHI	0.0	0.0	0.0	0.0	0.0
NORTHWESTERN	SERENJE	0.0	0.0	0.0	0.0	0.0
	SOLWEZI	0.0	0.0	0.0	0.0	126,567.2
	MWINILUNGA	0.0	0.0	0.0	107,944.9	972,342.2
	ZAMBEZI	0.0	873,051.8	9.7	40,949.6	732,668.7
	KABOMPO	0.0	0.0	61.2	72,334.8	1,149,333.4
	MFUMBWE	0.0	0.0	0.0	0.0	567,696.3
	KASEMPA	0.0	0.0	0.0	0.0	0.0
WESTERN	MONGU	0.0	0.0	676,822.9	0.0	0.0
	LUKULU	0.0	411,376.1	777,405.0	5,898.2	22,432.5
	KALABO	0.0	1,238,285.3	174,628.9	0.0	0.0
	SENANGA	0.0	1,647,183.9	981,865.2	0.0	44,804.3
	SESHEKE	0.0	401,108.0	1,202,795.2	0.0	1,024,701.4
	KAOMIA	0.0	0.0	900,209.7	0.0	1,193,948.5
	SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	0.0
NANWALA		0.0	0.0	0.0	0.0	775,220.9
MONZE		0.0	0.0	0.0	0.0	330,513.9
CHOMA		0.0	0.0	0.0	0.0	510,243.3
MAZABUKA		0.0	0.0	0.0	0.0	276,974.7
KALOMO		0.0	0.0	0.0	0.0	2,474,634.5
SIYONGA		0.0	0.0	0.0	0.0	0.0
GWEMBE		0.0	0.0	0.0	0.0	1,721.2
SINAZONWE		0.0	0.0	0.0	0.0	0.0
LUAPULA		MANSA	0.0	0.0	0.0	0.0
	NCHELENGE	0.0	0.0	0.0	0.0	0.0
	KAWAMBWA	0.0	0.0	0.0	0.0	0.0
	MWENSE	0.0	0.0	0.0	0.0	0.0
	SANFYA	0.0	0.0	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	0.0	0.0	0.0	0.0
	KAPUTA	0.0	0.0	0.0	0.0	0.0
	MBALA	0.0	0.0	0.0	0.0	0.0
	MPOROKOSO	0.0	0.0	0.0	0.0	0.0
	LUWINGU	0.0	0.0	0.0	0.0	0.0
	CHILUBI	0.0	0.0	0.0	0.0	0.0
	ISOKA	0.0	0.0	0.0	0.0	0.0
	CHINSALI	0.0	0.0	0.0	0.0	0.0
	MPIKA	0.0	0.0	0.0	0.0	0.0
	EASTERN	CHIPATA	0.0	0.0	0.0	0.0
CHAMA		0.0	0.0	0.0	0.0	0.0
LUNDAZI		0.0	0.0	0.0	0.0	0.0
CHADIZA		0.0	0.0	0.0	0.0	0.0
KATETE		0.0	0.0	0.0	0.0	0.0
PETAUKE		0.0	0.0	0.0	0.0	0.0
<b>TOTAL</b>		<b>14,804.9</b>	<b>4,571,005.1</b>	<b>4,713,797.8</b>	<b>227,127.5</b>	<b>10,326,552.1</b>

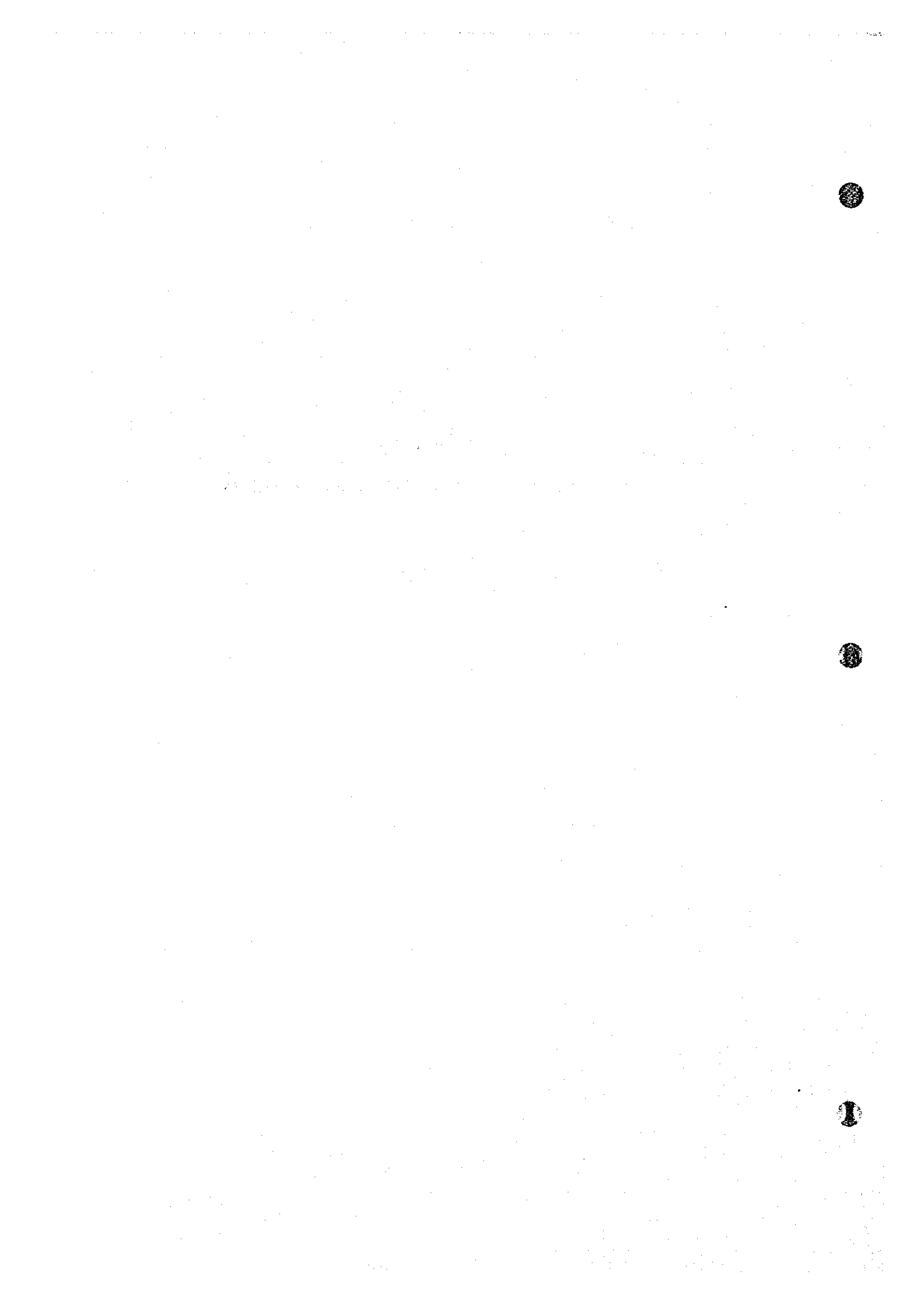
PROVINCE	DISTRICT	2B5	2B7	3A	3B
		FLOODPLAINS	ALLUVIATED VALLEYS	ESCARPMENT	ESCARPMENT COMPLEX
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	574.1
	LUSAKA-RURAL	0.0	0.0	0.0	772,881.1
	LUANGWA	0.0	0.0	0.0	69,567.9
COPPERBELT	NDOLA-URBAN	0.0	0.0	0.0	0.0
	NDOLA-RURAL	0.0	0.0	0.0	0.0
	CHILILABOMBWE	0.0	0.0	0.0	0.0
	CHUNGOLA	0.0	0.0	0.0	0.0
	MUFULIRA	0.0	0.0	0.0	0.0
	KALULUSHI	0.0	0.0	0.0	0.0
	KITWE	0.0	0.0	0.0	0.0
	LUANSHYA	0.0	0.0	0.0	0.0
CENTRAL	KABWE-URBAN	0.0	0.0	0.0	0.0
	KABWE-RURAL	0.0	0.0	3,109.3	47,446.1
	MUMBWA	0.0	0.0	0.0	0.0
	MBUSHI	0.0	0.0	14,907.8	275,737.1
NORTHWESTERN	SERENJE	0.0	0.0	33,173.7	335,261.2
	SOLWEZI	0.0	0.0	0.0	0.0
	MWINILUNGA	0.0	0.0	0.0	0.0
	ZAMBEZI	227,936.4	0.0	0.0	0.0
	KABOMPO	0.0	0.0	0.0	0.0
	MUMBWE	0.0	15,733.9	0.0	0.0
WESTERN	KASEMPA	0.0	9,033.1	0.0	0.0
	MONGU	259,256.7	71,006.1	0.0	0.0
	LUKULU	312,506.6	0.0	0.0	0.0
	KALABO	310,130.2	0.0	0.0	0.0
	SENASA	399,409.4	112,444.5	0.0	0.0
	SESHEKE	47,517.9	197,907.2	0.0	0.0
	KAOMA	8,314.7	103,978.4	0.0	0.0
SOUTHERN	LIVINGSTONE	0.0	0.0	0.0	0.0
	NANIWALA	0.0	0.0	0.0	0.0
	MONZE	0.0	0.0	0.0	83,178.1
	CHOMA	0.0	0.0	0.0	163,241.1
	MAZABUKA	0.0	3,019.4	0.0	246,306.2
	KALOMO	0.0	0.0	0.0	344,211.6
	SIYONGA	0.0	0.0	0.0	52,047.1
	GWEMBE	0.0	0.0	0.0	153,216.3
	SENZONGWE	0.0	0.0	0.0	128,743.9
	LUAPULA	MANSA	0.0	0.0	0.0
NCHELENGE		0.0	0.0	0.0	109,191.3
KAWAMBWA		0.0	0.0	0.0	125,201.7
MWENSE		0.0	0.0	0.0	62,194.8
SANFYA		0.0	0.0	0.0	0.0
NORTHERN	KASAMA	0.0	0.0	0.0	0.0
	KAPUTA	0.0	0.0	0.0	230,974.7
	MDALA	0.0	0.0	107,702.1	167,718.0
	MPOROKOSO	0.0	0.0	0.0	42,621.6
	LUWINGU	0.0	0.0	0.0	0.0
	CHILUBI	0.0	0.0	0.0	0.0
	ISOKA	0.0	0.0	0.0	257,506.7
	CHINSALI	0.0	0.0	0.0	48,029.9
	MPIKA	0.0	0.0	27,781.4	376,264.5
	EASTERN	CHIPATA	0.0	0.0	0.0
CHAMA		0.0	0.0	0.0	591,289.9
LUNDAZI		0.0	0.0	0.0	399,904.5
CHADIZA		0.0	0.0	0.0	161,867.9
KATEIE		0.0	0.0	0.0	100,516.6
	PETAUKE	0.0	0.0	0.0	696,898.1
<b>TOTAL</b>		<b>1,365,071.9</b>	<b>513,122.6</b>	<b>186,673.3</b>	<b>6,503,916.6</b>

		4A1	4A2	4B1	4B3
PROVINCE	DISTRICT	ISOLATED LARGE HILLS	DISSECTED HILLY LAND	FLOODPLAINS	GENTLY UNDULATING LAND
LUSAKA	LUSAKA-URBAN	0.0	0.0	0.0	0.0
	LUSAKA-RURAL	0.0	203,563.7	3,017.8	0.0
	LUANGWA	113,415.7	177,069.2	25,877.3	0.0
COPPERBELT	NDOLA-URBAN	0.0	0.0	0.0	0.0
	NDOLA-RURAL	0.0	0.0	0.0	0.0
	CHILILABOMBWE	0.0	0.0	0.0	0.0
	CHINGOLA	0.0	0.0	0.0	0.0
	MUFULIRA	0.0	0.0	0.0	0.0
	KALULUSHI	0.0	0.0	0.0	0.0
	KITWE	0.0	0.0	0.0	0.0
	LUANSHYA	0.0	0.0	0.0	0.0
CENTRAL	KABWE-URBAN	0.0	0.0	0.0	0.0
	KABWE-RURAL	0.0	33,343.1	0.0	0.0
	MUMBWA	0.0	0.0	0.0	0.0
	MKUSHI	738.5	283,160.2	12,837.8	0.0
	SERENJE	19,792.5	233,454.8	17,440.0	38,764.0
NORTHWESTERN	SOLWEZI	0.0	0.0	0.0	0.0
	MWINILUNGA	0.0	0.0	0.0	0.0
	ZAMBEZI	0.0	0.0	0.0	0.0
	KABOMPO	0.0	0.0	0.0	0.0
	MFUMBWE	0.0	0.0	0.0	0.0
	KASEMPA	0.0	0.0	0.0	0.0
	MONGU	0.0	0.0	0.0	0.0
WESTERN	LUKULU	0.0	0.0	0.0	0.0
	KALABO	0.0	0.0	0.0	0.0
	SENANGA	0.0	0.0	0.0	0.0
	SÉSHEKE	0.0	0.0	0.0	0.0
	KAOMA	0.0	0.0	0.0	0.0
	LIVINGSTONE	0.0	0.0	0.0	0.0
	NAMWALA	0.0	0.0	0.0	0.0
SOUTHERN	MONZE	0.0	0.0	0.0	0.0
	CHOMA	0.0	107.3	0.0	0.0
	MAZABUKA	0.0	0.0	0.0	0.0
	KALOMO	0.0	7,229.6	0.0	0.0
	SLAVONGA	30,179.1	170,627.1	0.0	0.0
	GWEMBE	37,610.1	235,328.1	0.0	0.0
	SENAZONGWE	3,847.7	237,984.4	0.0	0.0
	MANSA	0.0	0.0	0.0	0.0
LUAPULA	NCHELENGE	0.0	0.0	0.0	275,720.1
	KAWAMBWA	0.0	0.0	0.0	98,886.9
	MWENSE	0.0	0.0	0.0	70,502.2
	SANDYA	0.0	0.0	0.0	0.0
	KASAMA	0.0	0.0	0.0	0.0
NORTHERN	KAPUTA	0.0	229,034.5	0.0	478,384.1
	NIBALA	0.0	98,302.8	0.0	129,987.2
	MPOROKOSO	0.0	0.0	0.0	31,739.3
	LUWINGU	0.0	0.0	0.0	0.0
	CHILUDI	0.0	0.0	0.0	0.0
	ISOKA	1,095.4	0.0	728.1	142,080.0
	CHINSALI	0.0	0.0	0.0	0.0
	MPIKA	0.0	540,060.2	87,796.7	583,212.4
	CHIPATA	0.0	767.9	5,004.9	235,783.7
	CHAMA	1,258.7	62,807.0	91,354.4	890,378.3
EASTERN	LUNDAZI	0.0	0.0	7,654.5	241,878.1
	CHADIZA	0.0	0.0	0.0	0.0
	KATETE	0.0	0.0	0.0	0.0
	PETAUKE	99,919.6	299,623.7	38,216.5	229,612.7
	TOTAL	307,857.3	2,812,463.8	289,928.0	3,446,929.0

PROVINCE	DISTRICT	4B1	C	TOTAL	
		SWAMPS	LAKES		
LUSAKA	LUSAKA-URBAN	0.0	0.0	44,105.1	
	LUSAKA-RURAL	0.0	0.0	1,779,391.0	
	LUANGWA	0.0	0.0	385,930.1	
COPPERBELT	NDOLA-URBAN	0.0	0.0	99,332.5	
	NDOLA-RURAL	0.0	0.0	2,342,346.0	
	CHILILABOMBWE	0.0	0.0	100,985.8	
	CHINGOLA	0.0	0.0	175,149.5	
	MUFULIRA	0.0	0.0	128,015.2	
	KALULUSHI	0.0	0.0	113,508.6	
	KITWE	0.0	0.0	75,071.3	
	LUANSHYA	0.0	0.0	87,268.5	
CENTRAL	KABWE-URBAN	0.0	0.0	152,990.8	
	KABWE-RURAL	0.0	0.0	2,553,641.4	
	MUMBWA	0.0	0.0	2,157,640.2	
	MKUSHI	0.0	0.0	2,246,961.2	
	SERENJE	0.0	0.0	2,357,205.6	
NORTHWESTERN	SOLWEZI	0.0	0.0	3,012,191.5	
	MWINILUNGA	0.0	0.0	2,089,448.6	
	ZAMBEZI	0.0	0.0	1,874,616.2	
	KABOMPO	0.0	0.0	1,453,502.1	
	MFUMBWE	0.0	0.0	1,907,816.5	
	KASEMPA	0.0	0.0	2,190,452.1	
WESTERN	MONGU	0.0	0.0	1,007,085.7	
	LUKULU	0.0	0.0	1,563,946.4	
	KALABO	0.0	0.0	1,723,044.4	
	SENANGA	0.0	0.0	3,185,707.3	
	SESHEKE	0.0	0.0	2,952,232.8	
	KAOMA	0.0	0.0	2,302,364.7	
	SOUTHERN	LIVINGSTONE	0.0	0.0	104,131.4
		NAMWALA	0.0	0.0	2,152,791.5
MONZE		0.0	0.0	490,147.8	
CHOMA		0.0	0.0	700,752.3	
MAZABUKA		0.0	0.0	662,464.6	
KALOMO		0.0	0.0	3,142,472.8	
SIAVONGA		0.0	8,004.3	260,857.6	
GWEANBE		0.0	98,355.3	526,231.0	
LUAPULA	SINAZONGWE	0.0	109,433.8	480,009.8	
	MANSA	0.0	0.0	1,599,736.0	
	NCIBLENGE	53,311.3	288,989.0	794,437.8	
	KAWAMBWA	19,441.8	5,635.1	910,837.0	
	MWENSE	14,925.0	0.0	667,214.0	
	SAMFYA	0.0	0.0	987,222.2	
	NORTHERN	KASAMA	0.0	0.0	2,045,749.8
KAPUTA		48,449.0	201,784.3	1,238,834.1	
MBALA		29,100.5	153,465.4	1,869,524.1	
MPOROKOSO		0.0	0.0	1,193,294.1	
LUWINGU		0.0	0.0	883,133.3	
CHILUDI		0.0	0.0	526,921.8	
ISOKA		0.0	0.0	1,376,749.9	
CHINSALI		0.0	0.0	1,544,514.2	
MPIKA		0.0	0.0	4,050,470.3	
EASTERN		CHIPATA	0.0	0.0	1,218,943.4
	CHAMA	0.0	0.0	1,780,311.1	
	LUNDAZI	0.0	0.0	1,368,722.6	
	CHADIZA	0.0	0.0	250,155.8	
	KATETE	0.0	0.0	384,155.8	
	PETAUKE	0.0	0.0	1,912,338.8	
<b>TOTAL</b>		<b>165,227.6</b>	<b>865,667.2</b>	<b>75,185,076.0</b>	

APPENDIX C

LAND COVER BY ADMINISTRATIVE BOUNDARY



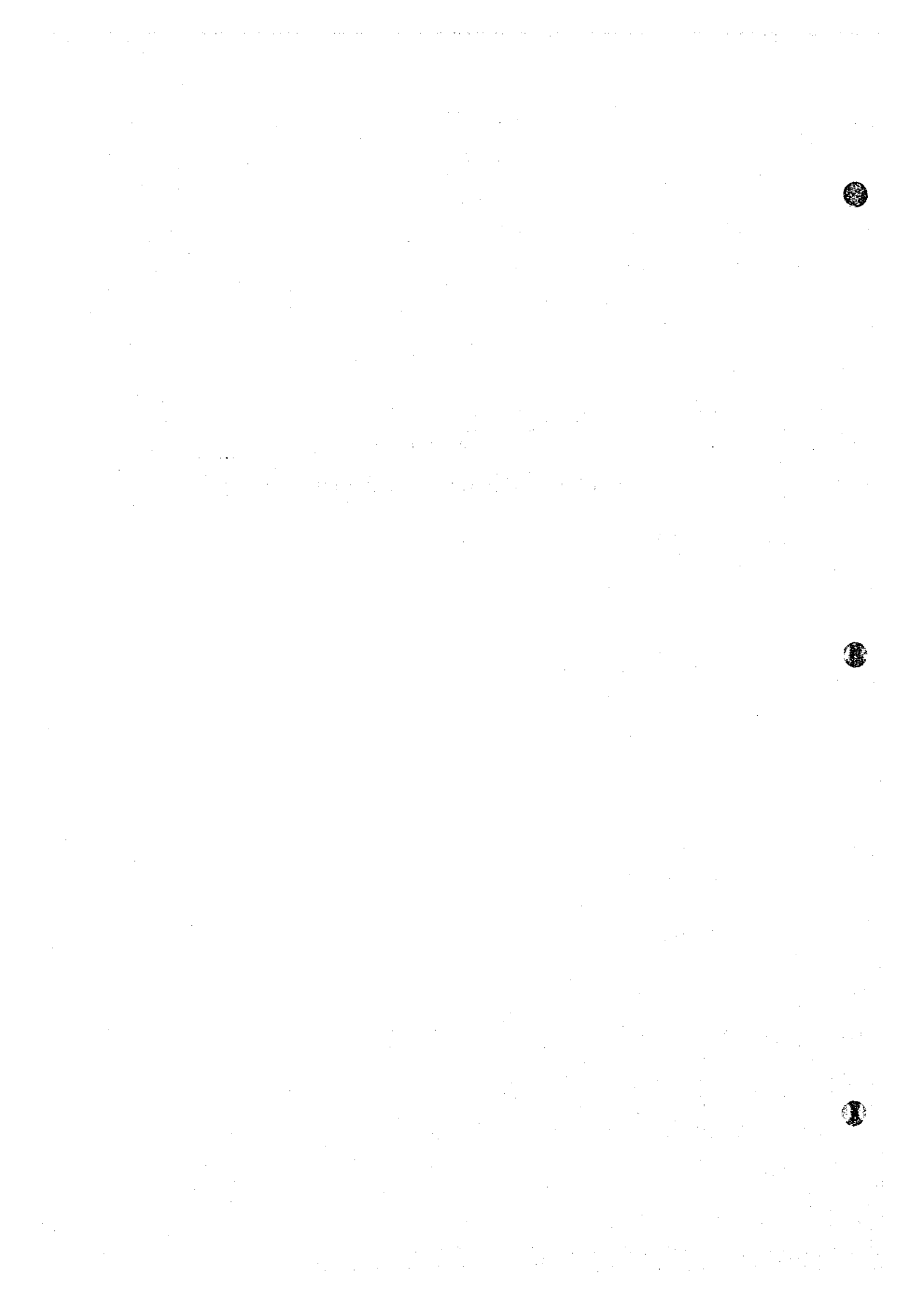
PROVINCE	DISTRICT	FOREST	SAVANNA	GRASSLAND	AGRICULTURE
LUSAKA	LUSAKA-URBAN	36.4	69.9	28,970.4	2,540.7
	LUSAKA-RURAL	510,724.3	304,619.3	906,135.1	22,789.6
	LUANGWA	14,243.3	74,268.5	291,016.4	183.8
COPPERBELT	NDOLA-URBAN	2,527.0	3,785.0	69,445.1	16,030.2
	NDOLA-RURAL	679,923.2	332,195.9	1,299,487.6	22,383.1
	CHILILABOMBWE	17,339.9	12,397.0	67,054.5	1,343.2
	CHENGOLA	18,742.7	9,968.8	137,272.4	5,088.4
	MUFULIRA	12,429.4	14,849.0	91,446.0	2,781.4
	KALULUSHI	3,612.6	9,274.3	78,472.1	19,322.8
	KITWE	6,348.8	8,419.7	51,022.5	745.4
	LUANSHYA	3,260.3	4,241.2	69,923.8	2,275.1
CENTRAL	KABWE-URBAN	440.6	3,663.1	127,034.3	18,548.4
	KABWE-RURAL	304,347.2	201,700.9	1,808,647.5	98,566.3
	MUMBWA	198,096.2	197,934.3	1,708,288.9	12,119.3
	MKUSHI	756,726.2	440,760.7	927,520.9	107,235.2
	SERENJE	522,717.4	832,791.9	937,854.3	41,584.9
NORTHWESTERN	SOLWEZI	937,814.9	364,357.6	1,698,001.4	5,446.6
	MWINILUNGA	296,863.5	637,627.4	1,134,438.4	8,869.6
	ZAMBESI	138,323.5	254,074.0	1,454,142.5	14,322.0
	KABOMPO	238,425.1	407,440.7	794,960.2	10,544.0
	MFUMBWE	132,780.3	533,205.6	1,235,806.2	2,999.9
	KASEMPA	439,638.0	483,411.2	1,262,850.6	1,304.4
WESTERN	MONGU	97,356.8	191,592.3	698,131.8	2,037.0
	LUKULU	340,967.6	90,505.8	1,119,950.1	4,689.1
	KALABO	9,930.7	164,109.1	1,507,912.6	2,589.3
	SENANOA	109,524.4	466,551.5	2,564,487.5	3,652.9
	SESHEKE	216,118.8	606,555.7	2,114,157.2	1,968.2
	KAOMA	560,629.3	363,637.2	1,364,259.7	10,955.0
SOUTHERN	LIVINGSTONE	32,970.9	20,858.9	42,710.4	2,091.4
	NANWALA	256,843.9	171,791.2	1,603,157.0	39,210.1
	MONZE	11,954.5	12,936.0	406,720.7	49,063.4
	CHOMA	150,134.3	38,801.4	481,396.7	28,623.2
	MAZABUKA	52,573.3	18,013.6	480,510.1	48,660.2
	KALOMO	459,514.7	716,400.1	1,891,458.2	66,063.9
	SLAVONGA	23,489.7	16,818.9	196,198.8	11,132.4
	GWEMBE	50,085.5	29,875.3	334,377.0	12,885.9
	SINAZONGWE	98,557.1	33,554.1	231,870.5	4,707.7
LUAPULA	MANSA	230,452.8	452,554.7	871,379.2	15,153.7
	NCHELENGE	43,231.7	76,036.6	308,529.7	20,683.4
	KAWAMBWA	161,999.2	283,557.6	427,451.9	2,383.1
	MWENSE	141,330.6	137,462.2	367,794.7	3,840.1
	SAMFYA	16,118.5	73,556.6	569,571.1	3,001.2
NORTHERN	KASAMA	220,940.4	555,020.9	1,251,232.0	5,329.9
	KAPUTA	35,706.2	137,675.5	805,349.6	16,915.8
	MBALA	204,478.3	543,112.7	938,837.3	7,427.9
	MPOROKOSO	94,936.3	610,765.9	464,642.2	8,804.7
	LUWINGU	117,893.2	249,635.5	500,014.2	3,452.7
	CHILUBI	28,767.3	10,130.3	379,855.2	586.8
	ISOKA	76,423.2	498,774.4	791,765.9	4,951.4
	CHINSALI	376,969.9	640,109.1	520,741.8	1,009.2
	MPIKA	608,314.7	1,509,568.1	1,835,344.7	3,478.0
EASTERN	CHIPATA	32,365.9	102,991.2	1,069,395.3	11,053.1
	CHAMA	171,012.1	534,889.9	1,070,242.1	2,897.2
	LUNDAZI	177,177.9	322,071.1	781,033.0	87,405.7
	CHIADIZA	18,322.4	39,372.2	180,580.1	11,881.1
	KATETE	6,684.1	15,753.8	303,473.5	58,046.5
	PETAUKE	96,663.6	231,079.6	1,405,577.6	174,999.6
TOTAL		10,569,850.8	15,097,215.0	46,059,922.5	1,150,655.1



PROVINCE	DISTRICT	BARREN	WETLANDS	URBAN	WATER	TOTAL (hectares)	
LUSAKA	LUSAKA-URBAN	0.0	0.0	12,487.7	0.0	44,105.1	
	LUSAKA-RURAL	2.2	25,442.7	4,383.0	5,294.8	1,779,391.0	
	LUANGWA	1,373.0	98.8	382.5	4,363.8	383,930.1	
COPPERBELT	NDOLA-URBAN	0.0	110.2	7,189.1	245.9	99,332.5	
	NDOLA-RURAL	60.1	6,382.8	1,049.1	814.2	2,342,346.0	
	CHILLABOMBWE	82.2	317.9	1,990.3	460.8	100,985.8	
	CHINGOLA	3,075.8	0.0	415.6	585.8	175,149.5	
	MUFULIRA	478.6	0.0	5,153.0	877.8	128,015.2	
	KALULUSHI	67.3	0.0	2,526.8	232.7	113,508.6	
	KITWE	76.8	0.0	8,278.6	179.5	75,071.3	
CENTRAL	LUANSIYA	528.7	112.2	4,636.4	288.8	87,268.5	
	KABWE-URBAN	0.0	0.0	3,260.8	43.6	152,990.8	
	KABWE-RURAL	224.9	123,183.0	2,235.0	14,736.6	2,553,641.4	
	MUMBWA	0.0	33,076.9	1,664.5	6,440.1	2,157,640.2	
	MKUSHI	5,548.3	116.4	1,467.1	7,386.4	2,246,961.2	
	SERENJE	743.5	18,060.5	1,029.3	2,423.8	2,357,205.6	
	NORTHWESTERN	SOLWEZI	0.0	4,962.9	654.6	953.5	3,012,191.5
	MWINILUNGA	801.9	8,199.8	2,574.5	73.5	2,089,448.6	
	ZAMBEZI	3,413.7	2,161.3	2,470.2	5,709.0	1,874,616.2	
	KABOMPO	0.0	9.6	1,820.2	302.3	1,453,502.1	
	MPUMBWE	666.7	751.6	161.5	1,444.7	1,907,816.5	
	KASEMPA	0.0	1,412.1	578.2	1,257.6	2,190,452.1	
	WESTERN	MONGU	2,559.6	10,925.3	559.7	3,923.2	1,007,083.7
		LUKULU	976.0	312.2	365.8	6,179.8	1,563,946.4
	KALABO	22,909.4	13,480.0	423.1	1,690.2	1,723,044.4	
	SENANGA	20,415.3	9,110.7	0.0	9,965.0	3,185,707.3	
	SESHEKE	891.6	3,132.1	518.7	8,890.5	2,952,232.8	
	KAOMA	824.9	271.8	587.9	1,198.9	2,302,364.7	
	SOUTHERN	LIVINGSTONE	67.2	235.0	4,554.8	642.8	104,131.4
		NAMWALA	0.0	37,231.6	990.7	43,567.0	2,152,791.5
		MONZE	0.0	4,419.6	682.8	4,370.8	490,147.8
	CHOMA	0.0	0.0	1,796.7	0.0	700,752.3	
	MAZABUKA	0.0	58,475.3	1,663.9	2,568.2	662,464.6	
	KALOMO	95.4	6,021.0	1,084.5	1,835.0	3,142,472.8	
	SLAVONGA	99.6	100.1	0.0	11,018.1	260,857.6	
	GWEAIBE	0.0	400.8	0.0	98,606.5	526,231.0	
	SINAZONGWE	124.1	1,674.2	60.8	109,461.3	480,009.8	
	LUAPULA	MANSA	628.1	22,573.0	2,432.3	4,562.2	1,599,736.0
	NCHELENGE	669.6	51,534.3	1,389.1	292,343.4	794,437.8	
	KAWAMBWA	0.0	26,378.7	2,134.1	6,932.4	910,837.0	
	MWENSE	0.0	12,122.7	1,586.9	3,076.8	667,214.0	
	SANFYA	3,947.1	150,020.5	1,546.9	169,460.3	987,222.2	
	NORTHERN	KASAMA	0.0	6,982.4	4,362.2	1,882.0	2,045,749.8
		KAPUTA	0.0	38,953.2	709.1	203,524.7	1,238,834.1
		MBALA	589.6	18,933.2	1,989.8	154,155.3	1,869,524.1
	MPOROKOSO	0.0	12,072.4	1,391.4	681.0	1,193,294.1	
	LUWINGU	0.0	9,028.2	441.1	2,668.4	883,133.3	
	CHILUBI	0.0	45,120.1	219.4	62,242.7	526,921.8	
	ISOKA	2,540.3	1,986.0	308.7	0.0	1,376,749.9	
	CHINSALI	654.5	3,383.2	1,030.5	616.0	1,544,514.2	
	MPIKA	22,818.1	67,527.2	2,808.7	610.8	4,030,470.3	
	EASTERN	CHIPATA	351.8	0.0	2,532.4	253.7	1,218,943.4
	CHAMA	410.9	572.9	105.5	180.5	1,780,311.1	
	LUNDAZI	815.4	0.0	199.5	0.0	1,368,722.6	
	CHADIZA	0.0	0.0	0.0	0.0	250,155.8	
	KATETE	0.0	0.0	197.9	0.0	384,155.8	
	PETAUKE	1,347.3	564.5	1,417.6	689.0	1,912,338.8	
TOTAL		100,879.5	837,940.9	106,500.5	1,262,111.7	75,185,076.0	

**APPENDIX D**

**GEOLOGY BY WATERSHED BOUNDARY**



	1.0	2.0	3.0	4.0	5.0	6.0
	Kimberlite	Carbonate	Basic igneous and meta igneous rocks, amphibolites	Syenite, syenodiorite and diorite and metamorphic equivalents	Granite	Mylonite and Blastomylonite
WATERSHED NUMBER						
AZ-01	0.0	0.0	16,048.1	0.0	0.0	0.0
AZ-02	0.0	0.0	0.0	0.0	0.0	0.0
AZ-03	0.0	0.0	0.0	0.0	0.0	0.0
AZ-04	0.0	0.0	18,064.7	568.3	1,045.3	0.0
AZ-05	0.0	0.0	0.0	0.0	0.0	0.0
AZ-06	0.0	0.0	0.0	0.0	57,734.2	0.0
AZ-07	0.0	0.0	0.0	0.0	0.0	0.0
AZ-08	0.0	0.0	0.0	0.0	0.0	0.0
AZ-09	0.0	0.0	0.0	0.0	0.0	0.0
AZ-10	0.0	0.0	0.0	0.0	0.0	0.0
AZ-11	0.0	0.0	0.0	0.0	0.0	0.0
AZ-12	0.0	0.0	0.0	0.0	0.0	0.0
AZ-13	0.0	0.0	0.0	0.0	0.0	0.0
AZ-14	0.0	0.0	0.0	0.0	0.0	0.0
AZ-15	0.0	0.0	5,320.7	0.0	138,414.4	0.0
AZ-16	0.0	0.0	0.0	0.0	0.0	0.0
AZ-17	0.0	0.0	0.0	0.0	0.0	0.0
AZ-18	0.0	0.0	2,367.8	0.0	548,838.7	8,989.2
AZ-19	0.0	0.0	57.0	0.0	590.9	0.0
AZ-20	0.0	0.0	5,385.0	0.0	8,496.1	0.0
SUBTOTAL	0.0	0.0	47,243.3	568.3	785,119.6	8,989.2
AK-01	0.0	0.0	0.0	0.0	0.0	0.0
AK-02	0.0	0.0	3,125.8	0.0	5,324.4	0.0
AK-03	0.0	0.0	0.0	0.0	4,495.8	0.0
AK-04	0.0	0.0	1,135.7	0.0	0.0	0.0
AK-05	0.0	0.0	2,663.7	0.0	666.3	0.0
AK-06	0.0	0.0	0.0	0.0	0.0	0.0
AK-07	0.0	0.0	811.5	0.0	0.0	0.0
AK-08	0.0	0.0	0.0	0.0	0.0	0.0
AK-09	0.0	0.0	0.0	11,987.1	48,746.1	0.0
AK-10	0.0	0.0	25,915.8	0.0	0.0	0.0
AK-11	0.0	0.0	0.0	0.0	1,954.5	0.0
AK-12	2,009.8	0.0	0.0	5,101.7	159,218.1	0.0
AK-13	1,212.8	0.0	0.0	0.0	505,564.2	0.0
AK-14	0.0	0.0	2,365.1	9,091.4	459,716.2	0.0
AK-15	0.0	0.0	0.0	0.0	273.9	0.0
SUBTOTAL	3,222.6	0.0	36,017.6	26,180.2	1,185,960.5	0.0
AL-01	0.0	537.2	18,418.3	55,750.2	551,459.2	0.0
AL-02	0.0	0.0	3,397.2	19,987.9	163,340.9	0.0
AL-03	0.0	0.0	4,940.0	1,100.0	38,471.3	0.0
AL-04	0.0	0.0	6,184.8	0.0	22,345.7	0.0
AL-05	0.0	0.0	1,207.0	4,623.8	0.0	0.0
AL-06	0.0	0.0	553.2	0.0	0.0	0.0
AL-07	0.0	0.0	1,445.9	0.0	0.0	0.0
AL-08	0.0	9,927.4	0.0	0.0	1,151.2	0.0
SUBTOTAL	0.0	10,464.6	36,146.4	81,461.9	776,768.3	0.0
AC-01	0.0	0.0	8,836.2	0.0	1,340,029.6	0.0
AC-02	0.0	0.0	0.0	0.0	342,323.1	0.0
AC-03	0.0	0.0	0.0	0.0	144,976.2	0.0
SUBTOTAL	0.0	0.0	8,836.2	0.0	1,827,328.9	0.0
AP-01	0.0	0.0	0.0	0.0	1,225,072.5	0.0
AP-02	0.0	0.0	0.0	3,434.7	376,631.8	0.0
AP-03	0.0	0.0	0.0	0.0	502,845.8	0.0
AP-04	0.0	0.0	0.0	1,055.3	0.0	0.0
AP-05	0.0	0.0	0.0	1,657.8	18,953.7	0.0
AP-06	0.0	0.0	0.0	1,040.6	116,092.8	0.0
SUBTOTAL	0.0	0.0	0.0	7,188.4	2,239,596.6	0.0
AT-01	0.0	0.0	1,622.7	0.0	12,838.1	0.0
AT-02	0.0	0.0	9,341.6	0.0	3,213.9	0.0
SUBTOTAL	0.0	0.0	10,964.3	0.0	16,102.0	0.0
AO-01	0.0	0.0	0.0	0.0	65,131.1	0.0
AO-02	0.0	0.0	0.0	3,816.1	419,126.2	0.0
SUBTOTAL	0.0	0.0	0.0	3,816.1	484,257.3	0.0
GRAND TOTAL	3,222.6	10,464.6	139,207.8	119,214.9	7,285,133.2	8,989.2

	70	80	90	100	110	120
	Quartz veins	Meta-quartzites of various ages	Calc-silicate rocks undifferentiated	Meta-carbonate rocks of various ages	Volcanics and meta-volcanics	Undifferentiated Basement Complex; mainly granitic gneisses and migmatites with some granite
WATERSHED NUMBER						
AZ-01	0.0	0.0	0.0	0.0	0.0	46,372.4
AZ-02	0.0	0.0	0.0	0.0	0.0	0.0
AZ-03	0.0	0.0	0.0	0.0	0.0	0.0
AZ-04	0.0	3,126.1	0.0	6,423.3	0.0	376,005.6
AZ-05	0.0	0.0	0.0	0.0	0.0	0.0
AZ-06	0.0	0.0	0.0	0.0	0.0	0.0
AZ-07	0.0	0.0	0.0	0.0	0.0	0.0
AZ-08	0.0	0.0	0.0	0.0	0.0	0.0
AZ-09	0.0	0.0	0.0	0.0	0.0	0.0
AZ-10	0.0	0.0	0.0	0.0	0.0	0.0
AZ-11	0.0	0.0	0.0	0.0	0.0	0.0
AZ-12	0.0	0.0	0.0	0.0	0.0	0.0
AZ-13	0.0	0.0	0.0	0.0	0.0	0.0
AZ-14	0.0	0.0	0.0	0.0	0.0	0.0
AZ-15	0.0	0.0	0.0	0.0	0.0	0.0
AZ-16	0.0	0.0	0.0	0.0	0.0	412,045.8
AZ-17	0.0	0.0	0.0	0.0	0.0	0.0
AZ-18	0.0	955.5	934.7	7,723.2	0.0	667,945.9
AZ-19	0.0	1,299.1	20,934.3	17,897.4	0.0	86,003.4
AZ-20	0.0	57,541.5	0.0	29,419.2	58,698.4	535,887.7
SUBTOTAL	0.0	62,922.2	21,919.0	61,463.1	58,698.4	2,124,260.8
AK-01	0.0	0.0	0.0	0.0	0.0	4,592.9
AK-02	0.0	158.9	0.0	0.0	0.0	28,059.7
AK-03	0.0	8,289.0	0.0	0.0	0.0	65,299.6
AK-04	0.0	0.0	0.0	0.0	0.0	9,290.8
AK-05	0.0	1,243.4	0.0	0.0	0.0	39,251.5
AK-06	0.0	0.0	0.0	0.0	0.0	0.0
AK-07	0.0	6,011.7	0.0	0.0	0.0	150,291.7
AK-08	0.0	0.0	0.0	0.0	0.0	0.0
AK-09	0.0	12,758.5	0.0	0.0	0.0	85,730.9
AK-10	0.0	2,435.4	0.0	0.0	0.0	79,542.7
AK-11	0.0	0.0	0.0	0.0	0.0	0.0
AK-12	0.0	0.0	0.0	0.0	0.0	0.0
AK-13	0.0	0.0	0.0	0.0	0.0	0.0
AK-14	0.0	64,198.7	317,433.1	187,379.5	2,083.8	533,970.4
AK-15	0.0	2,411.1	0.0	53,397.7	11,391.9	64,607.2
SUBTOTAL	0.0	97,856.7	317,433.1	240,777.1	13,475.7	1,060,637.4
AL-01	0.0	196,608.4	0.0	7,305.9	3,675.5	2,964,801.2
AL-02	0.0	113,609.8	0.0	20,711.5	18,794.2	728,801.3
AL-03	0.0	86,709.7	0.0	26,296.9	0.0	288,100.5
AL-04	0.0	147,994.8	0.0	1,818.4	51,360.7	1,417,484.1
AL-05	0.0	179,371.0	0.0	5,039.5	0.0	787,846.1
AL-06	0.0	28,113.8	0.0	0.0	0.0	42,900.7
AL-07	0.0	16,181.3	0.0	0.0	7.5	69,015.5
AL-08	0.0	36,500.8	0.0	1,991.0	11,021.0	118,441.8
SUBTOTAL	0.0	805,889.8	0.0	63,163.2	84,858.9	6,437,391.3
AC-01	0.0	142,056.9	0.0	0.0	3,626.2	79,803.5
AC-02	0.0	0.0	0.0	0.0	0.0	47,128.4
AC-03	0.0	0.0	0.0	0.0	0.0	11,104.7
SUBTOTAL	0.0	142,056.9	0.0	0.0	3,626.2	138,036.6
AP-01	0.0	78,525.6	0.0	0.0	48,332.0	175,617.0
AP-02	0.0	84,703.6	0.0	0.0	2,074.4	171,571.5
AP-03	0.0	0.0	0.0	0.0	244,086.9	0.0
AP-04	0.0	17,484.2	0.0	0.0	0.0	0.0
AP-05	1,777.7	515,995.8	0.0	0.0	135,915.0	0.0
AP-06	0.0	534.1	0.0	0.0	125,185.8	0.0
SUBTOTAL	1,777.7	697,233.3	0.0	0.0	555,594.1	347,188.5
AT-01	7,029.4	580,531.9	0.0	0.0	2,168.0	0.0
AT-02	0.0	396,723.6	0.0	0.0	64,627.8	0.0
SUBTOTAL	7,029.4	977,255.5	0.0	0.0	66,795.8	0.0
AO-01	0.0	5,057.1	0.0	0.0	5,328.7	57,255.7
AO-03	0.0	5,639.3	0.0	0.0	0.0	226,783.2
SUBTOTAL	0.0	10,746.4	0.0	0.0	5,328.7	284,038.9
GRAND TOTAL	8,807.1	2,791,860.8	339,352.1	365,403.5	788,377.8	10,391,453.4

	130	140	150	160	170
	Granulite facies rocks (excluding charnockites)	Pre-katanga schists, undifferentiated includes Lufubu Schists of Copperbelt (interlayered gneiss and schist) and various groups in Southern and Northwestern Provinces	Metamorphosed pelite, quartzite-pelite and psammite sequences, some with associated meta-volcanic rocks. Includes Chisamba Formation.	Quartzite-pelite sequences	Lower quartzite
WATERSHED NUMBER					
AZ-01	0.0	0.0	0.0	0.0	0.0
AZ-02	0.0	0.0	0.0	0.0	0.0
AZ-03	0.0	0.0	0.0	0.0	0.0
AZ-04	0.0	59,713.2	0.0	0.0	0.0
AZ-05	0.0	0.0	0.0	0.0	0.0
AZ-06	0.0	0.0	0.0	0.0	0.0
AZ-07	0.0	0.0	0.0	0.0	0.0
AZ-08	0.0	0.0	0.0	0.0	0.0
AZ-09	0.0	0.0	0.0	0.0	0.0
AZ-10	0.0	0.0	0.0	0.0	0.0
AZ-11	0.0	0.0	0.0	0.0	0.0
AZ-12	0.0	0.0	0.0	0.0	0.0
AZ-13	0.0	0.0	0.0	0.0	0.0
AZ-14	0.0	0.0	0.0	0.0	0.0
AZ-15	0.0	72,049.1	0.0	0.0	0.0
AZ-16	0.0	0.0	0.0	0.0	0.0
AZ-17	0.0	0.0	0.0	0.0	0.0
AZ-18	0.0	206,199.7	0.0	0.0	0.0
AZ-19	0.0	0.0	0.0	0.0	0.0
AZ-20	0.0	0.0	133,436.3	0.0	0.0
SUBTOTAL	0.0	337,962.0	133,436.3	0.0	0.0
AK-01	0.0	0.0	0.0	0.0	0.0
AK-02	0.0	1,493.6	0.0	5,224.3	0.0
AK-03	0.0	31,990.5	0.0	0.0	0.0
AK-04	0.0	59,569.6	0.0	43,711.3	0.0
AK-05	0.0	2,344.7	0.0	152,789.1	0.0
AK-06	0.0	0.0	0.0	0.0	0.0
AK-07	0.0	0.0	0.0	0.0	0.0
AK-08	0.0	0.0	0.0	0.0	0.0
AK-09	0.0	0.0	19,174.0	78,870.5	0.0
AK-10	0.0	0.0	0.0	0.0	0.0
AK-11	0.0	0.0	0.0	0.0	0.0
AK-12	0.0	0.0	0.0	0.0	0.0
AK-13	0.0	0.0	0.0	0.0	0.0
AK-14	0.0	101,331.6	15,959.1	0.0	0.0
AK-15	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	197,185.0	35,133.1	280,595.2	0.0
AL-01	266,810.2	0.0	0.0	569,368.5	52,663.1
AL-02	0.0	0.0	27,054.2	3,289.3	0.0
AL-03	0.0	0.0	19,139.1	0.0	0.0
AL-04	0.0	0.0	261,870.7	346,650.2	0.0
AL-05	0.0	0.0	86,653.5	131,757.6	0.0
AL-06	0.0	0.0	13,367.6	0.0	0.0
AL-07	0.0	0.0	4,069.2	0.0	0.0
AL-08	0.0	0.0	68,065.8	0.0	0.0
SUBTOTAL	266,810.2	0.0	472,320.1	1,051,075.6	52,663.1
AC-01	0.0	0.0	0.0	530,835.3	552,780.2
AC-02	0.0	0.0	0.0	0.0	253,000.7
AC-03	0.0	0.0	0.0	0.0	3,656.2
SUBTOTAL	0.0	0.0	0.0	530,835.3	809,437.1
AP-01	0.0	0.0	0.0	94,652.4	81,154.0
AP-02	0.0	0.0	0.0	320,589.6	0.0
AP-03	0.0	0.0	0.0	0.0	102,692.4
AP-04	0.0	0.0	0.0	0.0	218,400.8
AP-05	0.0	0.0	0.0	0.0	36,244.2
AP-06	0.0	0.0	0.0	0.0	64,302.3
SUBTOTAL	0.0	0.0	0.0	415,242.0	502,803.7
AT-01	0.0	0.0	0.0	0.0	56,974.2
AT-02	0.0	0.0	0.0	0.0	6,770.0
SUBTOTAL	0.0	0.0	0.0	0.0	63,744.2
AO-01	0.0	0.0	0.0	0.0	28,691.3
AO-02	43,395.3	0.0	505.9	0.0	0.0
SUBTOTAL	43,395.3	0.0	505.9	0.0	28,691.3
GRAND TOTAL	315,205.5	535,147.0	641,395.4	1,267,798.1	1,457,339.4

WATERSHED NUMBER	180	190	200	210	220
	Lower shales	Upper quartzite	Upper shales	Silice 'Series' undifferentiated. Upper Roan plus Mwashia in Northwestern Province and at western end of Copperbelt; probably Lower and Upper Roan around Luswishi Dome. Status uncertain south of Copperbelt.	Lower Roan with basal conglomerate; the main copper-bearing unit. Includes quartzites, conglomerates, argillites, arkoses, and some dolomite.
AZ-01	0.0	0.0	0.0	0.0	0.0
AZ-02	0.0	0.0	0.0	0.0	0.0
AZ-03	0.0	0.0	0.0	0.0	0.0
AZ-04	0.0	0.0	0.0	0.0	0.0
AZ-05	0.0	0.0	0.0	553,935.0	151,133.3
AZ-06	0.0	0.0	0.0	0.0	0.0
AZ-07	0.0	0.0	0.0	0.0	0.0
AZ-08	0.0	0.0	0.0	0.0	0.0
AZ-09	0.0	0.0	0.0	0.0	0.0
AZ-10	0.0	0.0	0.0	0.0	0.0
AZ-11	0.0	0.0	0.0	0.0	0.0
AZ-12	0.0	0.0	0.0	0.0	0.0
AZ-13	0.0	0.0	0.0	0.0	0.0
AZ-14	0.0	0.0	0.0	0.0	0.0
AZ-15	0.0	0.0	0.0	0.0	0.0
AZ-16	0.0	0.0	0.0	0.0	0.0
AZ-17	0.0	0.0	0.0	0.0	0.0
AZ-18	0.0	0.0	0.0	87,442.6	0.0
AZ-19	0.0	0.0	0.0	39,581.6	0.0
AZ-20	0.0	0.0	0.0	159,111.5	0.0
SUBTOTAL	0.0	0.0	0.0	840,120.7	151,133.3
AK-01	0.0	0.0	0.0	2,662.7	4,447.7
AK-02	0.0	0.0	0.0	0.0	9,437.4
AK-03	0.0	0.0	0.0	7,268.1	15,311.1
AK-04	0.0	0.0	0.0	31,101.5	34,521.3
AK-05	0.0	0.0	0.0	45,520.9	145,906.4
AK-06	0.0	0.0	0.0	0.0	51,827.2
AK-07	0.0	0.0	0.0	38,108.9	24,293.5
AK-08	0.0	0.0	0.0	0.0	14,705.5
AK-09	0.0	0.0	0.0	129,642.2	147,189.8
AK-10	0.0	0.0	0.0	4,914.2	8,818.4
AK-11	0.0	0.0	0.0	0.0	0.0
AK-12	0.0	0.0	0.0	0.0	0.0
AK-13	0.0	0.0	0.0	0.0	0.0
AK-14	0.0	0.0	0.0	907,673.7	0.0
AK-15	0.0	0.0	0.0	116,616.5	0.0
SUBTOTAL	0.0	0.0	0.0	1,283,508.7	456,458.3
AL-01	0.0	0.0	0.0	0.0	0.0
AL-02	0.0	0.0	0.0	0.0	0.0
AL-03	0.0	0.0	0.0	0.0	0.0
AL-04	0.0	0.0	0.0	71,210.2	4,767.8
AL-05	0.0	0.0	0.0	0.0	0.0
AL-06	0.0	0.0	0.0	0.0	0.0
AL-07	0.0	0.0	0.0	0.0	0.0
AL-08	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	71,210.2	4,767.8
AC-01	0.0	0.0	0.0	0.0	0.0
AC-02	0.0	0.0	0.0	0.0	0.0
AC-03	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0
AP-01	0.0	0.0	0.0	0.0	0.0
AP-02	0.0	0.0	0.0	0.0	0.0
AP-03	75,067.5	251,876.2	60,103.4	0.0	0.0
AP-04	110,132.0	553,737.5	159,183.4	0.0	0.0
AP-05	87,897.6	27,956.1	0.0	0.0	0.0
AP-06	43,301.2	138,157.8	0.0	0.0	0.0
SUBTOTAL	316,398.3	966,727.6	249,286.8	0.0	0.0
AT-01	174,778.0	37,491.2	0.0	0.0	0.0
AT-02	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	174,778.0	37,491.2	0.0	0.0	0.0
AO-01	0.0	0.0	0.0	0.0	0.0
AO-02	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0
GRAND TOTAL	491,176.3	1,004,218.8	249,286.8	2,194,839.6	612,359.4

	230	240	250	260	270	280
WATERSHED NUMBER	Upper Roan - typically dolomite and argillite	Mwashla - typically carbonaceous shale and argillite	Kundehungu undifferentiated; may include some Mine 'Series' in the northwest. predominantly shales, siltstones, sandstones and mudlites	Kundehungu carbonate rocks; may be Mwashla in part in some areas	Lower Kundehungu Shales (Luapula Province)	Kundehungu Psammite and rudite formations (includes Feilit Conglomerat in Luapula Province)
AZ-01	0.0	0.0	42,938.4	0.0	0.0	0.0
AZ-02	0.0	0.0	0.0	0.0	0.0	0.0
AZ-03	0.0	0.0	0.0	0.0	0.0	0.0
AZ-04	2,269.3	0.0	1,243,959.1	72,725.3	0.0	0.0
AZ-05	0.0	0.0	3,745.3	0.0	0.0	0.0
AZ-06	0.0	0.0	819,990.4	0.0	0.0	27,775.6
AZ-07	0.0	0.0	0.0	0.0	0.0	0.0
AZ-08	0.0	0.0	0.0	0.0	0.0	0.0
AZ-09	0.0	0.0	0.0	0.0	0.0	0.0
AZ-10	0.0	0.0	0.0	0.0	0.0	0.0
AZ-11	0.0	0.0	0.0	0.0	0.0	0.0
AZ-12	0.0	0.0	0.0	0.0	0.0	0.0
AZ-13	0.0	0.0	0.0	0.0	0.0	0.0
AZ-14	0.0	0.0	0.0	0.0	0.0	0.0
AZ-15	0.0	0.0	0.0	0.0	0.0	0.0
AZ-16	0.0	0.0	0.0	0.0	0.0	0.0
AZ-17	0.0	0.0	0.0	0.0	0.0	0.0
AZ-18	0.0	0.0	0.0	0.0	0.0	0.0
AZ-19	0.0	0.0	0.0	0.0	0.0	0.0
AZ-20	0.0	0.0	0.0	17,014.6	0.0	0.0
SUBTOTAL	2,269.3	0.0	2,110,633.2	89,739.9	0.0	27,775.6
AK-01	0.0	30,821.0	395,398.3	98,485.4	0.0	0.0
AK-02	10,731.6	3,461.9	2,503.7	7,708.2	0.0	0.0
AK-03	14,159.8	14,121.2	46,007.4	23,129.0	0.0	0.0
AK-04	17,729.5	9,662.6	31,410.4	70,211.1	0.0	0.0
AK-05	46,367.9	5,937.7	217,366.8	331,940.8	0.0	0.0
AK-06	25,900.4	0.0	6,593.5	0.0	0.0	0.0
AK-07	0.0	0.0	494,317.4	54,346.3	0.0	0.0
AK-08	0.0	0.0	61,590.1	13,066.7	0.0	0.0
AK-09	55,228.2	0.0	836,155.4	98,949.4	0.0	28,254.0
AK-10	12,802.2	13,424.4	1,705,871.2	194,230.2	0.0	0.0
AK-11	0.0	0.0	195,223.4	16,037.8	0.0	395.4
AK-12	0.0	0.0	593,669.6	224.3	0.0	3,183.9
AK-13	0.0	0.0	76,037.7	0.0	0.0	0.0
AK-14	0.0	0.0	437,331.0	42,097.7	0.0	0.0
AK-15	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	182,919.6	82,428.8	5,101,820.9	950,426.9	0.0	31,839.3
AL-01	0.0	0.0	2,659.6	0.0	0.0	0.0
AL-02	0.0	0.0	0.0	0.0	0.0	0.0
AL-03	0.0	0.0	0.0	0.0	0.0	0.0
AL-04	0.0	0.0	28,638.1	21,239.6	0.0	0.0
AL-05	0.0	0.0	0.0	0.0	0.0	0.0
AL-06	0.0	0.0	0.0	0.0	0.0	0.0
AL-07	0.0	0.0	0.0	0.0	0.0	0.0
AL-08	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	31,297.7	21,239.6	0.0	0.0
AC-01	0.0	0.0	123,192.3	0.0	0.0	0.0
AC-02	0.0	0.0	0.0	0.0	0.0	0.0
AC-03	0.0	0.0	148,103.7	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	271,296.0	0.0	0.0	0.0
AP-01	0.0	0.0	1,311,029.9	0.0	0.0	0.0
AP-02	0.0	0.0	516,879.6	9,869.8	27,091.4	149,193.3
AP-03	0.0	0.0	0.0	0.0	39,917.1	42,443.5
AP-04	0.0	0.0	0.0	0.0	0.0	0.0
AP-05	0.0	0.0	0.0	0.0	0.0	0.0
AP-06	0.0	0.0	34,579.2	0.0	0.0	177,759.1
SUBTOTAL	0.0	0.0	1,862,479.7	9,869.8	67,008.5	369,400.9
AT-01	0.0	0.0	0.0	0.0	0.0	0.0
AT-02	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	0.0
AO-01	0.0	0.0	0.0	0.0	0.0	0.0
AO-02	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	0.0
GRAND TOTAL	185,188.9	82,428.8	9,377,532.5	1,071,216.2	67,008.5	429,015.8



	29.0	30.0	31.0	32.0	33.0	34.0
	Upper Kundelungu shales (Lusapula Province)	Basal Formation and Coal Measure	Lower Karroo, undifferentiated	Upper Karroo (Zambesi Valley); Karroo undifferentiated (elsewhere)	Basalts	Kalahari Group with fossiliferous dunes
WATERSHED NUMBER						
AZ-01	0.0	0.0	0.0	0.0	0.0	159,493.0
AZ-02	0.0	0.0	0.0	0.0	0.0	523,369.7
AZ-03	0.0	0.0	0.0	0.0	0.0	241,108.4
AZ-04	0.0	0.0	0.0	0.0	0.0	1,416,209.9
AZ-05	0.0	0.0	0.0	9,986.6	1,401.5	253,535.2
AZ-06	0.0	0.0	0.0	23,626.9	4,267.9	626,639.7
AZ-07	0.0	0.0	0.0	69.1	148.6	28,128.3
AZ-08	0.0	0.0	0.0	0.0	0.0	449,836.0
AZ-09	0.0	0.0	0.0	0.0	0.0	597,500.3
AZ-10	0.0	0.0	0.0	6.7	0.0	0.0
AZ-11	0.0	0.0	0.0	0.0	0.0	0.0
AZ-12	0.0	0.0	0.0	0.0	0.0	0.0
AZ-13	0.0	0.0	0.0	0.0	0.0	0.0
AZ-14	0.0	0.0	0.0	0.0	0.0	0.0
AZ-15	0.0	0.0	0.0	0.0	0.0	0.0
AZ-16	0.0	0.0	0.0	0.0	3,991.8	336,412.7
AZ-17	0.0	0.0	0.0	0.0	0.0	0.0
AZ-18	0.0	10,320.6	129,945.0	424,781.4	279,191.6	110,535.5
AZ-19	0.0	578.1	30,383.7	90,866.0	3,949.8	6,239.1
AZ-20	0.0	0.0	0.0	81,906.7	5,590.9	0.0
SUBTOTAL	0.0	10,898.7	160,333.7	631,243.4	325,061.7	4,749,007.8
AK-01	0.0	0.0	0.0	0.0	0.0	0.0
AK-02	0.0	0.0	0.0	0.0	0.0	0.0
AK-03	0.0	0.0	0.0	0.0	0.0	0.0
AK-04	0.0	0.0	0.0	0.0	0.0	0.0
AK-05	0.0	0.0	0.0	0.0	0.0	0.0
AK-06	0.0	0.0	0.0	0.0	0.0	0.0
AK-07	0.0	0.0	0.0	0.0	0.0	33,843.5
AK-08	0.0	0.0	0.0	0.0	0.0	54.6
AK-09	0.0	0.0	0.0	0.0	0.0	12,756.1
AK-10	0.0	0.0	0.0	0.0	0.0	17,435.0
AK-11	0.0	0.0	0.0	60,980.0	0.0	0.0
AK-12	0.0	0.0	0.0	390,014.2	0.0	151,886.9
AK-13	0.0	0.0	0.0	299,803.2	0.0	21,670.1
AK-14	0.0	0.0	0.0	31,404.0	101.2	273,472.9
AK-15	0.0	0.0	7,212.9	57,996.9	3,028.8	0.0
SUBTOTAL	0.0	0.0	7,212.9	840,203.3	3,130.0	516,169.1
AL-01	0.0	14,662.9	533,899.9	1,934,560.9	0.0	0.0
AL-02	0.0	1,327.2	39,294.4	627,440.1	0.0	0.0
AL-03	0.0	0.0	0.0	8,387.6	0.0	0.0
AL-04	0.0	0.0	97,427.7	221,073.5	0.0	0.0
AL-05	0.0	0.0	24,587.7	250,040.9	0.0	0.0
AL-06	0.0	0.0	10,915.9	2,402.2	0.0	0.0
AL-07	0.0	0.0	0.0	45.9	0.0	0.0
AL-08	0.0	0.0	0.0	122,682.2	0.0	0.0
SUBTOTAL	0.0	15,990.1	696,125.6	3,166,633.3	0.0	0.0
AC-01	0.0	0.0	85.6	0.0	0.0	0.0
AC-02	0.0	0.0	0.0	0.0	0.0	0.0
AC-03	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	85.6	0.0	0.0	0.0
AP-01	0.0	0.0	2,634.7	0.0	0.0	0.0
AP-02	22,947.2	0.0	0.0	0.0	0.0	0.0
AP-03	13,553.1	0.0	0.0	0.0	0.0	0.0
AP-04	0.0	0.0	0.0	0.0	0.0	0.0
AP-05	0.0	0.0	0.0	0.0	0.0	0.0
AP-06	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	41,500.3	0.0	2,634.7	0.0	0.0	0.0
AT-01	0.0	0.0	0.0	0.0	0.0	0.0
AT-02	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	0.0
AO-01	0.0	0.0	0.0	0.0	0.0	0.0
AO-02	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	0.0
GRAND TOTAL	41,500.3	26,888.8	866,392.3	4,638,080.0	328,191.7	5,265,176.9

WATERSHED NUMBER	600	610	620	630	1000	2500	TOTAL (hectares)
	Kalahari Group/ Basement and Kantsanga System	Kalahari Group/ Karroo basalt	Kalahari Group/ Karroo Clastics	Kalahari Group/ Cretaceous	Alluvium, Colluvium, Laterite	Water	
AZ-01	0.0	0.0	0.0	0.0	82,039.3	0.0	346,881.2
AZ-02	0.0	0.0	0.0	0.0	47,189.3	0.0	570,559.0
AZ-03	0.0	0.0	0.0	0.0	18,743.0	0.0	259,851.4
AZ-04	0.0	0.0	0.0	0.0	196,883.3	0.0	4,102,111.9
AZ-05	0.0	0.0	0.0	0.0	7,781.8	0.0	216,450.4
AZ-06	446,771.7	20,057.0	43,612.0	0.0	11,515.0	0.0	2,086,990.4
AZ-07	0.0	57,955.1	0.0	0.0	2,316.6	0.0	88,617.7
AZ-08	0.0	8,949.8	0.0	0.0	90,192.6	0.0	548,978.4
AZ-09	0.0	3,289.2	158,810.3	0.0	188,806.3	0.0	948,406.1
AZ-10	210,895.4	1,637,643.0	297,784.8	0.0	221,421.5	0.0	2,417,152.4
AZ-11	0.0	0.0	60,704.0	527,153.9	158,658.7	0.0	746,516.6
AZ-12	0.0	6,496.0	572,765.4	33,963.3	278,548.1	0.0	891,772.8
AZ-13	0.0	314,335.1	113,625.6	236,782.7	356,238.2	0.0	1,020,981.6
AZ-14	149,815.5	2,711,836.0	0.0	982,162.8	500,519.3	0.0	4,344,333.6
AZ-15	661,830.1	221,134.1	419,972.0	0.0	317,859.0	0.0	2,589,029.7
AZ-16	0.0	478,315.3	0.0	826,323.7	113,115.7	0.0	1,417,754.7
AZ-17	0.0	0.0	0.0	0.0	30,077.4	0.0	167,132.5
AZ-18	0.0	0.0	0.0	0.0	801.2	215,794.0	2,598,520.2
AZ-19	0.0	0.0	0.0	0.0	0.0	25.4	292,171.7
AZ-20	0.0	0.0	0.0	0.0	16,052.0	0.0	1,108,539.9
SUBTOTAL	1,469,313.7	5,510,010.6	1,672,274.1	1,606,386.4	2,638,748.5	215,819.4	26,823,352.2
AK-01	0.0	0.0	0.0	0.0	40,133.6	0.0	577,541.6
AK-02	0.0	0.0	0.0	0.0	0.0	479.7	82,714.2
AK-03	0.0	0.0	0.0	0.0	0.0	1,165.0	231,237.5
AK-04	0.0	0.0	0.0	0.0	0.0	0.0	308,743.8
AK-05	0.0	0.0	0.0	0.0	114,428.8	0.0	1,106,428.0
AK-06	0.0	0.0	0.0	0.0	35,205.4	0.0	119,926.4
AK-07	0.0	0.0	0.0	0.0	76,865.9	0.0	883,890.4
AK-08	0.0	0.0	0.0	0.0	45,403.6	0.0	134,760.5
AK-09	0.0	0.0	0.0	0.0	574,253.8	11,414.5	2,151,110.5
AK-10	0.0	0.0	0.0	0.0	34,416.2	0.0	2,099,905.7
AK-11	0.0	0.0	0.0	0.0	1,238.2	0.0	276,835.3
AK-12	77,715.3	0.0	236,834.5	0.0	31,118.0	0.0	1,650,981.3
AK-13	70,392.6	0.0	81,022.5	0.0	3,210.4	36,323.2	1,095,241.7
AK-14	160,688.0	0.0	321,194.6	0.0	788,196.0	7,789.3	4,663,527.3
AK-15	0.0	0.0	0.0	0.0	0.0	0.0	316,936.9
SUBTOTAL	308,795.9	0.0	639,051.6	0.0	1,744,469.9	57,171.7	15,699,781.2
AL-01	0.0	0.0	0.0	0.0	378,975.6	0.0	7,342,156.6
AL-02	0.0	0.0	0.0	0.0	76,872.4	0.0	1,843,920.4
AL-03	0.0	138.4	0.0	0.0	333.1	0.0	465,616.6
AL-04	0.0	0.0	0.0	0.0	15,855.5	8,239.8	2,744,271.6
AL-05	0.0	0.0	0.0	0.0	0.0	0.0	1,471,127.1
AL-06	0.0	0.0	0.0	0.0	0.0	0.0	98,253.4
AL-07	0.0	0.0	0.0	0.0	0.0	0.0	90,765.5
AL-08	0.0	0.0	0.0	0.0	9,825.3	0.0	379,606.5
SUBTOTAL	0.0	138.4	0.0	0.0	281,861.9	8,239.8	14,435,717.7
AC-01	0.0	0.0	0.0	0.0	702,647.6	553.4	3,474,496.8
AC-02	0.0	0.0	0.0	0.0	7,917.6	0.0	650,269.8
AC-03	0.0	0.0	0.0	0.0	9,981.4	0.0	317,827.2
SUBTOTAL	0.0	0.0	0.0	0.0	720,546.6	553.4	4,442,693.8
AP-01	0.0	0.0	0.0	0.0	1,577,977.5	207,450.7	4,801,447.3
AP-02	0.0	0.0	0.0	0.0	62,931.0	0.0	1,747,967.9
AP-03	0.0	0.0	0.0	0.0	85,961.8	3,416.7	1,326,969.4
AP-04	0.0	0.0	0.0	0.0	144,534.0	0.0	1,239,577.2
AP-05	0.0	0.0	0.0	0.0	70,877.4	156,742.9	1,854,018.2
AP-06	0.0	0.0	0.0	0.0	90,896.4	279,371.7	1,061,211.0
SUBTOTAL	0.0	0.0	0.0	0.0	2,033,278.1	646,982.0	11,332,191.0
AT-01	0.0	0.0	0.0	0.0	29,170.6	0.0	902,654.1
AT-02	0.0	0.0	0.0	0.0	4,929.5	197,299.7	682,906.1
SUBTOTAL	0.0	0.0	0.0	0.0	34,100.1	197,299.7	1,585,560.2
AO-01	0.0	0.0	0.0	0.0	0.0	0.0	161,463.9
AO-02	0.0	0.0	0.0	0.0	0.0	0.0	704,316.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	0.0	865,779.9
GRAND TOTAL	1,778,109.6	5,510,149.6	2,311,325.7	1,606,386.4	7,453,005.1	1,116,066.0	75,185,076.0

**APPENDIX E**

**GEOMORPHOLOGY BY WATERSHED BOUNDARY**

WATERSHED NUMBER	1A1 MONTANE PLATEAU	1A2 MONTANE ESCARPMENT	2A1 LEVEL TO UNDULATING PLATEAU	2A2 DISSECTED PLATEAU	2A3 HILLS, RIDGES AND MINOR ESCARPMENTS	2A4 SWAMPS
AZ-01	0.0	0.0	89,143.0	0.0	8,289.9	0.0
AZ-02	0.0	0.0	0.0	0.0	0.0	0.0
AZ-03	0.0	0.0	0.0	0.0	0.0	0.0
AZ-04	0.0	0.0	2,359,384.2	0.0	39,785.3	47,567.2
AZ-05	0.0	0.0	19,856.2	0.0	0.0	0.0
AZ-06	0.0	0.0	1,232,004.7	0.0	4,102.6	0.0
AZ-07	0.0	0.0	1,617.1	0.0	0.0	0.0
AZ-08	0.0	0.0	0.0	0.0	0.0	0.0
AZ-09	0.0	0.0	0.0	0.0	0.0	0.0
AZ-10	0.0	0.0	15,583.5	0.0	0.0	0.0
AZ-11	0.0	0.0	0.0	0.0	0.0	0.0
AZ-12	0.0	0.0	0.0	0.0	0.0	0.0
AZ-13	0.0	0.0	0.0	0.0	0.0	0.0
AZ-14	0.0	0.0	0.0	0.0	0.0	0.0
AZ-15	0.0	0.0	31,642.5	0.0	71,371.2	0.0
AZ-16	0.0	0.0	0.0	0.0	0.0	0.0
AZ-17	0.0	0.0	0.0	0.0	0.0	0.0
AZ-18	0.0	0.0	0.0	0.0	22,231.9	0.0
AZ-19	0.0	0.0	0.0	0.0	0.0	0.0
AZ-20	0.0	0.0	429,808.7	169,006.5	7,709.5	0.0
SUBTOTAL	0.0	0.0	4,179,039.9	169,006.5	153,490.4	47,567.2
AK-01	0.0	0.0	528,489.9	0.0	8,868.4	26,957.2
AK-02	0.0	0.0	80,053.5	0.0	2,111.0	0.0
AK-03	0.0	0.0	229,939.9	0.0	12.5	0.0
AK-04	0.0	0.0	298,106.7	0.0	10,637.2	0.0
AK-05	0.0	0.0	897,841.1	42,112.4	60,723.0	5,316.7
AK-06	0.0	0.0	47,441.2	25,958.2	11,321.7	701.2
AK-07	0.0	0.0	752,352.6	30,903.3	23,909.6	8,530.0
AK-08	0.0	0.0	89,088.0	324.8	0.0	5,072.0
AK-09	0.0	0.0	1,402,363.1	109.9	163,061.6	215,962.4
AK-10	0.0	0.0	1,821,383.5	0.0	243,827.6	16,448.9
AK-11	0.0	0.0	231,848.8	0.0	43,748.3	0.0
AK-12	0.0	0.0	1,355,055.6	0.0	45,397.9	0.0
AK-13	0.0	0.0	861,015.1	0.0	59,266.3	0.0
AK-14	0.0	0.0	1,426,646.4	14,302.8	276,369.8	347,199.6
AK-15	0.0	0.0	32,232.8	31,841.3	0.0	0.0
SUBTOTAL	0.0	0.0	10,054,068.1	145,552.7	989,324.9	616,188.0
AL-01	42,896.7	5,401.1	1,394,493.0	682,184.4	379,613.2	0.0
AL-02	0.0	0.0	380,938.8	59,648.9	21,243.0	7,972.5
AL-03	0.0	0.0	151,290.8	0.0	0.0	0.0
AL-04	0.0	0.0	1,577,344.1	304,137.2	190,567.1	0.0
AL-05	0.0	0.0	400,898.8	131,314.1	209,351.3	0.0
AL-06	0.0	0.0	0.0	0.0	0.0	0.0
AL-07	0.0	0.0	0.0	0.0	0.0	0.0
AL-08	0.0	0.0	0.0	19,329.2	0.0	0.0
SUBTOTAL	42,896.7	5,401.1	3,904,965.5	1,196,613.8	806,771.6	7,972.5
AC-01	0.0	0.0	2,164,287.7	6,363.2	583,751.9	38,907.5
AC-02	0.0	0.0	610,394.9	551.1	31,508.1	0.0
AC-03	0.0	0.0	305,289.7	0.0	2,556.2	0.0
SUBTOTAL	0.0	0.0	3,079,972.3	6,914.3	617,816.2	38,907.5
AP-01	0.0	0.0	2,858,940.2	0.0	158,368.2	780,432.6
AP-02	0.0	0.0	1,524,064.1	0.0	162,194.6	4,392.2
AP-03	0.0	0.0	925,526.7	166,090.7	131,913.0	1,765.3
AP-04	0.0	0.0	857,702.2	295.4	128,890.3	13,654.3
AP-05	0.0	0.0	20,523.2	61,380.1	0.0	0.0
AP-06	0.0	0.0	106,367.6	48,820.9	0.0	0.0
SUBTOTAL	0.0	0.0	6,363,124.0	276,587.1	581,368.1	800,211.4
AT-01	0.0	0.0	334,123.4	39,756.4	0.0	0.0
AT-02	0.0	0.0	434,725.5	0.0	20,803.5	0.0
SUBTOTAL	0.0	0.0	468,848.9	39,756.4	20,803.5	0.0
AO-01	0.0	0.0	129,368.3	0.0	33,095.6	0.0
AO-03	0.0	0.0	390,853.3	0.0	95,733.0	0.0
SUBTOTAL	0.0	0.0	520,221.6	0.0	127,828.6	0.0
GRAND TOTAL	42,896.7	5,401.1	18,570,330.4	1,834,430.8	3,397,406.3	1,510,856.6

WATERSHED NUMBER	2A5 LAKES	2A6 FLOODPLAINS	2A7 TERRACES	2B1 LINEAR DUNE COMPLEX	2B2 PAN COMPLEX	2B3 DILUNGUS
AZ-01	0.0	0.0	0.0	58,940.4	0.0	0.0
AZ-02	0.0	0.0	0.0	146,768.7	0.0	28,536.7
AZ-03	0.0	0.0	0.0	74,864.8	0.0	1,447.6
AZ-04	0.0	33,675.4	0.0	0.0	0.0	115,124.9
AZ-05	0.0	0.0	0.0	0.0	0.0	2,781.8
AZ-06	0.0	0.0	0.0	0.0	194,241.7	0.0
AZ-07	0.0	0.0	0.0	0.0	57,230.3	2,316.6
AZ-08	0.0	0.0	0.0	0.0	12,320.6	68,338.4
AZ-09	0.0	0.0	0.0	756,124.1	3,497.7	0.0
AZ-10	0.0	0.0	0.0	0.0	1,140,176.6	3,581.6
AZ-11	0.0	0.0	0.0	517,079.0	70,714.4	0.0
AZ-12	0.0	0.0	0.0	572,749.5	38,744.3	0.0
AZ-13	0.0	0.0	0.0	57,789.4	623,393.7	0.0
AZ-14	0.0	0.0	0.0	1,135,263.1	2,440,292.2	0.0
AZ-15	0.0	221,423.7	0.0	253.0	133,555.2	0.0
AZ-16	0.0	0.0	0.0	1,246,011.4	0.0	0.0
AZ-17	0.0	30,076.1	0.0	0.0	0.0	0.0
AZ-18	0.0	801.2	0.0	0.0	0.0	0.0
AZ-19	0.0	0.0	0.0	0.0	0.0	0.0
AZ-20	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	285,976.4	0.0	4,571,345.4	4,714,166.7	217,127.6
AK-01	0.0	13,226.1	0.0	0.0	0.0	0.0
AK-02	479.7	0.0	0.0	0.0	0.0	0.0
AK-03	1,285.2	0.0	0.0	0.0	0.0	0.0
AK-04	0.0	0.0	0.0	0.0	0.0	0.0
AK-05	0.0	100,434.9	0.0	0.0	0.0	0.0
AK-06	0.0	34,504.2	0.0	0.0	0.0	0.0
AK-07	0.0	68,195.0	0.0	0.0	0.0	0.0
AK-08	0.0	40,275.6	0.0	0.0	0.0	0.0
AK-09	11,414.5	343,194.0	14,804.9	0.0	0.0	0.0
AK-10	0.0	18,245.8	0.0	0.0	0.0	0.0
AK-11	0.0	1,238.2	0.0	0.0	0.0	0.0
AK-12	0.0	14,543.1	0.0	0.0	0.0	0.0
AK-13	36,384.3	3,210.4	0.0	0.0	0.0	0.0
AK-14	7,743.3	441,719.8	0.0	0.0	0.0	0.0
AK-15	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	57,507.0	1,078,787.1	14,804.9	0.0	0.0	0.0
AL-01	0.0	0.0	0.0	0.0	0.0	0.0
AL-02	0.0	0.0	0.0	0.0	0.0	0.0
AL-03	0.0	0.0	0.0	0.0	0.0	0.0
AL-04	8,227.9	0.0	0.0	0.0	0.0	0.0
AL-05	0.0	0.0	0.0	0.0	0.0	0.0
AL-06	0.0	0.0	0.0	0.0	0.0	0.0
AL-07	0.0	0.0	0.0	0.0	0.0	0.0
AL-08	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	8,227.9	0.0	0.0	0.0	0.0	0.0
AC-01	553.4	664,371.0	0.0	0.0	0.0	0.0
AC-02	0.0	7,915.7	0.0	0.0	0.0	0.0
AC-03	0.0	9,981.4	0.0	0.0	0.0	0.0
SUBTOTAL	553.4	682,268.1	0.0	0.0	0.0	0.0
AP-01	228,817.2	775,882.1	0.0	0.0	0.0	0.0
AP-02	0.0	57,317.1	0.0	0.0	0.0	0.0
AP-03	3,416.7	81,909.5	0.0	0.0	0.0	0.0
AP-04	0.0	131,110.1	0.0	0.0	0.0	0.0
AP-05	0.0	11,617.7	0.0	0.0	0.0	0.0
AP-06	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	232,233.9	1,057,836.5	0.0	0.0	0.0	0.0
AT-01	0.0	0.0	0.0	0.0	0.0	0.0
AT-02	539.2	80.6	0.0	0.0	0.0	0.0
SUBTOTAL	539.2	80.6	0.0	0.0	0.0	0.0
AO-01	0.0	0.0	0.0	0.0	0.0	0.0
AO-03	0.0	0.0	0.0	0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	0.0
GRAND TOTAL	298,851.4	3,104,948.7	14,804.9	4,571,345.4	4,714,166.7	217,127.6

WATERSHED NUMBER	2B1 SLIGHTLY DISSECTED PLATEAU	2B3 FLOODPLAINS	2B7 ALLUVIATED VALLEYS	3A ESCARPMENT	3B ESCARPMENT COMPLEX	4A1 ISOLATED LARGE HILLS
AZ-01	108,415.4	82,093.2	0.0	0.0	0.0	0.0
AZ-02	379,943.8	15,309.7	0.0	0.0	0.0	0.0
AZ-03	165,229.9	17,309.0	0.0	0.0	0.0	0.0
AZ-04	1,505,373.7	0.0	0.0	0.0	0.0	0.0
AZ-05	248,812.4	0.0	0.0	0.0	0.0	0.0
AZ-06	645,126.2	0.0	11,515.0	0.0	0.0	0.0
AZ-07	27,453.7	0.0	0.0	0.0	0.0	0.0
AZ-08	445,435.2	21,884.1	0.0	0.0	0.0	0.0
AZ-09	0.0	188,784.3	0.0	0.0	0.0	0.0
AZ-10	1,020,969.5	152,971.5	84,469.4	0.0	0.0	0.0
AZ-11	0.0	158,728.0	0.0	0.0	0.0	0.0
AZ-12	0.0	275,279.0	0.0	0.0	0.0	0.0
AZ-13	0.0	339,094.2	704.3	0.0	0.0	0.0
AZ-14	267,774.2	172,346.4	328,155.8	0.0	0.0	0.0
AZ-15	2,034,366.7	28,156.8	68,260.5	0.0	0.0	0.0
AZ-16	58,627.7	113,115.7	0.0	0.0	0.0	0.0
AZ-17	137,056.3	0.0	0.0	0.0	0.0	0.0
AZ-18	947,390.1	0.0	0.0	0.0	857,932.9	47,844.9
AZ-19	944.9	0.0	0.0	0.0	149,038.9	23,484.2
AZ-20	0.0	0.0	0.0	0.0	291,953.7	91,197.8
<b>SUBTOTAL</b>	<b>7,996,119.7</b>	<b>1,565,071.9</b>	<b>493,105.0</b>	<b>0.0</b>	<b>1,298,925.5</b>	<b>167,526.9</b>
AK-01	0.0	0.0	0.0	0.0	0.0	0.0
AK-02	0.0	0.0	0.0	0.0	0.0	0.0
AK-03	0.0	0.0	0.0	0.0	0.0	0.0
AK-04	0.0	0.0	0.0	0.0	0.0	0.0
AK-05	0.0	0.0	0.0	0.0	0.0	0.0
AK-06	0.0	0.0	0.0	0.0	0.0	0.0
AK-07	0.0	0.0	0.0	0.0	0.0	0.0
AK-08	0.0	0.0	0.0	0.0	0.0	0.0
AK-09	0.0	0.0	0.0	0.0	0.0	0.0
AK-10	0.0	0.0	0.0	0.0	0.0	0.0
AK-11	0.0	0.0	0.0	0.0	0.0	0.0
AK-12	215,967.2	0.0	20,017.5	0.0	0.0	0.0
AK-13	55,363.6	0.0	0.0	0.0	0.0	0.0
AK-14	2,019,144.5	0.0	0.0	0.0	130,401.0	0.0
AK-15	0.0	0.0	0.0	0.0	193,331.9	307.8
<b>SUBTOTAL</b>	<b>2,330,477.3</b>	<b>0.0</b>	<b>20,017.5</b>	<b>0.0</b>	<b>333,732.9</b>	<b>307.8</b>
AL-01	0.0	0.0	0.0	20,010.3	2,172,055.5	2,354.1
AL-02	0.0	0.0	0.0	40,716.2	512,180.7	79,809.2
AL-03	0.0	0.0	0.0	0.0	165,511.1	8,594.4
AL-04	0.0	0.0	0.0	18,017.2	327,174.1	0.0
AL-05	0.0	0.0	0.0	229.6	411,557.4	32,047.0
AL-06	0.0	0.0	0.0	0.0	88,637.0	0.0
AL-07	0.0	0.0	0.0	0.0	90,765.4	0.0
AL-08	0.0	0.0	0.0	0.0	137,872.6	22,217.9
<b>SUBTOTAL</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>78,973.3</b>	<b>3,905,753.8</b>	<b>145,022.6</b>
AC-01	0.0	0.0	0.0	0.0	16,262.3	0.0
AC-02	0.0	0.0	0.0	0.0	0.0	0.0
AC-03	0.0	0.0	0.0	0.0	0.0	0.0
<b>SUBTOTAL</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>16,262.3</b>	<b>0.0</b>
AP-01	0.0	0.0	0.0	0.0	0.0	0.0
AP-02	0.0	0.0	0.0	0.0	0.0	0.0
AP-03	0.0	0.0	0.0	0.0	33,144.0	0.0
AP-04	0.0	0.0	0.0	0.0	50,910.2	0.0
AP-05	0.0	0.0	0.0	0.0	179,501.0	0.0
AP-06	0.0	0.0	0.0	0.0	232,071.8	0.0
<b>SUBTOTAL</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>495,617.0</b>	<b>0.0</b>
AT-01	0.0	0.0	0.0	19,457.2	245,841.9	0.0
AT-02	0.0	0.0	0.0	88,244.9	0.0	0.0
<b>SUBTOTAL</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>107,702.1</b>	<b>245,841.9</b>	<b>0.0</b>
AO-01	0.0	0.0	0.0	0.0	0.0	0.0
AO-02	0.0	0.0	0.0	0.0	217,729.6	0.0
<b>SUBTOTAL</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>217,729.6</b>	<b>0.0</b>
<b>GRAND TOTAL</b>	<b>10,326,597.0</b>	<b>1,565,071.9</b>	<b>513,122.5</b>	<b>186,675.4</b>	<b>6,503,813.0</b>	<b>307,857.3</b>

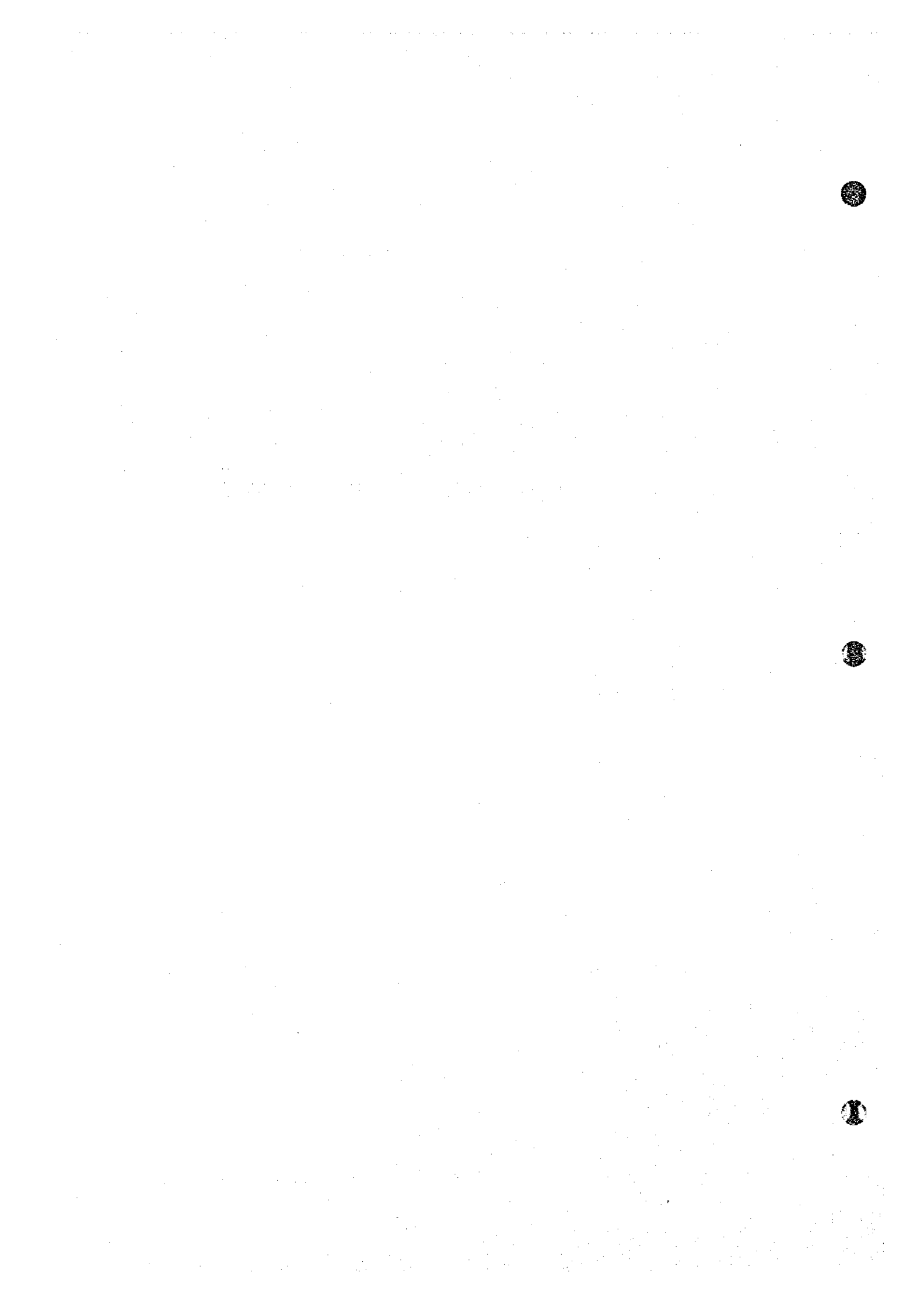
WATERSHED NUMBER	4A2	4B1	4B3	4B4	C	TOTAL (Hectares)
	DISSECTED HILLY LAND	FLOODPLAINS	GENTLY UNDULATING LAND	SWAMPS	LAKES	
AZ-01	0.0	0.0	0.0	0.0	0.0	345,880.9
AZ-02	0.0	0.0	0.0	0.0	0.0	570,558.9
AZ-03	0.0	0.0	0.0	0.0	0.0	159,851.3
AZ-04	0.0	0.0	0.0	0.0	0.0	4,102,311.7
AZ-05	0.0	0.0	0.0	0.0	0.0	276,450.4
AZ-06	0.0	0.0	0.0	0.0	0.0	2,086,990.2
AZ-07	0.0	0.0	0.0	0.0	0.0	88,617.7
AZ-08	0.0	0.0	0.0	0.0	0.0	548,978.3
AZ-09	0.0	0.0	0.0	0.0	0.0	948,406.1
AZ-10	0.0	0.0	0.0	0.0	0.0	2,417,752.1
AZ-11	0.0	0.0	0.0	0.0	0.0	746,521.4
AZ-12	0.0	0.0	0.0	0.0	0.0	891,772.8
AZ-13	0.0	0.0	0.0	0.0	0.0	1,020,981.6
AZ-14	0.0	0.0	0.0	0.0	0.0	4,344,333.7
AZ-15	0.0	0.0	0.0	0.0	0.0	1,589,019.6
AZ-16	0.0	0.0	0.0	0.0	0.0	1,417,754.8
AZ-17	0.0	0.0	0.0	0.0	0.0	167,132.4
AZ-18	506,551.0	0.0	0.0	0.0	215,768.0	2,598,520.0
AZ-19	118,678.2	0.0	0.0	0.0	25.4	292,171.6
AZ-20	102,811.7	16,052.0	0.0	0.0	0.0	1,108,539.9
SUBTOTAL	728,040.9	16,052.0	0.0	0.0	215,793.4	26,823,355.4
AK-01	0.0	0.0	0.0	0.0	0.0	577,541.6
AK-02	0.0	0.0	0.0	0.0	0.0	87,714.2
AK-03	0.0	0.0	0.0	0.0	0.0	231,237.6
AK-04	0.0	0.0	0.0	0.0	0.0	308,743.9
AK-05	0.0	0.0	0.0	0.0	0.0	1,106,428.1
AK-06	0.0	0.0	0.0	0.0	0.0	119,926.5
AK-07	0.0	0.0	0.0	0.0	0.0	883,890.5
AK-08	0.0	0.0	0.0	0.0	0.0	134,760.4
AK-09	0.0	0.0	0.0	0.0	0.0	2,151,110.4
AK-10	0.0	0.0	0.0	0.0	0.0	2,099,905.8
AK-11	0.0	0.0	0.0	0.0	0.0	276,835.3
AK-12	0.0	0.0	0.0	0.0	0.0	1,650,981.3
AK-13	0.0	0.0	0.0	0.0	0.0	1,095,241.7
AK-14	0.0	0.0	0.0	0.0	0.0	4,663,527.1
AK-15	59,223.1	0.0	0.0	0.0	0.0	316,936.9
SUBTOTAL	59,223.1	0.0	0.0	0.0	0.0	15,699,781.4
AL-01	466,441.4	178,962.1	1,997,744.6	0.0	0.0	7,342,156.1
AL-02	310,030.6	68,899.9	356,480.5	0.0	0.0	1,843,920.3
AL-03	132,615.2	333.1	7,271.8	0.0	0.0	465,616.1
AL-04	302,945.4	15,855.5	0.0	0.0	0.0	2,744,268.5
AL-05	285,728.7	0.0	0.0	0.0	0.0	1,471,126.9
AL-06	9,616.6	0.0	0.0	0.0	0.0	98,153.6
AL-07	0.2	0.0	0.0	0.0	0.0	90,765.6
AL-08	190,361.5	9,425.3	0.0	0.0	0.0	379,606.5
SUBTOTAL	1,697,739.6	273,875.9	2,361,496.9	0.0	0.0	14,435,714.2
AC-01	0.0	0.0	0.0	0.0	0.0	3,474,497.0
AC-02	0.0	0.0	0.0	0.0	0.0	650,369.8
AC-03	0.0	0.0	0.0	0.0	0.0	317,827.3
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	4,442,694.1
AP-01	0.0	0.0	0.0	0.0	0.0	4,802,447.3
AP-02	0.0	0.0	0.0	0.0	0.0	1,747,958.0
AP-03	0.0	0.0	11,100.1	2,101.4	0.0	1,416,969.4
AP-04	0.0	0.0	57,044.7	0.0	0.0	1,239,512.2
AP-05	120,475.3	0.0	448,670.6	53,194.1	158,656.2	1,054,018.2
AP-06	0.0	0.0	301,870.4	77,622.2	294,388.1	1,061,311.0
SUBTOTAL	120,475.3	0.0	818,685.8	132,987.7	453,044.3	11,332,191.8
AT-01	74,774.7	0.0	159,600.1	29,100.5	0.0	901,654.2
AT-02	132,087.3	0.0	106,464.9	3,132.4	196,829.5	681,905.8
SUBTOTAL	206,862.0	0.0	266,065.0	32,232.9	196,829.5	1,583,560.0
AO-01	0.0	0.0	0.0	0.0	0.0	161,463.9
AO-03	0.0	0.0	0.0	0.0	0.0	704,315.9
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	865,779.8
GRAND TOTAL	2,812,340.9	289,927.9	3,446,247.7	165,217.6	865,667.1	75,185,076.0

**APPENDIX F**

**LAND COVER BY WATERSHED BOUNDARY**

S-App-29(2)





WATERSHED NUMBER	FOREST	SAVANNA	GRASSLAND	AGRICULTURE	BARREN
AZ-01	28,212.0	55,082.6	261,972.8	939.0	0.0
AZ-02	49,961.4	150,075.0	354,465.1	9,840.1	2,584.4
AZ-03	29,616.3	41,456.0	182,048.6	4,034.1	122.3
AZ-04	730,395.8	1,155,236.0	2,194,069.5	16,927.9	801.9
AZ-05	20,703.3	67,787.2	184,895.5	2,611.3	0.0
AZ-06	269,750.8	581,223.3	1,233,610.9	1,619.4	0.0
AZ-07	26,859.6	13,103.1	48,229.9	0.0	0.0
AZ-08	79,919.5	109,797.5	357,221.5	133.4	0.0
AZ-09	6,327.3	49,517.7	84,394.4	379.7	867.7
AZ-10	654,453.4	275,709.7	1,471,329.6	13,073.0	743.8
AZ-11	4,991.7	96,224.5	625,534.1	1,476.0	6,974.2
AZ-12	294.9	10,767.7	864,948.4	2,517.0	4,884.1
AZ-13	62,731.3	171,187.5	755,197.4	2,434.3	5,640.5
AZ-14	314,298.0	1,017,314.2	2,973,283.2	4,044.1	18,726.3
AZ-15	330,488.1	549,835.9	1,694,787.5	6,320.2	0.0
AZ-16	2,284.6	104,626.0	1,295,180.4	3,430.5	11,433.9
AZ-17	20,731.9	38,823.8	100,417.2	2,098.9	162.6
AZ-18	506,577.2	307,904.4	1,519,819.1	39,233.2	124.1
AZ-19	26,449.7	12,984.7	238,043.7	11,560.8	101.0
AZ-20	292,931.9	120,521.6	654,466.5	27,589.2	54.8
SUBTOTAL	3,447,978.7	4,919,178.4	17,893,935.3	150,272.1	59,221.6
AK-01	158,310.2	32,226.3	379,800.3	4,004.2	0.0
AK-02	1,567.1	6,833.1	64,052.3	8,680.9	133.1
AK-03	17,579.8	23,166.0	171,469.2	6,536.8	3,636.7
AK-04	26,083.7	54,885.8	197,020.1	19,508.8	43.6
AK-05	154,936.7	232,233.0	680,381.0	25,062.3	496.1
AK-06	33,783.2	15,583.5	65,424.4	3,938.2	60.1
AK-07	365,387.0	23,893.0	490,351.5	107.7	0.0
AK-08	67,934.6	6,371.8	60,388.3	0.0	0.0
AK-09	342,444.2	268,732.7	1,373,705.6	26,243.8	224.9
AK-10	863,612.5	138,647.0	1,092,524.2	3,659.5	0.0
AK-11	32,565.4	67,823.5	176,446.3	0.0	0.0
AK-12	124,322.0	335,503.8	1,181,718.7	1,155.4	666.7
AK-13	164,889.4	121,607.7	766,436.7	1,926.6	0.0
AK-14	335,037.3	210,004.5	3,696,962.5	235,522.3	0.0
AK-15	60,502.6	11,882.2	238,819.5	1,510.6	0.0
SUBTOTAL	2,748,945.7	1,549,393.9	10,635,600.6	337,857.1	5,261.2
AL-01	853,166.2	2,177,932.5	4,170,322.0	111,868.3	24,456.0
AL-02	200,804.2	462,928.9	1,078,589.8	86,935.2	2,947.4
AL-03	18,017.3	56,265.4	384,375.8	6,091.9	58.7
AL-04	635,786.2	507,605.4	1,408,942.1	173,640.8	3,779.0
AL-05	477,363.2	505,149.2	456,837.3	28,508.7	2,100.2
AL-06	14,590.9	59,825.3	23,603.4	0.0	8.8
AL-07	10,355.4	47,107.2	33,060.4	0.0	62.3
AL-08	100,010.7	81,389.4	196,036.1	183.8	1,328.3
SUBTOTAL	2,310,124.1	3,898,203.3	7,751,766.9	407,228.7	34,740.9
AC-01	405,695.5	1,269,242.7	1,780,787.6	6,740.9	628.7
AC-02	60,488.6	225,521.7	354,956.9	2,692.0	0.0
AC-03	53,092.4	65,553.3	192,235.2	1,798.0	0.0
SUBTOTAL	519,276.5	1,560,317.7	2,327,979.7	11,230.9	628.7
AP-01	468,724.0	980,764.2	2,815,091.0	13,546.3	5,713.0
AP-02	334,316.9	520,643.6	863,149.9	16,532.5	53.5
AP-03	238,884.4	346,537.3	803,022.5	14,626.2	0.0
AP-04	112,495.3	676,940.2	430,564.6	9,315.5	0.0
AP-05	27,451.2	82,600.6	724,726.0	16,783.3	6.1
AP-06	144,013.7	100,458.4	435,006.1	22,007.7	663.3
SUBTOTAL	1,315,895.5	2,707,944.3	6,051,560.1	91,806.5	6,435.9
AT-01	110,408.5	265,779.9	512,475.6	1,215.9	0.0
AT-02	66,892.6	83,852.8	313,184.6	6,921.1	589.6
SUBTOTAL	177,301.1	351,632.7	827,660.2	8,140.0	589.6
AO-01	11,638.4	32,916.5	116,017.7	890.6	0.0
AO-03	38,751.7	67,648.1	451,433.5	142,154.9	0.0
SUBTOTAL	50,390.1	100,564.6	571,451.2	143,045.5	0.0
GRAND TOTAL	10,569,911.7	15,097,244.9	46,059,854.0	1,150,654.8	100,877.9

WATERSHED NUMBER	WETLANDS	URBAN	WATER	TOTAL (hectares)
AZ-01	4.5	462.0	206.0	336,878.9
AZ-02	133.4	1,637.8	1,859.3	570,556.5
AZ-03	55.9	516.3	2,001.8	259,851.3
AZ-04	11,607.3	2,809.5	263.6	4,102,111.5
AZ-05	0.0	393.8	59.4	276,450.5
AZ-06	134.0	159.3	493.1	2,086,990.8
AZ-07	0.0	142.7	282.5	88,617.8
AZ-08	0.0	1,450.8	455.6	548,978.3
AZ-09	2,206.7	111.8	4,600.8	948,406.1
AZ-10	675.1	590.2	1,177.6	2,417,752.4
AZ-11	11,127.1	196.9	0.0	746,524.5
AZ-12	3,820.2	92.2	4,428.3	891,772.8
AZ-13	15,740.1	693.9	7,356.5	1,020,981.5
AZ-14	3,643.1	0.0	13,022.8	4,344,333.7
AZ-15	3,920.4	618.8	3,058.9	2,589,029.8
AZ-16	773.4	0.0	36.9	1,417,355.7
AZ-17	3,557.5	4.9	1,305.5	167,132.3
AZ-18	2,075.0	6,332.3	216,454.9	2,598,320.2
AZ-19	53.1	0.0	2,978.7	292,171.7
AZ-20	277.8	6,101.2	6,607.1	1,108,540.1
SUBTOTAL	59,806.6	22,314.4	266,649.3	26,823,355.4
AK-01	1,932.6	465.5	802.6	577,541.7
AK-02	0.0	582.4	865.3	82,714.2
AK-03	0.0	7,510.5	1,338.5	231,237.5
AK-04	0.0	11,031.6	170.3	308,743.9
AK-05	1,467.6	11,301.3	550.1	1,106,428.1
AK-06	331.9	104.4	700.7	119,926.4
AK-07	3,778.4	195.7	177.0	883,890.3
AK-08	65.8	0.0	0.0	134,760.5
AK-09	123,228.7	1,702.7	14,827.8	2,151,110.4
AK-10	912.8	401.5	148.4	2,099,905.9
AK-11	0.0	0.0	0.0	276,835.2
AK-12	2,194.7	511.0	4,909.2	1,650,981.5
AK-13	1,650.3	0.0	38,730.9	1,095,241.6
AK-14	156,169.0	12,821.8	17,019.6	4,663,527.0
AK-15	45.0	4,127.3	49.8	316,937.0
SUBTOTAL	291,776.8	58,755.7	89,290.2	15,699,781.2
AL-01	574.2	3,418.8	418.5	2,342,156.5
AL-02	8,311.8	260.6	3,142.4	1,843,920.3
AL-03	0.0	693.2	114.0	465,616.3
AL-04	562.0	4,966.5	8,986.5	2,744,264.5
AL-05	415.1	753.1	0.0	1,471,126.8
AL-06	0.0	225.2	0.0	98,253.6
AL-07	0.0	150.0	0.0	90,763.5
AL-08	0.0	385.7	272.4	379,606.4
SUBTOTAL	9,863.1	10,853.1	12,933.8	14,435,713.9
AC-01	8,634.1	2,151.3	616.0	3,474,496.8
AC-02	4,417.1	1,904.5	358.9	650,369.7
AC-03	1,513.3	2,401.4	1,233.9	317,827.5
SUBTOTAL	14,594.5	6,457.2	2,208.8	4,442,694.0
AP-01	278,603.9	4,374.6	235,630.2	4,802,447.2
AP-02	19,803.0	1,299.9	2,169.6	1,747,968.9
AP-03	17,672.4	2,001.1	4,222.5	1,426,999.4
AP-04	18,437.0	1,208.1	616.3	1,239,577.0
AP-05	42,368.6	945.5	159,127.4	1,054,018.7
AP-06	64,975.8	4,362.0	299,727.9	1,061,309.9
SUBTOTAL	441,860.7	14,194.3	701,493.9	11,331,191.1
AT-01	12,283.3	435.1	55.9	902,654.2
AT-02	7,614.7	1,331.0	198,432.6	682,906.0
SUBTOTAL	19,898.0	1,766.1	198,488.5	1,585,560.2
AO-01	0.0	0.0	0.0	161,463.2
AO-03	165.6	162.2	0.0	704,316.0
SUBTOTAL	165.6	162.2	0.0	865,779.2
GRAND TOTAL	837,965.3	106,501.9	1,263,064.5	75,185,676.0

**APPENDIX G**

**RIVER DENSITY BY GEOMORPHOLOGY**

Geomorphology Code	Geomorphology	Drainage (in km)	Area (in Sq.km)	Drainage (in Km) per Area (in Sq.km)
1A1	MONTANE PLATEAU	22.072	428.97	0.051454
1A2	MONTANE ESCARPMENT	0	54.01	0.000000
2A1	LEVEL TO UNDULATING PLATEAU	89085.694	285,707.92	0.311807
2A2	DISSECTED PLATEAU	5505.905	18,344.31	0.300142
2A3	HILLS, RIDGES, AND MINOR ESCARPMENTS	8462.88	32,974.07	0.256653
2A4	SWAMPS	0	15,205.06	0.000000
2A5	LAKES	0	2,988.52	0.000000
2A6	FLOODPLAINS	10328.719	31,046.44	0.332686
2A7	TERRACES	43.382	148.05	0.293025
2B1	LINEAR DUNE COMPLEX	5213.545	45,710.05	0.114057
2B2	PAN COMPLEX	4446.707	47,137.98	0.094334
2B3	DILUNGUS	554.013	2,271.28	0.243922
2B4	SLIGHTLY DISSECTED PLATEAU	22817.718	103,265.52	
2B5	FLOODPLAINS	6056.43	15,650.72	0.386975
2B7	ALLUVIATED VALLEYS	2937.444	5,131.23	0.572464
3A	ESCARPMENT	696.865	1,866.75	0.373303
3B	ESCARPMENT COMPLEX	12097.726	65,039.17	0.186007
4A1	ISOLATED LARGE HILLS	393.092	3,078.57	0.127686
4A2	DISSECTED HILLY LAND	7992.201	28,124.64	0.284171
4B1	FLOODPLAINS	1551.354	2,899.28	0.535083
4B3	GENTLY UNDULATING LAND	8815.445	34,469.29	0.255748
4B4	SWAMPS	0	1,652.28	0.000000
4C	LAKES	0	8,656.67	0.000000
	<b>TOTAL</b>	<b>187021.192</b>	<b>751,850.76</b>	

APPENDIX H

RIVER DENSITY BY GEOLOGY

Lithology Code	Lithology Type	Drainage (in Km)	Area (in Sq. Km)	Drainage (in Km) per Area (in Sq. Km)
1.0	Kimberlite	8.720	32.23	0.270589
2.0	Carbonatite	0.557	104.65	0.005323
3.0	Basic igneous and meta igneous rocks, amphibolites	396.095	1392.08	0.284535
4.0	Syenite, syenodiorite, diorite and metamorphic equivalents	329.982	1192.15	0.276796
5.0	Granite	26548.035	72850.74	0.364417
6.0	Mylonite and Blsdtonylonite	41.437	89.89	0.460964
7.0	Quartz veins	37.849	88.07	0.429756
8.0	Meta-quartzites of various ages	5689.851	27930.35	0.203716
9.0	Calc-silicate rocks undifferentiated	402.852	3393.55	0.118711
10.0	Meta-carbonate rocks of various ages	263.335	3654.03	0.072067
11.0	Volcanics and meta-volcanics	1885.641	7883.78	0.239180
12.0	Undifferentiated Basement Complex; mainly granitic gneisses and migmatites with some granite	31117.349	103916.32	0.299446
13.0	Granulite facies rocks (excluding chamockites)	611.847	3152.06	0.194110
14.0	Pre-katanga schists, undifferentiated Includes Lufubu Schists of Copperbelt (interlayered gneiss and schist) and various groups in Southern and Northwestern Provinces	1726.962	5351.47	0.322708
15.0	Metamorphosed pelite, quartzite-pelite and psammite sequences, some with associated meta-volcanic rocks. Includes Chisamba Formation.	871.834	6413.95	0.135928
16.0	Quartzite-pelite sequences	6693.090	22678.10	0.295134
17.0	Lower quartzite	2813.480	14573.40	0.193056
18.0	Lower shales	1610.982	4911.76	0.327985
19.0	Upper quartzite	1985.599	10037.26	0.197823
20.0	Upper shales	549.940	2492.87	0.220605
21.0	Mine 'Series' undifferentiated. Upper Roan plus Mwashia in Northwestern Province and at western end of Copperbelt; probably Lower and Upper Roan around Luswishi Dome. Status uncertain south of Copperbelt.	4637.396	21948.36	0.211287
22.0	Lower Roan with basal conglomerate; the main copper-bearing unit. Includes quartzites, conglomerates, argillites, arkoses, and some dolomite.	1540.676	6123.59	0.251597
23.0	Upper Roan - typically dolomite and argillite	216.834	1851.89	0.117088
24.0	Mwashia - typically carbonaceous shale and argillite	95.227	824.29	0.115526
25.0	Kundelungu undifferentiated; may include some Mine 'Series' in the northwest, predominantly shales, siltstones, sandstones and mixites	30016.716	93775.20	0.320092
26.0	Kundelungu carbonate rocks; may be Mwashia in part in some areas	2557.892	10712.76	0.238771
27.0	Lower Kundelungu Shales (Luapula Province)	286.109	670.09	0.426974
28.0	Kundelungu Psammite and rudite formations (includes Petit Conglomerat in Luapula Province)	1030.578	4290.16	0.240219
29.0	Upper Kundelungu shales (Luapula Province)	212.470	415.00	0.511971
30.0	Basal Formation and Coal Measure	66.027	268.89	0.245555
31.0	Lower Karroo, undifferentiated	2185.655	8663.93	0.252271
32.0	Upper Karroo (Zambesi Valley), Karroo undifferentiated (elsewhere)	11407.110	46383.20	0.245932
33.0	Basalts	451.323	3282.56	0.137491
34.0	Kalahari Group with fossil seif dunes	9472.847	52652.39	0.179913
60.0	Kalahari Group/Basement and Kantanga System	2536.914	17781.10	0.142675
61.0	Kalahari Group/Karroo basalt	5450.274	55093.80	0.098927
62.0	Kalahari Group/Karroo Clastics	3211.210	23113.30	0.138933
63.0	Kalahari Group/Cretaceous	1986.711	26058.87	0.076239
100.0	Alluvium, Laterite	26073.784	74542.02	0.349786
250.0	Water	0.000	11260.66	0.000000
	TOTAL	187021.190	751850.76	

JAPAN INTERNATIONAL COOPERATION AGENCY  
REPUBLIC OF ZAMBIA  
MINISTRY OF ENERGY AND WATER DEVELOPMENT

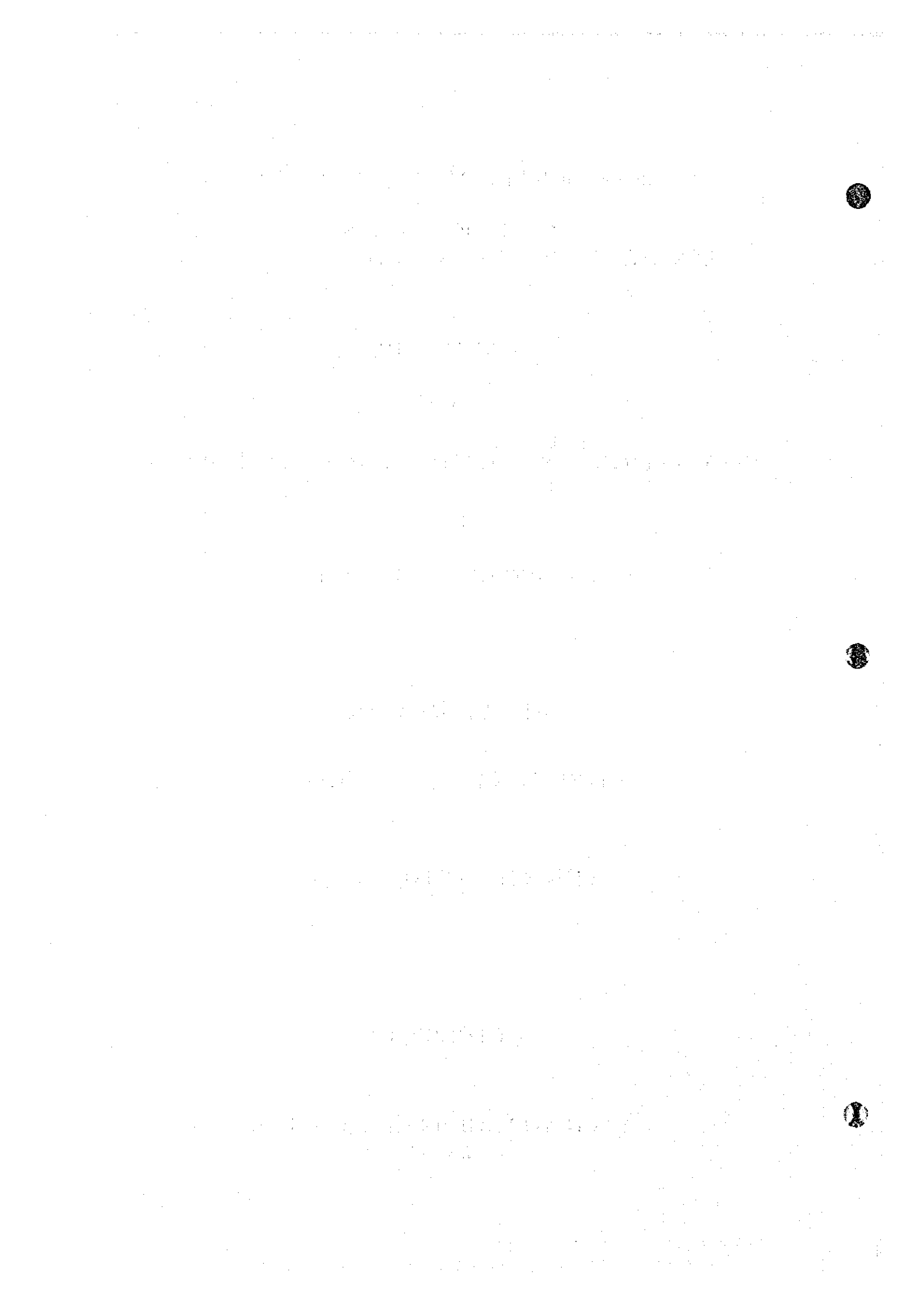
THE STUDY  
ON  
THE NATIONAL WATER RESOURCES MASTER PLAN  
IN  
THE REPUBLIC OF ZAMBIA

FINAL REPORT  
SUPPORTING REPORT [T]  
TOPOGRAPHIC SURVEY

OCTOBER, 1995

YACHIYO ENGINEERING CO., LTD.  
(YEC)





**THE STUDY ON NATIONAL WATER RESOURCES MASTER PLAN  
IN THE REPUBLIC OF ZAMBIA**

**SUPPORTING REPORT (T)  
TOPOGRAPHIC SURVEY**

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## **CHAPTER 1 SCOPE OF WORK**

The Works included the following survey works:

- (a) Levelling Survey for Establishment of Bench Marks at Hydrological Observation Stations and Groundwater Level Monitoring Wells**
- (b) Cross Sectional Survey of River at Hydrological Observation Stations**
- (c) Cross Sectional Survey of Dam Sites**
- (d) Installation of Bench Marks**

## CHAPTER 2 LOCATION AND NUMBER OF SURVEY SITES

The survey sites were scattered across ZAMBIA, and classified into the following categories.

- Hydrological Observation Stations
- Monitoring Wells for Groundwater Level
- Dam Sites

### 2.1 Hydrological Observation Stations

There were three (3) hydrological observation stations to be surveyed, as listed in Table 2-1.

**Table 2-1 Hydrological Observation Stations**

River System	No. of Station	Name of Station
Luangwa	5-650	M'fuwe
Chambeshi	6-289	Chambeshi Old Pontoon
Luapula	5-670	Chembe Ferry

The locations of the stations are shown in Figure 2-1.

### 2.2 Monitoring Wells for Groundwater Level

There were seven (7) monitoring wells to be surveyed, as listed in Table 2-2.

**Table 2-2 Monitoring Wells**

Location	No. of Station	Name of Station
Lusaka City	1	Mass Media 3
	2	Old Mumbwa Road 2
	3	Shaft No. 5
Kabwe City	4	Borehole 4 (Kalulu Pump Station)
	5	Borehole 11 (Misunda St-1)
Ndola City	6	Borehole 1 (Misunda St-2)
	7	Borehole 5

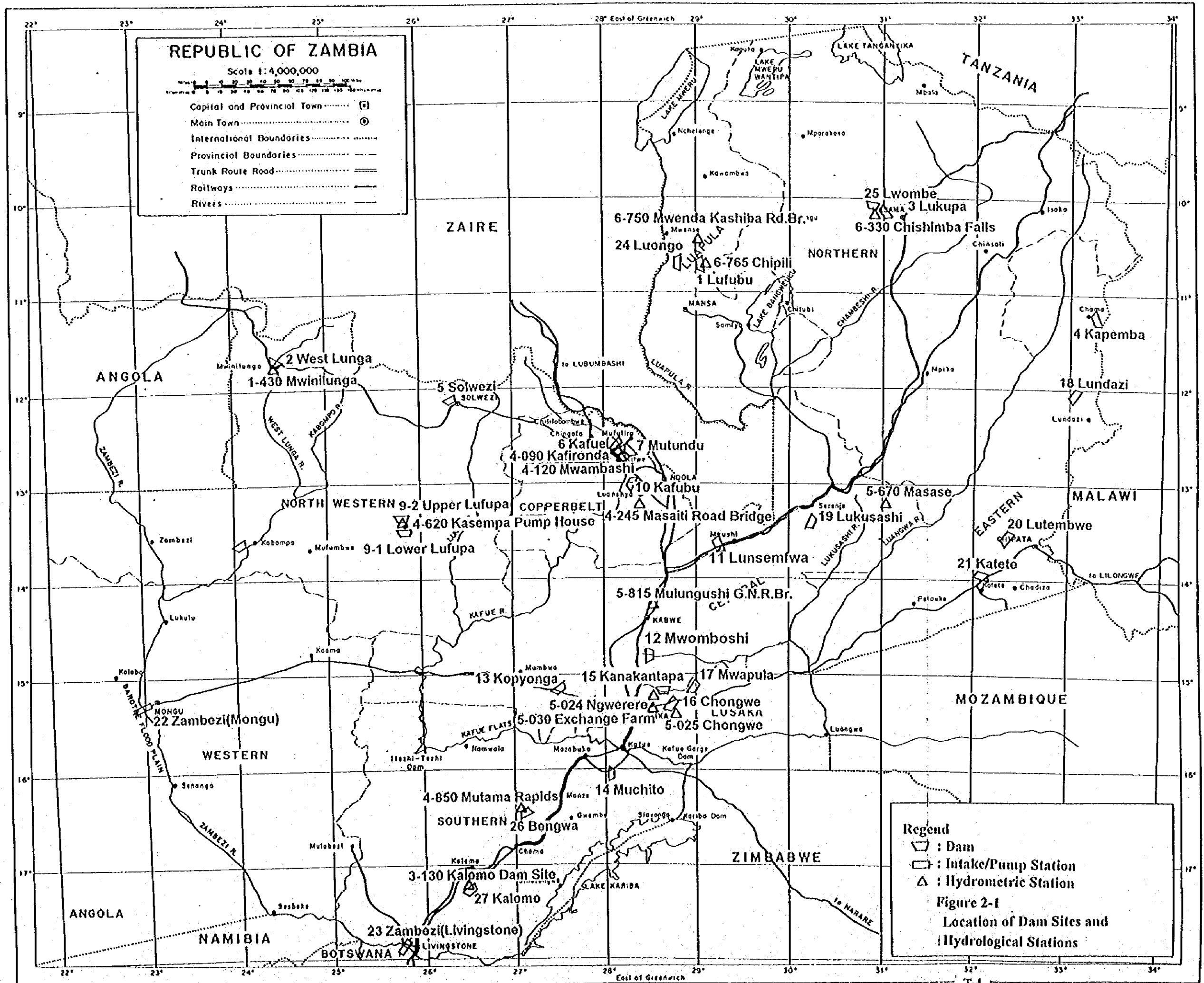
The locations of the monitoring wells are shown in Figures 2-2 and 2-3.

### 2.3 Dam Sites

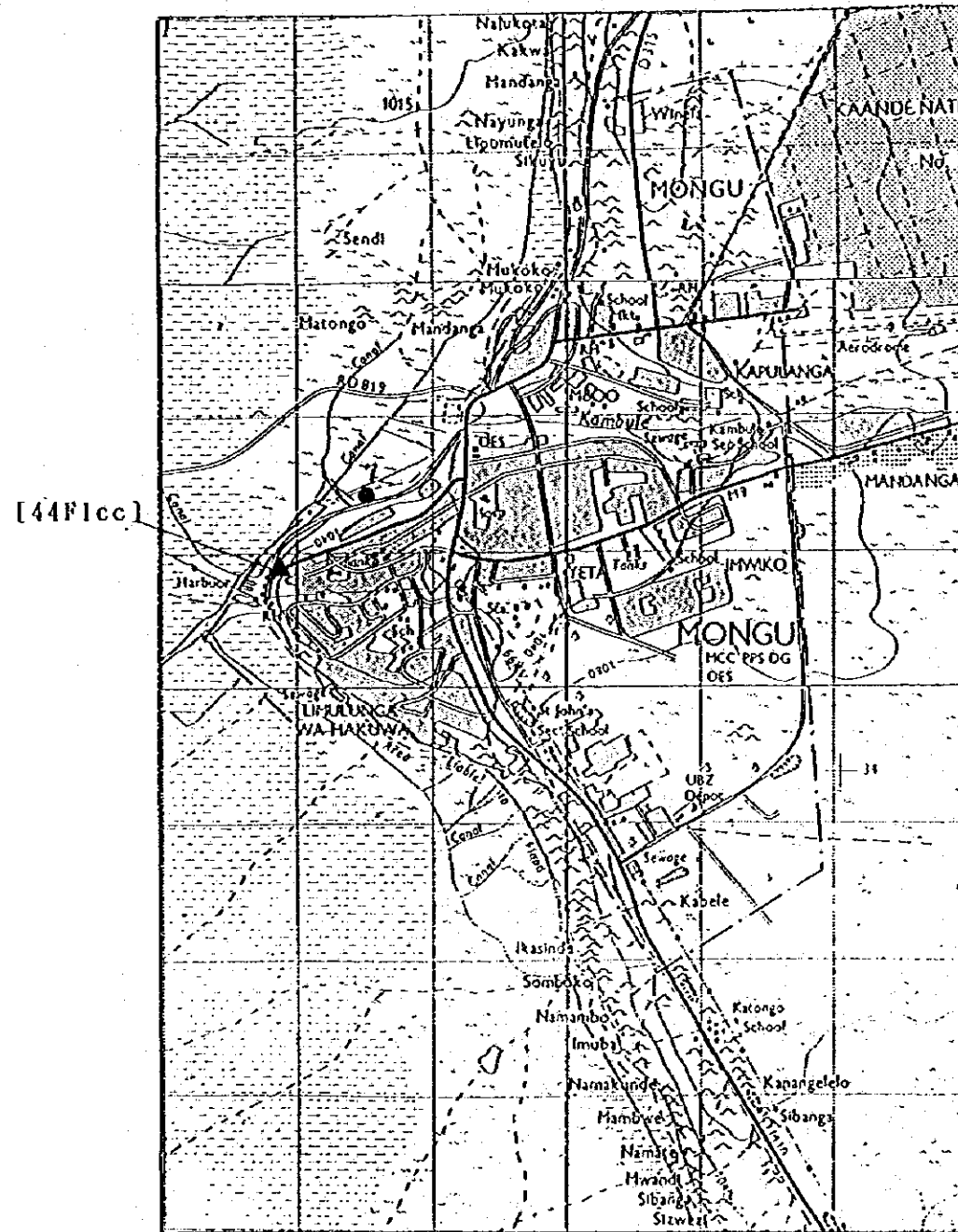
There were twenty (25) dam sites to be surveyed, as listed in Table 2-3. The locations of the dam sites are shown in Figure 2-1.

Table 2-3 Dam Sites

Description		Coordinates		Reference Maps	
No.	Name of River	x (10 <sup>3</sup> m)	y (10 <sup>3</sup> m)	1:250,000	1:50,000
1	Lufube	729	8813	SC-35-12	1029 C1
2	West Lunga	221	8701	SC-35-13	1124 C2
3	Lukupu	278	8879	SC-36-9	1030 B2
4	Kapemba	521	8760	SC-35-15	1133 A1
5	Solwezi	434	8655	SD-35-2	1226 A2
6	Kafue	626	8606	SD-35-3	1228 C1
7	Mutundu	636	8598	- ditto -	1228 C2
8	Lubi	188	8492	SD-35-5	1324 C1
9-1	Lufupa	376	8519	SD-35-5	1325 B4
9-2	Lufupa	375	8538	SD-35-5	1325 B4
10	Baluba	661	8519	SD-35-7	1328 A2
11	Lusemfa	746	8490	SD-35-8	1329 C2
12	Mwomboshi	659	8361	SD-35-11	1428 C4
13	Kopyonga (Chibenga)	556	8326	SD-35-15	1527 B1
14	Muchito	633	8263	- ditto -	1528 C1
15	Kanalantapa	672	8321	SD-35-8	1528 B1
16	Chongwe	682	8306	- ditto -	1528 B3
17	Mwapula	712	8320	- ditto -	1528 B2
18	Lundazi	505	8665	SD-36-3	1233 A1
19	Lukusashi	202	8514	SD-36-5	1330 A3
20	Lutembwe	432	8501	SD-36-6	1332 C2
21	Katete	399	8449	SD-36-10	1432 A1
24	Musonda fall	701	8815	SC-35-12	1028d2
25	Chishimba fall	272	8883	SC-36-9	1030B2
26	Bwengwa	513	8178	SE-35-3	1627A3
27	Kalomo	439	8104	SE-35-6	1726A2

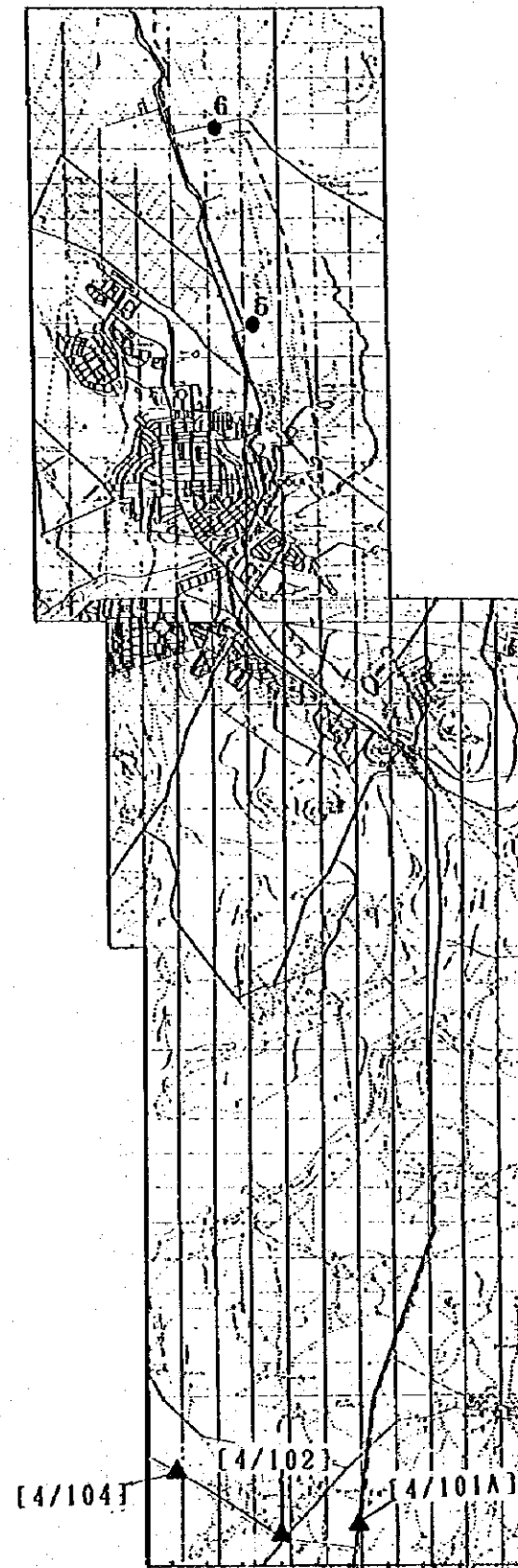


**Legend**  
 □ : Dam  
 □ : Intake/Pump Station  
 △ : Hydrometric Station  
**Figure 2-1**  
**Location of Dam Sites and Hydrological Stations**



MONGU Scale 1: 50,000

- Monitoring well
- ▲ National Bench Mark

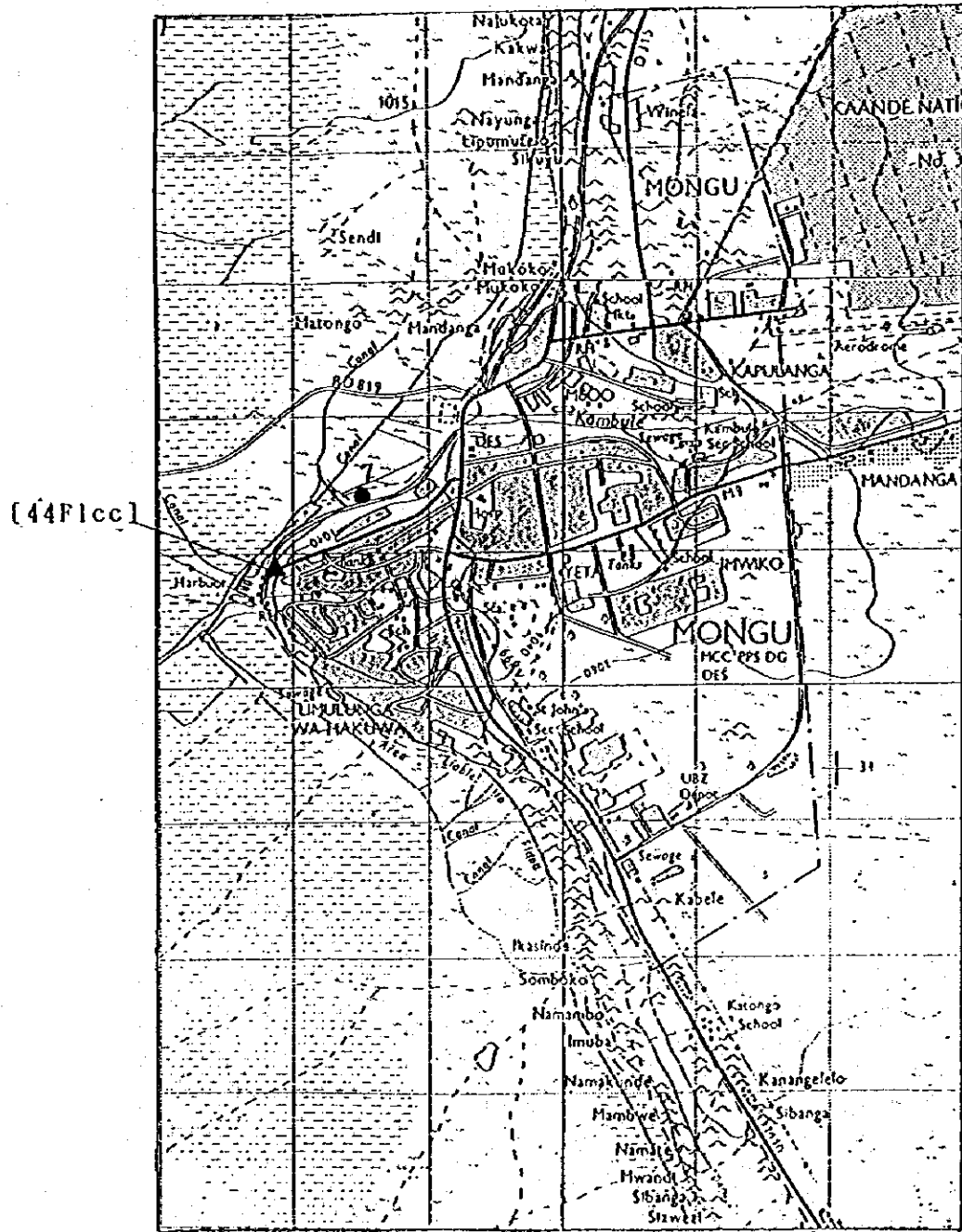


NDOLA Scale 1:200,000

- Monitoring well
- ▲ National Bench Mark

Figure 2-2 Location of Monitoring Wells (1)

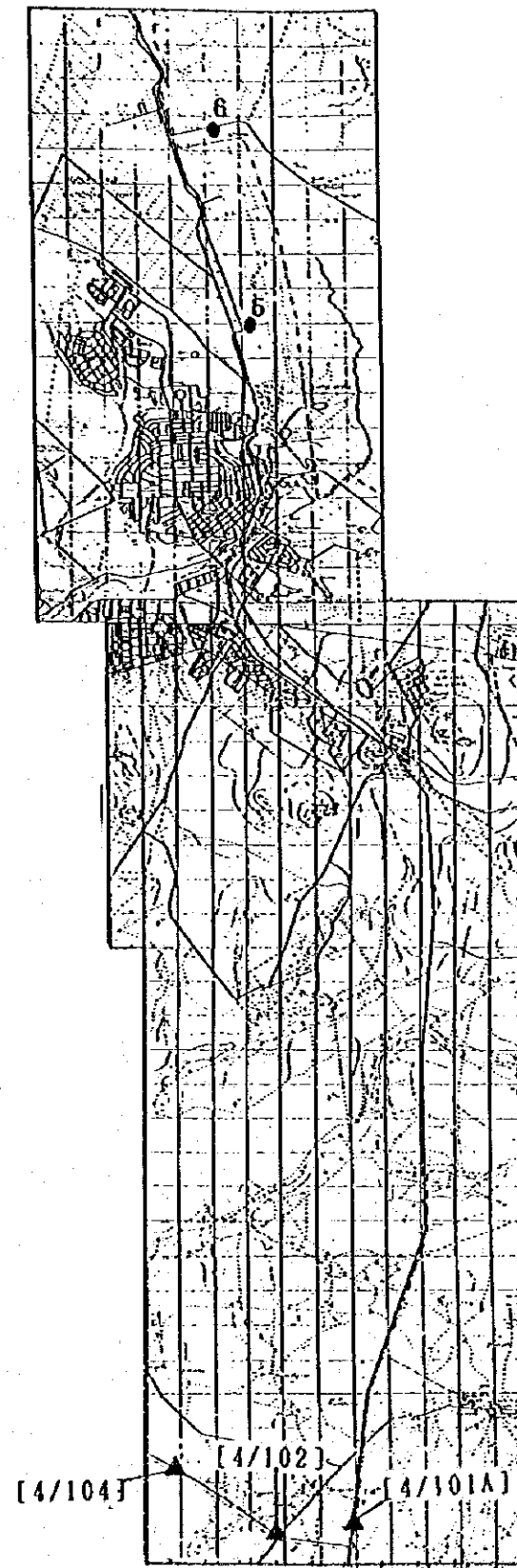




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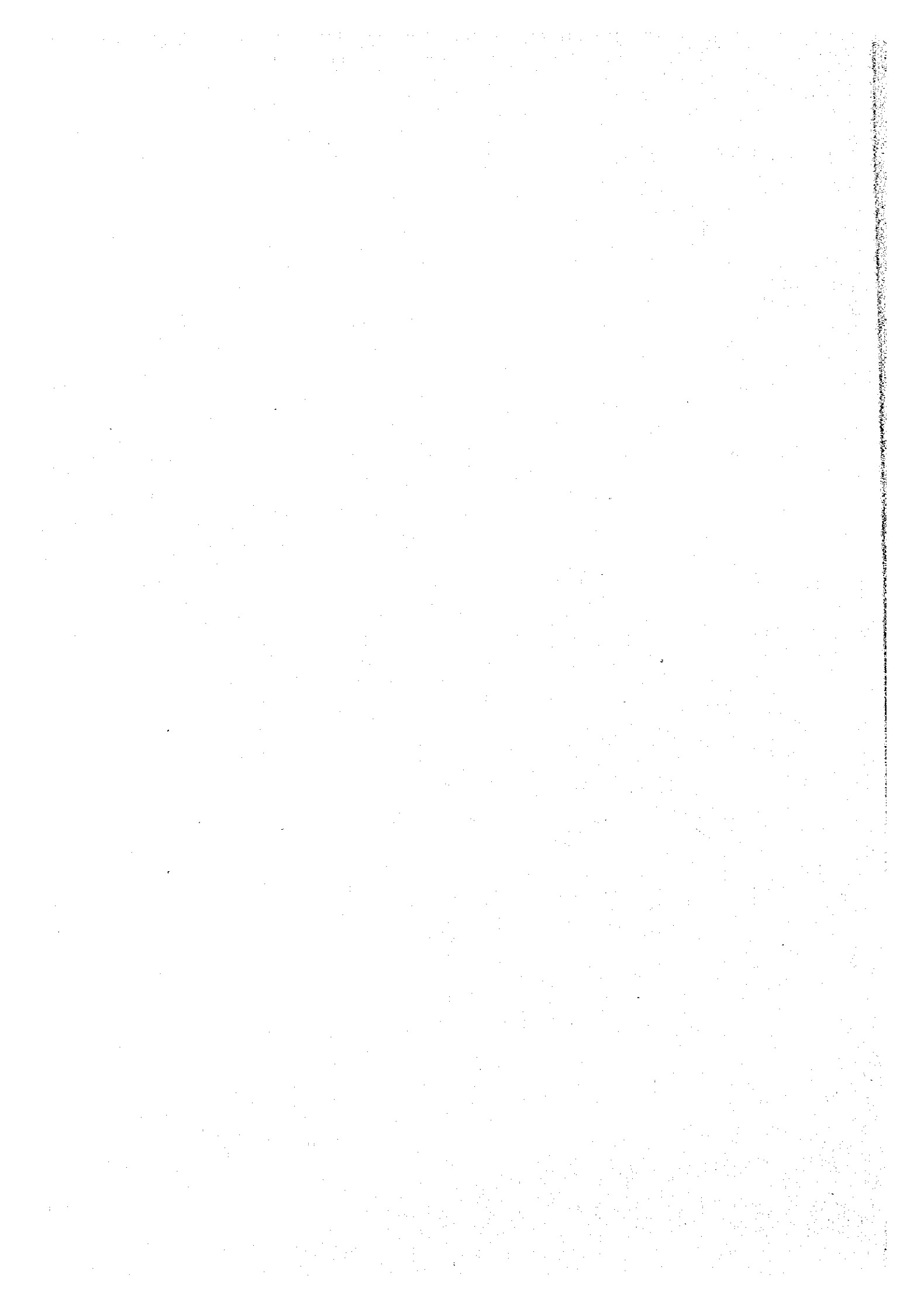
- Monitoring well
- ▲ National Bench Mark

Figure 2-3 Location of Monitoring Wells (2)



NDOLA Scale 1:200,000

- Monitoring well
- ▲ National Bench Mark



## CHAPTER 3 WORK QUANTITY

Work Quantity of the Levelling Survey and Cross Sectional Survey are shown in Table 3-1.

**Table 3-1 Work Quantity of the Levelling Survey and Cross Sectional Survey**

Survey Points	Levelling Survey (Km)		Installation of Bench Mark	Cross-Sectional Survey	
	D/L	I/L		Hydrometric Station	Dam Site
<b>1. Hydrometric stations</b>					
M'fuwe (5-650)	-	10.0	1	1	-
Chambeshi Old Pontoon (6-289)	-	9.5	1	1	-
Chembe Ferry (6-670)	1.2	10.7	2	2	-
<Total>	1.2	30.2	4	4	-
<b>2. Monitoring Wells</b>					
No. 1	1.8	-	1	-	-
No. 2	8.5	-	1	-	-
No. 3	7.1	-	1	-	-
No. 4	1.5	-	1	-	-
No. 5	7.3	-	1	-	-
No. 6	-	4.4	1	-	-
No. 7	1.2	-	1	-	-
<Total>	27.4	4.4	7	-	-
<b>3. Dam Sites (21 points)</b>	-	-	21	-	21
<b>4. Provisional Quantities (4 points)</b>	-	50.7	4	-	4
<b>Grand Total</b>	<b>28.6</b>	<b>91.1</b>	<b>36</b>	<b>4</b>	<b>25</b>

Note: D/L: Direct Levelling  
I/L: Indirect Levelling

## CHAPTER 4 SURVEY METHOD

### 4.1 Levelling Survey

To establish Bench Marks at observation stations, levelling survey was carried out. The method of levelling survey to be applied was classified into the following three methods depending on distance between the existing Bench Mark and observation station.

- (a) Levelling Survey by Automatic Level
- (b) Levelling Survey by Distance Metre
- (c) Levelling Survey by Barometer

#### 4.1.1 Levelling Survey by Automatic Level

Levelling survey by using an automatic level was performed as listed below:

- 1) Fourth Grade Levelling Survey Standards for Public Works in Japan as applied to this survey.
- 2) The automatic level and other equipment was inspected and adjusted before commencement of the survey and once every two weeks during the study.
- 3) Measurement was made in both directions, forward and backward. The forward and back measurements was accomplished within one day.
- 4) Temporary bench marks were marked at about one (1) to one and half (1.5) kilometres interval on non-movable and firm points along the levelling route.
- 5) The number of measuring points along the levelling route was even.
- 6) Rear sights and fore sights was approximately equal in distance and the maximum sight distance was not exceed seventy (70) metres.
- 7) Allowable height differences between forward measurement and rearward measurements was within  $20 \text{ mm } \sqrt{S}$ , where S is the distance between existing bench mark and newly established bench mark in kilometre.
- 8) The height difference of the loop was distributed to each measuring point in proportion to length of each section.

#### 4.1.2 Levelling Survey by Distance Metre

The height difference between two points were calculated by measuring distance and vertical angle between two points by using an electro-optical distance metre. This indirect levelling survey was carried out in the following manner.

- 1) The maximum distance between two measuring points was less than two (2) kilometres.
- 2) The distance between two points was measuring by electro-optical distance metre at least three times with measurement error less than five (5) centimetres.
- 3) The allowable height difference between forward sight and rearward sight measurement was not exceed thirty (30) centimetres.
- 4) The vertical angles was measured twice at the normal telescope position and at the reverse so that the total angle was about three hundred sixty (360) degrees. The

difference of total vertical angle between forward sight and rearward sight was less than thirty (30) seconds.

#### **4.1.3 Levelling Survey by Barometer**

The height difference between two points was calculated by measuring barometric pressure by using barometers. This indirect levelling survey was carried out in the following manner.

- 1) The maximum distance between two measuring points was less than two (2) kilometres. However, the maximum distance was often decided taking into consideration weather conditions and topographic conditions.
- 2) The barometric pressure and air temperature at the two points was measured at the same time.

#### **4.2 Cross-sectional Survey of River**

To establish rating curve for flow measurement, the cross-sectional survey was carried out at each hydrological observation station in the following manner.

- 1) The cross-section line was determined in perpendicular to the centre line of the river channel, along which the bench mark was installed.
- 2) The length of the cross-sectional survey was more than that covering the section of the maximum water level in the past.
- 3) The interval of measuring point was less than twenty(20) meters, including additional topographically transformed points.
- 4) Measurement on land was made in the following manner.
  - (a) The distance was measured by tape.
  - (b) The height was measured by levelling survey by automatic level and/or other indirect levelling survey.
- 5) The distance measurement on the river water was made in the following manner.
  - (a) Type A (in case that the width of the river channel was not very wide): The distance was directly measured tape or rope.
  - (b) Type B (in case that the width of river channel was wide): The distance was measured by electro-optical distance meter.
- 6) The height measurement on the river water was made in the following manner.
  - (a) The water depth was measure by staff or rod, or measuring rope with weight.
  - (b)The water level was measured before and after the survey work.

#### **4.3 Cross-sectional Survey of Dam Site**

The cross-sectional survey was carried out at each dam site in the following manners.

- 1) The cross section line dam axis was determined in perpendicular to the centre line of the river channel.
- 2) The length of cross-section survey was not more than one (1) kilometre.
- 3) The interval of measuring point was less than twenty (20) meters, including additional topographically transformed points.
- 4) Measurement on land was made in the following manner.

- (a) The distance was measured by tape.
- (b) The height was measured by levelling survey by automatic level and/or other indirect levelling survey.
- 5) The distance measurement on the river water was made by measuring tape or rope.
- 6) The water depth was measured by measuring staff or rod, or measuring rope with attached weight.

#### 4.4 Installation of Bench Mark

The standard types of bench mark was as shown in Appendix 3.

- 1) Excavation was made to depth and width as shown in Appendix 3.
- 2) Concrete with mix proportion of cement:sand:gravel = 1 : 2 : 4, was placed in the excavated hole.
- 3) PVC pipe steel pipe with inner diameter of ten (10) centimetres was installed into the concrete.
- 4) Bolt or nail of length ten (10) centimetres was embedded into the top pipe. Installation points of bench marks was designated at the Site.

## CHAPTER 5 SURVEY RESULT

Survey result was as follows:

- (a) Drawing of cross-section of rivers
- (b) Drawing of Cross-section of dam Site
- (c) Route map and description of newly established and existing Bench Marks, including sketches of their positions.
- (d) Field Book and Computation results.

### 5.1 Hydrological Observation Station

Cross section survey, installation of benchmarks and levelling were carried out at the three selected hydrometric stations. All the results are attached at Appendix 5. Each of these result is as follows:

#### 5.1.1 Benchmarks

Depending on the site condition, different types of bench marks were installed as follows:

- M'fuwe : Top of abutment of M'fuwe bridge
- Chambeshi Old Pontoon : Type C
- Chembe Ferry (old station) : Type C
- Chembe Ferry (new station) : Both DWA and BM are existing

#### 5.1.2 Levelling

Indirect Levelling was carried out with a barometer from a triangulation point near the hydrometric station. The results of levelling are shown in Table 5-1.

Table 5-1 Results of Levelling at Hydrometric Stations

Hydrometric Station	Triangulation Point and Benchmark	Distance	Difference in Elevation	Elevation Above Sea Level
M'fuwe (5-650)	Triangulation Point: TS165	-	-	EL. 574.20m
	Benchmark	10.0km	-45.40m	EL. 528.80m
Chambeshi Old Pontoon (6-289)	Triangulation Point: TS568	-	-	EL. 1246.00m
	TP Benchmark	9.5km	-58.875m	EL.1187.125m
Chembe Ferry (5-670)	Benchmark	-	+0.160m	EL.1187.285m
	Triangulation Point: 619L29	-	-	EL.1119.528m
	Old Station Benchmark	10.7km	-62.00m	EL.1057.528m
	New Station Benchmark	-	+0.512m	EL.1058.030m

#### 5.1.3 Checking of Staff Gauge Zeros

The elevation of each hydrometric stations staff gauge was checked against the local benchmark. The staff gauges at M'fuwe showed a 30cm difference between the three methods. Its average zero and the zero elevation of the other staff gauges is shown below:

- M'fuwe : EL. 514.92m (Average)
- Chambeshi Old Pontoon : EL.1180.37m
- Chembe Ferry (old station) : EL.1051.46m
- Chembe Ferry (new station) : 1050.82m

#### 5.1.4 Cross Section Survey

The cross-section survey at the three hydrometric stations were shown in Appendix 5.

#### 5.2 Levelling of Groundwater Monitoring Wells

Depending on site conditions, benchmarks of type A or B were installed. Both direct and indirect levelling was carried out at each groundwater monitoring well. All the results are attached at Appendix 4. The survey results are shown in Table 5-2.

**Table 5-2 Result of Levelling at Groundwater Monitoring Wells**

Groundwater Monitoring Well	Triangulation Point and Benchmark	Difference in Elevation	Elevation Above Sea Level
Lusaka City	Triangulation Point: ZT35	-	EL. 1276.560m
	Benchmark Type-B (Well No.1)	-11.596m	EL.1264.964 m
	Benchmark Type-B (Well No.2)	+8.438m	EL.1284.998m
	Benchmark Type-B (Well No.3)	-2.202m	EL.1274.358m
Kabwe City	Triangulation Point: ZS429	-	EL.1225.550 m
	Benchmark Type-A (Well No.4)	-37.609m	EL. 1187.941m
Ndola City	Triangulation Point: ZS124	-	EL.1328.740m m
	Benchmark Type-A (Well No.5)	-75.931m	EL. 1252.809mm
	Benchmark Type-A (Well No.6)	-81.750m	EL. 1246.990m
Mongu City	Triangulation Point: 44FI	-	EL. 1053.676m
	Benchmark Type-A (Well No.7)	-31.560m	EL. 1022.116m

#### 5.3 Cross Section Survey of Dam Site

At the 25 proposed dam sites, dam axis profile survey was carried out as follows and all the results are attached at Appendix 6.

##### 5.3.1 Bench Mark

Bench marks of type C were installed on the dam axis of the 25 sites. The bench mark positions (E.N. coordinates) were observed with a ENSIGN GPS.

##### 5.3.2 Levelling

The elevation of benchmarks were determined in one of three ways: (1) taken as an arbitrary 0.0m at certain points; (2) estimated from a contour map and (3) observed from triangulation points with a barometer.



- (1) 0.0m points were adopted for: Dam Sites No. 1, 2, 3, 4, 6, 7, 9-1, 9-2, 10, 11, 12, 13, 19, 24, 25, 26, 27
- (2) Estimates from a contour map were used for: Dam Sites No. 4, 20.
- (3) Points based on a barometric survey from a known triangulation point. Dam Sites No. 14, 15, 16, 17, 18, 21.

### 5.3.3 Dam Axis Profile Survey

A dam centreline survey, to help with Dam planning, was carried out using stadia method. Observation providing the plan distance and the elevation difference were determined at each critical point or at 20m intervals.

**Table 5-3 Result of Levelling at Dam Site**

Dam Site	Triangulation Point and Benchmark	Difference in Elevation	Elevation Above Sea Level
Muchito (No.14)	Triangulation Point: ZP202	-	EL. 1219.20m
	Benchmark Type-C	-99.45m	EL. 1119.75m
Kanakantapa(No.15)	Triangulation Point: ZP210	-	EL. 1172.96m
	Benchmark Type-C	-63.96m	EL. 1109.00m
Chongwe(No.16)	Triangulation Point: JICA BM	-	EL. 1118.198m
	Benchmark Type-C	-67.375m	EL. 1050.823m
Mwapula(No.17)	Triangulation Point: 417TS	-	EL. 1237.70m
	Benchmark Type-C	-287.75m	EL. 1018.95m
Lundazi(No.18)	Triangulation Point: ZS264	-	EL. 1144.80m
	Benchmark Type-C	+123.80m	EL. 1021.00m
Katete(No.21)	Triangulation Point: ZP14 (Mpangwe)	-	EL. 1660.80m
	Benchmark Type-C	-545.20m	EL. 1115.60m
Kapemba(No.4)	Benchmark Type-C	-	EL. 818.0m
Lutembwe(No.20)	Benchmark Type-C	-	EL. 844.0m

## Appendices

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## Appendices

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## Appendix 1

Table: ACTUAL WORKS QUANTITY OF THE LEVELLING AND CROSS-SECTION SURVEY

SITES	D/L	I/L	Installation of bench Mark	Water Level Gauging Station	DAM SITES	REMARKS
<b>1. Water Level Gauging Station</b>						
M'Fuwe (5-650)		10.0	Attachment of the M'Fuwe Type-C	1		
Chambeshi (6-289)		9.5		1		
Chembe Ferry (6-670)						
New Station	1.2		D.W.A. B.M.	1		
Old Station		10.7	Type-C	1		
<Total>	1.2	30.2	4	4		
<b>2. Monitoring Wells</b>						
ZT35-#3BM	0.1		Type-B			
ZT35-TBM3	7.0					
TBM3-#1BM	1.8		Type-B			
TBM3-#2BM	8.5		Type-B			
ZS429-#4BM	1.5		Type-A			
ZS124-#6BM		4.4	Type-A			
#6BM-#5BM	7.3		Type-A			
44FI-#7BM	1.2		Type-A			
<Total>	27.4	4.4	7			
<b>3. Dam Sites (21 Sites)</b>		10.8	Type-C		21	
<Total>		10.8	21		21	
<b>4. Provisional Quantities(4 Sites)</b>		50.7	Type-C			
<Total>		50.7	4		4	
<b>Grand Total</b>	<b>28.6</b>	<b>96.1</b>	<b>36</b>	<b>4</b>	<b>25</b>	

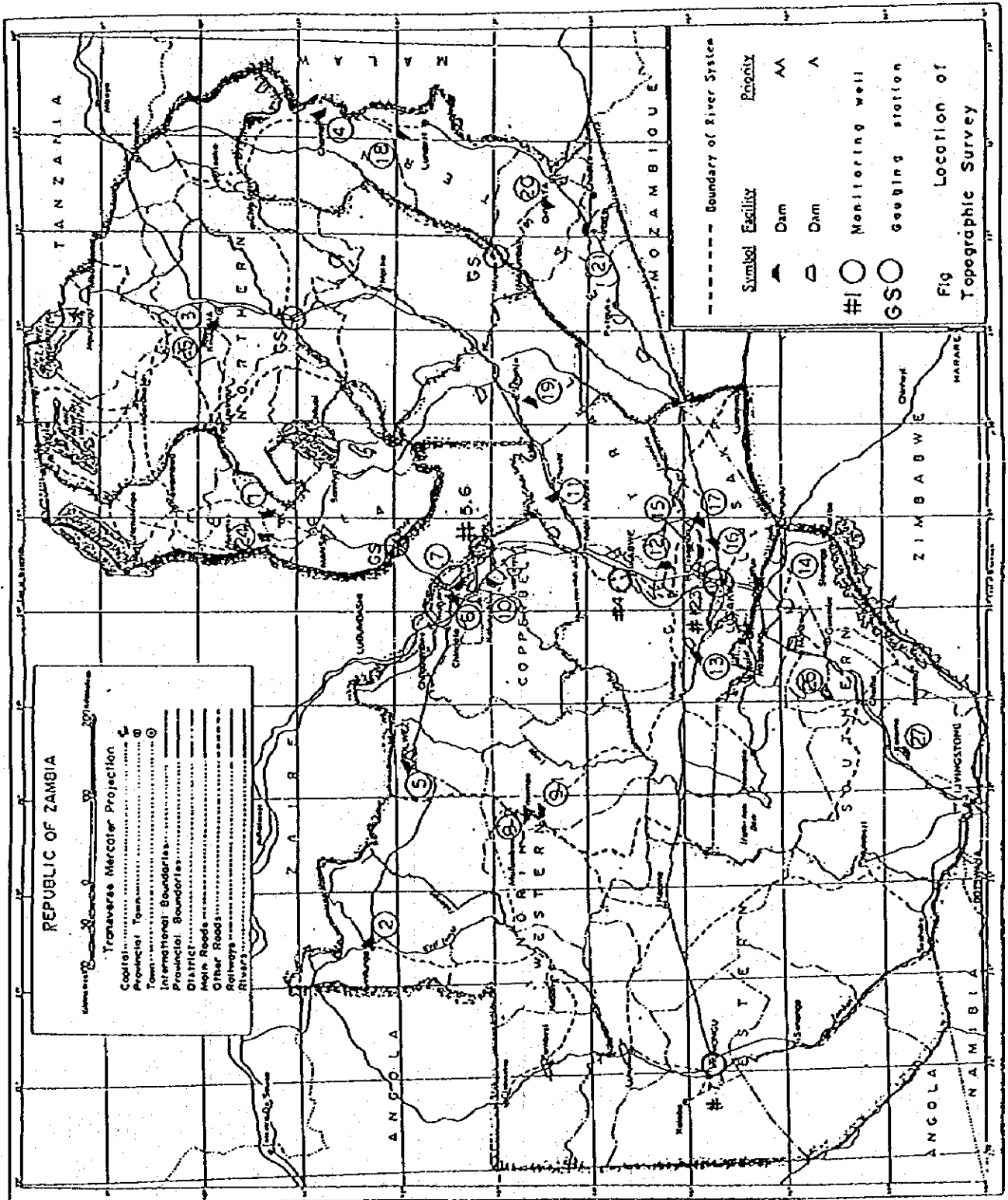
Note : D/L Direct Levelling  
I/L Indirect Levelling

Appendix 2 (I)

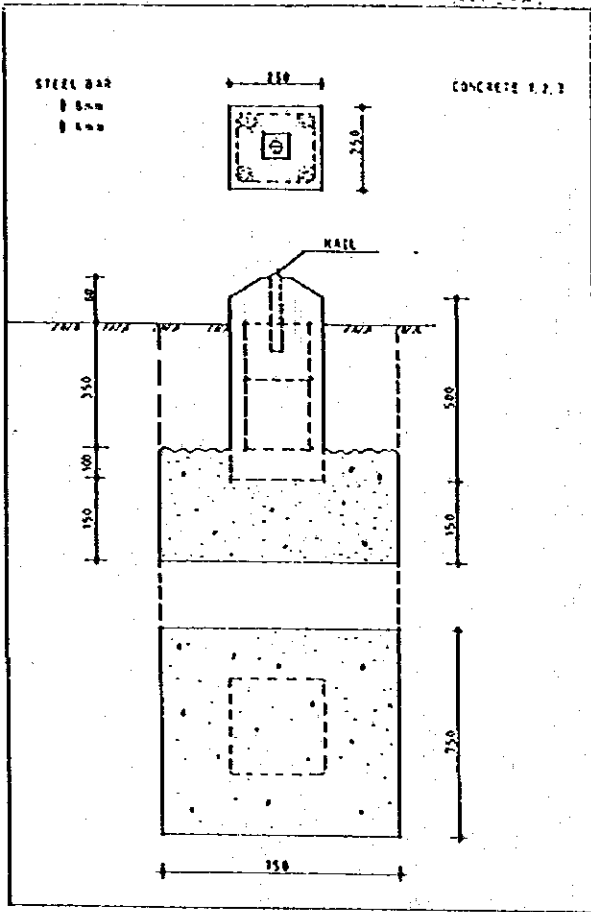
Table PALNNING DAM SITES LIST

DAM NO.	NAME OF RIVER	COORDINATES OF DAM BM (BY ENSIGN GPS)		REFERENCE MAPS		REMARKS
		E	N	1:250,000	1:50,000	
1	Lufubu	728899m	8813420m	SC-35-12	1029C1	
2	West Lunga	220,700	8,701,250	SC-35-13	1124C2	
3	Lukupu	277,780	8,878,781	SC-36-9	1030B2	
4	Kapemba	33-11.4	11-13.11	SD-36-15	1133A1	
5	Solwezi	434,576	8,655,660	SD-35-2	1226A2	
6	Kafue	624,840	8,605,435	SD-35-3	1228C1	
7	Mutundu	635,950	8,598,200	SD-35-5	1228C2	
9-1	Lufupa	375,525	8,518,943	SD-35-5	1325B4	
9-2	Lufupa	375,045	8,537,874	SD-35-5	1325B4	
10	Kafubu	661,052	8,518,943	SD-35-7	1328A2	
11	Lusemfa	746,090	8,490,560	SD-35-8	1329C2	
12	Mwonboshi	658,845	8,360,840	SD-35-11	1428C4	
13	Kopyonga	555,500	8,325,910	SD-35-15	1527B1	
14	Muchito	633,321	8,262,762	SD-35-16	1528C1	
15	Kanakantapa	672,343	8,320,668	SD-35-16	1528B1	
16	Chongwe	682,250	8,305,870	SD-35-16	1528B3	
17	Mwapula	711,957	8,319,590	SD-35-16	1528B2	
18	Lundazi	505,079	8,664,837	SD-36-3	1233A1	
19	Lukusashi	201,900	8,514,264	SD-36-5	1330A3	
20	Lutembwe	431,858	8,501,178	SD-36-6	1332C2	
21	Katete	398,862	8,448,694	SD-36-10	1432A1	
24	Musonda	701,201	8,815,086	SC-35-12	1028D2	
	falls					
25	Chishimba	271,571	8,883,148	SC-36-9	1030B2	
	falls					
26	Bwengwa	512,928	8,178,078	SE-35-3	1627A3	
27	kalomo	438,825	8,103,530	SE-35-6	1726A2	

Appendix 2 (2)



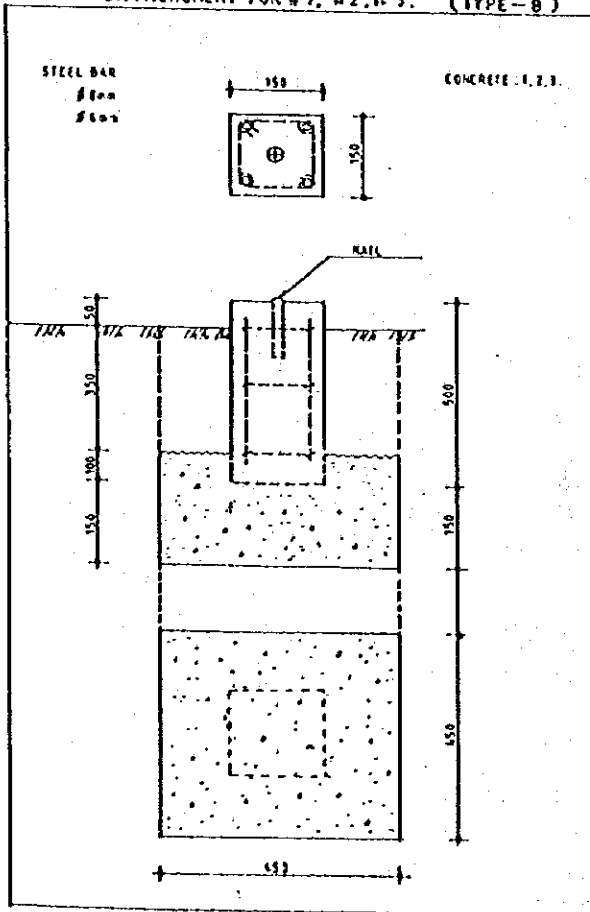
B.M. MONUMENT FOR R.C.C. (TYPE-A)



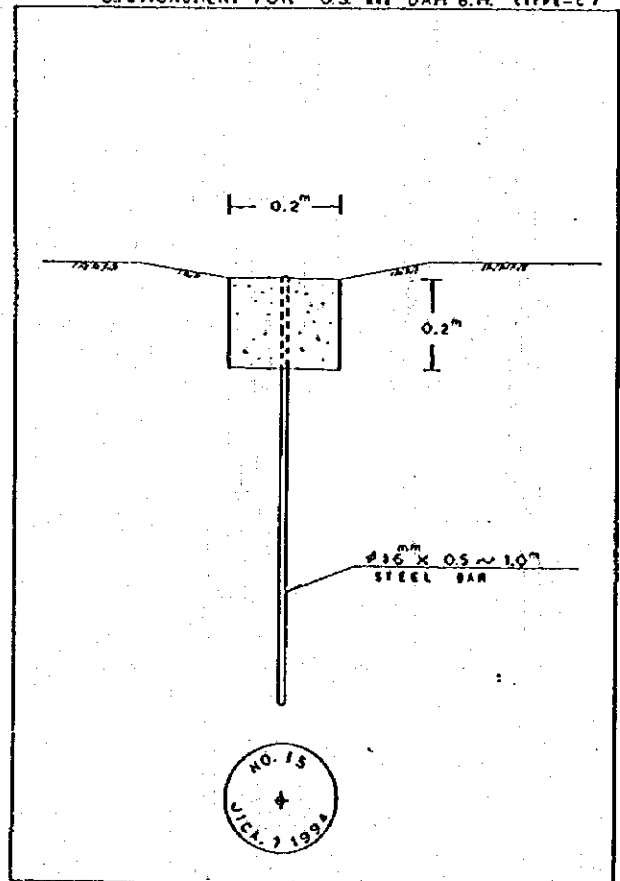
Appendix 3

B.M. MONUMENT

B.M. MONUMENT FOR R.C.C. (TYPE-B)



B.M. MONUMENT FOR G.S. and DAH B.M. (TYPE-C)



**Appendix 4 (1)**

**MONITORING WELL**

- #1, #2, #3, IN LUSAKA

Levelling Route Mpa

BM Description

- #4 IN KABWE

Levelling Route Mpa

BM Description

- #5, #6, IN NDOLA

Levelling Route Mpa

BM Description

- #7 IN MONGU

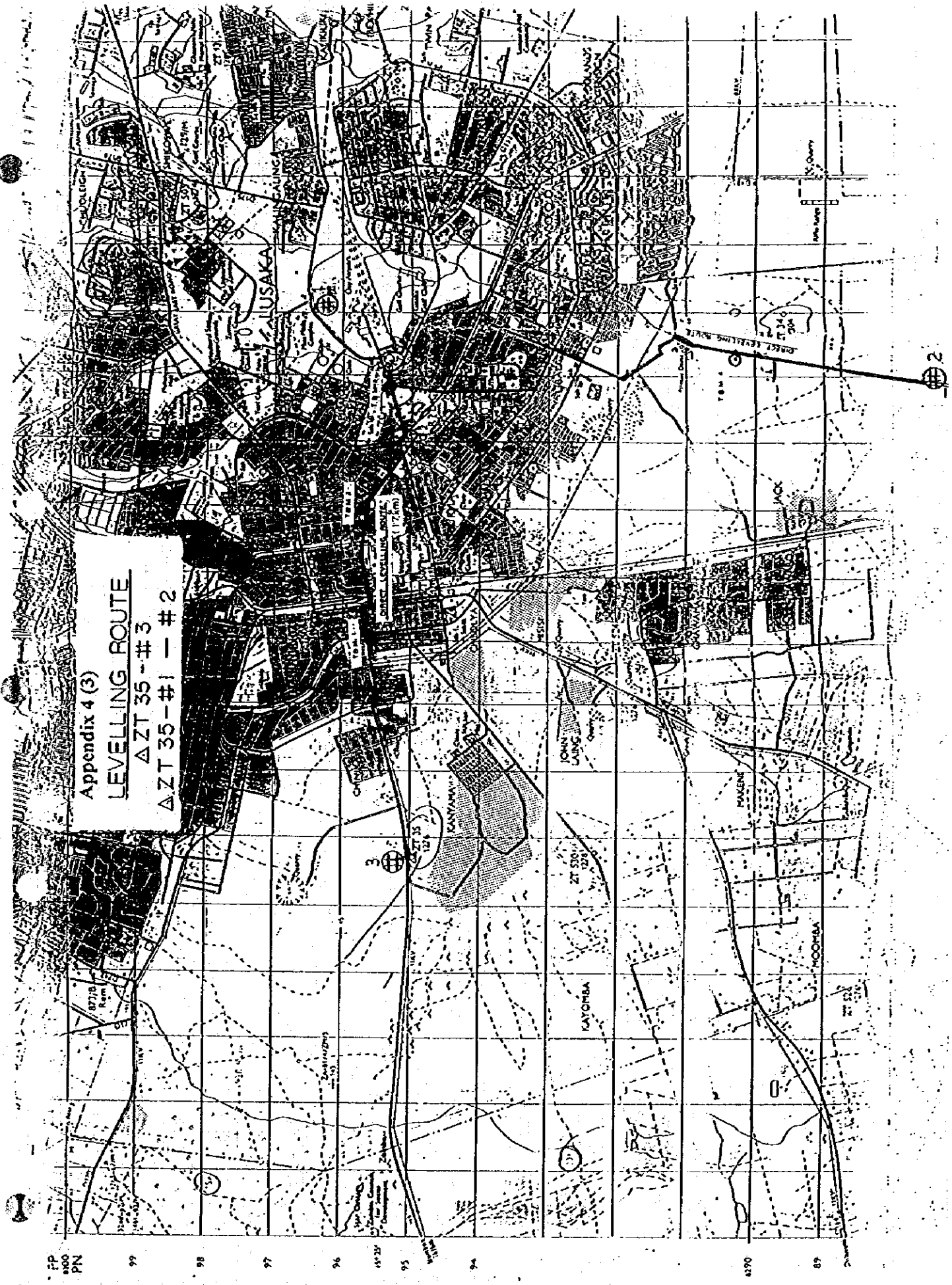
Levelling Route Mpa

BM Description



**Appendix 4 (2)**

**- #1, #2, #3, IN LUSAKA**



Appendix 4 (3)  
 LEVELLING ROUTE  
 Δ ZT 35 - # 3  
 Δ ZT 35 - # 1 - # 2

PP  
 400  
 PN

99

98

97

96

14° 35'

95

94

4290

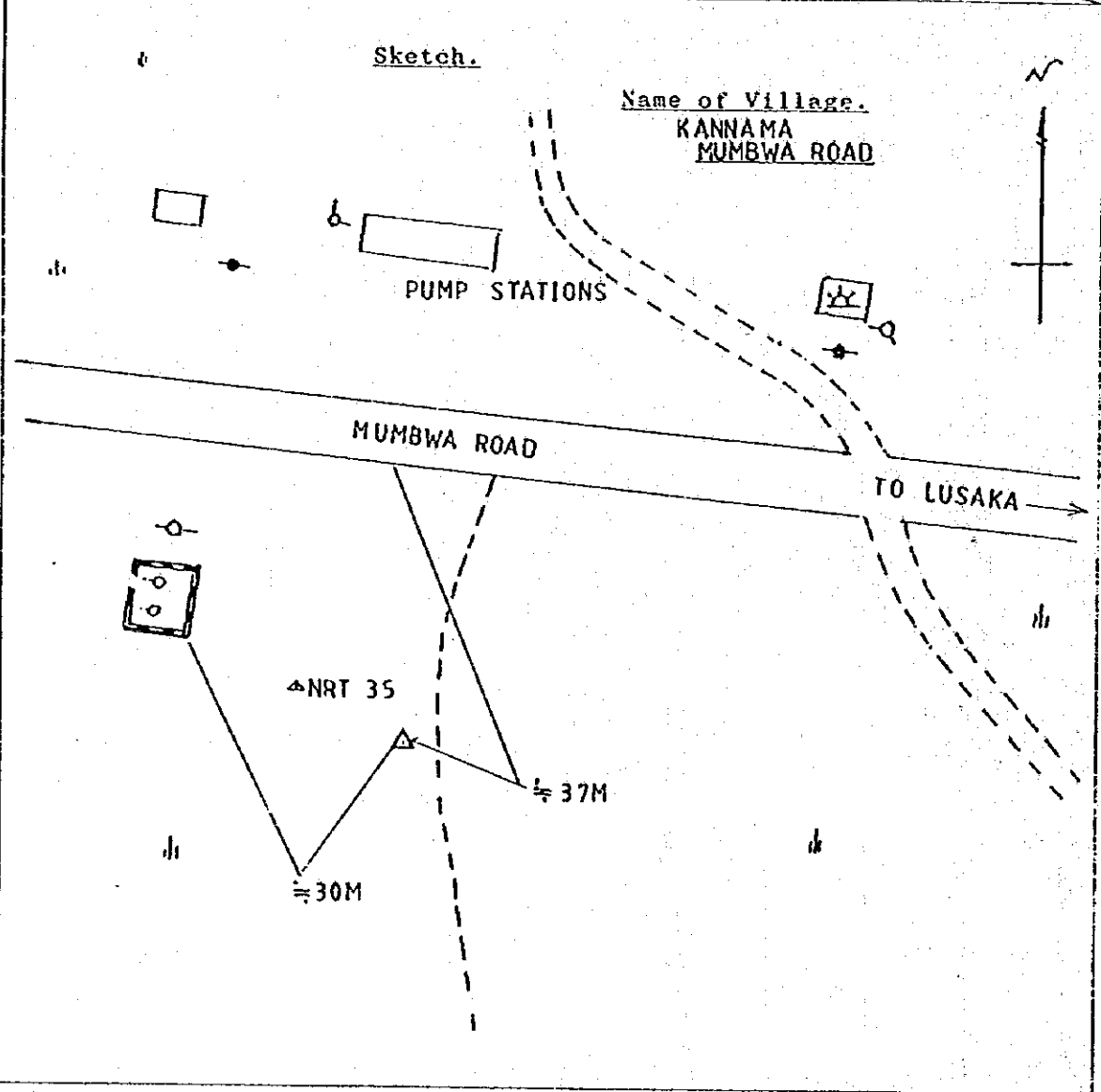
85

Appendix 4 (4)

FILE:NV

DESCRIPTION

		date: 12 JUNE 1994	weather: FINE
STATION	$\triangle$ NRT/35	1/50,000	1528 A4
		1/250,000	SO-35-15
HEIGHT	H= 1276.56	surveyor	MR. KODY
		instrument	
CO-ORDINATE	E= 633,715.900 N= 8294,954.810	surveyor	
		instrument	



FILE:NV

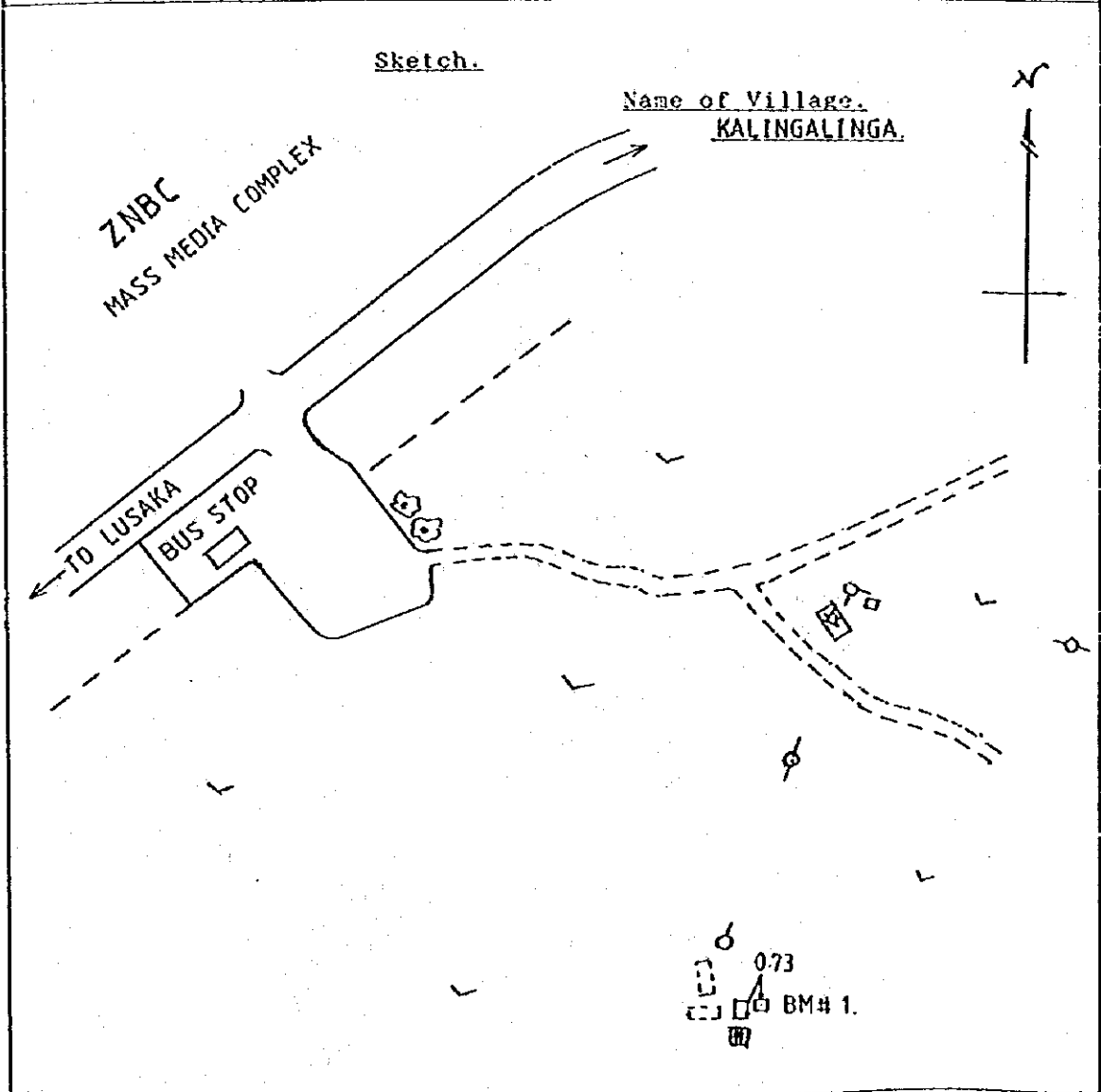
JICA STUDY TEAM.

Appendix 4 (5)

FILE:NV

DESCRIPTION

		date: 12 JUNE 1994	weather: FINE.
STATION	BM # 1	1/50,000	1528 A4
		1/250,000	SD-35-15
HEIGHT	<del>H= 1290 ENSIGN GPS</del>	surveyor	MR. KODY
	H= 1,264.964	instrument	NA 2
CO-ORDINATE	E= 642,248.	surveyor	MR. TAKAMATSU
	N= 8296,278.	instrument	ENSIGN GPS



FILE:NV

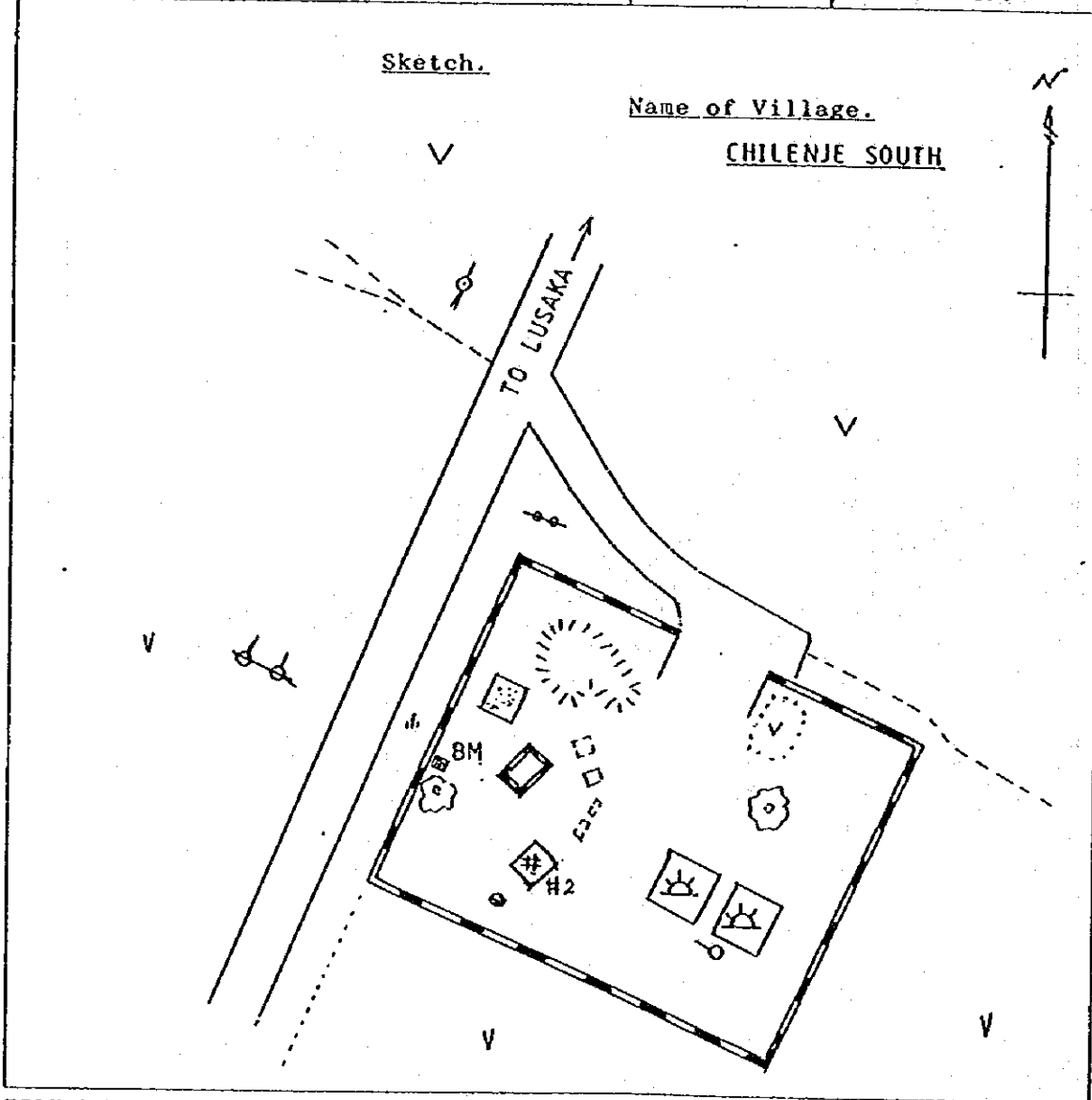
JICA STUDY TEAM.

Appendix 4 (6)

FILE:NV

DESCRIPTION

		date: 12. JUNE, 1994		weather: FINE	
STATION	BM. # 2	1/50,000	1528 A4		
		1/250,000	SD-35 -15		
HEIGHT	<del>H= 1290. ENSIGN GPS.</del>	surveyor	MR. KODY		
	H= 1284.998	instrument	NA 2		
CO-ORDINATE	E= 640,986	surveyor	MR. TAKAMATSU		
	N= 8287,336	instrument	ENSIGN GPS		



FILE:NV

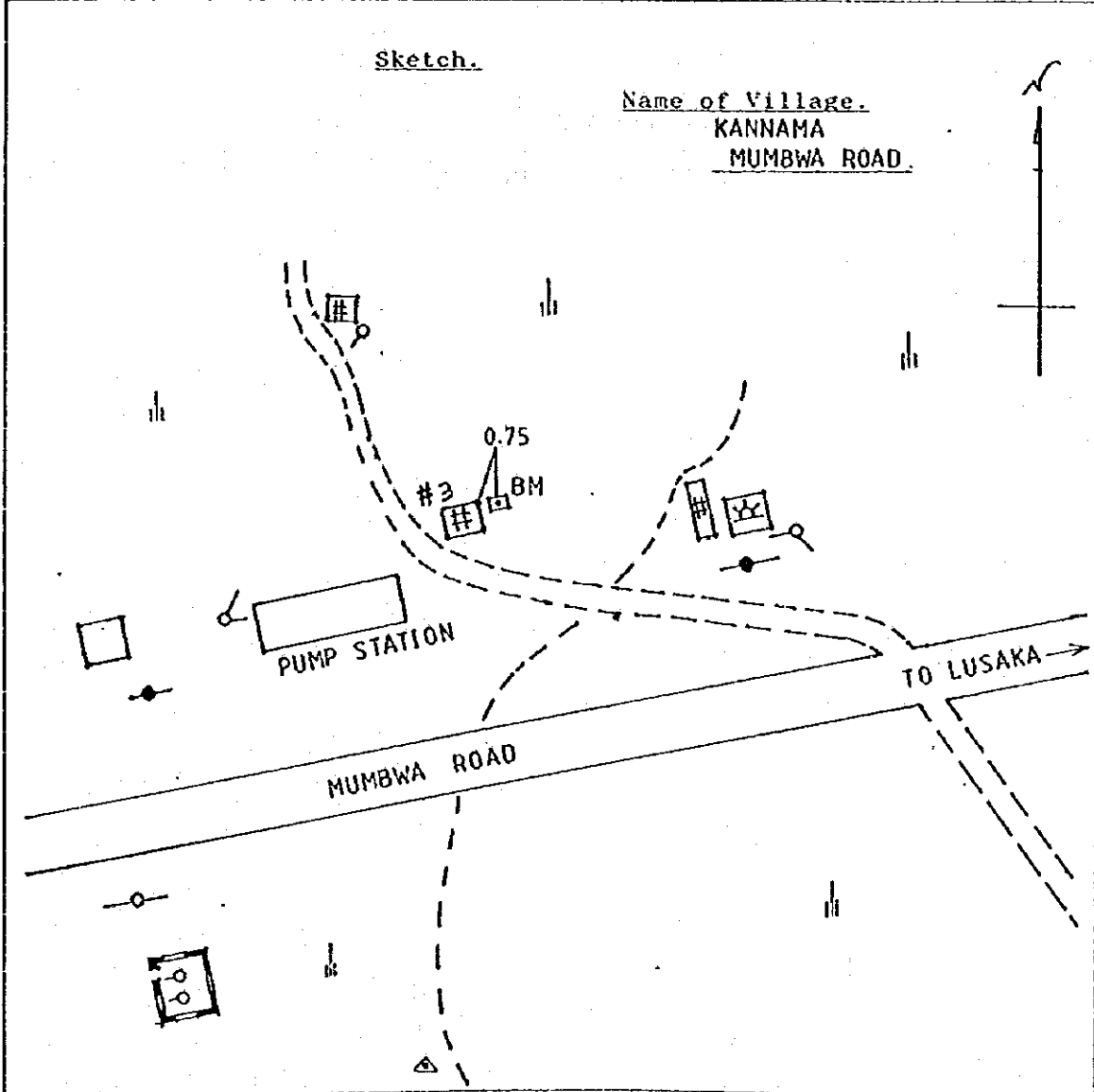
JICA STUDY TEAM.

Appendix 4 (7)

FILE:NV

DESCRIPTION

		date: 12 JUNE 1994	weather: FINE
STATION	BM # 3	1/50,000	1528 A4
		1/250,000	SD-35-15
HEIGHT	<del>H=1290</del> <del>GPS</del>	surveyor	MR. KODY
	H= 1,274.358	instrument	NA 2
CO-ORDINATE	E= 633,708.	surveyor	MR. TAKAMATSU
	N= 8295,005.	instrument	ENSIGN GPS.

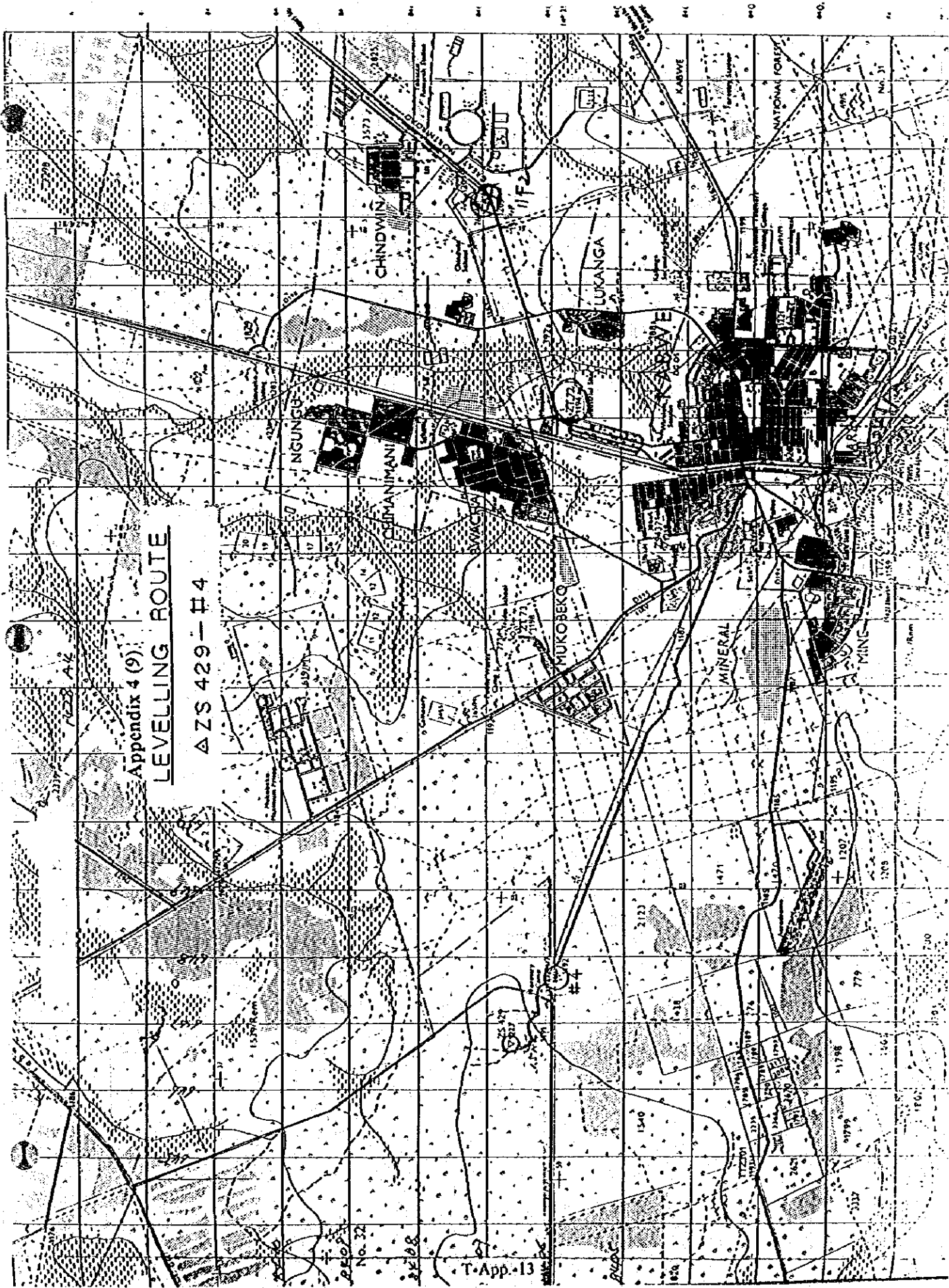


FILE:NV

JICA STUDY TEAM.

**Appendix 4 (8)**

**- #4 IN KABWE**



Appendix 4 (9)  
**LEVELLING ROUTE**

**AZS 429-#4**



Appendix 4 (10)

FILE:NV

DESCRIPTION

date: 4 JUL., 1994 weather: FINE			
STATION	△ ZS 429	1/50,000	1428 A4
		1/250,000	SD - 35 - 10
HEIGHT	H= 1225.550	surveyor	/
		instrument	
CO-ORDINATE	E= 646,646.700 N= 8,406,621.500	surveyor	
		instrument	
<p><u>Sketch.</u></p> <p style="text-align: right;"><u>Name of Village.</u></p>			

FILE:NV

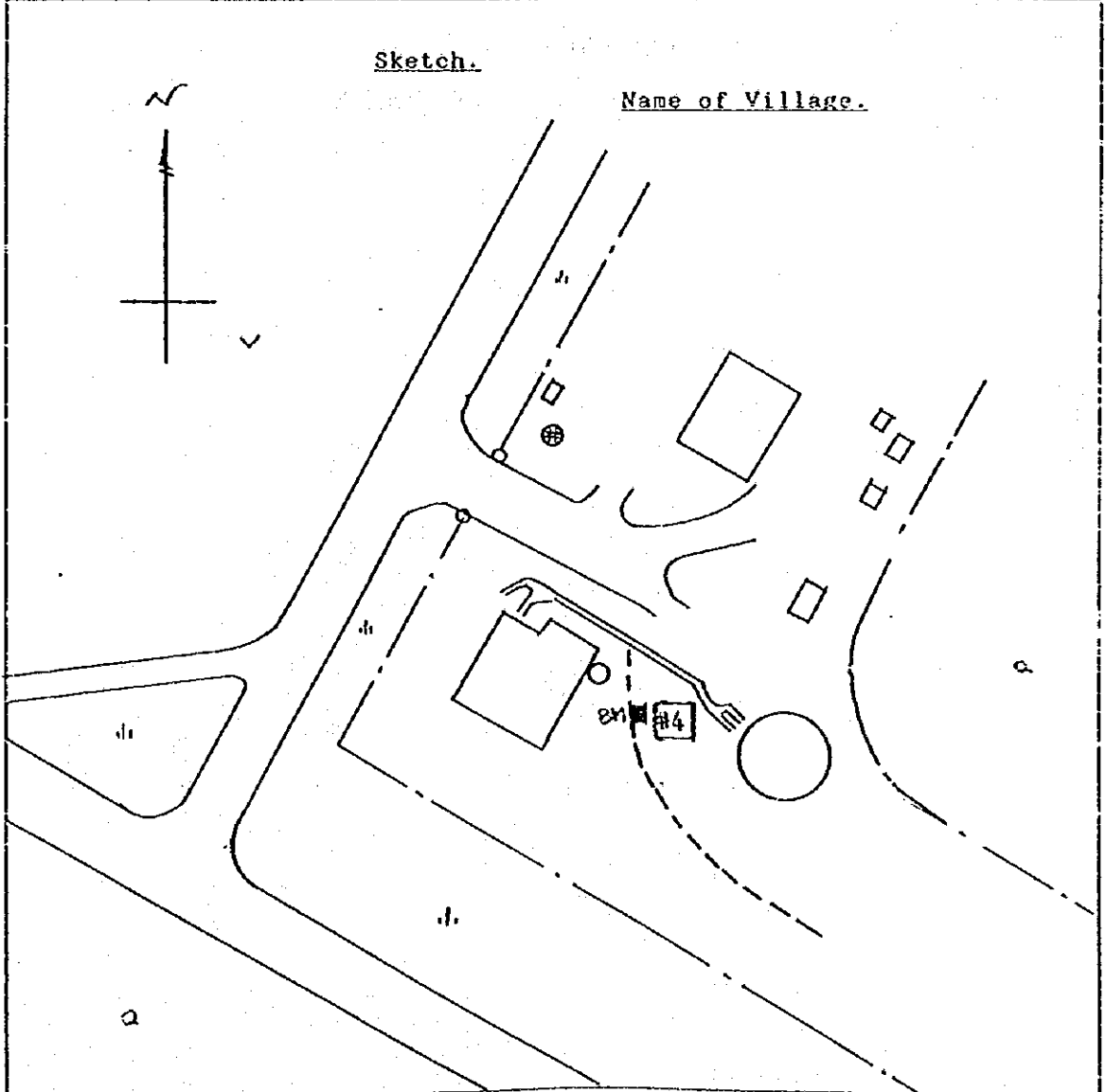
JICA STUDY TEAM.

Appendix 4 (11)

FILE:NV

DESCRIPTION

date: 5 JULY 1994 weather: FINE			
STATION	# 4 BM.	1/50,000	1428 A4
		1/250,000	SD - 35 - 10
HEIGHT	H= 1193.761	surveyor	KODY·A·W.
		instrument	NA 2
CO-ORDINATE	E= 647,687	surveyor	
	N= 8405,978	instrument	ENSIGN GPS



FILE:NV

JICA STUDY TEAM.

**Appendix 4 (12)**

- #5, #6, IN NDOLA