Table 2.13.3 HARVESTED AREA, YIELD AND PRODUCTION OF MAJOR CROPS IN BWANJE RDP (1984/85 - 1992/93)

Year	Local Maize			Composite Maize			Hybrid Maize			Maize Total		
	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)
1984/85	19,661	1,512	29,727	0	-	0	452	1,513	684	20,113	1,512	30,411
1985/86	17,337	923	16,002	204	653	133	408	2,103	858	17,949	947	16,993
1986/87	19,568	1,003	19,626	254	740	188	1,017	1,967	2,000	20,839	1,047	21,814
1987/88	19,329	1,268	24,509	840	1,862	1,564	1,121	1,914	2,146	21,290	1,325	28,219
1988/89	31,614	1,167	36,893	182	1,233	224	1,192	1,949	2,323	32,988	1,196	39,440
1989/90	28,500	838	23,870	2,410	1,344	3,240	2,550	3,300	8,415	33,460	1,062	35,525
1990/91	28,972	927	26,871	2,896	1,512	4,379	13,154	1,124	14,791	45,022	1,023	46,041
1991/92	30,015	116	3,481	1,590	135	214	4,969	582	2,891	36,574	180	6,586
1992/93	24,442	1,296	30,096	na	na	na	6,496	3,018	20,757	30,938	4,314	50,853
RDP Ave.	24,382	1,006	23,453	1,047	1,068	1,243	3,484	1,941	6,096	28,797	1,401	30,654
ADD Ave.	45,094	1,071	46,086	3,497	1,492	4,556	7,699	1,871	16,101	55,901	1,494	66,237
RDP/ADD (%)	54.1	-	50.9	29.9	-	27.3	45.3	-	37.9	51.5	-	46.3

Year	Rice (unhusked)			Pulses			Groundnuts			Sorghum		
	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)
1984/85	1,130	1,100	1,243	226	-	0	1,808	335	606	226	-	-
1985/86	0	-	0	612	-	0	1,836	458	841	204	-	-
1986/87	762	2,377	1,811	1,779	1,360	2,419	3,953	405	1,600	254	-	-
1987/88	840	1,970	1,655	280	306	86	6,723	347	2,332	200	-	-
1988/89	649	1,974	1,281	504	399	201	4,222	210	887	65	-	-
1989/90	1,085	951	1,032	1,742	547	953	446	482	215	300	530	159
1990/91	1,160	1,490	1,728	2,127	716	1,522	530	734	389	750	708	531
1991/92	2,610	512	1,336	1,138	160	179	598	48	29	735	56	41
1992/93	1,105	1,183	1,382	1,824	2,270	1,022	1,120	521	587	443	622	272
RDP Ave.	1,038	1,445	1,274	1,137	822	709	2,360	393	832	353	213	111
ADD Ave.	4,556	1,656	7,011	1,850	1,149	1,045	7,160	529	3,781	417	202	125
RDP/ADD (%)	22.8	-	18.2	61.5	-	67.9	33.0	-	22.0	84.7	-	89.2

Year	Millet			Cassava			Sweet Potatoes			Seed Cotton		
	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)
1984/85	612	-	-	678	2,200	1,491	452	2,200	994	5,647	800	4,518
1985/86	452	-	-	408	2,200	898	816	2,200	1,795	1,632	800	1,306
1986/87	1,017	1,360	1,383	508	2,200	1,117	762	2,200	1,676	1,779	800	1,424
1987/88	2,521	-	-	1,401	2,200	3,082	560	2,200	1,232	1,121	800	898
1988/89	2,233	420	938	1,114	2,200	2,450	1,015	2,200	2,233	4,129	800	3,303
1989/90	225	444	100	900	2,778	2,500	580	2,100	1,218	5,220	800	3,568
1990/91	940	577	542	1,330	3,528	4,692	1,145	3,180	3,641	5,502	800	6,533
1991/92	1,005	-	-	935	2,337	2,185	273	160	43	7,015	800	2,096
1992/93	258	598	154	218	2,370	519	584	2,029	1,196	5,052	1,153	5,866
RDP Ave.	1,029	378	346	832	2,446	2,104	687	2,052	1,559	4,122	839	3,279
ADD Ave.	1,030	377	347	7,971	2,687	23,639	1,215	2,276	2,909	12,141	768	9,001
RDP/ADD (%)	99.9	-	99.8	10.4	-	8.9	56.6	-	53.6	34.0	-	36.4

Year	Tobacco (sun-air)			Cashewnuts			Sunflower			Chillies		
	Area (ha)	Yield (kg/ha)	Production (ton)	Tree (nos.)	Yield (kg/tree)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)	Area (ha)	Yield (kg/ha)	Production (ton)
1988/89	157	-	-	na	na	na	na	na	na	na	na	na
1989/90	16	300	5	1,096	7.5	8.2	-	-	-	210	640	134
1990/91	20	400	8	1,096	2.0	2.2	-	-	-	-	-	-
1991/92	48	220	11	1,096	2.0	2.2	18.0	50	0.9	118	160	29
1992/93	43	800	27	1,096	2.0	3.0	20.0	500	10.0	114	497	74
RDP Ave.	57	430	10	1,096	3.4	3.9	19.0	275	5.5	147	432	79
ADD Ave.	68	430	10	4,164	2.3	9.3	40.6	309	14.2	164	519	90
RDP/ADD (%)	83.5	-	100.0	26.3	-	42.0	46.8	-	38.4	89.8	-	87.8

TABLE 2.13.4 AVERAGE YIELD OF PADDY AND MAIZE IN THE PROJECT AREAS

Crops		Upper Nadzipulu project	Lower Namilokwe and Mtandamula projects	Upper Namikokwe project	Lower Livulezi project	All project areas
Maize	sample size	23	36	40	61	160
	average yield (Kg/ha)					
	whole	1,393	1,133	1,915	930	1,246
	Local variet	1,435	1,269	1,640	906	1,239
	Hybrid	1,218	916	2,565	966	1,256
Rice	sample size	23	36	40	61	160
	average yield (Kg/ha)	1,113	1,319	1,545	624	1,154

Data source: the farmer's interview survey conducted by JICA team in 1992/93

TABLE 2.13.5 PADDY YIELD SURVEY IN THE MTANDAMURAIRRIGRION SCHEME

Number of farmers	male or female*	Number of plot	paddy land owned (ha)	Amount of paddy sold to ADMARC(bag	Total income from ADMARC (MK)	Remaining paddy kept at home(bag)	Kg/bag	Total production (kg)	Unit Yield (Ton/ha)
1	0		0.4	1	85	2	85	255	0.64
2	1		0.4	4	376	12	94	1,504	3.76
3	1	b77	0.4	5	375	5	75	750	1.88
4	0	b2	0.4	3.5	36	9	10	129	0.32
5	1	b1	0.8	32	2,560	0	80	2,560	3.20
6	0	b63	0.4	0.5	40	6	80	520	1.30
7	0	b14	0.4	0	0	18	80	1,440	3.60
8	0	b42	0.4	1.5	145	8	97	918	2.30
9	1	b43	0.4	2.5	263	13	105	1,631	4.08
10	1	b36	0.8	6	564	26	94	3,008	3.76
11	1	b72	0.4	3	225	17	75	1,500	3.75
12	1	b88	0.6	8	796	17	100	2,488	4.15
13	1	b35	0.4	10	1,000	7	100	1,700	4.25
14	1	b91	0.6	2	185	28	93	2,775	4.63
15	1	c64	0.6	2.5	230	8	92	966	1.61
16	1	d53	0.8	0	0	2	80	160	0.20
17	1	b28	0.8	3.5	230	20	66	1,544	1.93
18	0	c37	0.6	0	0	6	80	480	0.80
19	1	c5	0.8	2	185	38	93	3,700	4.63
20	1	c134	0.8	0.5	41	3	82	287	0.36
21	1	c130	0.8	5	463	27	93	2,963	3.70
22	0	c85	0.4	5	465	5	93	930	2.33
23	0	c120	0.4	0	0	20	80	1,600	4.00
24	0	c23	0.4	7	614	13	88	1,754	4.39
25	1	c57	0.4	2	200	10	100	1,200	3.00
26	1	c30	0.4	0.5	40	22	80	1,800	4.50
27	1	c9	0.4	3.5	300	7	86	900	2.25
28	1	c78	0.8	19	1,600	18	84	3,116	3.89
29	1	c16	0.4	3	240	3	80	480	1.20
30	1	c141	1.2	3	240	17	80	1,600	1.33
31	1	c44	0.8	0	0	28	80	2,240	2.80
32	1	c71	0.4	5	465	15	93	1,860	4.65
33	1	c14	0.4	1	66	17	66	1,188	2.97
34	1	c99	0.6	6	510	20	85	2,210	3.68
35	0	c113	0.8	1.5	150	10	100	1,150	1.44
36	0	c127	0.4	4	360	5	90	810	2.03
37	0	d60	0.4	0	0	3	80	240	0.60
38	1	b56	0.4	4.5	420	9	93	1,213	3.03
39	0	d144	0.4	7	657	8	94	1,408	3.52
40	1	d32	0.6	0.5	27	18	54	999	1.67
41	1	d102	0.4	0	0	2	80	160	0.40
42	0	d116	0.6	0	0	15	80	1,200	2.00
43	0	b98	0.4	5	375	3	75	600	1.50
44	1	d4	0.4	2.5	250	6	100	850	2.13
45	1	d123	0.4	0	0	16	80	1,280	3.20
46	1	d67	0.4	0	0	20	80	1,600	4.00
47	1	d37	0.8	0	0	30	80	2,400	3.00
48	0	d109	0.8	0	0	35	80	2,800	3.50
49	1	d95	0.4	4	305	8	76	915	2.29
50	0	d18	0.4	0	0	12	80	960	2.40
51	0	d137	0.4	0	0	6	80	480	1.20
52	0	d88	0.4	0.5	40	20	80	1,640	4.10
53	1	d130	0.4	2	168	16	84	1,512	3.78
54	1	c43	0.8	2.5	218	28	87	2,616	3.27
55	1	d120	0.8	3	252	27	84	2,520	3.15
56	1	c88	0.4	3.5	302	9	86	1,035	2.59
57	1	b48	0.8	10	838	15	84	2,095	2.62
58	1	d74	0.4	1	88	12	88	1,144	2.86
59	1	c74	0.8	7	525	33	75	3,000	3.75
60	0	b84	0.4	0	0	16	80	1,280	3.20
61	1	c2	0.4	2.5	183	17	73	1,391	3.48
62	0	b70	0.6	10	850	10	85	1,700	2.83
63	0	d25	0.4	2.5	215	14	86	1,376	3.44
64	1	d151	1.2	0	0	18	80	1,440	1.20

TABLE 2.13.6 YIELD AND YIELD COMPONENTS

No. of code	planting density per m2 (nos.of hill)	No.of panicles per m2	No.of spikelets per panicle	No.of spikelets per m2	Percentage of ripened grains (%)	Weight of 1000 ripened grains (gr)	Paddy yield per m2 (Kg)	Degree of lodging (%)
1	13	116	156	18,080	86	29	4,471	
2	15	129	131	16,866	87	26	3,884	
3	12	142	132	18,743	80	29	4,317	
4	18	155	137	21,196	91	30	5,665	
5	13	151	149	22,568	86	29	5,589	100
6	17	161	153	24,600	91	29	6,407	95
7	21	110	137	15,037	91	30	4,019	
8	14	110	178	19,567	90	30	5,265	
9	19	165	128	21,576	87	30	5,619	
10	14	83	138	11,430	89	29	2,947	
11	21	195	102	19,872	89	30	5,211	100
12	16	136	75	10,138	93	29	2,699	
13	26	194	97	18,765	82	29	4,467	
14	20	147	107	15,752	94	29	4,259	
15	16	92	148	13,553	93	30	3,722	
16	20	116	91	10,535	90	29	2,770	
17	11	105	114	11,900	91	30	3,220	
18	15	100	124	12,403	91	29	3,238	
19	22	176	136	23,893	85	30	6,019	100
20	14	128	137	17,539	64	28	3,104	
Avg.	17	136	128	17,201	88	29	4,345	
Max.	26	195	178	24,600	94	30	6,407	
Min.	11	83	75	10,138	64	26	2,699	
STD	4	32	24	4,364	6	1	1,129	

TABLE 2.13.7 CORRELATION COEFFICIENT BETWEEN YIELD AND YIELD COMPONENTS

Components		r
Number of panicles per unit area :	Yield	0.65**
Number of spikelets per panicle :	Yield	0.46*
Number of spikelets per unit area :	Yield	0.94**
Percentage of ripened grains :	Yield	0.07
Weight of 1000 ripened grains :	Yield	0.31
Planting density :	Spikelets/m2	-0.08
Number of panicles per unit area :	Spikelets/m2	0.69**
Number of spikelets per panicle :	Spikelets/m2	0.48*

*,** : Significant at 5% and at 1% each

TABLE 2.14.1 FARMER'S VIEW ON INCREASE OF FARM INCOME

Type of farmer Participated to farmer's club or not	Farmers in Mtandamula scheme area Both*** yes	Other farmers MHH* NOT	 FHH** NOT	 Both yes	For total farmer respondents
1. Expansion of cultivated land					
1.1 Expansion of paddy land					
present acreage (ha)	0.7	0.3	0.3	0.3	
additional land that farmers expect to expand (ha)	0.6	0.2	0.2	0.3	
1.2 Expansion of upland					
present acreage (ha)	0.5	0.8	0.5	1.0	
additional land that farmers expect to expand (ha)	0.5	0.8	0.5	1.0	
2. Desires that famers contribute their labour services for construction of expansion of paddy land (%)	100.0	40.0	33.3	47.8	
3. Kinds of crops that famers desire to cultivate on new additional land to be expaned (%)					
vegetables					74.0
rice					21.0
maize					15.0
others****					34.0
Sample size	17	61	52	26	156

*: male headed household ****: % for all farmer respondents

: female headed household **: other crops are beans, groundnuts and cotton

***: both of male and female headed houschold

TABLE 2.14.2 FARMER'S VIEW ON SHORTAGE OF LABOUR FORCE IN FARMING

Item Group	Farmers in Mtandamula scheme are	Other farmers			For all farmer respondents
Type of farmer	Both***	MHH*	FHH**	Both	
Participated to farmer's club or not	yes	not	not	yes	
(1) shortage of labour force for farming (%)	52.9	60.7	59.6	53.8	
(2) Countermeasure that farmers expect to solve shortage of lobour force (%)					
(a) reducing a scale of the cultivated land	43.7	7.8	28.9	17.6	21.1
(b) employing casual labour	18.7	29.4	10.5	58.8	26.9
(c) introducing draft animals	18.7	23.6	23.8	0.0	18.6
(d) introducing small machinery	6.3	0.0	0.0	0.0	0.6
(e) alleviating female's houseworks	12.6	39.2	36.8	23.6	32.8
construction of water wells for drin	6.3	31.4	34.2	17.6	27.6
construction of rice/maize mills	6.3	7.8	2.6	6	5.2
Total	100.0	100.0	100.0	100.0	100.0
sample size	17	61	52	26	156

*: male headed household

**: female headed household

***: both of male and female headed households

TABLE 2.14.3 FARMER'S VIEW ON AGRICULTURAL EXTENSION AND SACA'S SHORT TERM CREDIT

Item	Group	Farmers in Mtandamula scheme area	Other farmers			For all farmers
	Type of farmer	Both***	MHH*	FHH**	Both	
	Participated to farmer's club or not	yes	no	no	yes	
1. % of the farmers who satisfy extension services from Salima		100.0	51.6	40.4	100.0	60.0
2. Reasons why the farmers do not participate to farmers club						
	a. Farmer's conditions		23			
	b. Fear on credit conditions		35			
	c. Disapproval with SACA's thought		12			
	d. Shortage of extension activities		30			
3. Farmer's view on Credit Package (%)						
	troublesome the entrance formalities	58.8	58.1	44.2	40.0	
	difficult receiving Credit	82.4	41.9	26.9	20.0	
	difficult repayment of Credit	94.1	67.7	55.8	40.0	
	no merits of Credit for farmer	94.1	64.5	51.9	64.0	
	difficult repayment in unforeseen accident	94.1	67.7	59.6	56.0	
	troublesome obligation of farmers club	35.3	27.4	25.0	12.0	
	Sample size	17	61	52	26	156

*: male headed household **: female headed household

***: both of male and female headed households

Data source: the interview survey conducted by JICA team in 1993

TABLE 2.14.4 FARMER'S VIEW ON ROAD CONDITIONS

Items	Lower Nadzipulu project area			Lower Namikokwe and Mtamdamula project area			Upper Namikokwe project area			Lower Livulezi project area		
1. Distance from farmer's home (km)												
1) to market (ADMARC)		7.2			4.8			8.9			4.3	
2) to school		3.6			2.3			3.7			2.3	
3) to shopping		3.2			3.2			9.4			4.7	
4) to hospital		6.9			11.3			7.0			6.0	
5) to drinking water well		0.8			0.9			1.2			0.6	
6) to field		1.6			1.5			1.4			1.6	
2. Perception of farmers to present road conditio in the rainy season (%)	very bad	bad	good	very bac	bad	good	very bac	bad	good	very bac	bad	good
1) to market (ADMARC)	22.7	77.3	0.0	47.1	38.2	14.7	72.5	17.5	10.0	8.6	56.9	32.8
2) to school	22.7	40.9	27.3	47.1	38.2	14.7	52.5	20.0	27.5	0.0	34.5	63.8
3) to shopping	22.7	68.2	9.1	47.1	38.2	14.7	65.0	17.5	17.5	8.6	53.4	32.8
4) to hospital	22.7	72.7	4.5	47.1	50.0	2.9	52.5	22.5	22.5	10.3	34.5	53.4
5) to drinking water well	36.4	54.5	9.1	47.1	38.2	14.7	65.0	22.5	10.0	13.8	39.7	44.8
6) to field	50.0	50.0	0.0	47.1	52.9	0.0	60.0	30.0	5.0	51.7	31.0	17.2
3. Farmer's expectation for road repairing (%)*												
1) Main road (M17 and M18)					1.6							
2) Secondary road					12.4							
3) District road					9.2							
4) Village road (tracks)					37.3							
5) Agricultural road (farm lane)					39.5							
Sample size		22			34			40			58	

*: for all the farmers

Table 3.2.1 FARM LABOUR BALANCE UNDER WITH- AND WITHOUT-PROJECT CONDITIONS

I. PRESENT CONDITIONS (WITHOUT PROJECT)

Unit : hours/5 Day

Crop/Farming Practices	Work days	Work hr/day	November						December						January						February						March						April					
			1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1. IRRIGATED PADDY (0.4 ha)																																						
1. Ploughing	25	750																																				
2. Breaking clods	2	28												28																								
3. Nursery/sowing	5	73													73																							
4. Puddling/transplant.	45	1,360																		113	113	113	113	113	113	113	113	113	113	113	113							
5. Weeding	38	875																		55	55	53	53	51	51	51	51	51	51	51	51	51	51	51	51	51		
6. Birds scaring	59	1,023																																			88	85
7. Harvesting & drying	19	853																																				
8. Thresh/winnow/store	20	963																																				
Total Paddy (ha)	213	5,925	0	0	0	0	0	0	0	0	0	0	0	28	73	0	0	0	0	168	168	166	166	164	164	164	164	164	164	164	164	51	51	51	51	51	88	85
A. Total Paddy (0.4ha)		2,370	0	0	0	0	0	0	0	0	0	0	0	11	29	0	0	0	0	67	67	66	66	66	66	66	66	66	66	66	66	20	20	20	20	20	35	34
2. RAINFED MAIZE (0.86 ha)																																						
1. Clearing	5	80																																				
2. Ridging	14	224																																				
3. Ridging & sowing	4	58										58																										
4. Weeding	19	190												33	33	31	31	31	31																			
5. Harvesting	9	93																																				
Total Paddy (ha)	51	645	0	0	0	0	0	0	0	0	0	58	0	33	33	31	31	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Total Paddy (0.86ha)		555	0	0	0	0	0	0	0	0	0	50	0	28	28	27	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL (A+B)		3,015	0	0	0	0	0	0	0	0	0	50	0	40	58	27	27	27	27	67	67	66	66	66	66	66	66	66	66	66	66	20	20	20	20	20	35	34
AVAIL. LABOUR		7,154	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
BALANCE		4,139	98	98	98	98	98	98	98	98	98	48	98	58	40	71	71	71	71	31	31	32	32	32	32	32	32	32	32	32	32	78	78	78	78	78	63	64
(Working Rate)		42%																																				

Crop/Farming Practices	Work days	Work hr/day	May						June						July						August						September						October					
			1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1. IRRIGATED PADDY (0.4 ha)																																						
1. Ploughing	25	750																															125	125	125	125	125	125
2. Breaking clods	2	28																																				
3. Nursery/sowing	5	73																																				
4. Puddling/transplant.	45	1,360																																				
5. Weeding	38	875																																				
6. Birds scaring	59	1,023	85	85	85	85	85	85	85	85	85	85																										
7. Harvesting & drying	19	853								143	142	142	142	142	142																							
8. Thresh/winnow/store	20	963												163	160	160	160	160	160																			
Total Paddy (ha)	213	5,925	85	85	85	85	85	85	85	228	227	227	142	305	302	160	160	160	160	0	0	0	0	0	0	0	0	0	0	0	0	0	125	125	125	125	125	125
A. Total Paddy (0.4ha)		2,370	34	34	34	34	34	34	34	91	91	91	57	122	121	64	64	64	64	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	50	50	50	50
2. RAINFED MAIZE (0.86 ha)																																						
1. Clearing	5	80																											40	40								
2. Ridging	14	224																																		76	74	74
3. Ridging & sowing	4	58																																				
4. Weeding	19	190																																				
5. Harvesting	9	93				46	47																															
Total Paddy (ha)	51	645	0	0	0	46	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	0	0	0	0	76	74	74
B. Total Paddy (0.86ha)		555	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	34	0	0	0	0	65	64	64
TOTAL (A+B)		3,015	34	34	34	74	74	34	34	91	91	91	57	122	121	64	64	64	64	0	0	0	0	0	0	0	0	0	0	34	34	0	50	50	50	115	114	114
AVAIL. LABOUR		7,154	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
BALANCE		4,139	64	64	64	24	24	64	64	7	7	7	41	-24	-23	34	34	34	34	98	98	98	98	98	98	98	98	98	98	64	64	98	48	48	48	-17	-16	-16
(Working Rate)		42%																																				

II. WITH PROJECT CONDITIONS

Crop/Farming Practices	Work days	Work hr/day	November						December						January						February						March						April					
			1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1. IRRIGATED PADDY (0.4 ha)																																						
1. Ploughing	25	750	150	150	150	150	150																															
2. Breaking clods	2	28					28																															
3. Nursery/sowing	5	73						37	36																													
4. Puddling/transplant.	45	1,200								200	200	200	200	200	200																							
5. Basal dosage	2	10										10																										
6. Top-dressing	4	20														10								10														
7. Weeding	38	875														150	145	145	145	145	145																	
8. Birds scaring	59	1,023																				173	170	170	170	170	170	170										
9. Harvesting & drying	19	853																											214	213	213	213						
10. Thresh/winnow/store	20	963																															163	160	160	160	160	160
11. Irrigation O&M	10	500																																				
Paddy (ha)	229	6,205	150	150	150	150	178	37	36	200	200	210	200	200	200	160	145	145	145	145	145	173	170	180	170	170	170	170	214	213	213	213	163	160	160	160	160	160
A. Paddy (0.4ha)		2,518	60	60	60	60	71	15	14	80	80	84	80	80	80	64	58	58	58	58	58	69	68	72	68	68	68	68	86	85	85	85	65	64	64	64	64	64
2. IRRIGATED MAIZE (0.03ha)																																						
1. Clearing	5	80																																				
2. Ridging	14	224																																				
3. Ridging & sowing	4	58																																				
4. Weeding	19	190																																				
5. Harvesting	9	93																																				
Maize (1 ha)	51	645	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Maize (0.03ha)		19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. IRRIGATED VEGETABLES (0.03ha)																																						
1. Land Preparation	30	800																																				
2. Fertilizer Application	2	10																																				
3. Transplanting	50	1,500																																				
4. Pest Control	2	10																																				
5. Harvesting	20	600																																				
Vegetables (1 ha)	104	2920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C. Vegetables (0.03ha)		88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. RAINFED MAIZE (0.86 ha)																																						
1. Clearing	5	80																																				
2. Ridging	14	224																																				
3. Ridging & sowing	4	58								18	16	16	16																									
4. Weeding	19	190												20	20	33	39	39	39																			
5. Harvesting	9	93																																				
Maize (ha)	51	645	0	0	0	0	0	0	0	18	16	16	16	20	20	33	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Maize (0.86ha)		555	0	0	0	0	0	0	0	15	14	14	14	17	17	28	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL (A+B+C+D)		3,180	79	79	79	79	91	54	14	95	94	98	94	97	97	92	92	92	92	58	58	69	68	72	68	68	68	68	86	85	85	85	65	64	64	64	64	64
AVAIL. LABOUR		7,154	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
BALANCE		3,974	19	19	19	19	7	64	84	3	4	0	4	1	1	6	6	6	6	40	40	29	30	26	30	30	30	30	12	13	13	13	33	34	34	34	34	34
(Working Rate)		44%																																				

Crop/Farming Practices	Work days	Work hr/day	May						June						July						August						September						October					
			1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1. IRRIGATED PADDY (0.4 ha)																																						
1. Ploughing	25	750																																				
2. Breaking clods	2	28																																				
3. Nursery/sowing	5	73																																				
4. Puddling/transplant.	45	1,200																																				
5. Basal dosage	2	10																																				
6. Top-dressing	4	20																																				
7. Weeding	38	875																																				
8. Birds scaring	59	1,023																																				
9. Harvesting & drying	19	853																																				
10. Thresh/winnow/store	20	963																																				
11. Irrigation O&M	10	500																											50	50	50	50	50	50	50	50	50	50
Paddy (ha)	229	6,205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50
A. Paddy (0.4ha)		2,518	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20	20	20	20	20	20	20	20	20
2. IRRIGATED MAIZE (0.03ha)																																						
1. Clearing	5	80									40	40																										
2. Ridging	14	224											112	112																								
3. Ridging & sowing	4	58													58																							
4. Weeding	19	190														18	18	18	17	17	17	17	17	17	17													
5. Harvesting	9	93																								47	46											
Maize (1 ha)	51	645	0	0	0	0	0	0	0	0	40	40	112	112	58	18	18	18	17	17	17	17	17	17	17	47	46	0	0	0	0	0	0	0	0	0	0	0
B. Maize (0.03ha)		19	0	0	0	0	0	0	0	0	1	1	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
3. IRRIGATED VEGETABLES (0.03ha)																																						
1. Land Preparation	30	800					133	133	133	133	133	133																										
2. Fertilizer Application	2	10											10																									
3. Transplanting	50	1,500																500	500	500																		
4. Pest Control	2	10																					10															
5. Harvesting	20	600																								200	200	200										
Vegetables (1 ha)	104	2920	0	0	0	0	133	133	133	133	133	133	10	0	0	0	0	500	500	500	0	0	10	0	0	200	200	200	0	0	0	0	0	0	0	0	0	0
C. Vegetables (0.03ha)		88	0	0	0	0	4	4	4	4	4	4	0	0	0	0	0	15	15	15	0	0	0	0	0	6	6	6	0	0	0	0	0	0	0	0	0	0
4. RAINFED MAIZE (0.86 ha)																																						
1. Clearing	5	80																												40	40							
2. Ridging	14	224																																		76	74	74
3. Ridging & sowing	4	58																																				
4. Weeding	19	190																																				
5. Harvesting	9	93				46	47																															
Maize (ha)	51	645	0	0	0	46	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	0	0	0	0	76	74	74
D. Maize (0.86ha)		555	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	34	0	0	0	0	65	64	64
TOTAL (A+B+C+D)		3,180	0	0	0	40	44	4	4	4	4	4	0	0	3	3	3	18	18	18	1	1	1	1	1	7	7	7	21	56	56	21	20	20	20	85	84	84
AVAIL. LABOUR		7,154	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
BALANCE		3,974	98	98	98	58	54	94	94	94	94	94	98	98	95	95	95	80	80	80	97	97	97	97	97	91	91	91	77	42	42	77	78	78	78	13	14	14
(Working Rate)		44%																																				

TABLE 3.2.2 REQUIRED CAPACITY AND NUMBERS OF RICE MILLS

Item	Unit	Lower Nadzipulu Irrigation Project	Namikokwe Integrated Irrigation Project	Lower Livulezi Irrigation Project
1 Irrigation Area	(ha)	250	800	520
2 Production (4.0/ha)	(tons)	1,000	3,200	2,080
3 Numbers of Farmers		625	2,000	1,300
4 Self Consumption Rice				
(1) Annual				
(320 kg/Year/household))	(tons)	200	640	416
(2) Required cap[acity of rice mill				
−10 months x 20 days	(ton/day)	1.0	3.2	2.1
−6 hours／day	(ton/hr)	0.17	0.54	0.35
5 Marketing Rice				
(1) Max. possible amount	(tons)	800	2,560	1,664
(2) Milling amount (50 % of (1))	(tons)	400	1,280	832
(3) Required capacity og rice mill				
−3 months x 20 days	(ton/day)	6.7	21.4	13.9
−6 hours／day	(ton/hr)	1.12	3.57	2.32
6 Required Capacity and Numbers of Rice Mill				
(1) Required Capacity (4 + 5)	(ton/hr)	1.29	4.11	2.67
(2) Required Nos. (1.0 ton/hr)	(set)	2	5	3

Table 3.3.1 WATER BALANCE CALCULATION FOR NADZIPULU RIVER BASIN (PATTERN-1)

Month		(1) River discharge (m3/sec)	(2) River maintenance (m3/sec)	(3) Irrigation days	(4) Available discharge (m3)	(5) Water requirement (mm)	(6) Irrigation Efficiency	(7) Gross Water requirement (mm)	(8) Effective rainfall (mm)	(9) Puddling Water requirement (mm)	(10) Gross puddling Water requirement (mm)	(11) Gross Water requirement (m3/ha)	(12) Calculated Irrigable Area (ha)	(13) Area intencity of puddling	(14) Area intencity of crop	(15) Potential Irrigation Area (ha)
	10	0.270	0.179	3	23,587	0.3	0.720	0.39	0.0	0.0	0.0	4	6,027	0.000	0.000	0
Nov	10	0.325	0.179	0	126,058	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.200	0.179	0	18,317	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	1.485	0.179	0	1,128,578	0.0	0.720	0.00	48.3	0.0	0.0	0	-	0.000	0.000	0
Dec	10	1.669	0.179	0	1,287,446	0.0	0.720	0.00	210.6	0.0	0.0	0	-	0.000	0.000	0
	11	2.530	0.179	11	2,234,380	0.0	0.720	0.00	38.9	47.1	65.5	655	3,413	0.314	0.000	521
	10	6.696	0.179	10	5,630,990	14.6	0.720	20.26	68.1	42.9	59.5	595	9,460	0.286	0.167	750
Jan	10	6.433	0.179	10	5,403,866	43.8	0.720	60.78	71.6	42.9	59.5	595	9,078	0.286	0.500	1,303
	11	7.059	0.179	11	6,538,847	81.7	0.720	113.45	112.3	17.1	23.8	250	26,163	0.114	0.848	1,596
	10	15.288	0.179	10	13,053,830	86.2	0.720	119.75	77.5	0.0	0.0	423	30,877	0.000	1.000	1,658
Feb	10	7.839	0.179	10	6,618,110	86.2	0.720	119.75	3.3	0.0	0.0	1,164	5,683	0.000	1.000	1,658
	8	5.324	0.179	8	3,556,063	69.0	0.720	95.80	8.9	0.0	0.0	869	4,092	0.000	1.000	1,658
	10	4.187	0.179	10	3,462,998	87.4	0.720	121.41	0.0	0.0	0.0	1,214	2,852	0.000	1.000	1,658
Mar	10	3.740	0.179	10	3,076,358	88.1	0.720	122.31	0.0	0.0	0.0	1,223	2,515	0.000	1.000	1,658
	11	2.890	0.179	11	2,576,946	95.8	0.720	133.11	0.0	0.0	0.0	1,331	1,936	0.000	1.000	1,658
	10	2.274	0.179	10	1,810,166	78.6	0.720	109.18	0.0	0.0	0.0	1,092	1,658	0.000	1.000	1,658
Apr	10	3.112	0.179	10	2,534,198	80.4	0.720	111.70	47.0	0.0	0.0	647	3,916	0.000	1.000	1,658
	10	2.179	0.179	10	1,728,302	65.9	0.720	91.56	0.0	0.0	0.0	916	1,888	0.000	0.833	1,382
	10	1.794	0.179	10	1,395,706	34.1	0.720	47.40	0.0	0.0	0.0	474	2,945	0.000	0.500	829
May	10	1.589	0.179	10	1,218,672	11.8	0.720	16.44	0.0	0.0	0.0	164	7,411	0.000	0.167	276
	11	1.310	0.179	0	1,074,911	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	1.092	0.179	0	788,486	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Jun	10	1.119	0.179	10	811,901	2.2	0.720	3.07	0.0	0.0	0.0	31	26,441	0.000	0.167	0
	10	0.864	0.179	10	592,272	6.6	0.720	9.21	0.0	0.0	0.0	92	6,429	0.000	0.500	0
	10	0.705	0.179	10	454,550	11.5	0.720	16.04	0.0	0.0	0.0	160	2,834	0.000	0.833	0
Jul	10	0.645	0.179	10	402,797	17.0	0.720	23.60	0.0	0.0	0.0	236	1,707	0.000	1.000	0
	11	0.582	0.179	11	382,674	25.3	0.720	35.14	0.0	0.0	0.0	351	1,089	0.000	1.000	0
	10	0.541	0.179	10	312,854	36.6	0.720	50.82	0.0	0.0	0.0	508	616	0.000	1.000	0
Aug	10	0.538	0.179	10	310,522	43.5	0.720	60.42	0.0	0.0	0.0	604	514	0.000	0.998	0
	11	0.434	0.179	11	242,447	59.3	0.720	82.31	0.0	0.0	0.0	823	295	0.000	0.994	0
	10	0.360	0.179	10	156,470	67.8	0.720	94.23	0.0	0.0	0.0	942	166	0.000	0.767	0
Sept	10	0.296	0.179	10	101,088	68.5	0.720	95.19	0.0	0.0	0.0	952	106	0.000	0.433	0
	10	0.246	0.179	10	58,061	67.0	0.720	93.07	0.0	0.0	0.0	931	62	0.000	0.107	0
	10	0.297	0.179	10	102,298	76.0	0.720	105.53	0.0	0.0	0.0	1,055	97	0.000	0.000	0
Oct	10	0.179	0.179	10	0	53.4	0.720	74.11	0.0	0.0	0.0	741	0	0.000	0.000	0
	11	0.252	0.179	10	62,080	25.5	0.720	35.44	0.0	0.0	0.0	354	178	0.000	0.000	0

Irrigable area in rainy season 1,658 (ha)

Irrigable area in dry season 0 (ha)

Note) : The minimum river discharge in the year is considered as the river maintenance discharge

: Available discharge means river discharge during the irrigation period

: Water requirement is calculated based on followings : -Puddling for main field 150 mm

-Percolation losses is 3 mm/day.

Table 3.3.2 WATER BALANCE CALCULATION FOR NAMIKOKWE RIVER BASIN (PATTERN-1)

Month		(1) River discharge (m3/sec)	(2) River maintenance (m3/sec)	(3) Irrigation days	(4) Available discharge (m3)	(5) Water requirement (mm)	(6) Irrigation Efficiency	(7) Gross Water requirement (mm)	(8) Effective rainfall (mm)	(9) Puddling Water requirement (mm)	(10) Gross puddling Water requirement (mm)	(11) Gross Water requirement (m3/ha)	(12) Calculated Irrigable Area (ha)	(13) Area intencity of puddling	(14) Area intencity of crop	(15) Potential Irrigation Area (ha)
	10	0.261	0.066	3	50,629	0.3	0.720	0.39	0.0	0.0	0.0	4	12,936	0.000	0.015	0
Nov	10	0.128	0.066	0	53,382	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.203	0.066	0	118,044	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.390	0.066	0	279,618	0.0	0.720	0.00	48.3	0.0	0.0	0	-	0.000	0.000	0
Dec	10	2.408	0.066	0	2,023,056	0.0	0.720	0.00	210.6	0.0	0.0	0	-	0.000	0.000	0
	11	3.397	0.066	11	3,166,130	0.0	0.720	0.00	38.9	47.1	65.5	655	4,836	0.314	0.000	347
	10	5.400	0.066	10	4,608,196	14.6	0.720	20.26	68.1	42.9	59.5	595	7,742	0.286	0.167	500
Jan	10	2.868	0.066	10	2,420,748	43.8	0.720	60.78	71.6	42.9	59.5	595	4,067	0.286	0.500	868
	11	8.149	0.066	11	7,681,789	81.7	0.720	113.45	112.3	17.1	23.8	250	30,736	0.114	0.848	1,063
	10	10.413	0.066	10	8,939,931	86.2	0.720	119.75	77.5	0.0	0.0	423	21,146	0.000	1.000	1,104
Feb	10	5.591	0.066	10	4,773,228	86.2	0.720	119.75	3.3	0.0	0.0	1,164	4,099	0.000	1.000	1,104
	8	2.556	0.066	8	1,721,012	69.0	0.720	95.80	8.9	0.0	0.0	869	1,980	0.000	1.000	1,104
	10	2.632	0.066	10	2,216,838	87.4	0.720	121.41	0.0	0.0	0.0	1,214	1,826	0.000	1.000	1,104
Mar	10	2.370	0.066	10	1,990,297	88.1	0.720	122.31	0.0	0.0	0.0	1,223	1,627	0.000	1.000	1,104
	11	1.768	0.066	11	1,617,246	95.8	0.720	133.11	0.0	0.0	0.0	1,331	1,215	0.000	1.000	1,104
	10	1.461	0.066	10	1,205,521	78.6	0.720	109.18	0.0	0.0	0.0	1,092	1,104	0.000	1.000	1,104
Apr	10	1.709	0.066	10	1,419,622	80.4	0.720	111.70	47.0	0.0	0.0	647	2,194	0.000	1.000	1,104
	10	1.288	0.066	10	1,055,650	65.9	0.720	91.56	0.0	0.0	0.0	916	1,153	0.000	0.833	920
	10	0.907	0.066	10	726,553	34.1	0.720	47.40	0.0	0.0	0.0	474	1,533	0.000	0.500	552
May	10	0.790	0.066	10	625,057	11.8	0.720	16.44	0.0	0.0	0.0	164	3,801	0.000	0.167	184
	11	0.667	0.066	0	570,773	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.557	0.066	0	424,017	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Jun	10	0.529	0.066	10	399,697	2.2	0.720	3.07	0.0	0.0	0.0	31	13,017	0.000	0.167	0
	10	0.431	0.066	10	315,568	6.6	0.720	9.21	0.0	0.0	0.0	92	3,426	0.000	0.500	0
	10	0.418	0.066	10	304,471	11.5	0.720	16.04	0.0	0.0	0.0	160	1,898	0.000	0.833	0
Jul	10	0.373	0.066	10	265,484	17.0	0.720	23.60	0.0	0.0	0.0	236	1,125	0.000	1.000	0
	11	0.337	0.066	11	257,042	25.3	0.720	35.14	0.0	0.0	0.0	351	731	0.000	1.000	0
	10	0.296	0.066	10	199,053	36.6	0.720	50.82	0.0	0.0	0.0	508	392	0.000	1.000	0
Aug	10	0.269	0.066	10	175,059	43.5	0.720	60.42	0.0	0.0	0.0	604	290	0.000	1.000	0
	11	0.232	0.066	11	157,662	59.3	0.720	82.31	0.0	0.0	0.0	823	192	0.000	1.000	0
	10	0.166	0.066	10	86,003	67.8	0.720	94.23	0.0	0.0	0.0	942	91	0.000	1.000	0
Sept	10	0.132	0.066	10	57,365	68.5	0.720	95.19	0.0	0.0	0.0	952	60	0.000	1.000	0
	10	0.107	0.066	10	35,717	67.0	0.720	93.07	0.0	0.0	0.0	931	38	0.000	1.000	0
	10	0.123	0.066	10	48,770	76.0	0.720	105.53	0.0	0.0	0.0	1,055	46	0.000	0.973	0
Oct	10	0.085	0.066	10	16,674	53.4	0.720	74.11	0.0	0.0	0.0	741	22	0.000	0.973	0
	11	0.066	0.066	10	0	25.5	0.720	35.44	0.0	0.0	0.0	354	0	0.000	0.700	0

Irrigable area in rainy season **1,104** (ha)

Irrigable area in dry season **0** (ha)

Note) : The minimum river discharge in the year is considered as the river maintenance discharge

: Available discharge means river discharge during the irrigation period

: *Water requirement is calculated based on followings :* -*Puddling for main field* 150 mm

-Percolation losses is 3 mm/day.

Table 3.3.3 WATER BALANCE CALCULATION FOR LIVULEZI RIVER BASIN (PATTERN-1)

Month		(1) River discharge (m3/sec)	(2) River maintenance (m3/sec)	(3) Irrigation days	(4) Available discharge (m3)	(5) Water requirement (mm)	(6) Irrigation Efficiency	(7) Gross Water requirement (mm)	(8) Effective rainfall (mm)	(9) Puddling Water requirement (mm)	(10) Gross puddling Water requirement (m3/ha)	(11) Total Water requirement (m3/ha)	(12) Calculated Irrigable Area (ha)	(13) Area intencity of puddling	(14) Area intencity of crop	(15) Potential Irrigation Area (ha)
	10	0.165	0.102	3	16,433	0.3	0.720	0.39	0.0	0.0	0.0	4	4,199	0.000	0.015	1
Nov	10	0.120	0.102	0	15,638	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.102	0.102	0	0	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	1.214	0.102	0	961,092	0.0	0.720	0.00	48.3	0.0	0.0	0	-	0.000	0.000	0
Dec	10	0.287	0.102	0	160,164	0.0	0.720	0.00	210.6	0.0	0.0	0	-	0.000	0.000	0
	11	0.753	0.102	11	619,502	0.0	0.720	0.00	38.9	47.1	654.8	655	946	0.314	0.000	297
	10	1.451	0.102	10	1,165,968	14.6	0.720	20.26	68.1	42.9	595.2	595	1,959	0.286	0.167	428
Jan	10	1.343	0.102	10	1,072,980	43.8	0.720	60.78	71.6	42.9	595.2	595	1,803	0.286	0.500	743
	11	5.417	0.102	11	5,051,851	81.7	0.720	113.45	112.3	17.1	238.1	250	20,213	0.114	0.848	911
	10	8.686	0.102	10	7,417,224	86.2	0.720	119.75	77.5	0.0	0.0	423	17,544	0.000	1.000	946
Feb	10	10.506	0.102	10	8,989,704	86.2	0.720	119.75	3.3	0.0	0.0	1,164	7,720	0.000	1.000	946
	8	17.083	0.102	8	11,737,843	69.0	0.720	95.80	8.9	0.0	0.0	869	13,506	0.000	1.000	946
	10	11.265	0.102	10	9,645,264	87.4	0.720	121.41	0.0	0.0	0.0	1,214	7,944	0.000	1.000	946
Mar	10	4.800	0.102	10	4,059,504	88.1	0.720	122.31	0.0	0.0	0.0	1,223	3,319	0.000	1.000	946
	11	3.634	0.102	11	3,357,710	95.8	0.720	133.11	0.0	0.0	0.0	1,331	2,522	0.000	1.000	946
	10	2.690	0.102	10	2,236,464	78.6	0.720	109.18	0.0	0.0	0.0	1,092	2,048	0.000	1.000	946
Apr	10	2.129	0.102	10	1,751,544	80.4	0.720	111.70	47.0	0.0	0.0	647	2,707	0.000	1.000	946
	10	1.596	0.102	10	1,291,464	65.9	0.720	91.56	0.0	0.0	0.0	916	1,411	0.000	0.833	788
	10	1.294	0.102	10	1,030,320	34.1	0.720	47.40	0.0	0.0	0.0	474	2,174	0.000	0.500	473
May	10	1.214	0.102	10	961,200	11.8	0.720	16.44	0.0	0.0	0.0	164	5,846	0.000	0.167	158
	11	1.159	0.102	0	1,005,134	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.924	0.102	0	710,986	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Jun	10	0.841	0.102	10	638,842	2.2	0.720	3.07	0.0	0.0	0.0	31	20,805	0.000	0.167	10
	10	0.753	0.102	10	563,155	6.6	0.720	9.21	0.0	0.0	0.0	92	6,113	0.000	0.500	30
	10	0.604	0.102	10	434,160	11.5	0.720	16.04	0.0	0.0	0.0	160	2,706	0.000	0.833	50
Jul	10	0.512	0.102	10	354,672	17.0	0.720	23.60	0.0	0.0	0.0	236	1,503	0.000	1.000	60
	11	0.392	0.102	11	276,350	25.3	0.720	35.14	0.0	0.0	0.0	351	786	0.000	1.000	60
	10	0.501	0.102	10	345,427	36.6	0.720	50.82	0.0	0.0	0.0	508	680	0.000	1.000	60
Aug	10	0.382	0.102	10	242,438	43.5	0.720	60.42	0.0	0.0	0.0	604	401	0.000	1.000	60
	11	0.309	0.102	11	197,294	59.3	0.720	82.31	0.0	0.0	0.0	823	240	0.000	1.000	60
	10	0.447	0.102	10	298,080	67.8	0.720	94.23	0.0	0.0	0.0	942	316	0.000	1.000	60
Sept	10	0.233	0.102	10	113,184	68.5	0.720	95.19	0.0	0.0	0.0	952	119	0.000	1.000	60
	10	0.171	0.102	10	59,962	67.0	0.720	93.07	0.0	0.0	0.0	931	64	0.000	1.000	60
	10	0.180	0.102	10	68,170	76.0	0.720	105.53	0.0	0.0	0.0	1,055	65	0.000	0.973	58
Oct	10	0.153	0.102	10	44,323	53.4	0.720	74.11	0.0	0.0	0.0	741	60	0.000	0.973	58
	11	0.305	0.102	10	175,588	25.5	0.720	35.44	0.0	0.0	0.0	354	495	0.000	0.700	42

Irrigable area in rainy season **946** (ha)

Irrigable area in dry season **60** (ha)

Note) : The minimum river discharge in the year is considered as the river maintenance discharge

: Available discharge means river discharge during the irrigation period

: Water requirement is calculated based on followings : -Puddling for main field 150 mm

-Percolation losses is 3 mm/day.

Table 3.3.4 WATER BALANCE CALCULATION FOR NADZIPULU RIVER BASIN (PATTERN-2)

Month		(1) River discharge (m3/sec)	(2) River maintenance (m3/sec)	(3) Irrigation days	(4) Available discharge (m3)	(5) Water requirement (mm)	(6) Irrigation Efficiency	(7) Gross Water requirement (mm)	(8) Effective rainfall (mm)	(9) Puddling Water requirement (mm)	(10) Gross puddling Water requirement (mm)	(11) Gross Water requirement (m3/ha)	(12) Calculated Irrigable Area (ha)	(13) Area intencity of puddling	(14) Area intencity of crop	(15) Potential Irrigation Area (ha)
	10	0.270	0.179	3	23,587	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Nov	10	0.325	0.179	0	126,058	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.200	0.179	0	18,317	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	1.485	0.179	0	1,128,578	0.0	0.720	0.00	48.3	0.0	0.0	0	-	0.000	0.000	0
Dec	10	1.669	0.179	0	1,287,446	0.0	0.720	0.00	210.6	0.0	0.0	0	-	0.000	0.000	0
	11	2.530	0.179	11	2,234,380	0.0	0.720	0.00	38.9	47.1	65.5	655	3,413	0.314	0.000	521
	10	6.696	0.179	10	5,630,990	14.6	0.720	20.26	68.1	42.9	59.5	595	9,460	0.286	0.167	750
Jan	10	6.433	0.179	10	5,403,866	43.8	0.720	60.78	71.6	42.9	59.5	595	9,078	0.286	0.500	1,303
	11	7.059	0.179	11	6,538,847	81.7	0.720	113.45	112.3	17.1	23.8	250	26,163	0.114	0.848	1,596
	10	15.288	0.179	10	13,053,830	86.2	0.720	119.75	77.5	0.0	0.0	423	30,877	0.000	1.000	1,658
Feb	10	7.839	0.179	10	6,618,110	86.2	0.720	119.75	3.3	0.0	0.0	1,164	5,683	0.000	1.000	1,658
	8	5.324	0.179	8	3,556,063	69.0	0.720	95.80	8.9	0.0	0.0	869	4,092	0.000	1.000	1,658
	10	4.187	0.179	10	3,462,998	87.4	0.720	121.41	0.0	0.0	0.0	1,214	2,852	0.000	1.000	1,658
Mar	10	3.740	0.179	10	3,076,358	88.1	0.720	122.31	0.0	0.0	0.0	1,223	2,515	0.000	1.000	1,658
	11	2.890	0.179	11	2,576,946	95.8	0.720	133.11	0.0	0.0	0.0	1,331	1,936	0.000	1.000	1,658
	10	2.274	0.179	10	1,810,166	78.6	0.720	109.18	0.0	0.0	0.0	1,092	1,658	0.000	1.000	1,658
Apr	10	3.112	0.179	10	2,534,198	80.4	0.720	111.70	47.0	0.0	0.0	647	3,916	0.000	1.000	1,658
	10	2.179	0.179	10	1,728,302	65.9	0.720	91.56	0.0	0.0	0.0	916	1,888	0.000	0.833	1,382
	10	1.794	0.179	10	1,395,706	34.1	0.720	47.40	0.0	0.0	0.0	474	2,945	0.000	0.500	829
May	10	1.589	0.179	10	1,218,672	11.8	0.720	16.44	0.0	0.0	0.0	164	7,411	0.000	0.167	276
	11	1.310	0.179	0	1,074,911	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	1.092	0.179	0	788,486	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Jun	10	1.119	0.179	10	811,901	2.2	0.720	3.07	0.0	0.0	0.0	31	26,441	0.000	0.167	37
	10	0.864	0.179	10	592,272	6.4	0.720	8.92	0.0	0.0	0.0	89	6,643	0.000	0.500	112
	10	0.705	0.179	10	454,550	14.4	0.720	20.05	0.0	0.0	0.0	201	2,267	0.000	0.833	186
Jul	10	0.645	0.179	10	402,797	23.4	0.720	32.52	0.0	0.0	0.0	325	1,239	0.000	1.000	224
	11	0.582	0.179	11	382,674	33.7	0.720	46.75	0.0	0.0	0.0	467	819	0.000	1.000	224
	10	0.541	0.179	10	312,854	48.3	0.720	67.11	0.0	0.0	0.0	671	466	0.000	1.000	224
Aug	10	0.538	0.179	10	310,522	53.8	0.720	74.66	0.0	0.0	0.0	747	416	0.000	0.998	223
	11	0.434	0.179	11	242,447	59.5	0.720	82.62	0.0	0.0	0.0	826	293	0.000	0.994	222
	10	0.360	0.179	10	156,470	50.4	0.720	69.95	0.0	0.0	0.0	699	224	0.000	0.767	172
Sept	10	0.296	0.179	10	101,088	26.1	0.720	36.25	0.0	0.0	0.0	362	279	0.000	0.433	97
	10	0.246	0.179	10	58,061	5.3	0.720	7.35	0.0	0.0	0.0	73	790	0.000	0.107	24
	10	0.297	0.179	10	102,298	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Oct	10	0.179	0.179	10	0	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	11	0.252	0.179	10	63,080	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0

Irrigable area in rainy season 1,658 (ha)

Irrigable area in dry season 224 (ha)

Note) : The minimum river discharge in the year is considered as the river maintenance discharge

: Available discharge means river discharge during the irrigation period

: Water requirement is calculated based on followings : -Puddling for main field 150 mm

-Percolation losses is 3 mm/day.

Table 3.3.5 WATER BALANCE CALCULATION FOR NAMIKOKWE RIVER BASIN (PATTERN-2)

Month		(1) River discharge (m3/sec)	(2) River maintenance (m3/sec)	(3) Irrigation days	(4) Available discharge (m3)	(5) Water requirement (mm)	(6) Irrigation Efficiency	(7) Gross Water requirement (mm)	(8) Effective rainfall (mm)	(9) Puddling Water requirement (mm)	(10) Gross puddling Water requirement (mm)	(11) Gross Water requirement (m3/ha)	(12) Calculated Irrigable Area (ha)	(13) Area intencity of puddling	(14) Area intencity of crop	(15) Potential Irrigation Area (ha)
	10	0.261	0.066	3	50,629	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Nov	10	0.128	0.066	0	53,382	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.203	0.066	0	118,044	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.390	0.066	0	279,618	0.0	0.720	0.00	48.3	0.0	0.0	0	-	0.000	0.000	0
Dec	10	2.408	0.066	0	2,023,056	0.0	0.720	0.00	210.6	0.0	0.0	0	-	0.000	0.000	0
	11	3.397	0.066	11	3,166,130	0.0	0.720	0.00	38.9	47.1	65.5	655	4,836	0.314	0.000	347
	10	5.400	0.066	10	4,608,196	14.6	0.720	20.26	68.1	42.9	59.5	595	7,742	0.286	0.167	500
Jan	10	2.868	0.066	10	2,420,748	43.8	0.720	60.78	71.6	42.9	59.5	595	4,067	0.286	0.500	868
	11	8.149	0.066	11	7,681,789	81.7	0.720	113.45	112.3	17.1	23.8	250	30,736	0.114	0.848	1,063
	10	10.413	0.066	10	8,939,931	86.2	0.720	119.75	77.5	0.0	0.0	423	21,146	0.000	1.000	1,104
Feb	10	5.591	0.066	10	4,773,228	86.2	0.720	119.75	3.3	0.0	0.0	1,164	4,099	0.000	1.000	1,104
	8	2.556	0.066	8	1,721,012	69.0	0.720	95.80	8.9	0.0	0.0	869	1,980	0.000	1.000	1,104
	10	2.632	0.066	10	2,216,838	87.4	0.720	121.41	0.0	0.0	0.0	1,214	1,826	0.000	1.000	1,104
Mar	10	2.370	0.066	10	1,990,297	88.1	0.720	122.51	0.0	0.0	0.0	1,223	1,627	0.000	1.000	1,104
	11	1.768	0.066	11	1,617,246	95.8	0.720	133.11	0.0	0.0	0.0	1,331	1,215	0.000	1.000	1,104
	10	1.461	0.066	10	1,205,521	78.6	0.720	109.18	0.0	0.0	0.0	1,092	1,104	0.000	1.000	1,104
Apr	10	1.709	0.066	10	1,419,622	80.4	0.720	111.70	47.0	0.0	0.0	647	2,194	0.000	1.000	1,104
	10	1.288	0.066	10	1,055,650	65.9	0.720	91.56	0.0	0.0	0.0	916	1,153	0.000	0.833	920
	10	0.907	0.066	10	726,553	34.1	0.720	47.40	0.0	0.0	0.0	474	1,533	0.000	0.500	552
May	10	0.790	0.066	10	625,057	11.8	0.720	16.44	0.0	0.0	0.0	164	3,801	0.000	0.167	184
	11	0.667	0.066	0	570,773	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.557	0.066	0	424,017	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Jun	10	0.529	0.066	10	399,697	2.2	0.720	3.07	0.0	0.0	0.0	31	13,017	0.000	0.167	20
	10	0.431	0.066	10	315,568	6.4	0.720	8.92	0.0	0.0	0.0	89	3,539	0.000	0.500	61
	10	0.418	0.066	10	304,471	14.4	0.720	20.05	0.0	0.0	0.0	201	1,518	0.000	0.833	102
Jul	10	0.373	0.066	10	265,484	23.4	0.720	32.52	0.0	0.0	0.0	325	816	0.000	1.000	123
	11	0.337	0.066	11	257,042	33.7	0.720	46.75	0.0	0.0	0.0	467	550	0.000	1.000	123
	10	0.296	0.066	10	199,053	48.3	0.720	67.11	0.0	0.0	0.0	671	297	0.000	1.000	123
Aug	10	0.269	0.066	10	175,059	53.8	0.720	74.66	0.0	0.0	0.0	747	234	0.000	0.998	123
	11	0.232	0.066	11	157,662	59.5	0.720	82.62	0.0	0.0	0.0	826	191	0.000	0.994	122
	10	0.166	0.066	10	86,003	50.4	0.720	69.95	0.0	0.0	0.0	699	123	0.000	0.767	94
Sept	10	0.132	0.066	10	57,365	26.1	0.720	36.25	0.0	0.0	0.0	362	158	0.000	0.433	53
	10	0.107	0.066	10	35,717	5.3	0.720	7.35	0.0	0.0	0.0	73	486	0.000	0.107	13
	10	0.123	0.066	10	48,770	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Oct	10	0.085	0.066	10	16,674	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	11	0.066	0.066	10	0	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0

Irrigable area in rainy season **1,104** (ha)

Irrigable area in dry season **123** (ha)

Note) : The minimum river discharge in the year is considered as the river maintenance discharge

: Available discharge means river discharge during the irrigation period

: Water requirement is calculated based on followings : -Puddling for main field 150 mm

-Percolation losses is 3 mm/day.

Table 3.3.6 WATER BALANCE CALCULATION FOR LIVULEZI RIVER BASIN (PATTERN-2)

Month		(1) River discharge (m3/sec)	(2) River maintenance (m3/sec)	(3) Irrigation days	(4) Available discharge (m3)	(5) Water requirement (mm)	(6) Irrigation Efficiency	(7) Gross Water requirement (mm)	(8) Effective rainfall (mm)	(9) Puddling Water requirement (mm)	(10) Gross puddling Water requirement (mm)	(11) Gross Water requirement (m3/ha)	(12) Calculated Irrigable Area (ha)	(13) Area intencity of puddling	(14) Area intencity of crop	(15) Potential Irrigation Area (ha)
	10	0.165	0.102	3	16,433	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Nov	10	0.120	0.102	0	15,638	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.102	0.102	0	0	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	1.214	0.102	0	961,092	0.0	0.720	0.00	48.3	0.0	0.0	0	-	0.000	0.000	0
Dec	10	0.287	0.102	0	160,164	0.0	0.720	0.00	210.6	0.0	0.0	0	-	0.000	0.000	0
	11	0.753	0.102	11	619,502	0.0	0.720	0.00	38.9	47.1	65.5	655	946	0.314	0.000	297
	10	1.451	0.102	10	1,165,968	14.6	0.720	20.26	68.1	42.9	59.5	595	1,959	0.286	0.167	428
Jan	10	1.343	0.102	10	1,072,980	43.8	0.720	60.78	71.6	42.9	59.5	595	1,803	0.286	0.500	743
	11	5.417	0.102	11	5,051,851	81.7	0.720	113.45	112.3	17.1	23.8	250	20,213	0.114	0.848	911
	10	8.686	0.102	10	7,417,224	86.2	0.720	119.75	77.5	0.0	0.0	423	17,544	0.000	1.000	946
Feb	10	10.506	0.102	10	8,989,704	86.2	0.720	119.75	3.3	0.0	0.0	1,164	7,720	0.000	1.000	946
	8	17.083	0.102	8	11,737,843	69.0	0.720	95.80	8.9	0.0	0.0	869	13,506	0.000	1.000	946
	10	11.265	0.102	10	9,645,264	87.4	0.720	121.41	0.0	0.0	0.0	1,214	7,944	0.000	1.000	946
Mar	10	4.800	0.102	10	4,059,504	88.1	0.720	122.31	0.0	0.0	0.0	1,223	3,319	0.000	1.000	946
	11	3.634	0.102	11	3,357,710	95.8	0.720	133.11	0.0	0.0	0.0	1,331	2,522	0.000	1.000	946
	10	2.690	0.102	10	2,236,464	78.6	0.720	109.18	0.0	0.0	0.0	1,092	2,048	0.000	1.000	946
Apr	10	2.129	0.102	10	1,751,544	80.4	0.720	111.70	47.0	0.0	0.0	647	2,707	0.000	1.000	946
	10	1.596	0.102	10	1,291,464	65.9	0.720	91.56	0.0	0.0	0.0	916	1,411	0.000	0.833	788
	10	1.294	0.102	10	1,030,320	34.1	0.720	47.40	0.0	0.0	0.0	474	2,174	0.000	0.500	473
May	10	1.214	0.102	10	961,200	11.8	0.720	16.44	0.0	0.0	0.0	164	5,846	0.000	0.167	158
	11	1.159	0.102	0	1,005,134	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	10	0.924	0.102	0	710,986	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Jun	10	0.841	0.102	10	638,842	2.2	0.720	3.07	0.0	0.0	0.0	31	20,805	0.000	0.167	40
	10	0.753	0.102	10	563,155	6.4	0.720	8.92	0.0	0.0	0.0	89	6,316	0.000	0.500	119
	10	0.604	0.102	10	434,160	14.4	0.720	20.05	0.0	0.0	0.0	201	2,165	0.000	0.833	199
Jul	10	0.512	0.102	10	354,672	23.4	0.720	32.52	0.0	0.0	0.0	325	1,091	0.000	1.000	239
	11	0.392	0.102	11	276,350	33.7	0.720	46.75	0.0	0.0	0.0	467	591	0.000	1.000	239
	10	0.501	0.102	10	345,427	48.3	0.720	67.11	0.0	0.0	0.0	671	515	0.000	1.000	239
Aug	10	0.382	0.102	10	242,438	53.8	0.720	74.66	0.0	0.0	0.0	747	325	0.000	0.998	238
	11	0.309	0.102	11	197,294	59.5	0.720	82.62	0.0	0.0	0.0	826	239	0.000	0.994	237
	10	0.447	0.102	10	298,080	50.4	0.720	69.95	0.0	0.0	0.0	699	426	0.000	0.767	183
Sept	10	0.233	0.102	10	113,184	26.1	0.720	36.25	0.0	0.0	0.0	362	312	0.000	0.433	103
	10	0.171	0.102	10	59,962	5.3	0.720	7.35	0.0	0.0	0.0	73	816	0.000	0.107	25
	10	0.180	0.102	10	68,170	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
Oct	10	0.153	0.102	10	44,323	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0
	11	0.305	0.102	10	175,588	0.0	0.720	0.00	0.0	0.0	0.0	0	-	0.000	0.000	0

Irrigable area in rainy season **946** (ha)

Irrigable area in dry season **239** (ha)

Note) : The minimum river discharge in the year is considered as the river maintenance discharge

: Available discharge means river discharge during the irrigation period

: Water requirement is calculated based on followings : -Puddling for main field 150 mm

-Percolation losses is 3 mm/day.

Table 5.2.1 CONSTRUCTION COST FOR
THE LOWER NADZIPULU IRRIGATION PROJECT

(1) Direct Construction Cost

	Work Item	Local Portion (M.Kwacha)	Foreign Portion (J.Yen)	Total (J.Yen)
1	PREPARATORY WORKS	623,000	19,141,000	34,093,000
2	HEAD WORKS	1,610,000	37,970,000	76,610,000
	2.1 Earth Works	406,000	27,982,000	37,726,000
	2.2 Concrete Works	985,000	4,571,000	28,211,000
	2.3 Metal Works	3,000	5,416,000	5,488,000
	2.4 Others	216,000	1,000	5,185,000
3.1	MAIN CANAL (ND-MC-1)	1,525,000	32,903,000	69,503,000
	3.1 Earth Works	516,000	24,292,000	36,676,000
	3.2 Lining Works	839,000	6,820,000	26,956,000
	3.3 Structural Works	157,000	1,714,000	5,482,000
	3.4 Others	13,000	77,000	389,000
3.2	MAIN CANAL (ND-MC-2)	721,000	11,798,000	29,102,000
	3.5 Earth Works	218,000	8,397,000	13,629,000
	3.6 Lining Works	381,000	2,977,000	12,121,000
	3.7 Structural Works	118,000	395,000	3,227,000
	3.8 Others	4,000	29,000	125,000
4	BRANCH CANALS	160,000	2,568,000	6,408,000
	4.1 Earth Works	49,000	1,875,000	3,051,000
	4.2 Lining Works	70,000	549,000	2,229,000
	4.3 Structural Works	39,000	131,000	1,067,000
	4.4 Others	2,000	13,000	61,000
5	INSPECTION ROADS			
	5.1 Earth Works	741,000	43,650,000	61,434,000
6	FLOOD DIKES/ROADS			
	6.1 Earth Works	845,000	46,653,000	66,933,000
7	CONNECTING ROADS	873,000	46,583,000	67,535,000
	7.1 Earth Works	811,000	46,188,000	65,652,000
	7.2 Structural Works	46,000	288,000	1,392,000
	7.3 Others	16,000	107,000	491,000
8	TERTIARY DEVELOPMENT	1,544,000	71,714,000	108,770,000
	8.1 Earth Works	922,000	34,919,000	57,047,000
	8.2 Land Reclamation	622,000	36,795,000	51,723,000
9	DRAINAGE CANALS	106,000	3,649,000	6,193,000
	9.1 Earth Works	38,000	3,199,000	4,111,000
	9.2 Structural Works	32,000	201,000	969,000
	9.3 Others	36,000	249,000	1,113,000
10	RICE MILL	356,000	18,566,000	27,110,000
	10.1 Milling Machine	5,000	13,723,000	13,843,000
	10.2 Drying Yard	156,000	943,000	4,687,000
	10.3 Storage & Mill House	195,000	3,900,000	8,580,000
	Total Direct Cost	9,104,000	335,195,000	553,691,000

Table 5.2.1 CONSTRUCTION COST FOR
THE LOWER NADZIPULU IRRIGATION PROJECT

(2) Engineering Services and Administration Costs

	Work Item	Local Portion (M.Kwacha)	Foreign Portion (J.Yen)	Total (J.Yen)
I.	ENGINEERING SERVICES COST			
I-1	(DESIGN STAGE)	556,000	55,600,000	68,944,000
1	REMMUNERATION	48,000	44,400,000	45,552,000
	1.1 Foreign Consultants	0	44,400,000	44,400,000
	1.2 Local Consultants	48,000	0	1,152,000
2	DIRECT COST	508,000	11,200,000	23,392,000
	2.1 International Air	0	11,200,000	11,200,000
	2.2 Communication	10,000	0	240,000
	2.3 Perdiem	270,000	0	6,480,000
	2.4 Accommodation	18,000	0	432,000
	2.5 Fuel	10,000	0	240,000
	2.6 Sub-contracts	150,000	0	3,600,000
	2.7 Others	50,000	0	1,200,000
I-2	(CONSTRUCTION STAGE)	634,400	50,800,000	66,025,600
1	REMMUNERATION	84,000	48,000,000	50,016,000
	1.1 Foreign Consultants	0	48,000,000	48,000,000
	1.2 Local Consultants	84,000	0	2,016,000
2	DIRECT COST	550,400	2,800,000	16,009,600
	2.1 International Air	0	2,800,000	2,800,000
	2.2 Communication	40,000	0	960,000
	2.3 Perdiem	360,000	0	8,640,000
	2.4 Accommodation	28,800	0	691,200
	2.5 Fuel	21,600	0	518,400
	2.6 Others	100,000	0	2,400,000
ENGINEERING SERVICES TOTAL		1,190,400	106,400,000	134,969,600
II.	ADMINISTRATION COST			
II-1	(DESIGN STAGE)	353,000	0	8,472,000
1	Staff Salary	180,000	0	4,320,000
2	Labour Charge	15,000	0	360,000
3	Office Expenses	84,000	0	2,016,000
4	Fuel	24,000	0	576,000
5	Office Equipment	18,000	0	432,000
6	Miscellaneous	32,000	0	768,000
II-2	(CONSTRUCTION STAGE)	1,274,000	0	30,576,000
1	Staff Salary	536,000	0	12,864,000
2	Labour Charge	120,000	0	2,880,000
3	Office Expenses	360,000	0	8,640,000
4	Fuel	96,000	0	2,304,000
5	Office Equipment	50,000	0	1,200,000
6	Miscellaneous	112,000	0	2,688,000
ADMINISTRATION COST TOTAL		1,627,000	0	39,048,000

Table 5.2.2 CONSTRUCTION COST FOR
THE NAMIKOKWE INTEGRATED IRRIGATION PROJECT

(1). DIRECT CONSTRUCTION COST

	Work Item	Local Portion (M.Kwacha)	Foreign Portion (J.Yen)	Total (J.Yen)
1	PREPARATORY WORKS	1,120,000	33,036,000	59,916,000
2	HEAD WORKS	1,606,000	38,311,000	76,855,000
	2.1 Earth Works	341,000	23,360,000	31,544,000
	2.2 Concrete Works	1,053,000	5,998,000	31,270,000
	2.3 Metal Works	4,000	8,952,000	9,048,000
	2.4 Others	208,000	1,000	4,993,000
3	MAIN CANAL (NM-MC-1)	2,644,000	65,401,000	128,857,000
	3.1 Earth Works	869,000	49,100,000	69,956,000
	3.2 Lining Works	1,489,000	12,083,000	47,819,000
	3.3 Structural Works	269,000	4,113,000	10,569,000
	3.4 Others	17,000	105,000	513,000
4	BRANCH CANALS	2,614,000	40,191,000	102,927,000
	4.1 Earth Works	705,000	27,421,000	44,341,000
	4.2 Lining Works	1,412,000	11,035,000	44,923,000
	4.3 Structural Works	468,000	1,555,000	12,787,000
	4.4 Others	29,000	180,000	876,000
5	INSPECTION ROADS			
	5.1 Earth Works	1,198,000	70,603,000	99,355,000
6	FLOOD DIKES/ROADS			
	6.1 Earth Works	1,075,000	61,927,000	87,727,000
7	CONNECTING ROADS	248,000	13,310,000	19,262,000
	7.1 Earth Works	224,000	13,155,000	18,531,000
	7.2 Structural Works	19,000	117,000	573,000
	7.3 Others	5,000	38,000	158,000
8	TERTIARY DEVELOPMENT	4,606,000	216,938,000	327,482,000
	8.1 Earth Works	2,794,000	105,793,000	172,849,000
	8.2 Land Reclamation	1,812,000	111,145,000	154,633,000
9	DRAINAGE CANALS	441,000	13,689,000	24,273,000
	9.1 Earth Works	175,000	12,224,000	16,424,000
	9.2 Structural Works	28,000	141,000	813,000
	9.3 Others	238,000	1,324,000	7,036,000
10	RICE MILL	891,000	46,416,000	67,800,000
	10.1 Milling Machine	12,000	34,320,000	34,608,000
	10.2 Drying Yard	391,000	2,346,000	11,730,000
	10.3 Storage & Mill House	488,000	9,750,000	21,462,000
	TOTAL DIRECT COST	16,444,000	599,822,000	994,478,000

Table 5.2.2 CONSTRUCTION COST FOR
THE NAMIKOKWE INTEGRATED IRRIGATION PROJECT

(2) Engineering Services and Administration Costs

	Work Item	Local Portion (M.Kwacha)	Foreign Portion (J.Yen)	Total (J.Yen)
I.	ENGINEERING SERVICES COST			
I-1	(DESIGN STAGE)	762,150	74,800,000	93,091,600
1	REMMUNERATION	66,000	63,600,000	65,184,000
	1.1 Foreign Consultants	0	63,600,000	63,600,000
	1.2 Local Consultants	66,000	0	1,584,000
2	DIRECT COST	696,150	11,200,000	27,907,600
	2.1 International Air	0	11,200,000	11,200,000
	2.2 Communication	10,000	0	240,000
	2.3 Perdiem	396,000	0	9,504,000
	2.4 Accommodation	26,400	0	633,600
	2.5 Fuel	13,750	0	330,000
	2.6 Sub-contracts	200,000	0	4,800,000
	2.7 Others	50,000	0	1,200,000
I-2	(CONSTRUCTION STAGE)	634,850	50,800,000	66,036,400
1	REMMUNERATION	84,000	48,000,000	50,016,000
	1.1 Foreign Consultants	0	48,000,000	48,000,000
	1.2 Local Consultants	84,000	0	2,016,000
2	DIRECT COST	550,850	2,800,000	16,020,400
	2.1 International Air	0	2,800,000	2,800,000
	2.2 Communication	40,000	0	960,000
	2.3 Perdiem	360,000	0	8,640,000
	2.4 Accommodation	28,800	0	691,200
	2.5 Fuel	21,600	0	518,400
	2.6 Others	100,450	0	2,410,800
ENGINEERING SERVICES TOTAL		1,398,000	125,600,000	159,128,000
II.	ADMINISTRATION COST			
II-1	(DESIGN STAGE)	472,000	0	11,328,000
1	Staff Salary	261,000	0	6,264,000
2	Labour Charge	22,500	0	540,000
3	Office Expenses	84,000	0	2,016,000
4	Fuel	36,000	0	864,000
5	Office Equipment	26,000	0	624,000
6	Miscellaneous	42,500	0	1,020,000
II-2	(CONSTRUCTION STAGE)	1,362,000	0	32,688,000
1	Staff Salary	624,000	0	14,976,000
2	Labour Charge	120,000	0	2,880,000
3	Office Expenses	360,000	0	8,640,000
4	Fuel	96,000	0	2,304,000
5	Office Equipment	50,000	0	1,200,000
6	Miscellaneous	112,000	0	2,688,000
ADMINISTRATION COST TOTAL		1,834,000	0	44,016,000

Table 5.2.3 CONSTRUCTION COST FOR
THE LOWER LIVULEZI IRRIGATION PROJECT

(1). Direct Construction Cost

	Work Item	Local Portion (M.Kwacha)	Foreign Portion (J.Yen)	Total (J.Yen)
1	PREPARATORY WORKS	1,203,000	35,146,000	64,018,000
2	CULVERT ON M-18	971,000	14,206,000	37,510,000
	2.1 Earth Works	112,000	9,152,000	11,840,000
	2.2 Concrete Works	794,000	5,054,000	24,110,000
	2.3 Other Works	65,000	0	1,560,000
3	RIVER DREDGING			
	3.1 Excavation	46,000	3,995,000	5,099,000
4	HEAD WORKS	3,802,000	135,333,000	226,581,000
	4.1 Earth Works	87,000	5,850,000	7,938,000
	4.2 Concrete Works	1,376,000	7,897,000	40,921,000
	4.3 Metal Works	4,000	8,337,000	8,433,000
	4.4 Other Works	367,000	0	8,808,000
	4.5 Intake Dike	1,968,000	113,249,000	160,481,000
5-1	MAIN CANAL (LV-MC-1)	2,207,000	46,206,000	99,174,000
	5.1 Earth Works	891,000	34,092,000	55,476,000
	5.2 Lining Works	1,031,000	8,058,000	32,802,000
	5.3 Structural Works	262,000	3,922,000	10,210,000
	5.4 Others	23,000	134,000	686,000
5-2	MAIN CANAL (LV-MC-2)	1,615,000	27,206,000	65,966,000
	5.5 Earth Works	504,000	19,436,000	31,532,000
	5.6 Lining Works	900,000	7,032,000	28,632,000
	5.7 Structural Works	196,000	647,000	5,351,000
	5.8 Others	15,000	91,000	451,000
6	BRANCH CANALS	393,000	5,879,000	15,311,000
	6.1 Earth Works	151,000	4,643,000	8,267,000
	6.2 Lining Works	161,000	1,022,000	4,886,000
	6.3 Structural Works	77,000	192,000	2,040,000
	6.4 Others	4,000	22,000	118,000
7	INSPECTION ROADS			
	7.1 Earth Works	795,000	38,066,000	57,146,000
8	FLOOD DIKES/ROADS			
	8.1 Earth Works	1,478,000	84,022,000	119,494,000
9	CONNECTING ROADS	273,000	14,208,000	20,760,000
	9.1 Earth Works	238,000	13,981,000	19,693,000
	9.2 Structural Works	27,000	171,000	819,000
	9.3 Others	8,000	56,000	248,000
10	TERTIARY DEVELOPMENT	3,217,000	149,269,000	226,477,000
	10.1 Earth Works	1,921,000	72,737,000	118,841,000
	10.2 Land Reclamation	1,296,000	76,532,000	107,636,000
11	DRAINAGE CANALS	846,000	33,812,000	54,116,000
	11.1 Earth Works	355,000	30,481,000	39,001,000
	11.2 Structural Works	48,000	301,000	1,453,000
	11.3 Others	443,000	3,030,000	13,662,000
12	RICE MILL	534,000	27,850,000	40,666,000
	12.1 Milling Machine	7,000	20,592,000	20,760,000
	12.2 Drying Yard	234,000	1,408,000	7,024,000
	12.3 Storage & Mill House	293,000	5,850,000	12,882,000
	TOTAL	17,380,000	615,198,000	1,032,318,000

Table 5.2.3 CONSTRUCTION COST FOR
THE LOWER LIVULEZI IRRIGATION PROJECT

(2) Engineering Services and Administration Costs

	Work Item	Local Portion (M.Kwacha)	Foreign Portion (J.Yen)	Total (J.Yen)
I.	ENGINEERING SERVICES COST			
I-1	(DESIGN STAGE)	716,500	68,800,000	85,996,000
1	REMMUNERATION	60,000	57,600,000	59,040,000
	1.1 Foreign Consultants	0	57,600,000	57,600,000
	1.2 Local Consultants	60,000	0	1,440,000
2	DIRECT COST	656,500	11,200,000	26,956,000
	2.1 International Air	0	11,200,000	11,200,000
	2.2 Communication	10,000	0	240,000
	2.3 Perdiem	360,000	0	8,640,000
	2.4 Accommodation	24,000	0	576,000
	2.5 Fuel	12,500	0	300,000
	2.6 Sub-contracts	200,000	0	4,800,000
	2.7 Others	50,000	0	1,200,000
I-2	(CONSTRUCTION STAGE)	634,400	50,800,000	66,025,600
1	REMMUNERATION	84,000	48,000,000	50,016,000
	1.1 Foreign Consultants	0	48,000,000	48,000,000
	1.2 Local Consultants	84,000	0	2,016,000
2	DIRECT COST	550,400	2,800,000	16,009,600
	2.1 International Air	0	2,800,000	2,800,000
	2.2 Communication	40,000	0	960,000
	2.3 Perdiem	360,000	0	8,640,000
	2.4 Accommodation	28,800	0	691,200
	2.5 Fuel	21,600	0	518,400
	2.6 Others	100,000	0	2,400,000
ENGINEERING SERVICES TOTAL		1,350,900	119,600,000	152,024,000
II.	ADMINISTRATION COST			
II-1	(DESIGN STAGE)	472,000	0	11,328,000
1	Staff Salary	261,000	0	6,264,000
2	Labour Charge	22,500	0	540,000
3	Office Expenses	84,000	0	2,016,000
4	Fuel	36,000	0	864,000
5	Office Equipment	26,000	0	624,000
6	Miscellaneous	42,500	0	1,020,000
II-2	(CONSTRUCTION STAGE)	1,362,000	0	32,688,000
1	Staff Salary	624,000	0	14,976,000
2	Labour Charge	120,000	0	2,880,000
3	Office Expenses	360,000	0	8,640,000
4	Fuel	96,000	0	2,304,000
5	Office Equipment	50,000	0	1,200,000
6	Miscellaneous	112,000	0	2,688,000
ADMINISTRATION COST TOTAL		1,834,000	0	44,016,000

Table 5.2.4 (1) DISBURSEMENT SCHEDULE OF THE PROJECT COST
THE LOWER NADZIPULU IRRIGATION PROJECT

(Unit : 1000 Kwacha, 1000 J.Yen)

	Total			1994			1995			1996		
	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total
I. Direct Construction Cost												
1. Preparatory Works	623	19,141	34,093				498	15,313	27,265	125	3,828	6,828
1. Head Works	1,609	37,970	76,586				1,609	37,970	76,586			
2. Main Canals	2,246	44,701	98,605				2,246	44,701	98,605			
3. Branch Canal	160	2,567	6,407				160	2,567	6,407			
4. Inspection Roads	741	43,650	61,434				741	43,650	61,434			
5. Flood Dike/Road	845	46,653	66,933							845	46,653	66,933
6. Connecting Road	873	46,584	67,536							873	46,584	67,536
7. Tertiary Development	1,545	71,714	108,794				464	21,514	32,650	1,081	50,200	76,144
8. Drainage Canals	106	3,649	6,193							106	3,649	6,193
Sub-Total	8,748	316,629	526,581				5,718	165,715	302,947	3,030	150,914	223,634
II. Rice Mill	356	18,566	27,110							356	18,566	27,110
III. Engineering Service	1,190	106,400	134,960	556	55,600	68,944	317	25,400	33,008	317	25,400	33,008
IV. Administration Expenses	1,627	0	39,048	353		8,472	637		15,288	637		15,288
V. Land Acquisition	375	0	9,000	375		9,000						
Total	12,296	441,595	736,699	1,284	55,600	86,416	6,672	191,115	351,243	4,340	194,880	299,040
VI. Contingencies												
1. Physical	1,230	44,160	73,670	128	5,560	8,642	667	19,112	35,124	434	19,488	29,904
2. Price	2,966	31,378	102,563	128	1,668	4,750	1,401	11,639	45,266	1,437	18,071	52,548
Grand Total	16,492	517,132	912,932	1,541	62,828	99,807	8,740	221,865	431,633	6,211	232,439	381,492

Note : L/C; Local Currency Portion
F/C; Foreign Currency Portion

Table 5.2.4 (2) DISBURSEMENT SCHEDULE OF THE PROJECT COST
THE NAMIKOKWE INTEGRATED IRRIGATION PEOJECT

(Unit : 1000 Kwacha, 1000 J.Yen)

	Total			1994			1995			1996		
	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total
I. Direct Construction Cost												
1. Preparatory Works	1,120	33,036	59,916				896	26,429	47,933	224	6,607	11,983
1. Head Works	1,607	38,311	76,879				1,607	38,311	76,879			
2. Main Canals	2,644	65,401	128,857				2,644	65,401	128,857			
3. Branch Canal	2,614	40,191	102,927				2,614	40,191	102,927			
4. Inspection Roads	1,198	70,603	99,355				1,198	70,603	99,355			
5. Flood Dike/Road	1,075	61,927	87,727							1,075	61,927	87,727
6. Connecting Road	248	13,310	19,262							248	13,310	19,262
7. Tertiary Development	4,606	216,938	327,482				1,382	65,081	98,249	3,224	151,857	229,233
8. Drainage Canals	441	13,689	24,273							441	13,689	24,273
Sub-Total	15,553	553,406	926,678				10,341	306,016	554,200	5,212	247,390	372,478
II. Rice Mill	891	46,416	67,800							891	46,416	67,800
III. Engineering Service	1,397	125,600	159,128	762	74,800	93,088	317	25,400	33,008	317	25,400	33,008
IV. Administration Expenses	1,834	0	44,016	472		11,328	681		16,344	681		16,344
V. Land Acquisition	855	0	20,520	855		20,520						
Total	20,530	725,422	1,218,142	2,089	74,800	124,936	11,339	331,416	603,552	7,101	319,206	489,630
VI. Contingencies												
1. Physical	2,053	72,542	121,812	209	7,480	12,494	1,134	33,142	60,355	710	31,921	48,963
2. Price	4,941	52,026	170,599	209	2,244	7,258	2,381	20,183	77,332	2,350	29,599	86,009
Grand Total	27,523	849,990	1,510,553	2,507	84,524	144,687	14,854	384,741	741,239	10,162	380,726	624,602

Note : L/C; Local Currency Portion
F/C; Foreign Currency Portion

Table 5.2.4 (3) DISBURSEMENT SCHEDULE OF THE PROJECT COST
THE LOWER LIVULEZI IRRIGATION PROJECT

(Unit : 1000 Kwacha, 1000 J.Yen)

	Total			1994			1995			1996		
	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total	L/C	F/C	Total
I. Direct Construction Cost												
1. Preparatory Works	1,203	35,146	64,018				962	28,117	51,205	241	7,029	12,813
2. Culvert on M-18	971	14,206	37,510				971	14,206	37,510			
3. River Dredging	46	3,995	5,099				46	3,995	5,099			
4. Head Works	3,802	135,333	226,581				3,802	135,333	226,581			
5. Main Canals	3,822	73,412	165,140				3,822	73,412	165,140			
3. Branch Canal	393	5,879	15,311				393	5,879	15,311			
4. Inspection Roads	795	38,066	57,146				795	38,066	57,146			
5. Flood Dike/Road	1,478	84,022	119,494							1,478	84,022	119,494
6. Connecting Road	273	14,208	20,760							273	14,208	20,760
7. Tertiary Development	3,217	149,269	226,477				965	44,781	67,941	2,252	104,488	158,536
8. Drainage Canals	846	33,812	54,116							846	33,812	54,116
Sub-Total	16,846	587,348	991,652				11,756	343,789	625,933	5,090	243,559	365,719
II. Rice Mill	534	27,850	40,666							534	27,850	40,666
III. Engineering Service	1,351	119,600	152,024	717	68,800	86,008	317	25,400	33,008	317	25,400	33,008
IV. Administration Expenses	1,834	0	44,016	472		11,328	681		16,344	681		16,344
V. Land Acquisition	780	0	18,720	780		18,720						
Total	21,345	734,798	1,247,078	1,969	68,800	116,056	12,754	369,189	675,285	6,622	296,809	455,737
VI. Contingencies												
1. Physical	2,135	73,480	124,708	197	6,880	11,606	1,275	36,919	67,529	662	29,681	45,574
2. Price	5,067	52,070	173,681	197	2,064	6,790	2,678	22,484	86,764	2,192	27,522	80,127
Grand Total	28,547	860,348	1,545,467	2,363	77,744	134,451	16,708	428,592	829,577	9,476	354,012	581,438

Note: L/C; Local Currency Portion
F/C; Foreign Currency Portion

Table 5.2.5 ANNUAL OPERATION AND MAINTENANCE COST

(Unit : M.Kwacha)

	Lower Nadzipulu	Namikokwe Integrated	Lower Livulezi
1 ADMINISTRATION COST	300,000	310,000	307,000
1.1 Staff Salary	126,000	135,000	132,000
1.2 Labour Charge	28,000	29,000	29,000
1.3 Office Expense	85,000	85,000	85,000
1.4 Fyel	23,000	23,000	23,000
1.5 Office Equipment	12,000	12,000	12,000
1.6 Micellaneous	26,000	26,000	26,000
2 O/M Equipment	168,000	204,000	183,000
2.1 Depreciation	69,000	81,000	76,000
2.2 Fuel	99,000	123,000	107,000
3 Maintenance of Facilities	72,000	126,000	134,000
3.1 Head Works	13,000	12,000	39,000
3.2 Canal System	32,000	85,000	66,000
3.3 Farm Roads	27,000	29,000	29,000
TOTAL O/M COST	540,000	640,000	624,000

Table 5.2.6 REPLACEMENT COST AND ECONOMIC LIFE OF FACILITIES

(Unit : M.Kwacha)

Items to be replaced	Economic Life (Year)	Lower Nadzipulu (M.Kwacha)	Namikokwe Integrated (M.Kwacha)	Lower Livulezi (M.Kwacha)
1 METAL WOORKS		337,000	719,000	578,000
1.1 Gates	20	334,000	717,000	576,000
1.2 Screens	20	3,000	2,000	2,000
2 RICE MILL				
2.1 Milling Machine	20	577,000	1,442,000	865,000
TOTAL REPLACEMENT COST		914,000	2,161,000	1,443,000

Table 5.4.1 CONSTRUCTION COST OF BWANJE DEVELOPMENT CENTER

	Work Item	Local Portion (M.Kwacha)	Foreign Portion (J.Yen)	Total (J.Yen)
I.	PREPARATORY WORKS	412,000	8,390,000	18,278,000
II.	BUILDING WORKS	5,193,000	95,918,000	220,550,000
1	Housing	4,934,000	53,782,000	172,198,000
	1.1 O/M Office	469,000	4,125,000	15,381,000
	1.2 Training Room	313,000	2,750,000	10,262,000
	1.3 Laboratory	313,000	2,750,000	10,262,000
	1.4 Guest House	1,935,000	22,290,000	68,730,000
	1.5 Staff Quater	1,044,000	12,002,000	37,058,000
	1.6 Storage/Repair	295,000	3,395,000	10,475,000
	1.7 Storage	469,000	5,401,000	16,657,000
	1.7 Guard House	80,000	926,000	2,846,000
	1.8 Generator house	16,000	143,000	527,000
2	Electricity	148,000	26,891,000	30,443,000
3	Water supply	49,000	13,445,000	14,621,000
4	Outside Works	62,000	1,800,000	3,288,000
	4.1 Earth works	37,000	1,655,000	2,543,000
	4.2 Structural Works	25,000	145,000	745,000
III.	FARM PREPARATION WORKS	582,000	21,541,000	35,509,000
	5.1 Earth Works	574,000	21,074,000	34,850,000
	5.2 Land Reclamation Works	8,000	467,000	659,000
	CONSTRUCTION WORKS TOTAL	6,187,000	125,849,000	274,337,000
IV	PROCUREMENT WORKS.		41,772,000	41,772,000
1	Purchasing		30,992,000	30,992,000
	1. Back-hoe		10340000	10,340,000
	2. Moter Grader		11385000	11,385,000
	3. Jeep		2415000	2,415,000
	4. Pickup		1562000	1,562,000
	5. Bike		1150000	1,150,000
	6. Meteo Equip		2415000	2,415,000
	7. Office Equip		1725000	1,725,000
2	Transportation		10780000	10,780,000
	TOTAL DIRECT COST	6,187,000	167,621,000	316,109,000

TABLE 7.2.1 PRIMARY PROFIT FROM CROPS

(1) Paddy

Items	Unit	Without Project-1 (paddy) Unit Yield (a) (kg)	Unit Price (b) (MK)	Amount (a x b) (MK)	Without Project-2 (paddy) Unit Yield (a) (kg)	Unit Price (b) (MK)	Amount (a x b) (MK)	With Project (Milled Rice) Unit Yield (a) (kg)	Unit Price (b) (MK)	Amount (a x b) (MK)
Gross Revenue	kg	2,700.0	1.5	4,050.0 (c)	1,000.0	1.5	1,500.0 (c)	2,925.0	4.0	11,700.0 (c)
Farm Inputs										
1) Seeds	kg	90.0	1.5	135.0	90.0	1.5	135.0	40.0	1.5	60.0
2) Fertilizers										
- Urea	kg	0.0	1.2	0.0	0.0	1.2	0.0	190.0	1.2	231.0
- TSP	kg	0.0	1.3	0.0	0.0	1.3	0.0	54.0	1.3	71.4
Sub-total				0.0			0.0			302.5
Miscellaneous										
(5 % of product. cost)		5%		6.8	5%		6.8	5%		18.1
Total Production Cost				141.8 (d)			141.8 (d)			380.6 (d)
Net Return per Ha										
(e = c - d)				3,908.3			1,358.3			11,319.4
(e/c %)				97%			91%			97%

Remarks: * "Without project-1" indicates crop budget for irrigated rice in the existing Mtandamula scheme, while "Without project-2" for rainfed paddy in Upper Namikokwe area and Livulezi area.

(2) Maize

Items	Unit	Without Project Unit Yield (a) (kg)	Unit Price (b) (MK)	Amount (a x b) (MK)	With Project Unit Yield (a) (kg)	Unit Price (b) (MK)	Amount (a x b) (MK)
Gross Revenue	kg	1,000.0	0.43	430.0 (c)	2,000.0	0.43	860.0 (c)
Farm Inputs							
1) Seeds	kg	60.0	1.0	58.8	25.0	3.3	82.8
Miscellaneous							
(5 % of product. cost)		5%		2.9	5%		4.1
Total Production Cost				61.7 (d)			86.9 (d)
Net Return per Ha							
(c - d)				368 (e)			773 (e)
(e/c %)				86%			90%

(3) Vegetable

Items	Unit	With Project Unit Yield (a) (kg)	Unit Price (b) (MK)	Amount (a x b) (MK)
Gross Revenue*	kg	-	-	13,902.0 (c)
Farm Inputs				
1) Seeds	kg	-	-	381.0
2) Fertil./chemi	kg	-	-	1,960.0
Miscellaneous				
(5 % of product. cost)		5%		117.1
Total Production Cost				2,458.1 (d)
Net Return per Ha				
(c - d)				11,444 (e)
(e/c %)				82.3%

Remark: * Estimated at 70% of the farm budget in Ngolowind Irrigation Scheme

TABLE 7.2.2 IRRIGATION BENEFIT AT FULL DEVELOPMENT STAGE

(1) The Lower Nadzipulu Irrigation Project

	Area (ha)	Unit Benefit (MK/ha)	Amount (MK)
A. Without Project			
1.Rainfed paddy	0	1,358	0
2.Irrigated paddy	0	3,908	0
3.Maize	80	368	29,440
Total-A			29,440
B. With Project			
1.Irrigated paddy	250	11,319	2,829,850
2.Irrigated maize	205	773	158,465
3.Irrigated vegetable	19	11,444	217,436
Total-B			3,205,751
C. Increment			3,176,311
(1,000 J¥)			(76,231)

(2) The Namikokwe Integrated Irrigation Project

	Area (ha)	Unit Benefit (MK/ha)	Amount (MK)
A. Without Project			
1.Rainfed paddy	150	1,358	203,745
2.Irrigated paddy	230	3,908	898,909
3.Maize	150	368	55,200
Total-A			1,157,854
B. With Project			
1.Irrigated paddy	800	11,319	9,055,520
2.Irrigated maize	63	773	48,699
3.Irrigated vegetable	60	11,444	686,640
Total-B			9,790,859
C. Increment			8,633,005
(1,000 J¥)			(207,192)

(3) The Lower Livulezi Irrigation Project

	Area (ha)	Unit Benefit (MK/ha)	Amount (MK)
A. Without Project			
1.Rainfed paddy	190	1,358	258,077
2.Irrigated paddy	0	3,908	0
3.Maize	0	368	0
Total-A			258,077
B. With Project			
1.Irrigated paddy	520	11,319	5,886,088
2.Irrigated maize	200	773	154,600
3.Irrigated vegetable	39	11,444	446,316
Total-B			6,487,004
C. Increment			6,487,004
(1,000 J¥)			(149,494)

TABLE 7.2.3 FINANCIAL INTERNAL RATE OF RETURN

1. Lower Nadzipulu Irrr. Project

Year in	250 ha		
Order	Cost	Benefit	Balance
1	95		-95
2	386		-386
3	329		-329
4	13	25	12
5	13	76	63
6	13	76	63
7	13	76	63
8	13	76	63
9	13	76	63
10	13	76	63
11	13	76	63
12	13	76	63
13	13	76	63
14	13	76	63
15	13	76	63
16	13	76	63
17	13	76	63
18	13	76	63
19	13	76	63
20	13	76	63
21	35	76	41
22	13	76	63
23	13	76	63
24	13	76	63
25	13	76	63
26	13	76	63
27	13	76	63
28	13	76	63
29	13	76	63
30	13	76	63
31	13	76	63
32	13	76	63

IRR: 5.54%

2. Namikokwe Integrated Irri. Project-1

Year in	800 ha		
Order	Cost	Benefit	Balance
1	137		-137
2	664		-664
3	539		-539
4	15	103	88
5	15	207	192
6	15	207	192
7	15	207	192
8	15	207	192
9	15	207	192
10	15	207	192
11	15	207	192
12	15	207	192
13	15	207	192
14	15	207	192
15	15	207	192
16	15	207	192
17	15	207	192
18	15	207	192
19	15	207	192
20	15	207	192
21	68	207	139
22	15	207	192
23	15	207	192
24	15	207	192
25	15	207	192
26	15	207	192
27	15	207	192
28	15	207	192
29	15	207	192
30	15	207	192
31	15	207	192
32	15	207	192

IRR: 11.88%

3. Lower Livulezi Irr. Project

Year in	520 ha		
Order	Cost	Benefit	Balance
1	128		-128
2	743		-743
3	501		-501
4	15	49	34
5	15	149	134
6	15	149	134
7	15	149	134
8	15	149	134
9	15	149	134
10	15	149	134
11	15	149	134
12	15	149	134
13	15	149	134
14	15	149	134
15	15	149	134
16	15	149	134
17	15	149	134
18	15	149	134
19	15	149	134
20	15	149	134
21	50	149	99
22	15	149	134
23	15	149	134
24	15	149	134
25	15	149	134
26	15	149	134
27	15	149	134
28	15	149	134
29	15	149	134
30	15	149	134
31	15	149	134
32	15	149	134

IRR: 7.61%

TABLE 7.3.1 FUTURE FARM BUDGET OF THE TYPICAL FARMERS IN THE PROJECT AREA

Items	Unit	Mtandamula scheme		Rainfed condition	
		Without project condition	With Project condition	Without Project condition	With project condition
(a) Family size (person)		4.00	4.00	4.30	4.30
(b) Cultivated area					
Irrigated paddy	ha		0.40		0.36
Irrigated maze	ha		0.03		0.03
Irrigated vegetables	ha		0.03		0.03
Rainfed maize	ha	1.00	1.00	0.83	0.83
Rainfed paddy	ha	0.40		0.36	
(c) Sale of crops					
Rice	MK		3744(1)		3370(1)
Maize	MK		0(2)		0(2)
Vegetables	MK		309(3)		309(3)
Total crop income	MK	2,240	4,053	395	3,679
(d) Sale of livestock	MK	41	41	126	126
(e) Non-farm income	MK	0	0	184	0
(f) Total income	MK	2,281	4,094	705	3,805
(g) Production cost					
Paddy	MK		152		137
Maize	MK		65		54
Vegetables	MK		74		74
Millig cost			180		162
Total productio cost	MK	294	471	40	427
(h) Non-farm cost	MK	0	0	27	0
(i) Living expense(4)	MK	1,685	2,022	689	827
(j) Total expense	MK	1,979	2,493	756	1,254
(k) Balance (capacity to pay)	MK	302	1,601	-51	2,551

(1): 80 % of the total product of rice is for sale.
(2): All product of maize for home consumption
(3): 90 % of the total product of vegetables is for sale.
(4): Living expense with project conditions is assumed to be 120 % of the without project condition

ANNEX II
FEASIBILITY STUDY FOR FIVE SELECTED PROJECTS

Figures

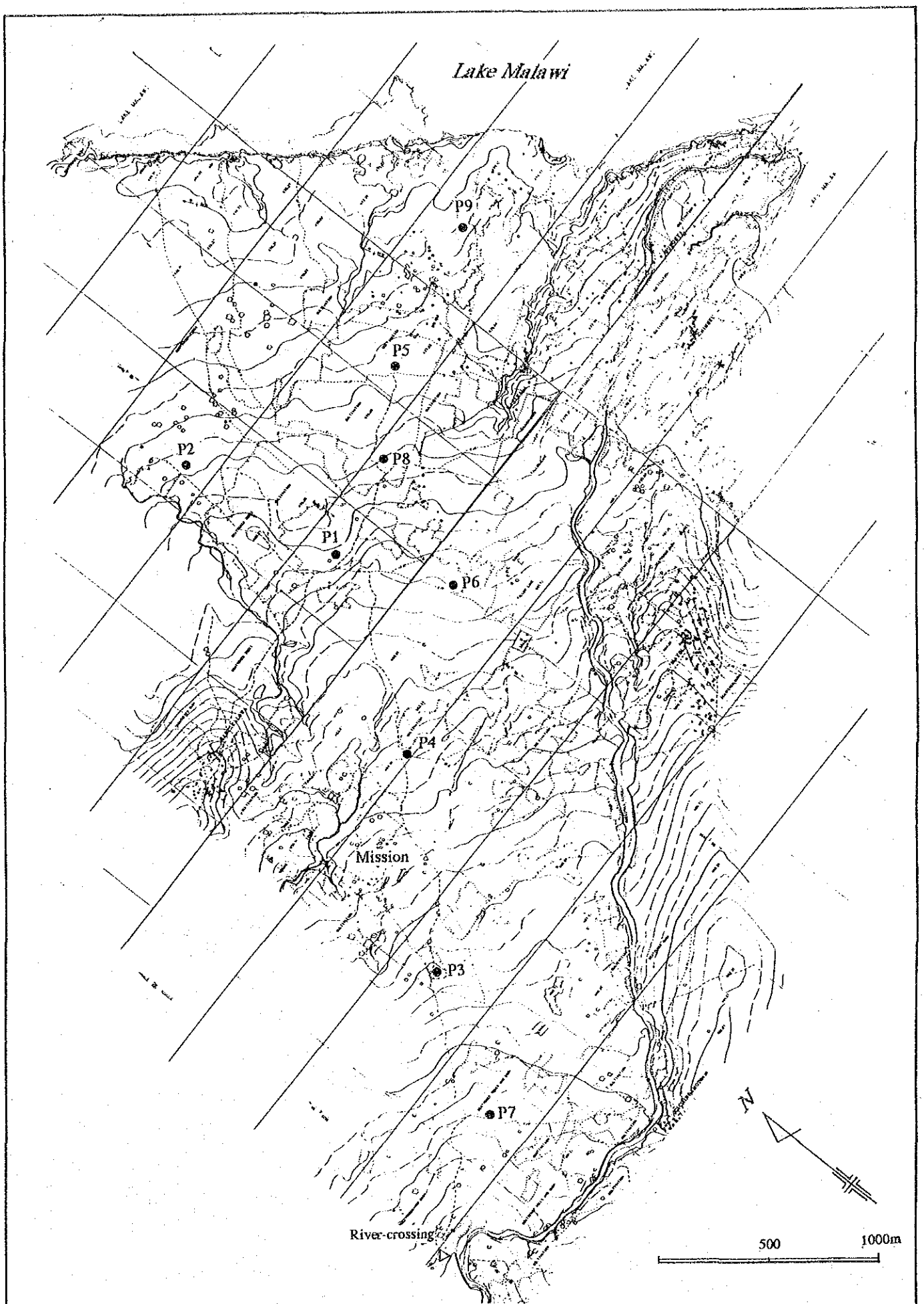


Figure 2.2.1 Location of Soil Profiles in Lower Nadzipulu Area

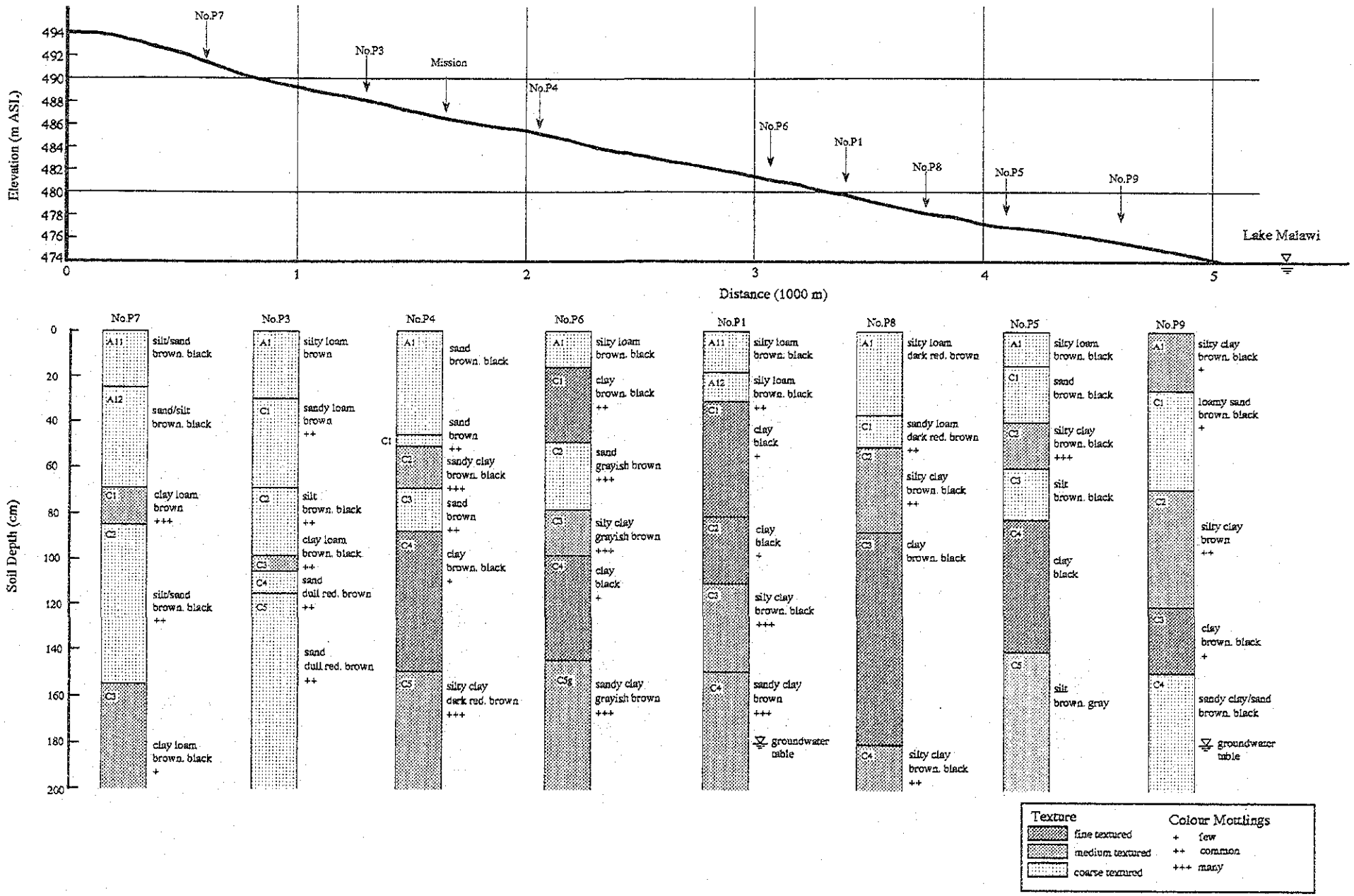


Figure 2.2.2 Soil Profiles of Lower Nadzipulu Area

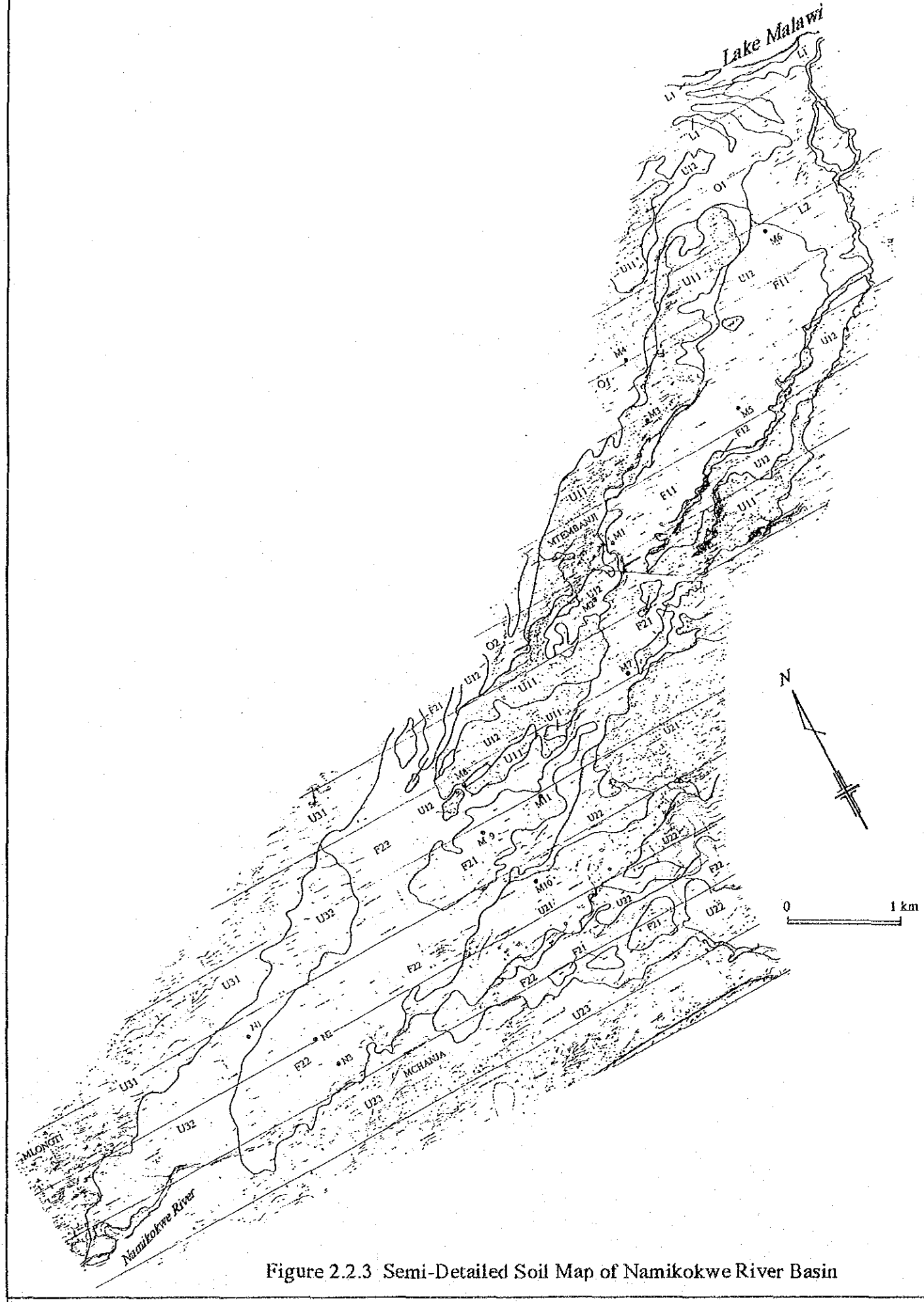


Figure 2.2.3 Semi-Detailed Soil Map of Namikokwe River Basin

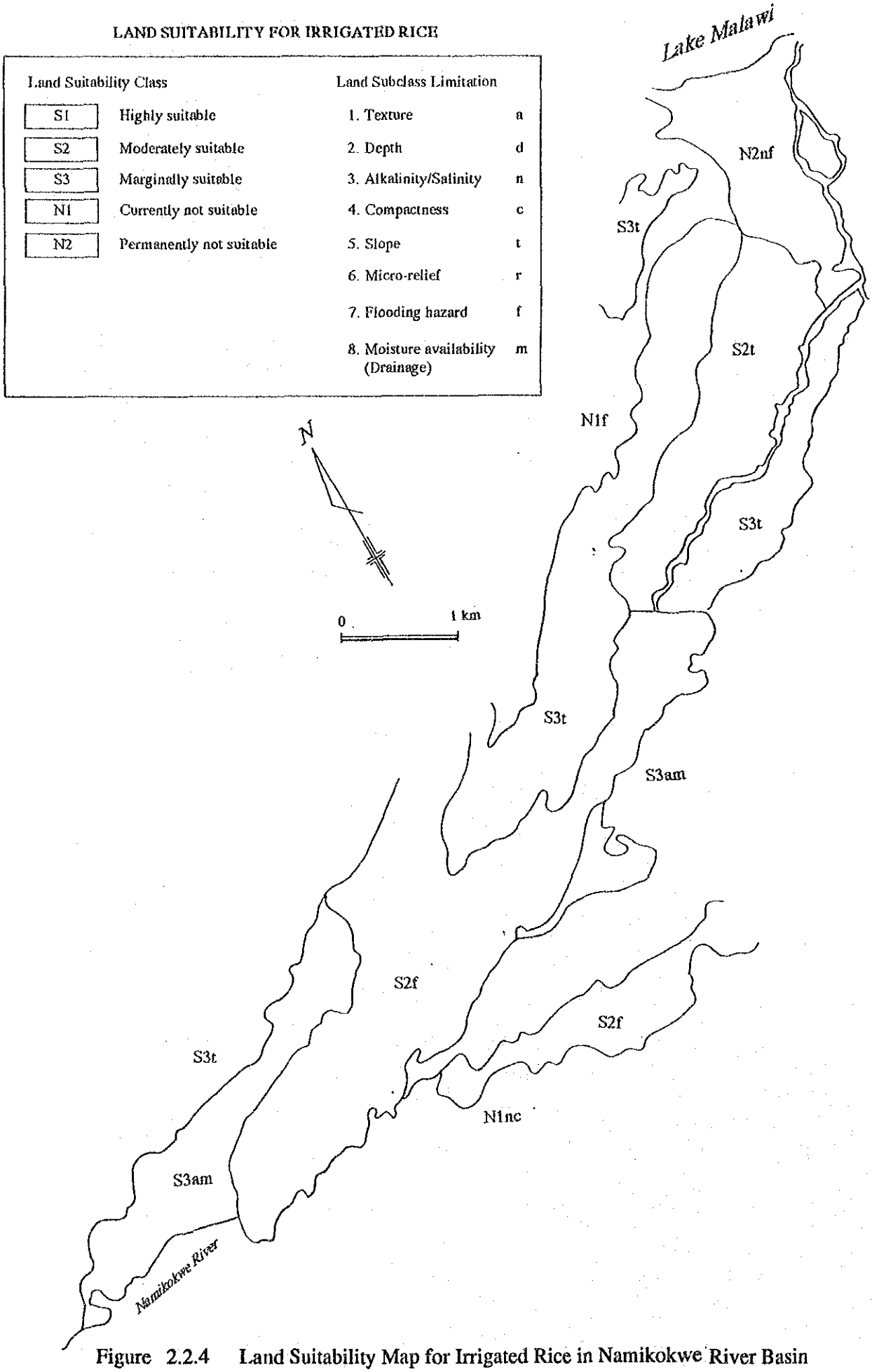


Figure 2.2.4 Land Suitability Map for Irrigated Rice in Namikokwe River Basin

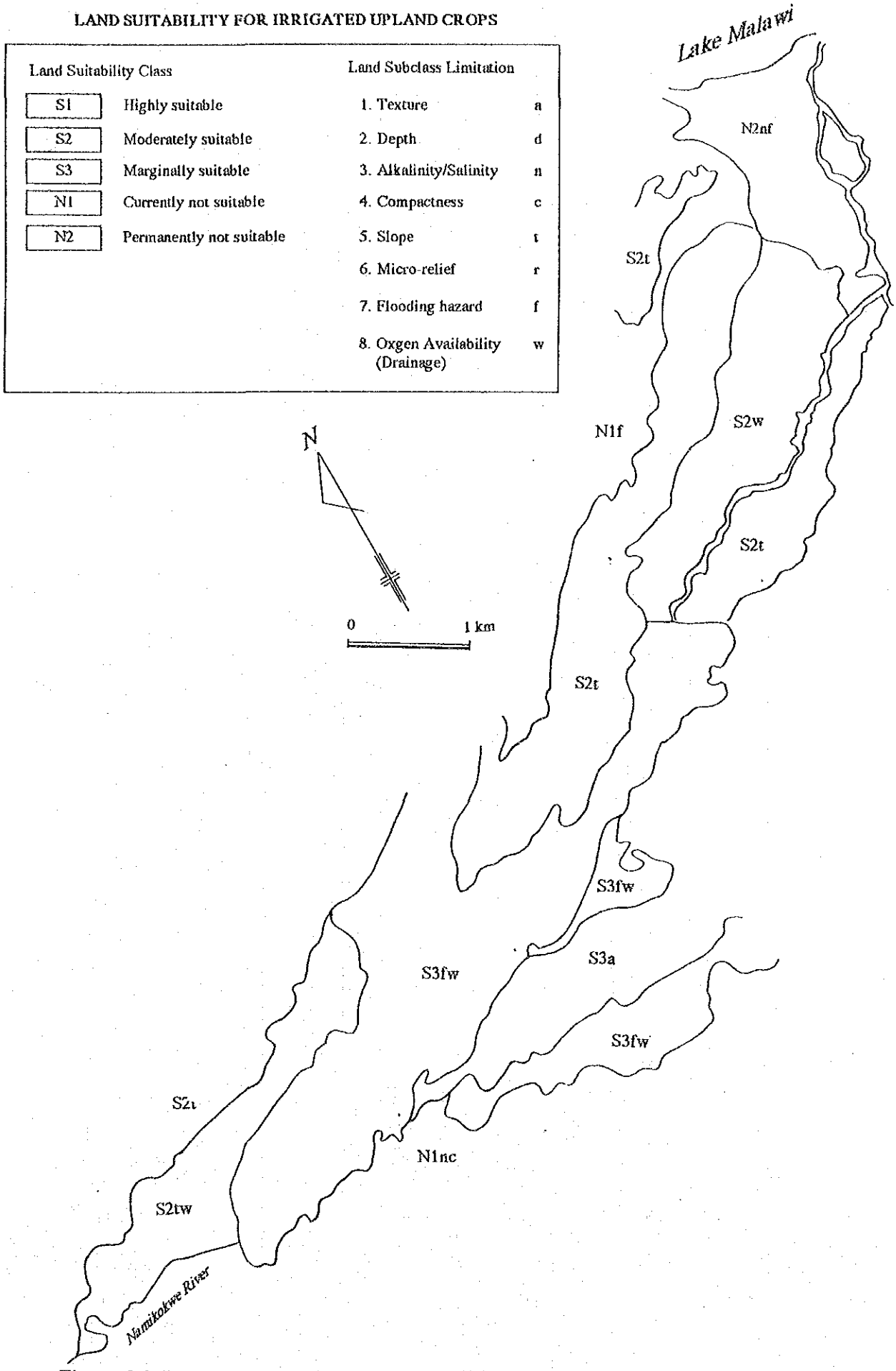


Figure 2.2.5 Land Suitability Map for Irrigated Upland Crops in Namikokwe River Basin

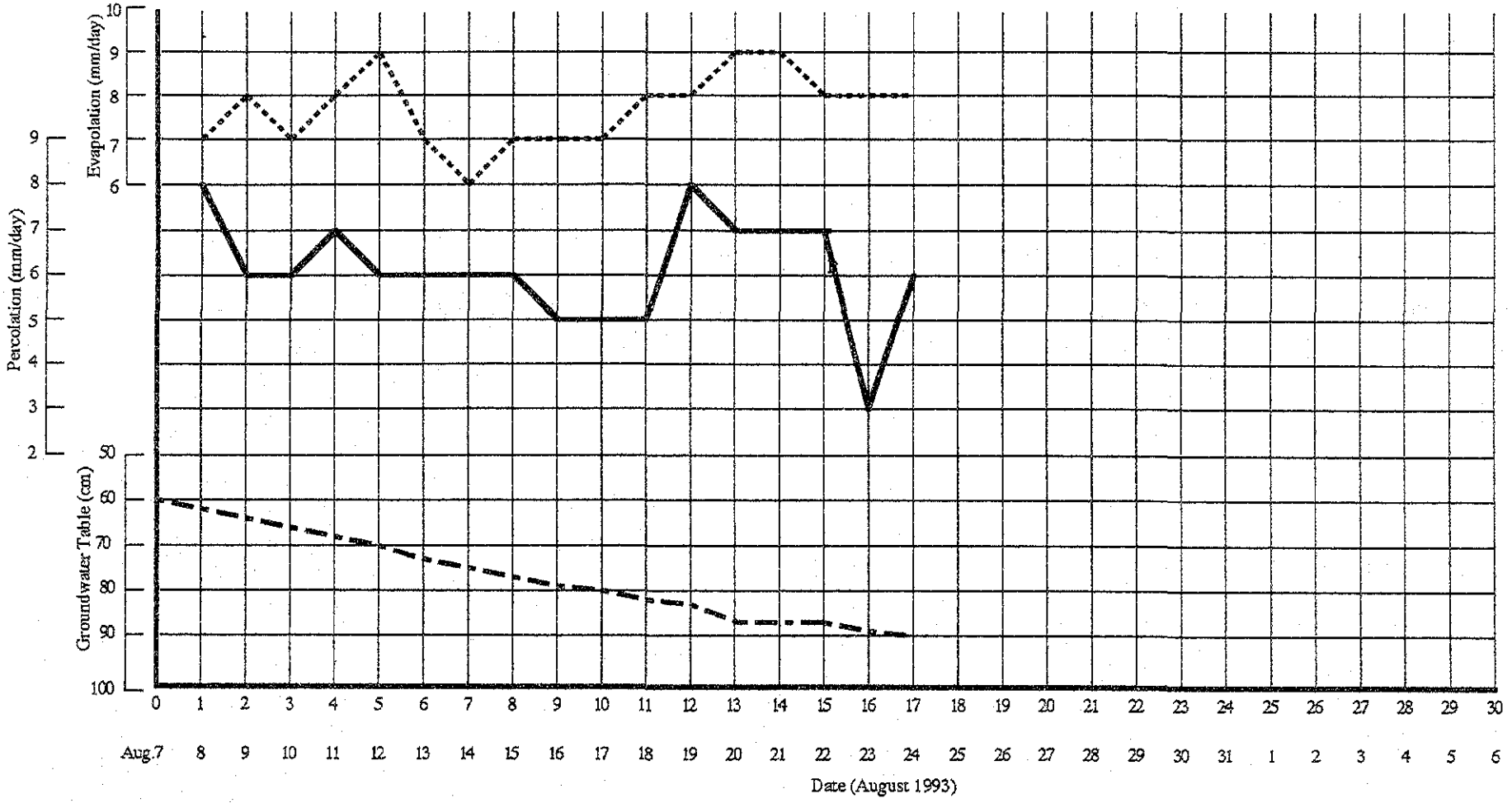
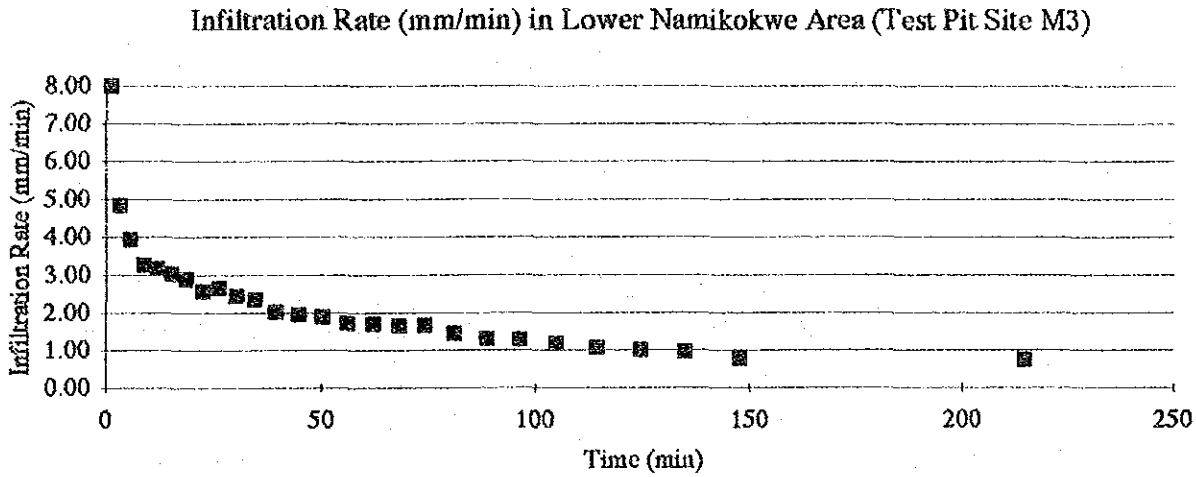


Figure 2.2.6 Test Results of Field Percolation Measurement



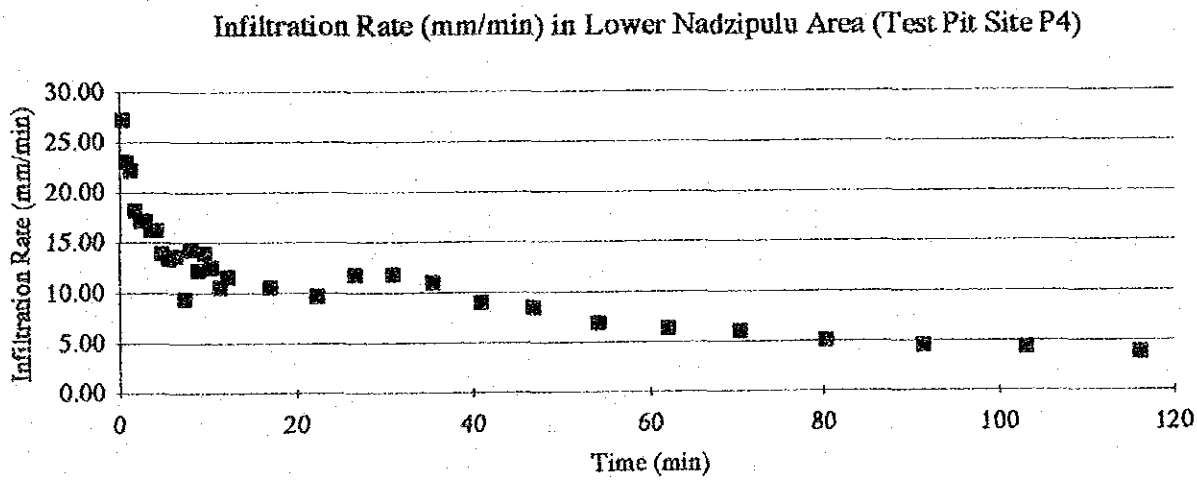
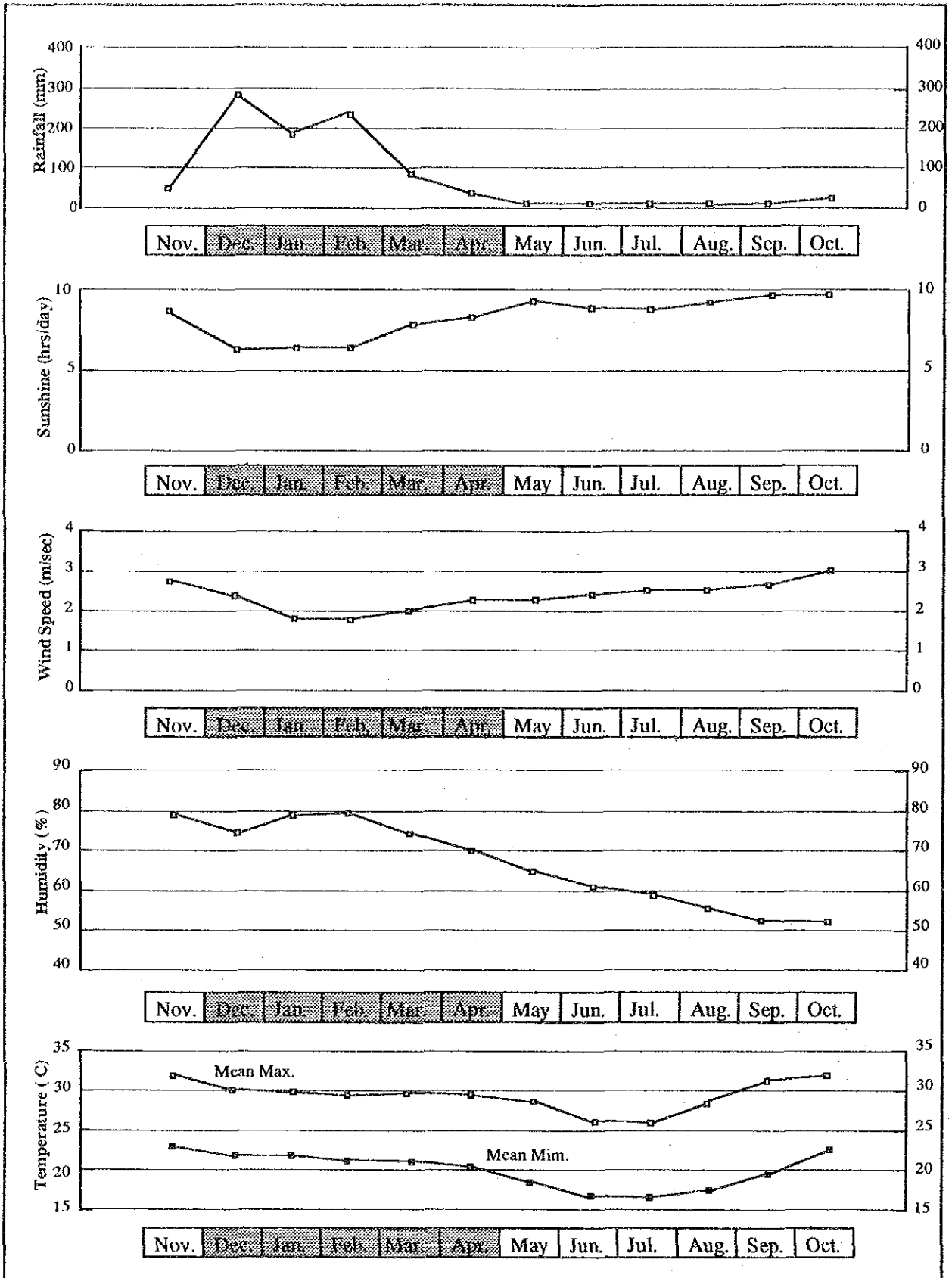


Figure 2.2.7 Test Results of Infiltration Rates in the Project Area



Source:National Early Warning Sysytem for Food Security(Technical Paper No.2)
Potential Evapotranspiration Studies in Malawi,October 1989
Food and Agriculture Organization of the United Nations

Figure 2.3.1 Monthly Meteorological Fluctuation in Monkey Bay

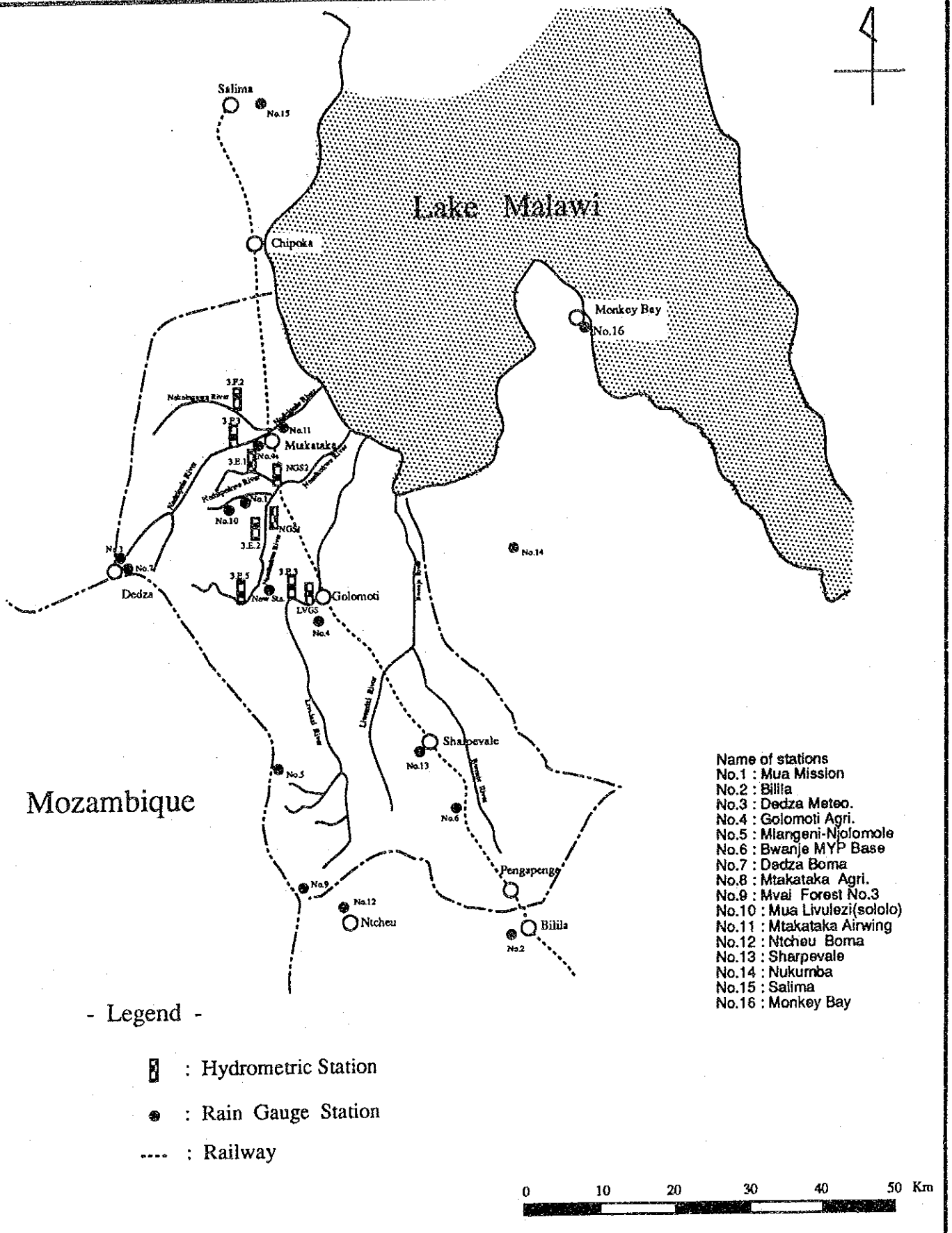


Figure 2.4.1 Location of Meteo- and Hydro- Station

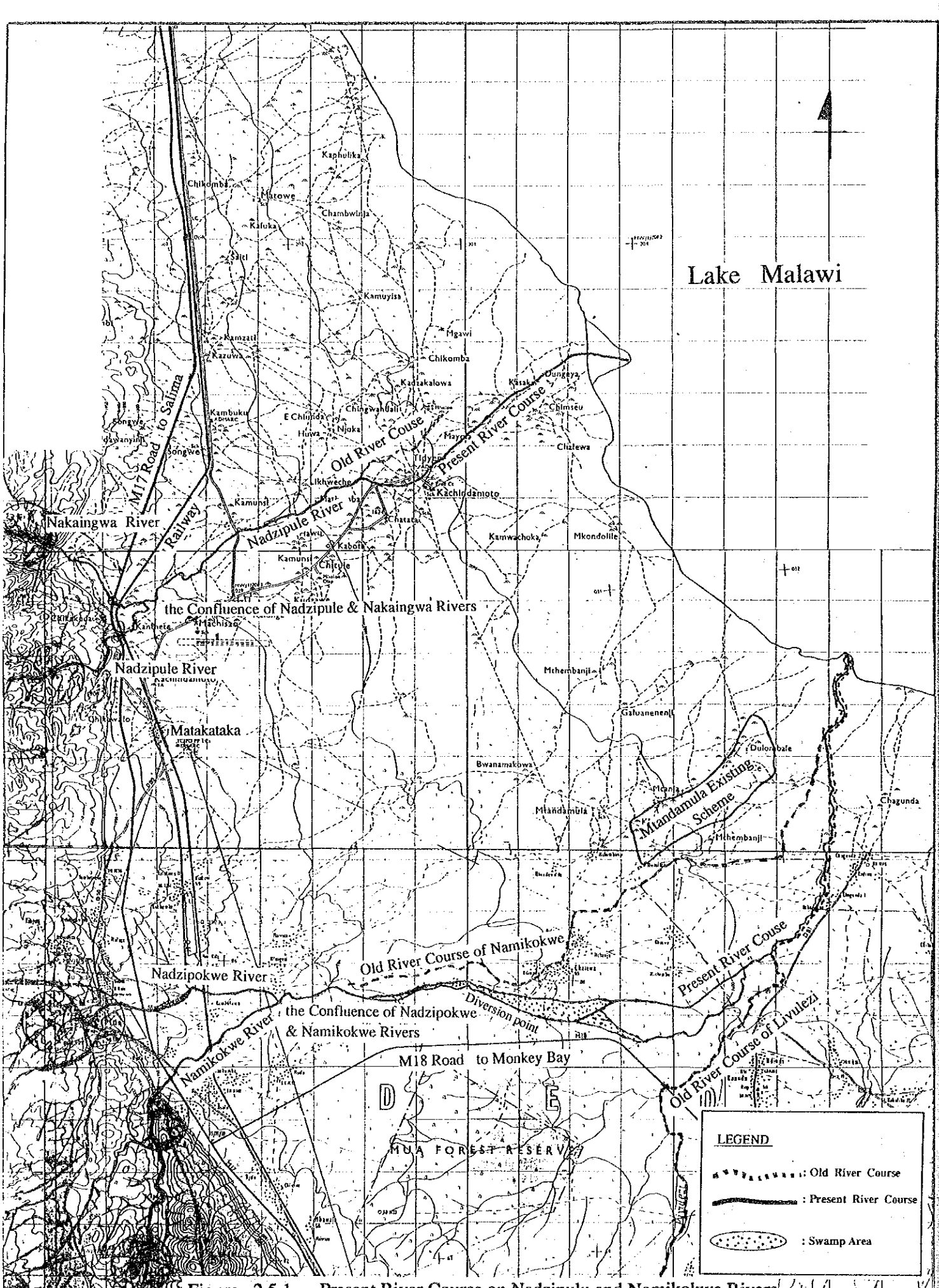


Figure 2.5.1 Present River Course on Nadzipulu and Namikokwe Rivers

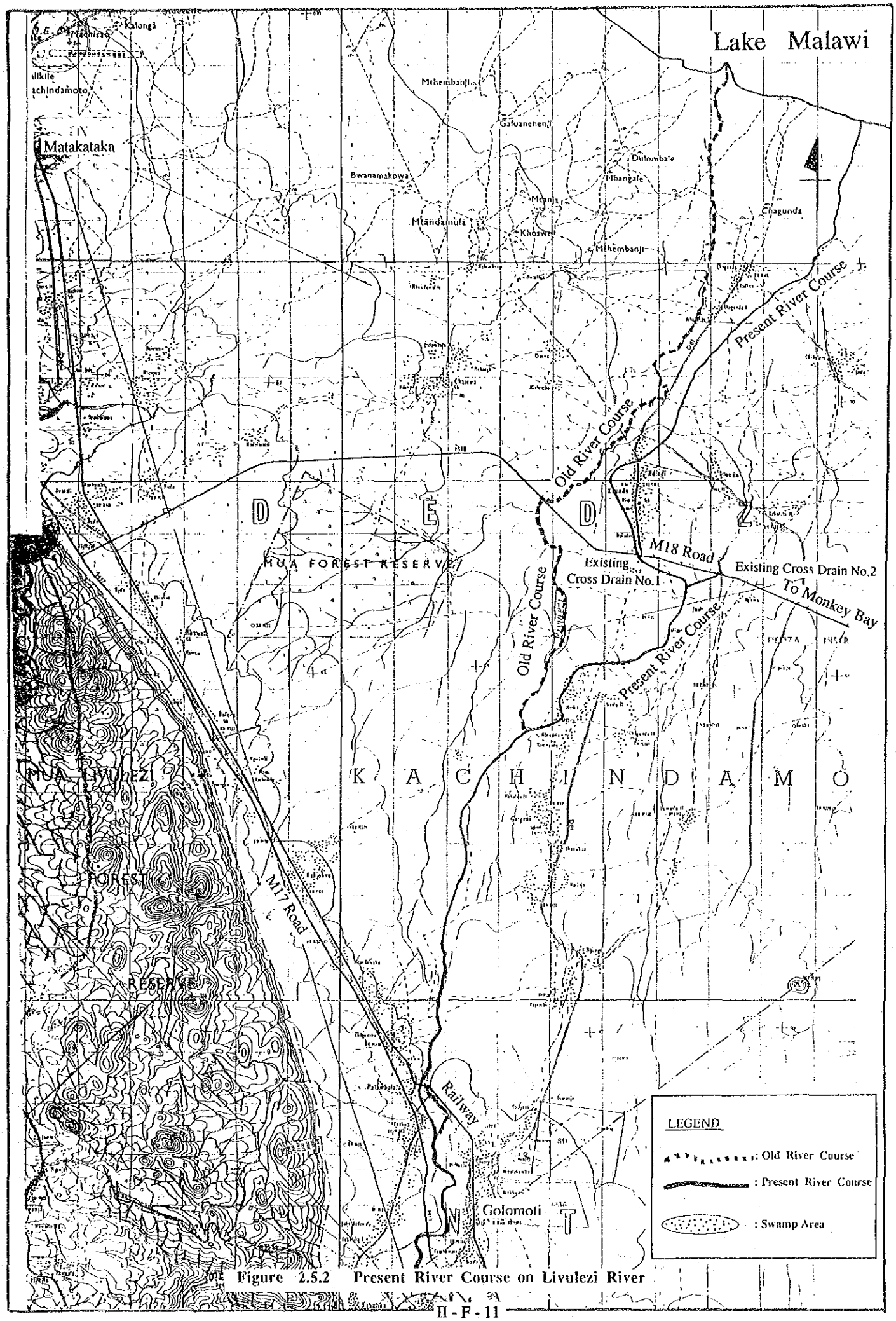


Figure 2.5.2 Present River Course on Livulezi River

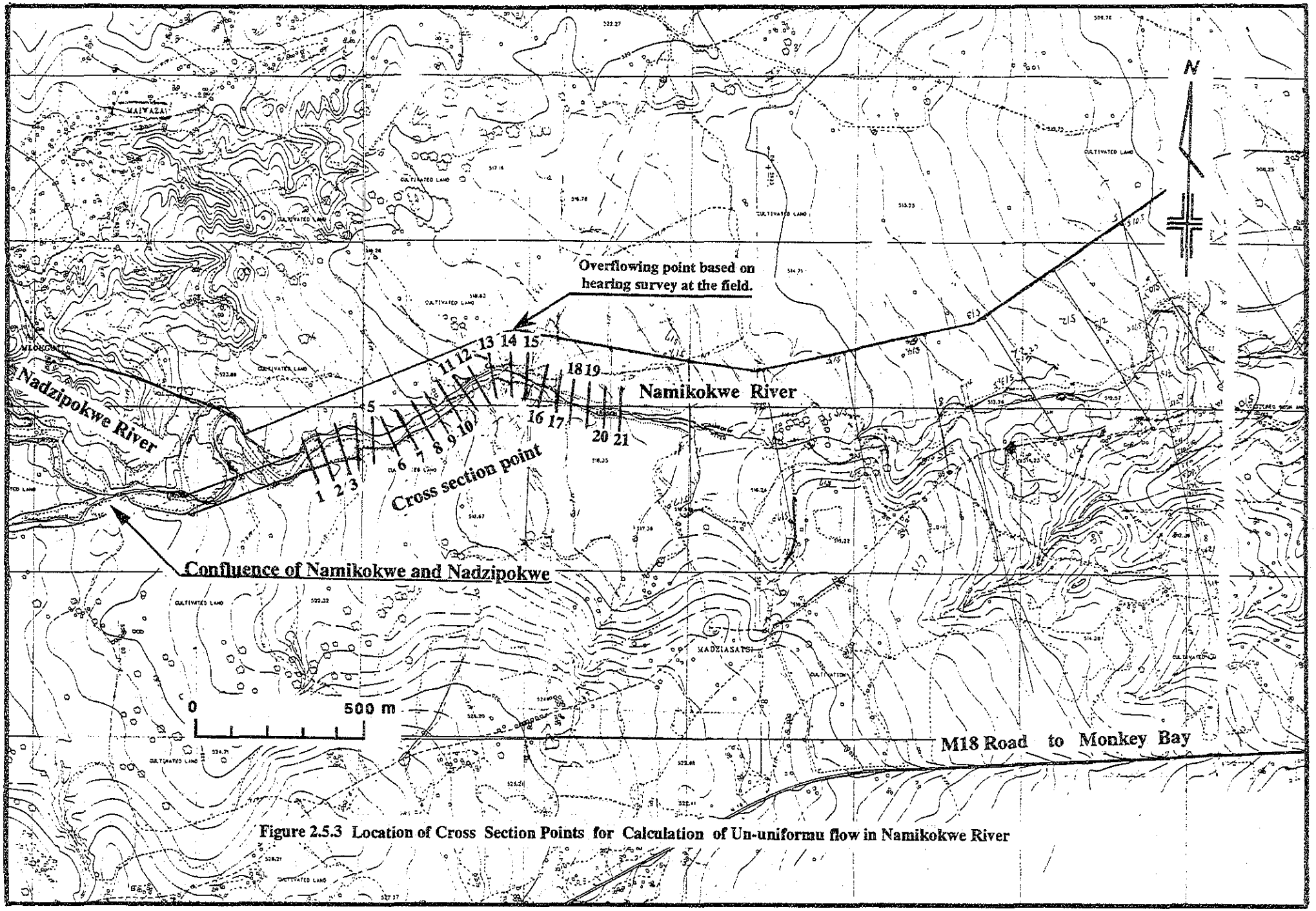


Figure 2.5.3 Location of Cross Section Points for Calculation of Un-uniformu flow in Namikokwe River

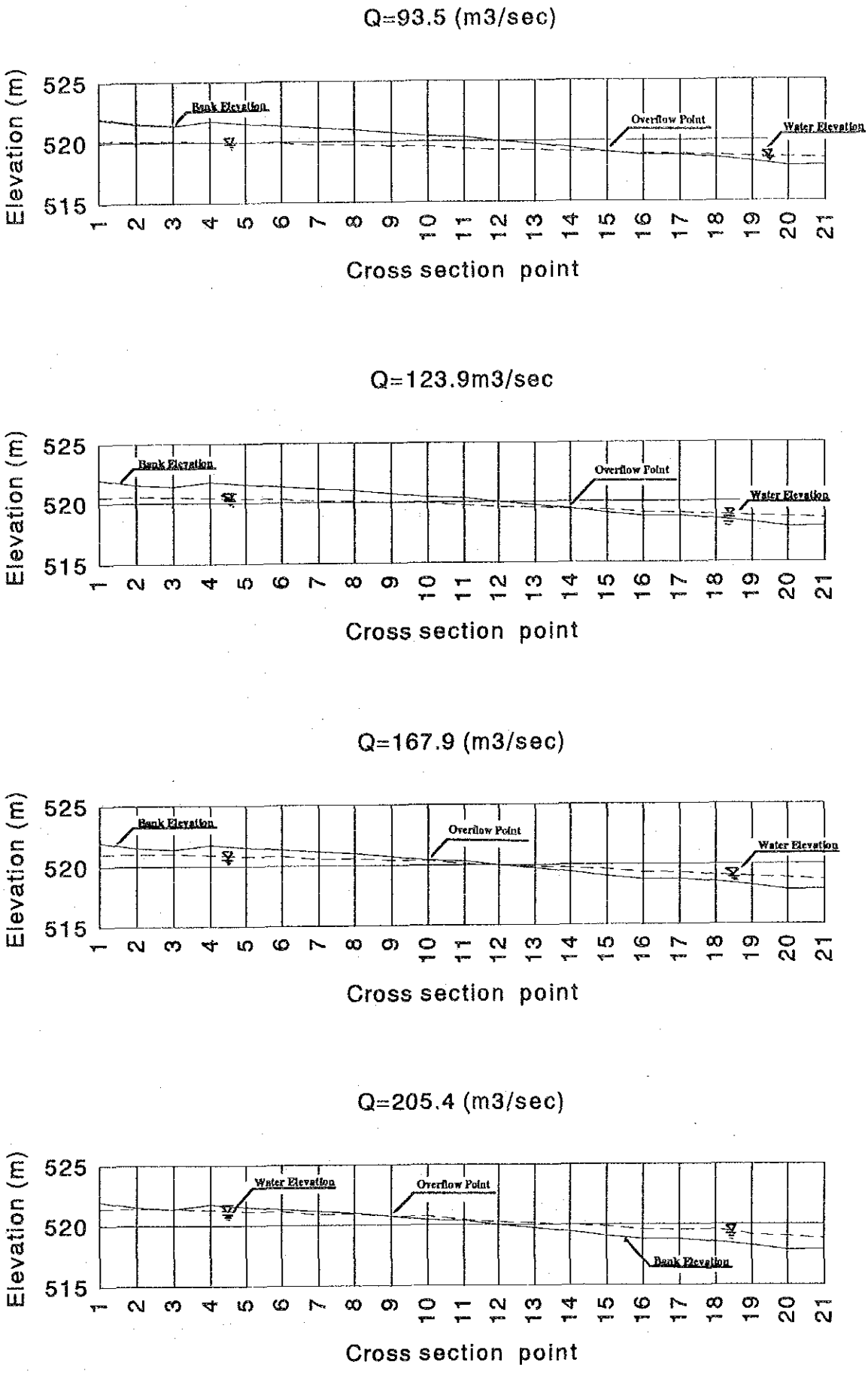
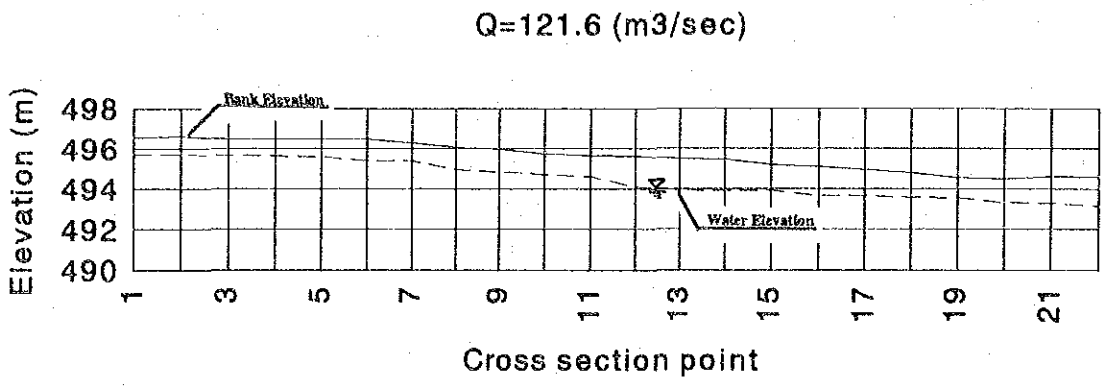
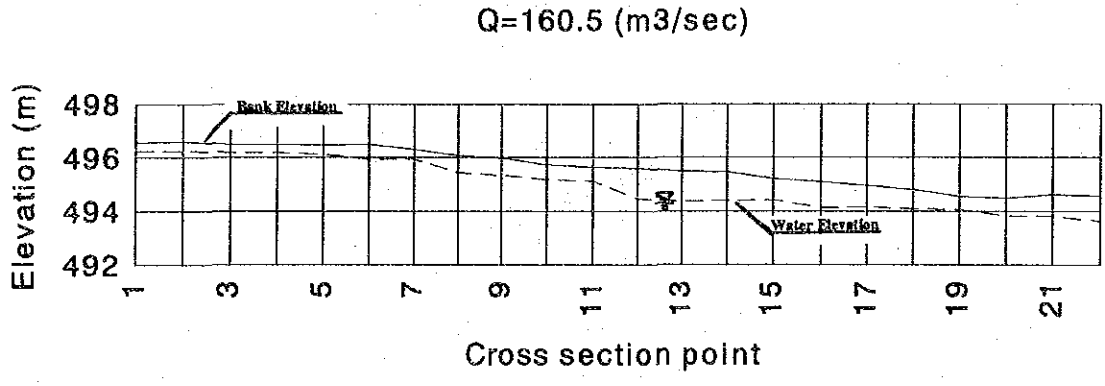


Figure 2.5.4 Results on Calculation of Un-uniform Flow in Namikokwe River





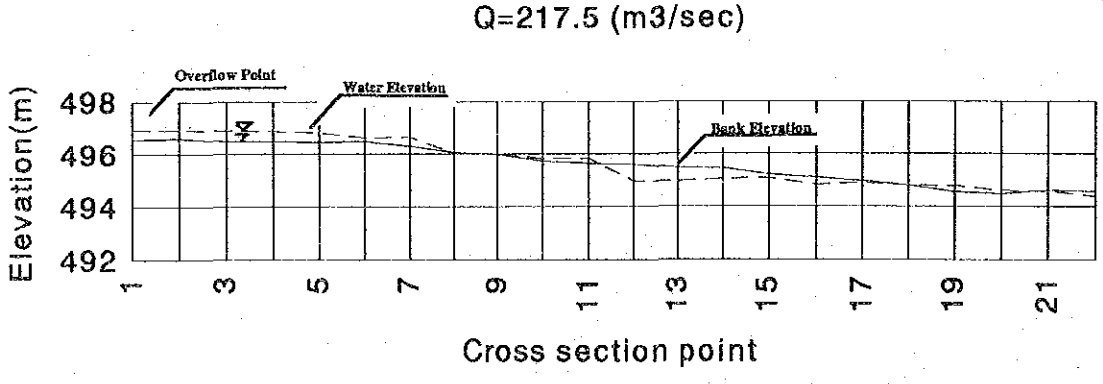
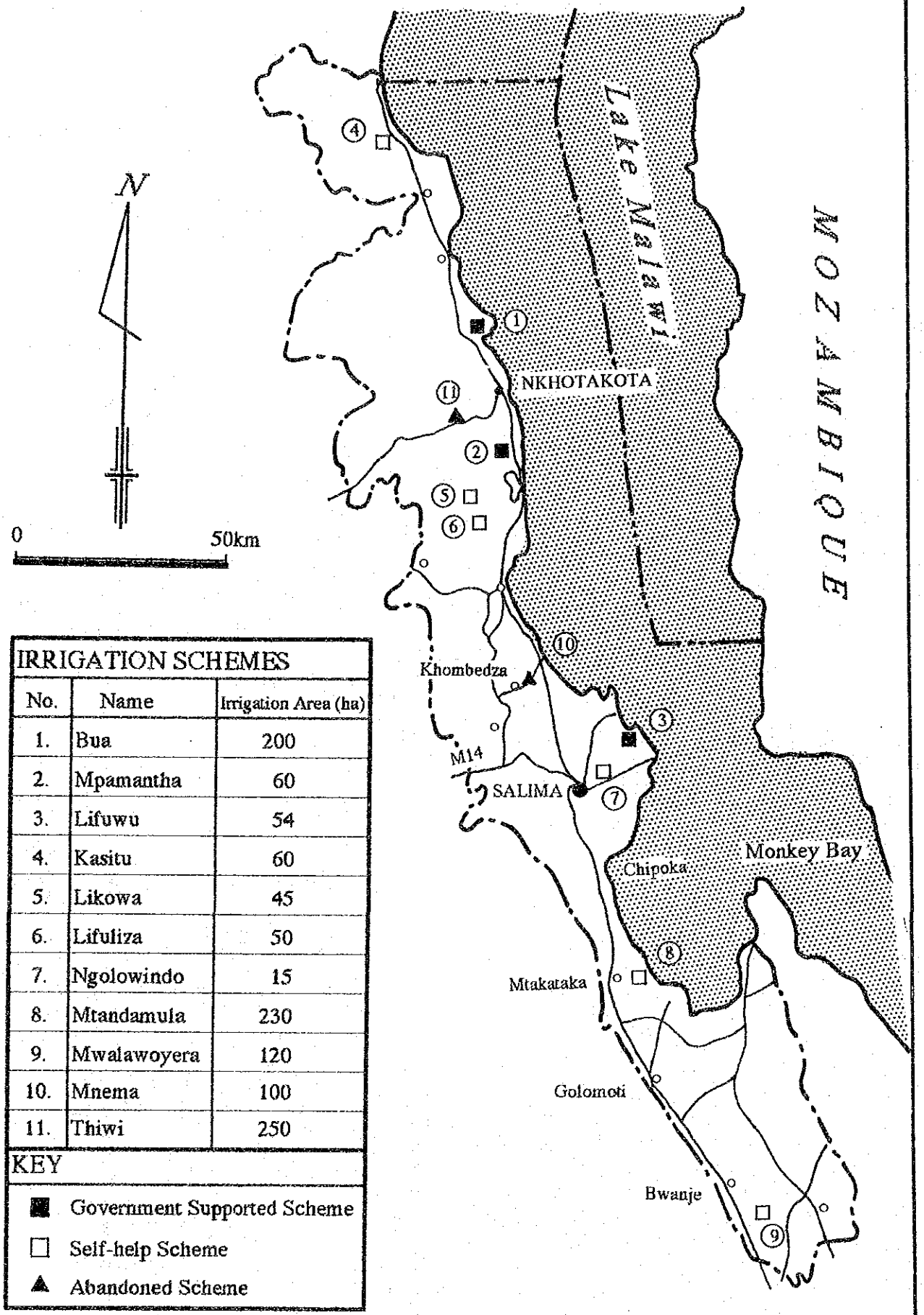


Figure 2.5.5 Results on Calculation of Un-uniform Flow in Nadzipulu River



IRRIGATION SCHEMES		
No.	Name	Irrigation Area (ha)
1.	Bua	200
2.	Mpamantha	60
3.	Lifuwu	54
4.	Kasitu	60
5.	Likowa	45
6.	Lifuliza	50
7.	Ngolowindo	15
8.	Mtandamula	230
9.	Mwalawoyera	120
10.	Mnema	100
11.	Thiwi	250

KEY

■ Government Supported Scheme

□ Self-help Scheme

▲ Abandoned Scheme

Figure 2.8.1 Location Map of Existing Irrigation Schemes in Salima ADD

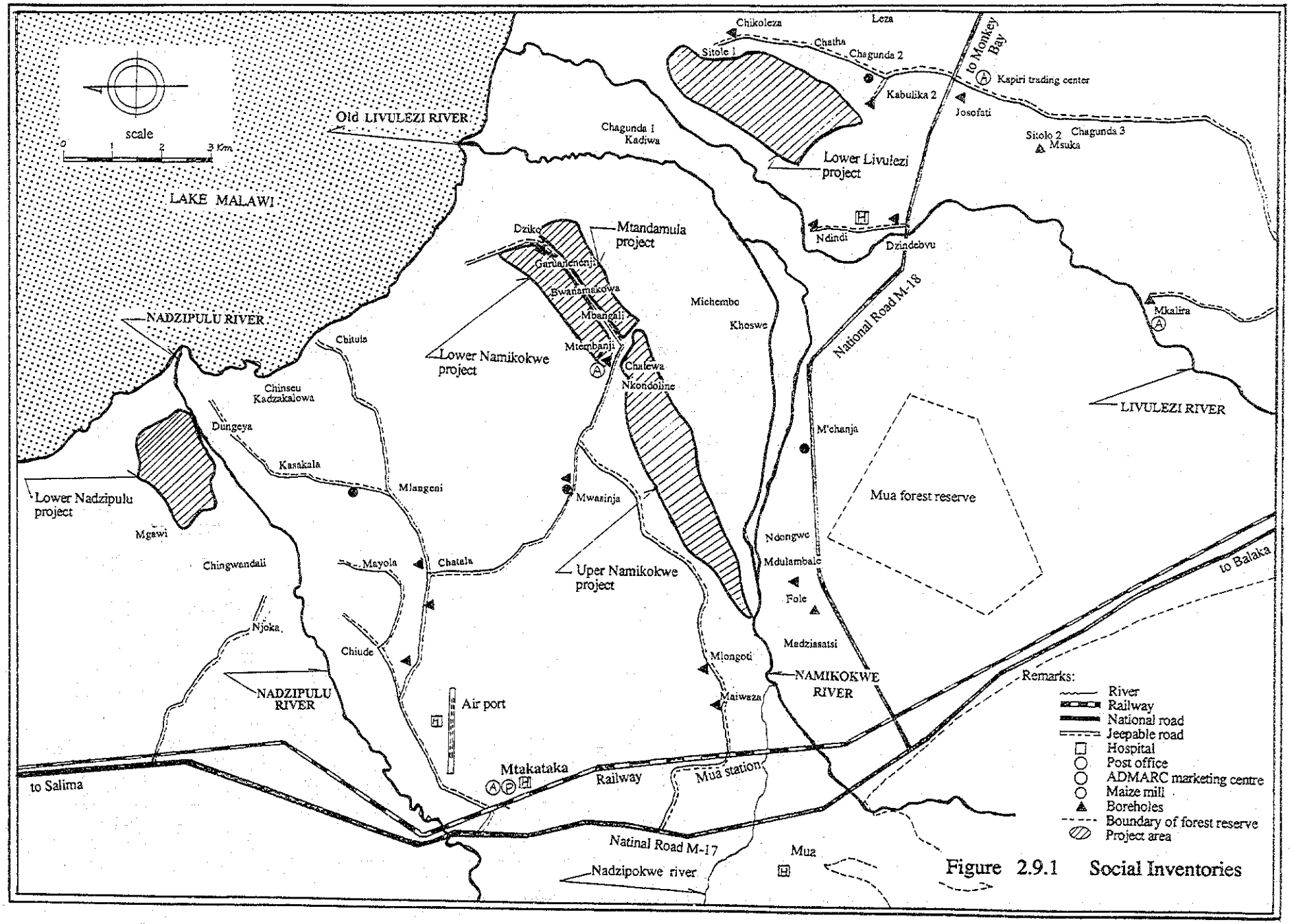


Figure 2.9.1 Social Inventories

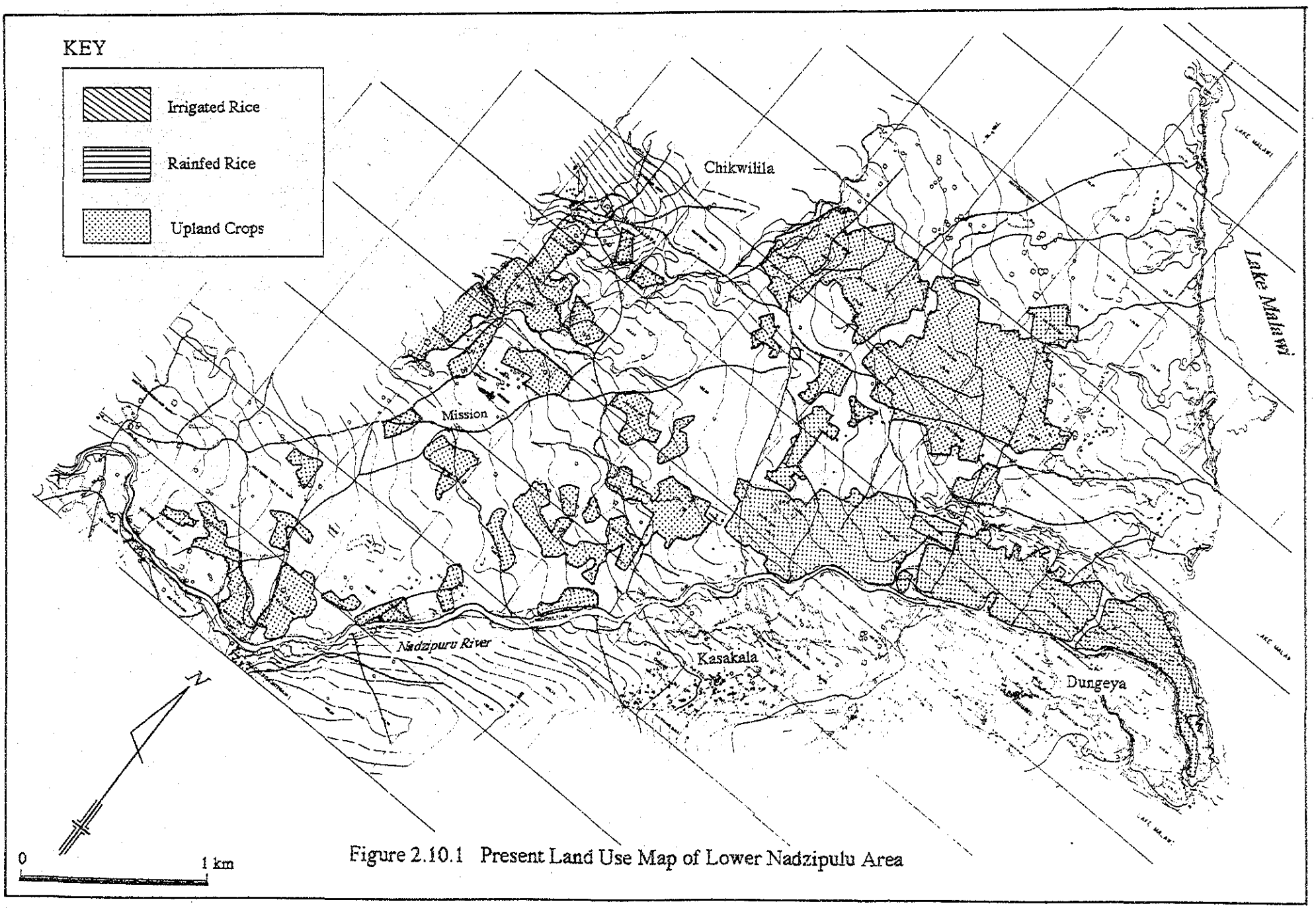


Figure 2.10.1 Present Land Use Map of Lower Nadzipulu Area

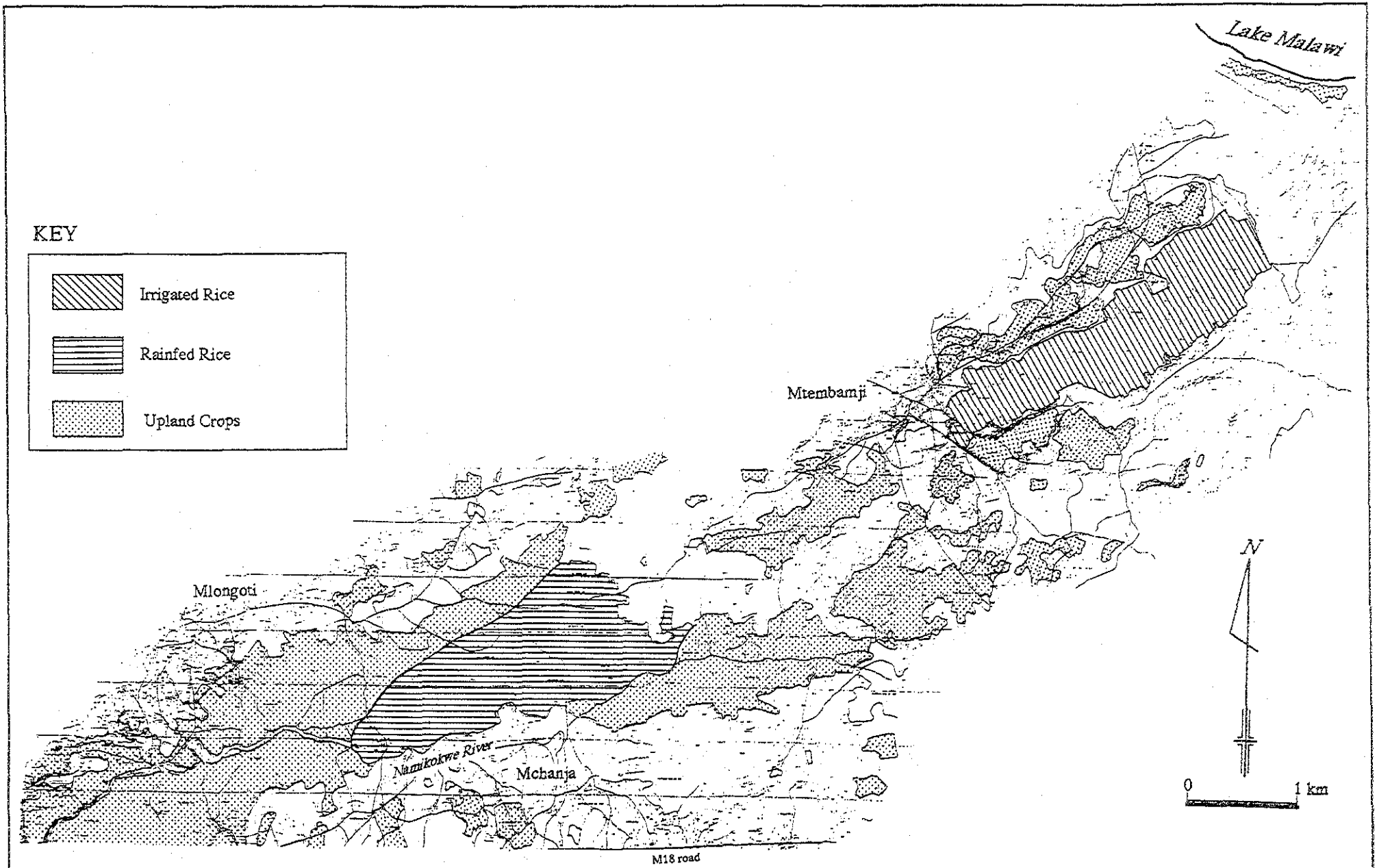


Figure 2.10.2 Present Land Use Map of Namikokwe Area

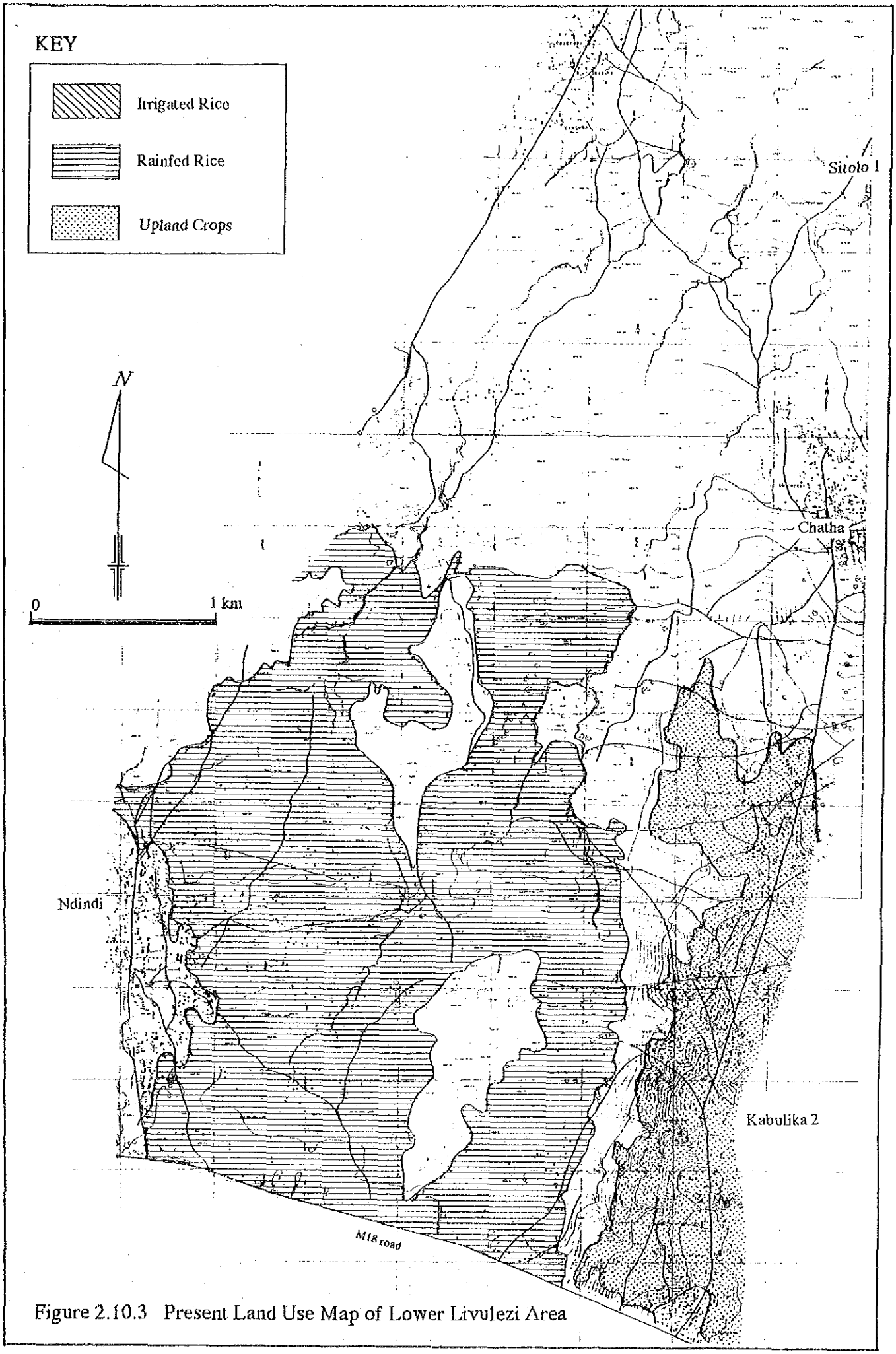


Figure 2.10.3 Present Land Use Map of Lower Livulezi Area

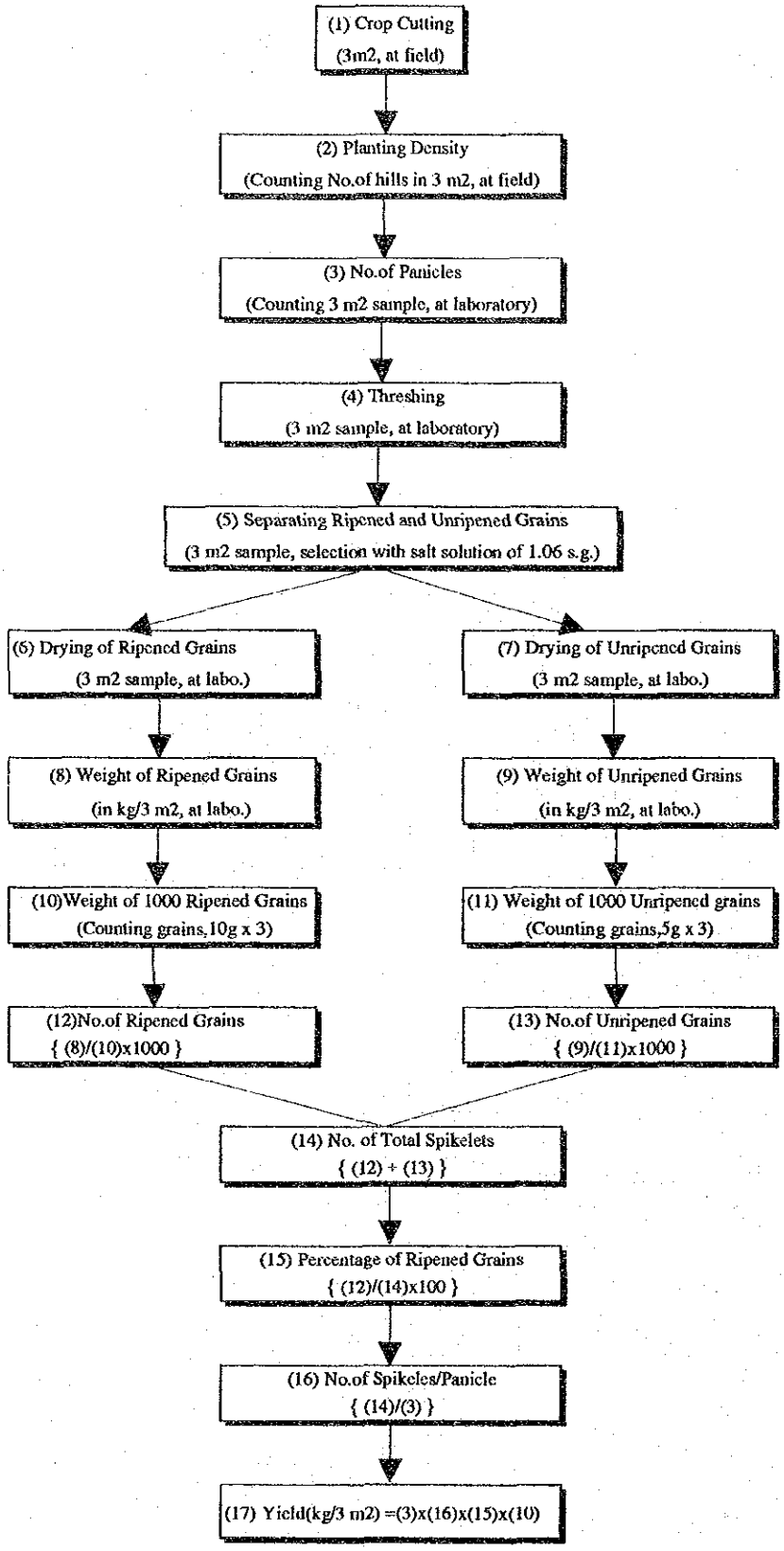


Figure 2.13.1 Method of Simplified Crop Cutting Survey

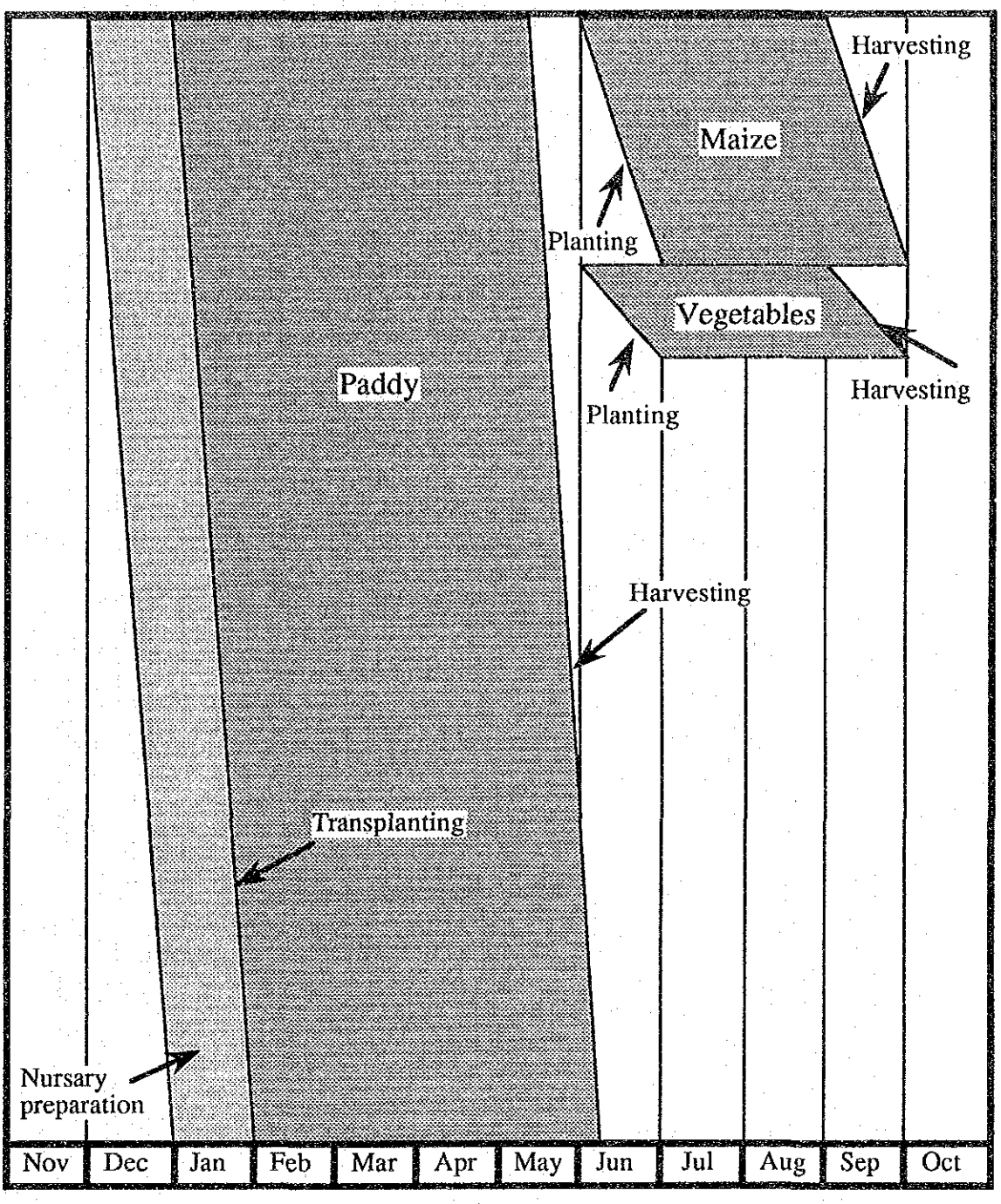


Figure 3.2.1 Proposed Cropping Pattern

Figure 3.3.1 Unit Water Requirement (pattern-1)

Season	Rainy Season																		Dry Season														
Month	Nov.			Dec.			Jan.			Feb.			Mar			Apr.			May			Jun			Jul.			Aug.			Sep.			Oct.		
ETo (at Monkey bay)	63.9	63.9	63.9	55.9	55.9	61.5	52.3	52.3	57.5	51.1	51.1	40.9	53.5	53.5	58.9	49.6	49.6	49.6	43.2	43.2	47.5	37.9	37.9	37.9	40.3	40.3	44.3	48.3	48.3	53.1	59.6	59.6	59.6	70.3	70.3	77.3
Cropping Pattern	Rice (Faya) + Maize (CCA) staggering 30 days (start of transplanting Jan. 1)																																			
Calendar																																				
Nursery period and Puddling for Main fields				Dec. 22		11	10	10	4																											
Vegetation period (1) (early stage)					Jan.1		10	10	11	10	10	8	10	10	11	5																				
Vegetation period (2) (after panicle initiation)												Mar.7	4	10	11	10	10	10	5																
Ripening period																5	10	10	10	10																
Initial development Stage																						10	10	10	10	11	4									
Crop development Stage																								5	10	11	10	10	11	10							
Mid season																												9	11	10	10	10	10	10	4	
Late season	3																															5	10	10	11	
Kc Vegetation period (1)							1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10																				
Kc Vegetation period (2)										1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05																	
Kc Ripening period																0.95	0.95	0.95	0.95	0.95																
Kc Initial development Stage																						0.35	0.35	0.35	0.35	0.35	0.35									
Kc Crop development Stage																								0.46	0.57	0.67	0.78	0.88	0.99	1.08						
Kc Mid season																												1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Kc Late season	0.980																															1.07	1.03	1.03	1.03	
Area intensity of paddling						0.31	0.29	0.29	0.11																											
Area intensity of Vegetation period (1)							0.17	0.50	0.85	1.00	1.00	1.00	0.97	0.70	0.35	0.04																				
ET Vegetation period (1)							9.59	28.76	53.60	56.22	56.22	44.97	57.30	41.21	22.66	1.14																				
Area intensity of Vegetation period (2)													0.03	0.30	0.65	0.92	0.67	0.33	0.04																
ET Vegetation period (2)													0.60	16.86	40.18	47.74	34.72	17.36	0.94																
Area intensity of Ripening period																0.04	0.33	0.50	0.46	0.17																
ET Ripening period																0.98	15.71	23.56	18.81	6.84																
Area intensity of Initial development																						0.17	0.50	0.79	0.67	0.32	0.03									
ET Initial development Stage																						2.21	6.63	11.16	9.40	4.91	0.16									
Area intensity of Crop development																								0.04	0.33	0.68	0.97	0.87	0.52	0.17						
ET Crop development Stage																								0.39	7.59	20.39	36.43	36.76	29.74	10.73						
Area intensity of Mid season																												0.14	0.48	0.83	1.00	0.96	0.67	0.33	0.02	
ET Mid season																												6.75	29.53	57.12	68.54	65.68	53.89	26.94	0.78	
Area intensity of Late season	0.02																															0.04	0.31	0.37	0.31	
ET Late season	0.28																															1.33	22.09	26.42	24.74	
Total Area intensity	0.02						0.17	0.50	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.50	0.17		0.17	0.50	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.70	0.34	
ETcrop	0.3						9.6	28.8	53.7	56.2	56.2	45.0	57.9	58.1	62.8	49.9	30.4	40.9	19.8	6.8		2.2	6.6	11.5	17.0	25.3	36.6	43.5	59.3	67.8	68.5	67.0	76.0	53.4	25.5	
Puddling (mm)						47.1	42.9	42.9	17.1																											
Percolation losses (mm/day)							5.0	15.0	28.0	30.0	30.0	24.0	29.5	30.0	33.0	28.8	30.0	25.0	14.4	5.0																
Water requirement (mm)	0.3						14.6	43.8	81.7	86.2	86.2	69.0	87.4	88.1	95.8	78.6	80.4	65.9	34.1	11.8		2.2	6.6	11.5	17.0	25.3	36.6	43.5	59.3	67.8	68.5	67.0	76.0	53.4	25.5	

Note) -ETo : Republic of Malawi Meteorological Department, Climatological Tables for Malawi Station at Monkey Bay.
-Puddling for main field including land preparation to be 150 mm
-Percolation losses is assumed to be 3 mm/day.
-Irrigation water during nursery period is neglected due to small amount

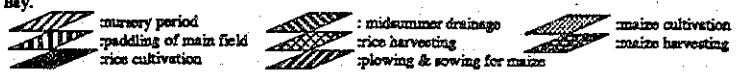


Figure 3.3.2 Unit Water Requirement (pattern-2)

Season	Rainy Season																			Dry Season														
Month	Nov.			Dec.			Jan.			Feb.			Mar			Apr.			May			Jun			Jul.			Aug.			Sep.			Oct.		
ETo (at Monkey bay)	63.9	63.9	63.9	55.9	55.9	61.5	52.3	52.3	57.5	51.1	51.1	40.9	53.5	53.5	58.9	49.6	49.6	49.6	43.2	43.2	47.5	37.9	37.9	37.9	40.3	40.3	44.3	48.3	48.3	53.1	59.6	59.6	59.6	70.3	70.3	77.3
Cropping Pattern	Rice (Faya) + Maize (90 days variety) staggering 30 days (start of transplanting Jan. 1)																																			
Calendar																																				
Nursery period and Puddling for Main fields				Dec. 22		11	10	10	4																											
Vegetation period (1) (early stage)						Jan. 1	10	10	11	10	10	8	10	10	11	5																				
Vegetation period (2) (after panicle initiation)													Mar. 7	4	10	11	10	10	5																
Ripening period																Apr. 6	5	10	10	10	10															
Initial development Stage																					Jun. 11	10	10	10	10	5									
Crop development Stage																							Jun. 26	5	10	10	11	10	9							
Mid season																										Jul. 22	11	10	10	11	10	8				
Late season																													1	11	10	10	8			
Kc Vegetation period (1)							1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10																				
Kc Vegetation period (2)										1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05																	
Kc Ripening period																0.95	0.95	0.95	0.95	0.95																
Kc Initial development Stage																						0.35	0.35	0.35	0.35	0.35									
Kc Crop development Stage																							0.43	0.55	0.70	0.70	0.83	0.99							
Kc Mid season																										1.15	1.15	1.15	1.15	1.15	1.15				
Kc Late season																												1.04	1.04	1.04	1.04	1.04			
Area intensity of paddling						0.31	0.29	0.29	0.11																											
Area intensity of Vegetation period (1)							0.17	0.50	0.85	1.00	1.00	1.00	0.97	0.70	0.35	0.04																				
ET Vegetation period (1)							9.59	28.76	53.68	56.22	56.22	44.97	57.30	41.21	22.66	1.14																				
Area intensity of Vegetation period (2)													0.03	0.30	0.65	0.92	0.67	0.33	0.04																
ET Vegetation period (2)													0.60	16.86	40.18	47.74	34.72	17.36	0.94																
Area intensity of Ripening period																0.04	0.33	0.50	0.46	0.17																
ET Ripening period																0.98	15.71	23.56	18.81	6.84																
Area intensity of Initial development																						0.17	0.46	0.50	0.33	0.04									
ET Initial development Stage																						2.21	6.08	7.05	4.70	0.27									
Area intensity of Crop development																							0.04	0.33	0.67	0.78	0.47	0.14							
ET Crop development Stage																							0.34	7.39	18.71	24.05	18.70	5.81							
Area intensity of Mid season																										0.18	0.55	0.86	0.78	0.43	0.11				
ET Mid season																										9.34	29.62	47.94	47.85	29.70	5.85				
Area intensity of Late season																													0.21	0.33	0.33	0.11			
ET Late season																													11.63	20.66	20.25	5.29			
Total Area intensity							0.17	0.50	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.50	0.17		0.17	0.50	0.83	1.00	1.00	1.00	1.00	0.99	0.77	0.43	0.11			
ETcrop							9.6	28.8	53.7	56.2	56.2	45.0	57.9	58.1	62.8	49.9	50.4	40.9	19.8	6.8		2.2	6.4	14.4	23.4	33.7	48.3	53.8	59.5	50.4	26.1	5.3			
Puddling (mm)						47.1	42.9	42.9	17.1																											
Percolation losses (mm/day)							5.0	15.0	28.0	30.0	30.0	24.0	29.5	30.0	33.0	28.8	30.0	25.0	14.4	5.0																
Water requirement (mm)							14.6	43.8	81.7	86.2	86.2	69.0	87.4	88.1	95.8	78.6	80.4	65.9	34.1	11.8		2.2	6.4	14.4	23.4	33.7	48.3	53.8	59.5	50.4	26.1	5.3			

Note) -ETo : Republic of Malawi Meteorological Department, Climatological Tables for Malawi Station at Monkey Bay.
-Puddling for main field including land preparation to be 150 mm
-Percolation losses is assumed to be 3 mm/day.
-Irrigation water during nursery period is neglected due to small amount

: nursery period
: paddling of main field
: rice cultivation
: midsummer drainage
: rice harvesting
: plowing & sowing for maize
: maize cultivation
: maize harvesting

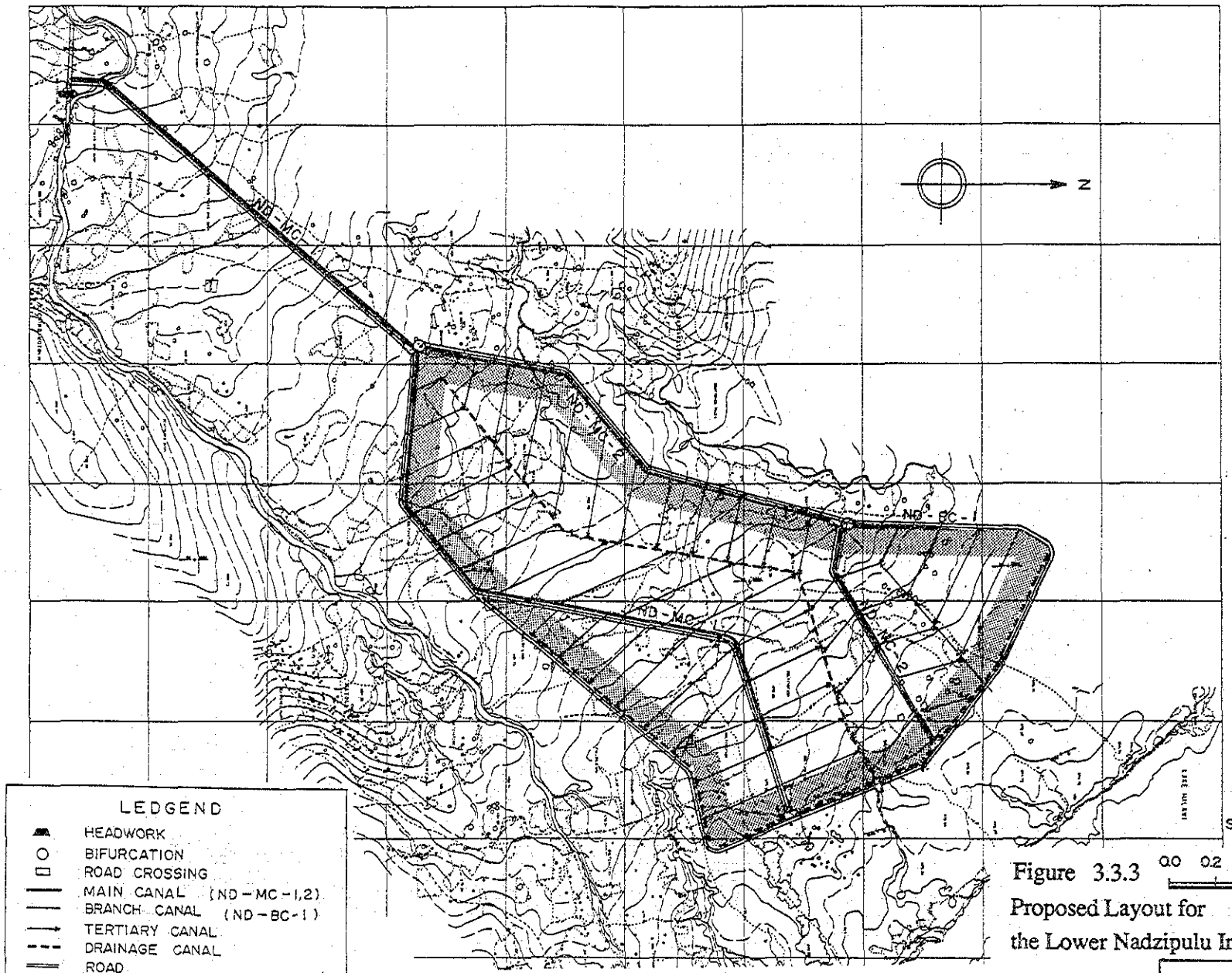


Figure 3.3.3 Proposed Layout for the Lower Nadzipulu Irrigation Project

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