

3. CURRENT FINANCIAL CONDITIONS OF NUWA

refer to section 3.3, Main Report

TABLE B.3.1 POPULATION, HOUSEHOLD AND NUMBER OF WATER CONNECTIONS REGISTERED TO NUWA

Sub branch	Ward	Type	Water Connect-ion	Area km2	Populat-ion In 1988	Populat-ion Density	Number of House-hold	Ave.Size of House-hold	Number of Domestic Connection	Number of Pop. per connection
Ilala	Ukonga	Mixed	N/D		45,203		10,127	4.5	480	94.2
Ilala	Pugu	Rural	N/C		6,226		1,178	5.3		
Ilala	Msongola	Rural	N/C		13,351		3,058	4.4		
Ilala	Tabata	Urban	N/D		18,465		3,780	4.9	511	36.1
Ilala	Kinyerezi	Rural	N/D		3,048		730	4.2	92	33.1
Ilala	Ilala	Urban	S		35,048		8,241	4.3	2,531	13.8
Ilala	Mchikichini	Urban	S		15,040		3,372	4.5	82	183.4
Ilala	Vingunguti	Urban	S		33,690		8,731	3.9		
Ilala	Kipawa	Urban	N/D		36,910		9,282	4.0	1,205	30.6
Ilala	Buguruni	Urban	S		48,247		13,198	3.7	986	48.9
Ilala	Kariakoo	Urban	S		12,569		2,499	5.0	1,578	8.0
Ilala	Jangwani	Urban	S		15,320		2,908	5.3	735	20.8
Ilala	Gerezani	Urban	S		7,487		1,557	4.8	742	10.1
Ilala	Kisutu	Urban	S		8,358		1,699	4.9	3,385	2.5
Ilala	Mchafukoge	Urban	S		8,547		1,604	5.3		
Ilala	Upanga East	Urban	S		9,807		752	13.0	2,036	4.8
Ilala	Upanga west	Urban	S		11,020		1,633	6.7	1,531	7.2
Ilala	Kivukoni	Urban	S		5,372		781	6.9	442	12.2
Total of Ilala					333,708		75,130	4.4	16,336	20.4
Temeke	Kigamboni	Mixed	N/C		26,078		6,197	4.2	134	194.6
Temeke	Vijibweni	Rural	N/C		2,557		520	4.9		
Temeke	Kibada	Rural	N/C		3,003		752	4.0		
Temeke	Kisarawe II	Rural	N/C		2,821		697	4.0		
Temeke	Somangira	Rural	N/C		6,730		1,596	4.2		
Temeke	Kimbiji	Rural	N/C		6,465		1,457	4.4		
Temeke	Mbagala	Mixed	N/D		40,866		9,539	4.3	747	54.7
Temeke	Chamazi	Rural	S		5,452		1,261	4.3		
Temeke	Yombo Vituka	Rural	N/C		13,408		2,876	4.7		
Temeke	Charamba	Mixed	N/C		18,624		3,974	4.7		
Temeke	Toangoma	Rural	N/C		6,652		1,553	4.3		
Temeke	Miburani	Urban	S		72,892		16,793	4.3		
Temeke	Temeke 14	Urban	S		91,144		22,271	4.1	5,197	17.5
Temeke	Mtoni	Urban	S		39,417		9,745	4.0	1,782	22.1
Temeke	Keko	Urban	S		42,868		10,493	4.1	1,194	35.9
Temeke	Kurasini	Urban	S		26,776		5,781	4.6	1,057	25.3
Total of Temeke					405,753		95,505	4.2	10,111	40.1
Kinondoni	Msasani	Urban	S		51,293		10,839	4.7	2,782	18.4
Kinondoni	Kinondoni	Urban	S		42,387		9,526	4.4	3,422	12.4
Kinondoni /Magomeni	Mwananyamala	Urban	S		72,508		16,943	4.3	2,498	29.0
Total of Kinondoni					166,188		37,308	4.5	8,702	19.1
Kawe	Goba	Rural	N/C		4,753		1,186	4.0	607	7.8
Kawe	Kawe	Urban	N/D		44,085		10,527	4.2	3,929	11.2
Kawe	Kunduchi	Rural	N/D		22,743		5,452	4.2		
Kawe	Mbweni	Rural	N/D		2,159		551	3.9		
Kawe	Bunju	Rural	N/D		9,977		2,493	4.0	346	28.8
Total of Kawe					83,717		20,209	4.1	4,882	17.1
Magomeni	Magomeni	Urban	S		16,944		4,361	3.9	2,217	7.6
Magomeni	Makurumla	Urban	S		53,991		12,987	4.2	468	115.4
Magomeni	Ndugumbi	Urban	S		32,736		7,933	4.1	793	41.3
Magomeni	Tandale	Urban	S		58,413		13,380	4.4		
Magomeni	Mzimuni	Urban	S		23,985		5,807	4.1		
Magomeni	Kigogo	Urban	S		21,222		4,693	4.5	1,601	13.3
Magomeni	Mabibo	Urban	S		45,963		10,761	4.3	1,081	42.5
Magomeni	Manzese	Urban	S		54,499		12,834	4.2		
Magomeni	Ubungo	Urban	S		46,980		9,521	4.9	6,895	6.8
Magomeni	Kibamba	Rural	S		16,751		3,875	4.3	1,427	11.7
Total of Magomeni					371,484		86,152	4.3	14,482	25.7
Total of Dar es Salaam					1,360,850		314,304	4.3	54,513	25.0

S:Served N/C:No Connection N/D:No Distribution System

TABLE B.3.2 LIST OF ZONE NUMBER AND WARD

Zone No	Ward	Zone No	Ward	Zone No	Ward	Zone No	Ward	Zone No	Ward	Zone No	Ward	Zone No	Ward
1 Kawe		51 Keko		101 Magomeni		151 Kisutu		201 Temeke		251 Mwananyamala		A01 Kawe	
2 Kinondoni		52 Keko		102 Magomeni		152 Kisutu		202 Temeke		252 Mwananyamala		A10 Magomeni	
3 Kinondoni		53 Ukonga		103 Magomeni		153 Kisutu		203 Mtoni		253 Mwananyamala		A12 Ilali	
4 Kinondoni		54 Kipawa		104 Magomeni		154 Kisutu		204 Mwananyamala		254 Mwananyamala		A19 Kibamba	
5 Kinondoni		55 Keko		105 Ilala		155 Kisutu		205 Makurumba		255 Temeke		A26 Kawe	
6 Kinondoni		57 Kurasini		106 Ilala		156 Kisutu		206 Makurumba		256 Ubungo		A27 Ubungo	
7 Kinondoni		58 Kurasini		107 Ilala		157 Kisutu		207 Mwananyamala		257 Kigamboni		A31 Mwananyamala	
8 Msasani		59 Temeke		108 Ilala		158 Kisutu		208 Magomeni		258 Mabibo		A54 Kipawa	
9 Msasani		60 Buguruni		109 Ilala		159 Kisutu		209 Ndugumbi		259 Kigogo		A56 Kurasini	
10 Msasani		61 Kinondoni		110 Ilala		160 Kisutu		210 Ndugumbi		260 Kigogo		A60 Suguruni	
11 Msasani		62 Temeke		111 Ilala		161 Kisutu		211 Ndugumbi		261 Kigogo		A90 Ubungo	
12 Msasani		63 Temeke		112 Ilala		162 Kisutu		212 Ndugumbi		262 Kigogo		B01 Kawe	
13 Msasani		64 Temeke		113 Ilala		163 Kisutu		213 Ndugumbi		263 Kigogo		B27 Ubungo	
14 Msasani		65 Keko		114 Ilala		164 Kisutu		214 Ndugumbi		264 Bunju		B31 Mwananyamala	
15 Msasani		66 Keko		115 Ilala		165 Kisutu		215 Ndugumbi		265 Keko		B36 Kurasini	
16 Msasani		67 Temeke		116 Kariakoo		166 Kisutu		216 Makurumba		266 Kawe		B90 Ubungo	
17 Msasani		68 Temeke		117 Kariakoo		167 Kisutu		217 Makurumba		267 Mchikichini		C01 Kawe	
18 Msasani		69 Upanga East		118 Jangwani		168 Kisutu		218 Temeke		268 Ubungo		C31 Mwananyamala	
19 Msasani		70 Upanga East		119 Jangwani		169 Kisutu		219 Temeke		269 Ubungo		C56 Kurasini	
20 Msasani		71 Upanga East		120 Jangwani		170 Kisutu		220 Temeke		270 Ubungo		C90 Ubungo	
21 Msasani		72 Upanga East		121 Jangwani		171 Kisutu		221 Temeke		271 Ubungo		D31 Mwananyamala	
22 Msasani		73 Kisutu		122 Jangwani		172 Kisutu		222 Temeke		272 Ubungo		D90 Ubungo	
23 Msasani		74 Kisutu		123 Jangwani		173 Kisutu		223 Temeke		273 Mabibo		E90 Ubungo	
24 Msasani		75 Upanga East		124 Jangwani		174 Kisutu		224 Temeke		274 Msasani			
25 Msasani		76 Upanga East		125 Jangwani		175 Kisutu		225 Temeke		275 Tabata			
26 Kinondoni		77 Upanga East		126 Kariakoo		176 Kisutu		226 Temeke		276 Ubungo			
27 Kinondoni		78 Upanga west		127 Kariakoo		177 Kisutu		227 Temeke		277 Kinyerezi			
28 Kinondoni		79 Upanga west		128 Kariakoo		178 Kisutu		231 Temeke		278 Ubungo			
29 Kinondoni		80 Upanga west		129 Kariakoo		179 Kisutu		237 Goba		401 Magomeni			
30 Kinondoni		81 Upanga west		130 Kariakoo		180 Kivukoni		238 Ndugumbi					
31 Kinondoni		82 Upanga west		131 Kariakoo		181 Kivukoni		239 Kinondoni					
32 Upanga East		83 Upanga west		132 Kariakoo		182 Kivukoni		240 Kinondoni					
33 Upanga East		84 Upanga west		133 Kariakoo		183 Kivukoni		241 Kinondoni					
34 Kivukoni		85 Upanga west		134 Kariakoo		184 Msasani		243 Keko					
35 Kivukoni		86 Upanga west		135 Kariakoo		186 Kawe		244 Kinondoni					
36 Kivukoni		87 Upanga west		136 Kariakoo		187 Kinondoni		245 Mwananyamala					
37 Kivukoni		88 Upanga west		137 Kariakoo		188 Msasani		246 Kinondoni					
38 Kivukoni		89 Temeke		138 Kariakoo		189 Msasani		247 Kinondoni					
39 Kivukoni		90 Ubungo		139 Kariakoo		190 Kibamba		248 Mwananyamala					
40 Kivukoni		92 Temeke		140 Kariakoo		191 Mbegala		249 Kigogo					
41 Kivukoni		93 Temeke		141 Kariakoo		192 Ukonga		250 Mwananyamala					
42 Gerezani		94 Temeke		142 Kariakoo		194 Kawe							
43 Gerezani		95 Temeke		143 Gerezani		195 Kawe							
44 Gerezani		96 Temeke		144 Gerezani		196 Kinondoni							
45 Gerezani		97 Temeke		145 Gerezani		197 Msasani							
46 Kurasini		98 Temeke		146 Kisutu		198 Kinondoni							
47 Kinondoni		99 Mtoni		147 Kisutu		199 Kinondoni							
48 Mtoni		100 Magomeni		148 Kisutu		200 Mwananyamala							
49 Mtoni				149 Kisutu									
50 Kivukoni				150 Kisutu									

**TABLE B.3.3 ASSESSED MINIMUM CHARGE OF DOMESTIC WATER
CONSUMPTION PER MONTH BY ZONE**

Zone No	Minimum Charge	Zone No	Minimum Charge	Zone No	Minimum Charge	Zone No	Minimum Charge	Zone No	Minimum Charge	Zone No	Minimum Charge
1	450.00	51	381.60	103	436.50	153	294.00	205	436.50	264	200.00
2	450.00	52	381.60	104	436.50	154	294.00	206	436.50	265	381.60
3	450.00	53	200.00	105	294.00	155	294.00	207	347.80	266	238.50
4	450.00	54	200.00	106	294.00	156	400.00	208	400.00	267	263.35
5	450.00	55	381.60	107	400.00	157	400.00	209	436.50	268	200.00
6	450.00	57	249.50	108	381.60	158	294.00	210	436.50	269	200.00
7	450.00	58	249.50	109	381.60	159	294.00	211	436.50	270	347.80
8	450.00	59	381.60	110	400.00	160	294.00	212	436.50	271	200.00
9	450.00	60	400.00	111	200.00	161	294.00	213	436.50	272	200.00
10	450.00	61	381.60	112	263.35	162	294.00	214	436.50	273	200.00
11	450.00	62	381.60	113	381.60	163	294.00	215	436.50	274	450.00
12	450.00	63	381.60	114	314.40	164	294.00	216	436.50	275	381.60
13	450.00	64	381.60	115	294.00	165	294.00	217	436.50	276	200.00
14	450.00	65	381.60	116	381.60	166	294.00	218	381.60	277	400.00
15	450.00	66	381.60	117	294.00	167	294.00	219	381.60	278	200.00
16	450.00	67	381.60	118	381.60	168	294.00	220	381.60	401	436.50
17	450.00	68	381.60	119	381.60	169	294.00	221	381.60	A01	352.10
18	450.00	69	400.00	120	381.60	170	381.60	222	381.60	A10	436.50
19	450.00	70	400.00	121	381.60	171	381.60	223	200.00	A12	381.60
20	650.00	71	400.00	122	381.60	172	381.60	224	249.50	A19	381.60
21	650.00	72	400.00	123	381.60	173	294.00	225	381.60	A26	381.60
22	450.00	73	400.00	124	381.60	174	294.00	226	249.50	A27	347.80
23	450.00	74	400.00	125	381.60	175	381.60	227	249.50	A31	381.60
24	450.00	75	400.00	126	381.60	176	294.00	231	381.60	A54	200.00
25	450.00	76	400.00	127	381.60	177	294.00	237	400.00	A56	200.00
26	450.00	77	400.00	128	381.60	178	294.00	238	436.50	A60	400.00
27	450.00	78	400.00	129	381.60	179	294.00	239	381.60	A90	436.50
28	450.00	79	400.00	130	381.60	180	294.00	240	381.60	B01	386.40
29	450.00	80	400.00	131	381.60	181	294.00	241	381.60	B27	347.80
30	381.60	81	400.00	132	381.60	182	294.00	243	381.60	B31	381.60
31	381.60	82	400.00	133	381.60	183	650.00	244	381.60	B56	200.00
32	400.00	83	400.00	134	381.60	184	450.00	245	400.00	B90	436.50
33	400.00	84	400.00	135	381.60	186	543.90	246	400.00	C01	386.40
34	400.00	85	400.00	136	284.30	187	381.60	247	381.60	C31	381.60
35	400.00	86	400.00	137	284.30	188	381.60	248	400.00	C56	200.00
36	381.60	87	400.00	138	294.00	189	450.00	249	200.00	C90	436.50
37	381.60	88	400.00	139	294.00	190	543.90	250	381.60	D31	381.60
38	381.60	89	381.60	140	294.00	191	200.00	251	381.60	D90	436.50
39	381.60	90	436.50	141	381.60	192	200.00	252	381.60	E90	436.50
40	381.60	92	381.60	142	294.00	194	650.00	253	400.00		
41	381.60	93	381.60	143	294.00	195	543.90	254	400.00		
42	400.00	94	381.60	144	294.00	196	381.60	255	249.50		
43	400.00	95	381.60	145	381.60	197	450.00	256	200.00		
44	400.00	96	381.60	146	381.60	198	381.60	257	200.00		
45	400.00	97	249.50	147	294.00	199	381.60	258	436.50		
46	381.60	98	249.50	148	294.00	200	381.60	259	200.00		
47	381.60	99	249.50	149	294.00	201	381.60	260	200.00		
48	381.60	100	436.50	150	294.00	202	381.60	261	200.00		
49	381.60	101	436.50	151	294.00	203	381.60	262	200.00		
50	381.60	102	436.50	152	294.00	204	381.60	263	200.00		

**TABLE B.3.4 (1) NUMBER OF CONNECTIONS REGISTERED BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone number	Ward	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Ilala	53	Ukonga	255			2	13	270
Ilala	192	Ukonga	225		9		2	236
Ilala	275	Tabata	511		36	2	2	551
Ilala	277	Kinyerezi	92		1			93
Ilala	105	Ilala	162		6		1	169
Ilala	106	Ilala	190		7		2	199
Ilala	107	Ilala	284		14	1		299
Ilala	108	Ilala	347		47		3	397
Ilala	109	Ilala	264		36		1	301
Ilala	110	Ilala	167		14			181
Ilala	111	Ilala	5		3	1	1	10
Ilala	112	Ilala	828		9	2	17	856
Ilala	113	Ilala	61		19			80
Ilala	114	Ilala	1		1		4	6
Ilala	115	Ilala	100				2	102
Ilala	A12	Ilala	122		2	1	6	131
Ilala	267	Mchikichini	82					82
Ilala	54	Kipawa	716		56	36	56	864
Ilala	A54	Kipawa	489		7		2	498
Ilala	60	Buguruni	842		52	1	8	903
Ilala	A60	Buguruni	144		4	3		151
Ilala	116	Kariakoo	79		8			87
Ilala	117	Kariakoo	148		12		3	163
Ilala	126	Kariakoo	30		1			31
Ilala	127	Kariakoo	4				3	7
Ilala	128	Kariakoo	30		1			31
Ilala	129	Kariakoo	48		6			54
Ilala	130	Kariakoo	38		13	1		52
Ilala	131	Kariakoo	67		4	3		74
Ilala	132	Kariakoo	14					14
Ilala	133	Kariakoo	58		11		1	70
Ilala	134	Kariakoo	65		9			74
Ilala	135	Kariakoo	77		11			88
Ilala	136	Kariakoo	123		14			137
Ilala	137	Kariakoo	174		9			183
Ilala	138	Kariakoo	149		3			152
Ilala	139	Kariakoo	117		5			122
Ilala	140	Kariakoo	108		6		1	115
Ilala	141	Kariakoo	151		13		1	165
Ilala	142	Kariakoo	98		2			100
Ilala	118	Jangwani	153		13			166
Ilala	119	Jangwani	93		6		1	100
Ilala	120	Jangwani	118		4	1		123
Ilala	121	Jangwani	73		6			79
Ilala	122	Jangwani	72		8			80
Ilala	123	Jangwani	61		3		1	65
Ilala	124	Jangwani	102		7	1		110
Ilala	125	Jangwani	63		6			69
Ilala	42	Gerezani	103		13	1	4	121
Ilala	43	Gerezani	99		6		2	107
Ilala	44	Gerezani	25		10	1		36
Ilala	45	Gerezani	37		7			44
Ilala	143	Gerezani	164		5	3	1	173

**TABLE B.3.4 (2) NUMBER OF CONNECTIONS REGISTERED BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone number	Ward	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Ilala	144	Gerezani	203		9	1	1	214
Ilala	145	Gerezani	111		15	1	2	129
Ilala	73	Kisutu	69		2		4	75
Ilala	74	Kisutu	103		1		1	105
Ilala	146	Kisutu	106		9			115
Ilala	147	Kisutu	37		6			43
Ilala	148	Kisutu	161		24		1	186
Ilala	149	Kisutu	76		27		1	104
Ilala	150	Kisutu	33		6		1	40
Ilala	151	Kisutu	89		8		1	98
Ilala	152	Kisutu	78		3			81
Ilala	153	Kisutu	123		22		2	147
Ilala	154	Kisutu	36				2	38
Ilala	155	Kisutu	68		7		2	77
Ilala	156	Kisutu	54		4	2	2	62
Ilala	157	Kisutu	116		8	3		127
Ilala	158	Kisutu	104		19		7	130
Ilala	159	Kisutu	74		5			79
Ilala	160	Kisutu	95		17		6	118
Ilala	161	Kisutu	103		9		2	114
Ilala	162	Kisutu	57		13		4	74
Ilala	163	Kisutu	91		21			112
Ilala	164	Kisutu	51		15		1	67
Ilala	165	Kisutu	44		3			47
Ilala	166	Kisutu	74		12		1	87
Ilala	167	Kisutu	84		5		1	90
Ilala	168	Kisutu	90		14			104
Ilala	169	Kisutu	49		4			53
Ilala	170	Kisutu	283		26	3	2	314
Ilala	171	Kisutu	285		34	3	5	327
Ilala	172	Kisutu	145		27		2	174
Ilala	173	Kisutu	178		23		10	211
Ilala	174	Kisutu	61		2			63
Ilala	175	Kisutu	127		13		1	141
Ilala	176	Kisutu	87		1		3	91
Ilala	177	Kisutu	69		32		7	108
Ilala	178	Kisutu	20		61	1		82
Ilala	179	Kisutu	65		22			87
Ilala	32	Upanga East	244				7	251
Ilala	33	Upanga East	88		1		6	95
Ilala	69	Upanga East	278				13	291
Ilala	70	Upanga East	458		2		9	469
Ilala	71	Upanga East	301				3	304
Ilala	72	Upanga East	219				4	223
Ilala	75	Upanga East	81		1		4	86
Ilala	76	Upanga East	170				8	178
Ilala	77	Upanga East	197				1	198
Ilala	78	Upanga west	448				2	450
Ilala	79	Upanga west	210		1		2	213
Ilala	80	Upanga west	157		1		3	161
Ilala	81	Upanga west	180				9	189
Ilala	82	Upanga west	137				9	146
Ilala	83	Upanga west	94		1		4	99
Ilala	84	Upanga west	45				7	52
Ilala	85	Upanga west	117				24	141
Ilala	86	Upanga west	109				28	137
Ilala	87	Upanga west	3				16	19
Ilala	88	Upanga west	31		1		16	48

**TABLE B.3.4 (3) NUMBER OF CONNECTIONS REGISTERED BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone number	Ward	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Ilala	34	Kivukoni	26				13	39
Ilala	35	Kivukoni	50		3	2	21	76
Ilala	36	Kivukoni	37				2	39
Ilala	37	Kivukoni	11		4		2	17
Ilala	38	Kivukoni	70		3		21	94
Ilala	39	Kivukoni	5				30	35
Ilala	40	Kivukoni	6			1	27	34
Ilala	41	Kivukoni	28		2		5	35
Ilala	50	Kivukoni	13		10		17	40
Ilala	180	Kivukoni	12		4		1	17
Ilala	181	Kivukoni	54		4		11	69
Ilala	182	Kivukoni	123		17		13	153
Ilala	183	Kivukoni	7					7
Temeke	257	Kigamboni	134		3	4	9	150
Temeke	191	Mbagala	747	1	6	1		755
Temeke	59	Temeke	17		8	34	2	61
Temeke	62	Temeke	4		5	48		57
Temeke	63	Temeke	5		14	45	1	65
Temeke	64	Temeke	1		18	13		32
Temeke	67	Temeke	32		14	72	3	121
Temeke	68	Temeke	11		9	44	113	177
Temeke	89	Temeke	39		6	3	5	53
Temeke	92	Temeke	380		12	1	3	396
Temeke	93	Temeke	391		3	1		395
Temeke	94	Temeke	268		9		3	280
Temeke	95	Temeke	219		3		3	225
Temeke	96	Temeke	100		13	1	9	123
Temeke	97	Temeke	357		3		1	361
Temeke	98	Temeke	199		8			207
Temeke	201	Temeke	203		1		1	205
Temeke	202	Temeke	139		1		2	142
Temeke	218	Temeke	170		10			180
Temeke	219	Temeke	155	1	3	2	1	162
Temeke	220	Temeke	191		5			196
Temeke	221	Temeke	191		7			198
Temeke	222	Temeke	68					68
Temeke	223	Temeke	190		9			199
Temeke	224	Temeke	337		3			340
Temeke	225	Temeke	229		11			240
Temeke	226	Temeke	89		1			90
Temeke	227	Temeke	339		2		1	342
Temeke	231	Temeke	767		12	1		780
Ilala	255	Temeke	106		2	20	5	133
Temeke	48	Mtoni	266		2		4	272
Temeke	49	Mtoni	791		27		3	821
Temeke	99	Mtoni	529		11			540
Temeke	203	Mtoni	196		7			203
Temeke	51	Keko	94		19		5	118
Temeke	52	Keko	216		5	1	27	249
Temeke	55	Keko	175		10		3	188
Temeke	65	Keko	181	1	26	28	7	243
Temeke	66	Keko	7		3		12	22
Temeke	243	Keko	298		14		11	323
Temeke	265	Keko	223		2			225
Temeke	46	Kurasini	14		31	7	24	76
Temeke	57	Kurasini	218		5		18	241
Temeke	58	Kurasini	185		9	5	7	206
Temeke	A56	Kurasini	174		1			175

**TABLE B.3.4 (4) NUMBER OF CONNECTIONS REGISTERED BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch Zone number	Ward	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Temeke	B56	Kurasini					215
Temeke	C56	Kurasini		3		1	255
Kinondoni	8	Msasani		55		9	762
Kinondoni	9	Msasani		5		4	251
Kinondoni	10	Msasani				2	106
Kinondoni	11	Msasani		3			61
Kinondoni	12	Msasani		5			64
Kinondoni	13	Msasani		2	1		64
Kinondoni	14	Msasani				1	59
Kinondoni	15	Msasani		2		6	35
Kinondoni	16	Msasani		3			54
Kinondoni	17	Msasani		5			48
Kinondoni	18	Msasani					41
Kinondoni	19	Msasani		2			44
Kinondoni	20	Msasani				1	36
Kinondoni	21	Msasani		1			27
Kinondoni	22	Msasani		2			113
Kinondoni	23	Msasani				1	50
Kinondoni	24	Msasani		1			37
Kinondoni	25	Msasani				1	56
Kinondoni	184	Msasani		1		1	35
Kinondoni	188	Msasani		29		3	169
Kinondoni	189	Msasani		1		2	210
Kinondoni	197	Msasani		9	2	32	554
Kinondoni	274	Msasani		8		1	107
Kinondoni	2	Kinondoni	1	6			102
Kinondoni	3	Kinondoni		2			64
Kinondoni	4	Kinondoni				1	65
Kinondoni	5	Kinondoni		29		2	335
Kinondoni	6	Kinondoni		6			78
Kinondoni	7	Kinondoni		3		3	234
Kinondoni	26	Kinondoni		8			126
Kinondoni	27	Kinondoni		8			58
Kinondoni	28	Kinondoni		31		1	425
Kinondoni	29	Kinondoni		1		2	71
Kinondoni	30	Kinondoni		11			163
Kinondoni	31	Kinondoni		75		1	394
Kinondoni	47	Kinondoni		2			70
Kinondoni	61	Kinondoni		5			89
Kinondoni	187	Kinondoni		13		6	155
Kinondoni	196	Kinondoni		2		26	138
Kinondoni	198	Kinondoni		9	1	5	142
Kinondoni	199	Kinondoni		6	2	1	68
Kinondoni	239	Kinondoni		23			318
Kinondoni	240	Kinondoni		5			162
Kinondoni	241	Kinondoni		25			173
Kinondoni	244	Kinondoni				8	144
Kinondoni	246	Kinondoni		14			140
Kinondoni	247	Kinondoni		3		1	56
Kinondoni	200	Mwananyamala		18		1	268
Kinondoni	204	Mwananyamala		32			343
Kinondoni	207	Mwananyamala		25		1	189
Kinondoni	245	Mwananyamala		11			87
Kinondoni	248	Mwananyamala		5			91
Kinondoni	250	Mwananyamala		2			45
Kinondoni	251	Mwananyamala		6			60
Kinondoni	252	Mwananyamala		15	1		223
Kinondoni	253	Mwananyamala		8			44

**TABLE B.3.4 (5) NUMBER OF CONNECTIONS REGISTERED BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone number	Ward	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Kinondoni	254	Mwananyamala	166		22		3	191
Kinondoni	A31	Mwananyamala	452		38		5	495
Kinondoni	B31	Mwananyamala	227		14		2	243
Kinondoni	C31	Mwananyamala	213		12		5	230
Kinondoni	D31	Mwananyamala	215		14		1	230
Kawe	237	Goba	607		9	8	10	634
Kawe	1	Kawe	700		57	15	109	881
Kawe	186	Kawe	545		3		3	551
Kawe	194	Kawe	42				2	44
Kawe	195	Kawe	33		3		6	42
Kawe	266	Kawe	852		18	4	21	895
Kawe	A01	Kawe	823		22	16	23	884
Kawe	A26	Kawe	33					33
Kawe	B01	Kawe	861		25	17	16	919
Kawe	C01	Kawe	40			2		42
Kawe	264	Bunju	346	2	8	4	1	361
Magomeni	100	Magomeni	767		51			818
Magomeni	101	Magomeni	551		35			586
Magomeni	102	Magomeni	268		30			298
Magomeni	103	Magomeni	219		3			222
Magomeni	104	Magomeni	206		11			217
Magomeni	208	Magomeni	130		9			139
Magomeni	401	Magomeni	45		1			46
Magomeni	A10	Magomeni	31					31
Magomeni	205	Makurumla	162		4			166
Magomeni	206	Makurumla	80	1				81
Magomeni	216	Makurumla	133		1			134
Magomeni	217	Makurumla	93		2			95
Magomeni	209	Ndugumbi	132		5		1	138
Magomeni	210	Ndugumbi	60		7		1	68
Magomeni	211	Ndugumbi	74		7			81
Magomeni	212	Ndugumbi	148		4			152
Magomeni	213	Ndugumbi	139		9			148
Magomeni	214	Ndugumbi	58		2			60
Magomeni	215	Ndugumbi	84		4			88
Magomeni	238	Ndugumbi	98		3			101
Magomeni	249	Kigogo	184					184
Magomeni	259	Kigogo	53					53
Magomeni	260	Kigogo	289					289
Magomeni	261	Kigogo	621		3	2	1	627
Magomeni	262	Kigogo	3					3
Magomeni	263	Kigogo	451		22			473
Magomeni	258	Mabibo	646		6			652
Magomeni	273	Mabibo	435		4			439
Magomeni	90	Ubungo	701		37	12		750
Magomeni	256	Ubungo	48					48
Magomeni	268	Ubungo	17		1			18
Magomeni	269	Ubungo	15					15
Magomeni	270	Ubungo	912		34		1	947
Magomeni	271	Ubungo	33					33
Magomeni	272	Ubungo	51					51
Magomeni	276	Ubungo	386		1			387
Magomeni	278	Ubungo	6				27	33
Magomeni	A27	Ubungo	859		24	1	3	887
Magomeni	A90	Ubungo	800		41	1		842
Magomeni	B27	Ubungo	215		2	2	1	220
Magomeni	B90	Ubungo	880		45	1	2	928
Magomeni	C90	Ubungo	793		47	2	1	843

**TABLE B.3.4 (6) NUMBER OF CONNECTIONS REGISTERED BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone	Ward	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
number								
Magomeni	D90	Ubungo	878		27		2	907
Magomeni	E90	Ubungo	301		4		1	306
Magomeni	190	Kibamba	739		4		2	745
Magomeni	A19	Kibamba	688		3		7	698
Total			54,513	7	2,786	502	1,212	59,020

Sub-branch	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Ilala	16,336	0	1,129	77	548	18,090
Temeke	10,111	3	376	331	284	11,105
Kinondoni	8,702	1	643	7	139	9,492
Kawe	4,882	2	145	66	191	5,286
Magomeni	14,482	1	493	21	50	15,047
Total	54,513	7	2,786	502	1,212	59,020

**TABLE B.3.5 (1) TOTAL BILLINGS WATER OF CONSUMPTION BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone number	Ward	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Kawe	1	Kawe	777,893		689,810	257,535	4,221,588	5,946,826
Kinondoni	2	Kinondoni	42,655	449	12,658			55,762
Kinondoni	3	Kinondoni	31,449		16,867			48,316
Kinondoni	4	Kinondoni	28,736				20,103	48,839
Kinondoni	5	Kinondoni	146,217		127,157		20,481	293,855
Kinondoni	6	Kinondoni	32,328		9,048			41,376
Kinondoni	7	Kinondoni	102,372		4,524		52,433	159,329
Kinondoni	8	Msasani	326,541		104,907		32,042	463,490
Kinondoni	9	Msasani	185,080		180,167		31,250	396,497
Kinondoni	10	Msasani	56,432				62,198	118,630
Kinondoni	11	Msasani	28,581		113,363			141,944
Kinondoni	12	Msasani	33,396		13,903			47,299
Kinondoni	13	Msasani	32,256		9,185	1,951		43,392
Kinondoni	14	Msasani	30,682				7,374	38,056
Kinondoni	15	Msasani	32,525		35,157		41,684	109,366
Kinondoni	16	Msasani	22,899		4,524			27,423
Kinondoni	17	Msasani	19,307		7,540			26,847
Kinondoni	18	Msasani	18,409					18,409
Kinondoni	19	Msasani	18,858		3,016			21,874
Kinondoni	20	Msasani	23,880				1,022	24,902
Kinondoni	21	Msasani	18,030		2,559			20,589
Kinondoni	22	Msasani	52,066		3,016			55,082
Kinondoni	23	Msasani	22,696				3,000	25,696
Kinondoni	24	Msasani	17,554		1,508			19,062
Kinondoni	25	Msasani	31,645				1,800	33,445
Kinondoni	26	Kinondoni	59,705		16,954			76,659
Kinondoni	27	Kinondoni	23,840		12,064			35,904
Kinondoni	28	Kinondoni	180,228		53,969		707	234,904
Kinondoni	29	Kinondoni	30,532		1,508		1,414	33,454
Kinondoni	30	Kinondoni	69,074		15,423			84,497
Kinondoni	31	Kinondoni	131,121		125,825		600	257,546
Ilala	32	Upanga East	116,786				6,780	123,566
Ilala	33	Upanga East	48,271		8,999		30,919	88,189
Ilala	34	Kivukoni	13,399				29,293	42,692
Ilala	35	Kivukoni	82,377		237,248	3,476	150,325	473,426
Ilala	36	Kivukoni	14,097				4,352	18,449
Ilala	37	Kivukoni	20,069		711,433		15,349	746,851
Ilala	38	Kivukoni	39,575		10,558		190,770	240,903
Ilala	39	Kivukoni	3,279				114,037	117,316
Ilala	40	Kivukoni	3,450			12,037	148,450	163,937
Ilala	41	Kivukoni	28,983		17,217		16,933	63,133
Ilala	42	Gerezani	52,070		97,616	3,879	181,103	334,668
Ilala	43	Gerezani	40,126		267,139		1,333	308,598
Ilala	44	Gerezani	10,778		17,706	59,951		88,435
Ilala	45	Gerezani	18,931		34,694			53,625
Temeke	46	Kurasini	36,509		2,233,137	125,039	221,121	2,615,806
Kinondoni	47	Kinondoni	25,908		2,560			28,468
Temeke	48	Mtoni	106,177		14,321		2,400	122,898
Temeke	49	Mtoni	372,383		196,620		1,800	570,803
Ilala	50	Kivukoni	7,210		187,769		172,004	366,983
Temeke	51	Keko	87,646		300,956		588,502	977,104
Temeke	52	Keko	124,742		15,233	91,872	393,929	625,776
Ilala	53	Ukonga	95,867			45,537	110,275	251,679
Ilala	54	Kipawa	190,190		346,643	9,973,264	665,801	11,175,898
Temeke	55	Keko	106,976		279,991		14,791	401,758
Temeke	57	Kurasini	255,255		100,551		468,675	824,481
Temeke	58	Kurasini	45,816		45,267	54,290	41,404	186,777
Temeke	59	Temeke	1,966,881		298,916	20,319,172	27,455	22,612,424
Ilala	60	Buguruni	364,211		129,980		10,986	505,177

**TABLE B.3.5 (2) TOTAL BILLINGS WATER OF CONSUMPTION BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone number	Hard	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Kinondoni	61	Kinondoni	41,563		14,076			55,639
Temeke	62	Temeke	16,803		92,024	7,697,785		7,806,612
Temeke	63	Temeke	20,892		124,163	1,874,538	600	2,020,193
Temeke	64	Temeke	2,494		1,300,732	173,802		1,477,028
Temeke	65	Keko	75,829	859	492,609	1,751,472	17,706	2,338,475
Temeke	66	Keko	16,868		43,109		115,565	175,542
Temeke	67	Temeke	111,340		182,438	4,593,012	9,621	4,896,411
Temeke	67	Temeke	10,904		50,136	825,223	347,506	1,233,769
Ilala	69	Upanga East	114,528				19,486	134,014
Ilala	70	Upanga East	242,630		3,725		25,389	271,744
Ilala	71	Upanga East	131,632				9,363	140,995
Ilala	72	Upanga East	100,083				5,583	105,666
Ilala	73	Kisutu	37,936		29,473		17,898	85,307
Ilala	74	Kisutu	68,425		1,343		18,747	88,515
Ilala	75	Upanga East	33,033		7,496		21,187	61,716
Ilala	76	Upanga East	73,769				29,570	103,339
Ilala	77	Upanga East	80,820				2,782	83,602
Ilala	78	Upanga west	182,470				178,274	360,744
Ilala	79	Upanga west	87,897		1,343		2,311	91,551
Ilala	80	Upanga west	98,605		2,496		10,807	111,908
Ilala	81	Upanga west	98,782				49,482	148,264
Ilala	82	Upanga west	66,866				12,271	79,137
Ilala	83	Upanga west	38,518		1,343		7,831	47,692
Ilala	84	Upanga west	19,319				5,130	24,449
Ilala	85	Upanga west	46,800				15,120	61,920
Ilala	86	Upanga west	43,603				65,294	108,897
Ilala	87	Upanga west	800				274,597	275,397
Ilala	88	Upanga west	15,028		19,122		466,619	500,769
Temeke	89	Temeke	18,516		1,356,440	35,959	69,237	1,480,152
Magomeni	90	Ubungo	1,994,173		81,804	1,739,061		3,815,038
Temeke	92	Temeke	159,088		72,958	25,074	99,805	356,925
Temeke	93	Temeke	1,164,012		26,374	6,846		1,197,232
Temeke	94	Temeke	219,156		58,795		28,978	306,929
Temeke	95	Temeke	123,810		26,374		41,666	191,850
Temeke	96	Temeke	79,730		119,231	1,656	92,603	293,220
Temeke	97	Temeke	96,090		8,294		7,783	112,167
Temeke	98	Temeke	63,521		26,972			90,493
Temeke	99	Mtoni	166,262		66,065			232,327
Magomeni	100	Magomeni	359,634		74,715			434,349
Magomeni	101	Magomeni	263,711		56,208			319,919
Magomeni	102	Magomeni	128,294		47,996			176,290
Magomeni	103	Magomeni	95,703		5,472			101,175
Magomeni	104	Magomeni	92,088		25,981			118,069
Ilala	105	Ilala	47,466		8,759		8,795	65,020
Ilala	106	Ilala	64,392		13,430		1,811	79,633
Ilala	107	Ilala	115,107		40,619	1,738		157,464
Ilala	108	Ilala	134,943		107,502		3,300	245,745
Ilala	109	Ilala	103,150		73,520		990	177,660
Ilala	110	Ilala	68,255		39,807			108,062
Ilala	111	Ilala	1,000		4,101	9,638	6,385	21,124
Ilala	112	Ilala	250,544		119,839	3,494,938	91,664	3,956,985
Ilala	113	Ilala	23,623		43,652			67,275
Ilala	114	Ilala	1,055		1,605		73,831	76,491
Ilala	115	Ilala	29,300				6,000	35,300
Ilala	116	Kariakoo	35,060		31,593			66,653
Ilala	117	Kariakoo	53,360		14,414		3,161	70,935
Ilala	118	Jangwani	63,868		69,456			133,324
Ilala	119	Jangwani	40,103		7,975		4,174	52,252
Ilala	120	Jangwani	52,930		61,285	1,656		115,871
Ilala	121	Jangwani	31,462		8,169			39,631
Ilala	122	Jangwani	34,081		15,358			49,439
Ilala	123	Jangwani	32,374		3,840		600	36,814
Ilala	124	Jangwani	50,254		22,097	1,656		74,007
Ilala	125	Jangwani	31,910		8,512			40,422

**TABLE B.3.5 (3) TOTAL BILLINGS WATER OF CONSUMPTION BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone	Ward	Domestic	Standpipe	Commercial	Industrial	Institutional	Total
	number		Customer	Customer	Customer	Customer	Customer	
Ilala	126	Kariakoo	23,137		63,987			87,124
Ilala	127	Kariakoo	15,564				3,486	19,050
Ilala	128	Kariakoo	26,745		1,909			28,654
Ilala	129	Kariakoo	27,275		7,680			34,955
Ilala	130	Kariakoo	16,004		40,884	1,656		58,544
Ilala	131	Kariakoo	39,443		13,455	4,968		57,866
Ilala	132	Kariakoo	28,316					28,316
Ilala	133	Kariakoo	25,470		16,920		3,578	45,968
Ilala	134	Kariakoo	28,128		13,542			41,670
Ilala	135	Kariakoo	112,666		35,766			148,432
Ilala	136	Kariakoo	56,934		33,080			90,014
Ilala	137	Kariakoo	154,874		122,378			277,252
Ilala	138	Kariakoo	104,583		22,969			127,552
Ilala	139	Kariakoo	124,404		22,834			147,238
Ilala	140	Kariakoo	35,859		51,356		1,719	88,934
Ilala	141	Kariakoo	115,288		204,844		3,000	323,132
Ilala	142	Kariakoo	41,061		7,382			48,443
Ilala	143	Gerezani	71,547		8,261	6,272	461	86,541
Ilala	144	Gerezani	111,441		43,600	3,300	461	158,802
Ilala	145	Gerezani	43,817		39,754	1,836	20,455	105,862
Ilala	146	Kisutu	41,062		20,251			61,313
Ilala	147	Kisutu	12,455		8,417			20,872
Ilala	148	Kisutu	53,404		29,954		2,039	85,397
Ilala	149	Kisutu	22,075		53,507		665	76,247
Ilala	150	Kisutu	9,669		20,093		4,501	34,263
Ilala	151	Kisutu	26,207		14,658		665	41,530
Ilala	152	Kisutu	25,211		5,161			30,372
Ilala	153	Kisutu	37,518		40,542		1,330	79,390
Ilala	154	Kisutu	13,754				3,665	17,419
Ilala	155	Kisutu	26,452		45,406		2,700	74,558
Ilala	156	Kisutu	22,082		21,483	24,840	1,295	69,700
Ilala	157	Kisutu	50,028		73,021	30,303		153,352
Ilala	158	Kisutu	34,915		38,969		5,340	79,224
Ilala	159	Kisutu	23,741		15,938			39,679
Ilala	160	Kisutu	28,302		24,591		4,267	57,160
Ilala	161	Kisutu	30,631		16,242		1,126	47,999
Ilala	162	Kisutu	16,701		29,051		2,252	48,004
Ilala	163	Kisutu	26,663		24,300			50,963
Ilala	164	Kisutu	14,943		20,093		461	35,497
Ilala	165	Kisutu	13,458		5,718			19,176
Ilala	166	Kisutu	21,812		13,193		461	35,466
Ilala	167	Kisutu	24,663		8,121		665	33,449
Ilala	168	Kisutu	45,629		33,455			79,084
Ilala	169	Kisutu	14,079		16,478			30,557
Ilala	170	Kisutu	111,759		117,640	34,920	4,350	268,669
Ilala	171	Kisutu	131,868		183,823	49,679	15,416	380,786
Ilala	172	Kisutu	55,287		464,516		1,950	521,753
Ilala	173	Kisutu	71,117		42,405		8,013	121,535
Ilala	174	Kisutu	18,063		1,968			20,031
Ilala	175	Kisutu	48,221		22,180		665	71,066
Ilala	176	Kisutu	26,857		3,640		1,995	32,492
Ilala	177	Kisutu	33,231		83,071		4,655	120,957
Ilala	178	Kisutu	5,990		173,927	5,530		185,447
Ilala	179	Kisutu	21,122		54,786			75,908
Ilala	180	Kivukoni	3,825		48,040		461	52,326
Ilala	181	Kivukoni	24,101		80,186		17,506	121,793
Ilala	182	Kivukoni	83,739		74,685		97,969	256,393
Ilala	183	Kivukoni	30,982					30,982
Kinondoni	184	Msasani	14,817		1,508		707	17,032
Kawe	186	Kawe	1,494,984		5,472		9,437	1,509,893
Kinondoni	187	Kinondoni	80,674		28,721		6,900	116,295
Kinondoni	188	Msasani	61,968		53,609		1,800	117,377
Kinondoni	189	Msasani	113,028		1,508		118,370	233,706
Magomeni	190	Kibamba	1,139,109		7,296		134,206	1,280,611

**TABLE B.3.5 (4) TOTAL BILLINGS WATER OF CONSUMPTION BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone	Ward	Domestic	Standpipe	Commercial	Industrial	Institutional	Total
	number		Customer	Customer	Customer	Customer	Customer	
Temeke	191	Mbagala	163,796	200	17,609	869		182,474
Ilala	192	Ukonga	189,471		122,864		12,797	325,132
Kawe	194	Kawe	110,073				2,044	112,117
Kawe	195	Kawe	27,822		382,917		10,061	420,800
Kinondoni	196	Kinondoni	41,910		2,560		91,627	136,097
Kinondoni	197	Msasani	201,217		10,714	2,525	38,942	253,398
Kinondoni	198	Kinondoni	50,018		16,000	4,164	24,741	94,923
Kinondoni	199	Kinondoni	23,434		10,665	3,312	600	38,011
Kinondoni	200	Mwananyamala	97,934		31,020		11,124	140,078
Temeke	201	Temeke	83,464		1,280		600	85,344
Temeke	202	Temeke	84,027		1,423		7,712	93,162
Temeke	203	Mtoni	78,124		31,162			109,286
Kinondoni	204	Mwananyamala	131,915		44,980			176,895
Magomeni	205	Makurumla	78,614		5,860			84,474
Magomeni	206	Makurumla	36,430	437				36,867
Kinondoni	207	Mwananyamala	62,247		29,150		546	91,943
Magomeni	208	Magomeni	53,507		12,087			65,594
Magomeni	209	Ndugumbi	57,684		7,325		687	65,696
Magomeni	210	Ndugumbi	26,220		10,255		687	37,162
Magomeni	211	Ndugumbi	36,924		10,255			47,179
Magomeni	212	Ndugumbi	67,616		5,860			73,476
Magomeni	213	Ndugumbi	66,755		13,185			79,940
Magomeni	214	Ndugumbi	25,783		3,965			29,748
Magomeni	215	Ndugumbi	41,746		10,793			52,539
Magomeni	216	Makurumla	66,615		1,465			68,080
Magomeni	217	Makurumla	40,641		7,863			48,504
Temeke	218	Temeke	77,968		65,589			143,557
Temeke	219	Temeke	75,841	381	16,107	3,312	5,740	101,381
Temeke	220	Temeke	79,850		43,186			123,036
Temeke	221	Temeke	87,007		45,245			132,252
Temeke	222	Temeke	29,676					29,676
Temeke	223	Temeke	45,109		61,336			106,445
Temeke	224	Temeke	100,229		27,660			127,889
Temeke	225	Temeke	547,302		75,061			622,363
Temeke	226	Temeke	29,984		7,682			37,666
Temeke	227	Temeke	94,486		10,025		392	104,903
Temeke	231	Temeke	400,290		51,530	1,656		453,476
Kawe	237	Goba	308,572		36,293	32,039	8,070	384,974
Magomeni	238	Ndugumbi	42,826		4,395			47,221
Kinondoni	239	Kinondoni	149,821		81,262			231,083
Kinondoni	240	Kinondoni	59,817		7,852			67,669
Kinondoni	241	Kinondoni	58,960		54,588			113,548
Temeke	243	Keko	119,347		105,003		31,469	255,819
Kinondoni	244	Kinondoni	54,881				4,800	59,681
Kinondoni	245	Mwananyamala	30,400		14,773			45,173
Kinondoni	246	Kinondoni	51,144		28,692			79,836
Kinondoni	247	Kinondoni	19,812		3,840		3,600	27,252
Kinondoni	248	Mwananyamala	34,400		6,715			41,115
Magomeni	249	Kigogo	40,451					40,451
Kinondoni	250	Mwananyamala	16,383		2,560			18,943
Kinondoni	251	Mwananyamala	20,574		7,680			28,254
Kinondoni	252	Mwananyamala	84,221		19,200	1,656		105,077
Kinondoni	253	Mwananyamala	14,400		10,744			25,144
Kinondoni	254	Mwananyamala	78,976		62,284		1,890	143,150
Temeke	255	Temeke	49,615		5,101	2,511,771	30,296	2,596,783
Magomeni	256	Ubungo	9,600					9,600
Temeke	257	Kigamboni	58,621		12,543	1,253,808	865,035	2,190,007
Magomeni	258	Mabibo	265,670		8,790			274,460
Magomeni	259	Kigogo	12,655					12,655
Magomeni	260	Kigogo	61,520					61,520
Magomeni	261	Kigogo	139,898		7,740	11,540	315	159,493
Magomeni	262	Kigogo	600					600
Magomeni	263	Kigogo	93,904		16,000			109,904
Kawe	264	Bunju	72,446	400	5,368	3,476	315	82,005

**TABLE B.3.5 (5) TOTAL BILLINGS WATER OF CONSUMPTION BY ZONE
AND BY CUSTOMER GROUP (DECEMBER 1990)**

Sub-branch	Zone	Hard number	Domestic Customer	Standpipe Customer	Commercial Customer	Industrial Customer	Institutional Customer	Total
Temeke	265	Keko	222,092		10,123			232,215
Kawe	266	Kawe	227,232		57,867	28,862	28,049	342,010
Ilala	267	Mchikichini	23,441					23,441
Magomeni	268	Ubungu	3,667		6,719			10,386
Magomeni	269	Ubungu	3,000					3,000
Magomeni	270	Ubungu	346,855		51,691		3,000	401,546
Magomeni	271	Ubungu	6,600					6,600
Magomeni	272	Ubungu	10,200					10,200
Magomeni	273	Mabibo	103,592		3,179			106,771
Kinondoni	274	Msasani	44,002		12,064		3,657	59,723
Ilala	275	Tabata	210,667		122,459	45,215	2,689	381,030
Magomeni	276	Ubungu	77,562		671			78,233
Ilala	277	Kinyerezi	64,208		1,343			65,551
Magomeni	278	Ubungu	1,200				8,505	9,705
Magomeni	401	Magomeni	20,698		1,465			22,163
Kawe	A01	Kawe	315,417		168,039	127,035	126,844	737,335
Magomeni	A10	Magomeni	13,547					13,547
Ilala	A12	Ilala	46,501		7,678	27,599	4,480	86,258
Magomeni	A19	Kibamba	293,968		2,560		4,495	301,023
Kawe	A26	Kawe	12,573					12,573
Magomeni	A27	Ubungu	308,983		33,216	1,508	1,638	345,345
Kinondoni	A31	Mwananyamala	184,026		79,515		21,081	284,622
Ilala	A54	Kipawa	124,353		13,752		630	138,735
Temeke	A56	Kurasini	103,081		671			103,752
Ilala	A60	Buguruni	68,031		5,120	4,968		78,119
Magomeni	A90	Ubungu	480,633		89,386	460,162		1,030,181
Kawe	B01	Kawe	2,077,785		64,233	131,287	71,357	2,344,662
Magomeni	B27	Ubungu	98,303		2,560	3,312	600	104,775
Kinondoni	B31	Mwananyamala	86,106		24,908		3,600	114,614
Temeke	B56	Kurasini	162,433					162,433
Magomeni	B90	Ubungu	426,946		80,724	37,882	1,374	546,926
Kawe	C01	Kawe	49,456			11,742		61,198
Kinondoni	C31	Mwananyamala	81,221		72,382		3,000	156,603
Temeke	C56	Kurasini	99,465		8,320		315	108,100
Magomeni	C90	Ubungu	360,538		95,727	4,661,431	687	5,118,383
Kinondoni	D31	Mwananyamala	84,586		54,431		600	139,617
Magomeni	D90	Ubungu	2,445,390		44,488		143,053	2,632,931
Magomeni	E90	Ubungu	236,820		5,860		687	243,367
			35,467,184	2,726	17,829,522	62,716,492	12,449,428	128,465,352

**TABLE B.3.6 SUMMARY OF AUDITORS' REPORTS
(1985/86-1988/89 FINANCIAL YEAR)**

	For the year ended 30/6/1986	For the year ended 30/6/1987	For the year ended 30/6/1988	For the year ended 30/6/1989
FIXED ASSETS	Rights of occupancy/title in respect of land and buildings of the Authority were not available to auditors for examination The Authority did not acquire registration cards for motor vehicles from the Ministry of Water in October 1984.			
	Physical count of movable fixed assets was not carried out at the year end.		Physical count result were not reconciled with records.	
		No detailed schedules of depreciation were prepared in respect of buildings, motor vehicles, electrical installations and furniture and fittings.		
CURRENT ASSETS STOCK AND STORES	Physical count of chemicals and stationary was not conducted. Results of physical count of the rest of the stocks were not incorporated in the final account.	Valuation of stocks and stores was improper.		
TRADE DEBTORS		Trade debtors and income from operations were under-stated. No provision for doubtful debts was made.		
OTHER DEBTORS	Detailed schedules of other debtors were not produced.			
CASH AT BANK		The correctness of cash cannot be certified.		
CURRENT LIABILITIES CREDITORS AND ACCRUALS	No schedules/detail of accrued charges could availed to auditors.			
GOVERNMENT GRANT		No documents were available to support an amount of Government Grants of 113,310,947 representing the value of stocks received as grant.		
INCOME FROM OPERATION	Water billings totaling Shs.22,007,565 were based on estimates. Income of new connection fees, sale of materials and maintenance services could not be verified.	Water billings totaling Shs.17,943,992 were based on estimates. Income of new connection fees, sale of materials and maintenance services could not be verified.	Water billings totaling Shs.10,917,888 were based on estimates. Income of new connection fees, sale of materials and maintenance services could not be verified.	
EXPENSES			No record were made available to support chemical consumption.	
CONCLUSION	Auditors were unable to state whether the financial statements of NUWA present fairly the financial position of NUWA.			Subject to the above reservations, the financial statements of NUWA present fairly the financial position of NUWA.

C.

APPENDIX TO CHAPTER 4

C. APPENDIX TO CHAPTER 4

1. FACILITIES IN LOWER RUVU SYSTEM*

1.1 INTAKE FACILITIES

(1) Brief details of normal operation and design particulars

Source	: Ruvu River
River flow	: Minimum 1.72 m ³ /sec 20.1.61
	: Maximum 1,180 m ³ /sec 24.4.83

(2) Weir

Purpose	: To maintain minimum level in the raw water pump well
Crest elevation	: 3.0 m (10 feet)
Normal operating water level	: 3.2 to 3.5 m (10.5 to 11.5 feet)
Maximum flood elevation	: 6.7 m (22 feet)
Control of the weir	: By two gates, one each on the intake channel discharge and the intake by-pass channel
River bank elevation near the weir	: 5.5 m (18 feet)

(3) Intake Structure

Type	: Reinforced concrete selective weir and channels, sluice-gated with coarse bar screens.
Design capacity	: 386,000 m ³ /day (85 mgd)
Present operating capacity	: 182,000 m ³ /day (40 mgd)
Intake channel	: in the direction of the river flow
Intake ports	: Two, upper and lower beside the intake channel
-Lower ports (vertical opening)	: Horizontal bar coarse screen,
spacing 76 mm c/c	: working range up to water level elevation of 5.2 m (17 feet)
-Upper ports (horizontal opening)	: Horizontal bar coarse screen, spacing 76 mm c/c; working range above 5.2 m (17 feet)
Access road to Intake Works	: available

(4) Intake Main

Conveying capacity	: 286,000 m ³ /day (63 mgd)
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* This section is summarized in Table 4.1, Main Report.

One number 1,350 mm pre-cast concrete gravity main. Arrangement for closing to permit dewatering exists through stop logs, both at inlet and outlet ends

(5) Raw Water Pumping Station

Capacity	: 2.5 m ³ /second (42 mgd) with 2 pumps
Style	: Gated, screened (stainless steel), duplex wells with sediment removal
Pumps	: Three, vertical mixed flow, 500 hp, 1.1 m ³ /s at 24 m. head. Two units variable speed from 700 to 847 rpm
Motors	: horizontal, 500 hp (375 kw), operating on 3.3 kV
Starters	: Auto-transformer starters
Alarm panel and D.C. panel	: to indicate one fault condition at a time
-Fault conditions	; a) differential level across the fine screen greater than 254 mm (10 inches) b) variable speed fluid coupling overheating c) pump motors overheating d) low pump well level
Electricity supply	: a) single incoming feeder b) common outdoor step-down transformers 33/3.3 kv (4 mva each) for the whole plant's operation

Pump Sump (Two pump wells):

- can be isolated by gates.
- removable fine screens provided; inset a guide way
- silt ejector system; provision in arrays covering the settling zone before leading to pump bay.
- Suction and pumping through high velocity jet pumps (through 3 numbers separate booster pumps including one standby)

Dewatering of pump sumps:

Through two submergible pumps, designed for handling mud and sand laden water

(6) Raw Water Main(1)

Conveying capacity	: 286,000 m ³ /day (63 mgd)
Pressure rating	: 690 KPa (100 psi)
Length	: 504 meters
Diameter	: 54 inches(1350 mm)
Material	: pre-stressed concrete pipe
Terminal point	: Branches into Raw Water Main(2)
Relief valves	: Each discharge header from pumps fitted with 100 mm hydraulically controlled air/pressure release and surge control valves. Each pump

discharge line also fitted with a Dall Tube primary measuring element, rated at 1,600 lps at 2.03 meter differential pressure.

(7) Raw Water Main(2)

Length : 75 meters and 80 meters
Diameter : 48 inches(1200 mm), 2 parallel lines
Material : pre-stressed concrete pipe

1.2 TREATMENT FACILITIES

1.2.1 CHEMICAL

(1) General

In-line mixing : Two raw water mains are connected to two inline-mixers with isolating butterfly valves.
Purpose : To provide instantaneous and uniform blending of water with alum solution
Chemicals used : alum (primary coagulant), sodium carbonate (pH adjustment after treatment), sodium bicarbonate and sodium silicate (for preparation of activated silica as a coagulant aid)

(2) Chemical Storage

Capacity : 1,390 m² space, one month's supply based on 259,000 m³/day (57 mgd flow)

(3) Chemical Solution Tanks

Alum : 4.57 m square 3.5 m deep in duplex
Sodium carbonate : identical to alum solution tanks
Sodium bicarbonate : 3.66 m square 3.5 m deep in duplex
Sodium silicate : Square tanks 3.5 m deep in duplex

Chemicals are conveyed for mixing in dry form, except sodium silicate.

Design capacity : All tanks for minimum one day use of chemicals

Alum solution strength : 20 to 40%

Sodium carbonate solution strength : 10 to 15%

All solution tanks equipped with electric driven agitators

(4) Solution Feeding

Alum solution : through three identical metering pumps with manual feed rate

adjustment, as earlier installed.

Other chemicals : 3 number pumps for each chemical, similar to above

Solution making water supply : Through 3 to 7.5 hp pressure supply pumps drawing water from backwash tank

(5) Mixing of Chemicals

Alum solution : can be pumped to the application point viz. at the on-line mixers or to the mixing and reaction zone of the clarifier.

In-line mixers : Two numbers in 1,200 mm (48 inches) raw water mains.

Arrangements for mixing ; baffles, straightening valves and multi-feed lines with rotameters (within the in-line mixers), also motor driven paddles.

(6) Control laboratory in the chemical building

1.2.2 CLARIFIER

Capacity : 1.3 m³/s (25 mgd) intermittent, 1.05 m³/s (20 mgd) continuous

Type : Upflow solids contact

Size : Reinforced concrete tanks. 38.1 m (125 ft) square, 5.5 m (18 feet) sidewater depth.

Number : 2

Detention period : 60 minutes (at flow rate of 40 mgd)

Zones : Two separate zones;
i) central mixing and reaction zone
ii) peripheral settlement zone

Method of sludge removal : Mechanically revolving scrapers driven by a central motor through reduction gears, Scraping the sludge from the bottom to the central well and then removed hydrostatically.

Equipment and accessories

a. circular steel baffle for separation of mixing and reaction zone

b. rotor-impeller, driven by a motorized, variable-drive for mixing and pumping

c. bottom scraper mechanism, driven by vary-drive and reducer

d. effluent collection launder system at the water surface

e. steel walkway and platform for access to the drive unit

f. internal piping arrangement for 1) influent 1,050 mm (42 inches); 2) sludge drainage; and 3) chemical feed

g. timer operated sludge valves for automatic removal of excess sludge

h. recirculation facility of a fraction of partially treated water with the raw water

i. discharge of sludge, through 200 mm (8 inches) dia. sludge line to waste sump to storm sewer and disposal in the river

j. overflow arrangement

1) overflow weir; in the outside wall of the clarifier

2) 900 mm (36 inch) dia. pipe carries overflow to concrete waste ducts

k. recirculation of sludge; provision exists for recirculation of sludge, with incoming raw water for effective chemical reaction

l. slurry pool;

- adjustable for proper clarification

- adjustment of slurry concentration through manipulation of timer setting of the sludge valve for adjustment of discharge frequency and discharge period

1.2.3 FILTER

Capacity : Eight units at 0.26 m³/s (5 mgd)

Filter rate : 142 m/day

Type : Gravity, rapid sand. Air/water backwash.
False bottom underdrain with plastic nozzles

Size : Two bays per unit separated by common wastewater gutter,
each bay size 5.5 m X 14.6 m, 80.3 m²

(1) Backwashing

water back wash : 4.89 liters/sec/m²

air back wash : 15 liters/sec/m²

hard wash rate (in case there is no air wash): 12.23 liters/sec/m²

(2) Backwash water pumps

Number of unit : two

Capacity : 39 liters/sec each

Discharge head : 180 kpa (40 feet)

Source of supply : clear water storage

Storage of water : Overhead storage tank (150,000 gallons or 680 m³) in the chemical storage building

Operation : automatic control by means of pressure switches installed

Control : rate control valve

(3) Air Supply

Air Blowers : three 1.23 m³/s

Air headers : 250 mm (10 inches) equipped with a rate control valve and metering device

(4) Conveying channel from clarifier

Number : 4

Shape & Size : 1,640 mm (64 inches) wide, 1,340 mm (53 inches) deep, rectangular section concrete troughs, leading to common filter influent channel

(5) Effluent control : Weir flow rate control, remote manual operating feature in the filter control console

(6) Influent control : proportional flow by weir and controlled by sluice gates.

(7) Drain valve : two drain valves 254 mm(10 inches) -butterfly wheel- with hydraulic operation controls in the control console

(8) Filter beds

Media : quartz sand, 684 mm (27 inches) depth

effective size : 0.45 to 0.55 mm

(9) Supporting layer : 76 mm depth (3 inches)

effective size : 0.9 mm

(10) Wash water troughs: at interval of 2.44 meter (8 feet)

(11) Filter piping design velocities:

influent : 1.22 m/sec (4 fps)

effluent : 1.83 m/sec (6 fps)

wash water supply : 3.05 m/sec (10 fps)

wash water drain : 2.44 m/sec (8 fps)

1.2.4 CHLORINATION

Disinfection of the water is by the application of liquid chlorine from one-ton cylinders to chlorinators. Each chlorinator has a capacity of 907 kg (2,000 pounds) per day, one being used for pre-chlorination and the other being used for post-chlorination.

The application point of chlorine for pre-chlorination is directly upstream of the in-line mixers feeding into the clarifiers, and that for post-treatment is to the clarifier effluent and to each of the compartments of the clearwell.

Two vacuum type chlorinators, each capable of 18.9 kgs/hr (1,000 lbs/day), installed in a separate room with an outside entrance.

Chlorine ton containers

Chlorination facilities:- raw water before in-line mixer (prechlorination)

- effluent flow from clarifiers, and

- clear water (post-chlorination)

Solution conveying lines: 2 1/2" size and ending in diffusers

Safety provisions : - chlorine detection equipment
- outside emergency showers, and
- gas masks

Details of chlorination equipment:

- weigh scales
- chlorine detector
- gas and suction valves
- solution distribution panels
- varia-meters
- ton-container cradles

Two chlorine pressure injectors:

at 60 psi water pressure

Amount of water required:

2.53 liters per sec.(30 gpm) for both together

1.3 CONVEYING FACILITIES

(1) Clear (treated) water reservoir

Two compartment concrete structure under the filter basin.

Size of each compartment : 2,360 m³ each

Bottom water level of the clearwell : 64 feet (20 m)

(2) Clear (treated) water pumping system

The high lift pumping station is fed by two 48-inch diameter pipes leaving the clearwell under the filters. Both are connected to a 60-inch header, about 555 feet long, leading to the treated water pumping station. Here, the 60-inch pipe is reduced to a 54-inch suction header inside the pumping station.

The pump installation comprises three single-stage, double-suction pumps, 24 inches by 16 inches. The rated capacity of each pump is 20 mgd against a total dynamic head of 350 feet. The centerline of the pumps is at an elevation of approximately 50.0 feet, with the bottom water level of the clearwell at 64 feet. The pumps are, therefore, under a positive suction head at all times.

The pumps deliver the water from the treated water pumping station through a 54-inch pipeline about 55 kilometers long, which discharges into the University reservoir, which has a high water level of 231 feet.

Of the total dynamic head of the pump, about 156 to 166 feet is used in static lift. Because the pipeline is very long, the friction factor is, in fact, a major contributor to the total dynamic head required for the

pump.

Capacity : 2.1 m³/s (40 mgd)
Style : above grade equipment, buried piping headers
Pumps : Three, centrifugal, horizontal, single stage, double suction. Directly coupled to electric motor 3.3 kv - 1,900 hp (1,417 kw), 992 rpm. 1.05 m³/s (20 mgd) at 108 m (350 feet) head. Two units variable speed by means of dynamic fluid drive couplings.

Under positive suction head : the centerline of the pumps is at approximately elevation 50.0 feet (15 m).

Starters : auto transformers

Piping : shut off valves, flow metering and check valves

Surge relief valves : pressure surge relief valves at the delivery main, size 300 mm (12 inches)

Pump house : - floor area, 297 m² (3200 square feet)
- lifting arrangement, overhead traveling bridge and hoists (capacity 10 tons) within the pump house

(3) Clear (treated) water pumping main

Maximum design capacity : capable of carrying 3.16 m³/sec (60 mgd) at an operating head of 186 m (620 feet)

Number, size and material : One 1,350 mm (54 inches), prestressed concrete pipe

Length : 55.225 km up to the University reservoir in DSM

1.4 DISTRIBUTION FACILITIES

1.4.1 UNIVERSITY RESERVOIR (TERMINAL RESERVOIR)

Number : two

Capacity : 22,750 m³ (5 million gallons) each

Shape and size : rectangular, reinforced concrete, 64.6 m X 64.6 m X 6.63 m per unit

Overflow cum distribution structure : located at discharge end of the delivery main.

Instrumentation and control :

- electrically operated sluice valves and automatic level and flow (?)
recorders in one reservoir

- manually operated controls in one reservoir with no level indicator

Overflow elevation : 70.37 m

Chlorination : for feeding calcium hypochlorite solution feed pump 484 l/hr X

2 kg/cm² X 0.75 kw X 2 No (1 No. as standby) for dosing 1.5 ppm

chlorine content against a flow rate with a 5% chlorine solution,
solution tank, storage tank, mixer, control panel, chlorination house in
1985

1.4.2 ELECTRIC SUPPLY

Additional Power Line:

Power transformer : 1 No. 4 MVA step - down 33/3.3 KV

Oil Circuit Breaker : 1 No.

Incoming OCB : 3.3 KV

LR8701.SLK

PLANT : Lower Ruvu

YEAR: 1987
MONTH: JAN

2. WATER QUALITY IN LOWER RUVU PLANT

(refer to section 4.1.3 "plant operation", Main Report)

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated	Raw	Treated			
1		380	6.5	7.2				1.0	200	260
2		380	6.0	7.2				1.0	200	85
3		360	6.0	7.2				0.6	200	45
4		340	6.0	7.2				1.0	200	165
5		340	6.0	7.3				1.0	180	180
6		345	6.0	7.3				1.0	180	240
7		340	6.0	7.3				1.0	180	240
8		350	6.0	7.3				1.0	170	240
9		335	6.0	7.3				0.6	170	185
10		320	6.0	7.3				0.8	150	200
11		300	6.0	7.3				1.0	150	130
12		300	6.0	7.2				1.0	140	250
13		300	6.0	7.3				1.0	160	250
14		380	6.0	7.2				0.8	190	125
15		420	6.0	7.3				0.8	190	100
16		540	5.0	7.2				0.8	220	80
17		580	5.0	7.2				0.8	250	100
18		560	5.0	7.0				0.8	250	100
19		550	6.0	7.0				0.8	250	100
20		520	6.0	7.0				0.8	250	100
21		470	6.0	7.2				0.5	250	100
22		420	6.0	7.2				0.8	240	100
23		380	6.0	7.3				0.5	240	35
24		320	5.0	7.3				0.8	240	90
25		325	5.0	7.3				0.8	230	100
26		320	5.0	7.3				0.4	220	40
27		350	5.0	7.3				0.8	220	145
28		350	5.0	7.3				1.0	200	140
29		340	5.5	7.3				1.0	200	200
30		345	5.0	7.3				1.0	200	200
AVE		385	5.7	7.2				0.8	204	144
Max		580	6.0	7.3				1.0	250	250
Min		300	5.0	7.0				0.4	140	35

LR8702.SLK

PLANT: Lower Ruvu

YEAR: 1987
MONTH: FEB

DATE	WATER PROD.	Turbidity		pH		Treated	Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated		Raw	Treated			
1		300	6.0	7.3	6.6				0.6	180	130
2		280	5.0	7.3	6.6				0.8	160	175
3		250	6.0	7.4	6.8				0.8	150	160
4		260	5.5	7.4	6.8				0.6	150	130
5		250	6.0	7.4	6.8				0.6	150	120
6		230	6.0	7.4	6.8				0.4	150	100
7		215	6.0	7.4	6.8				0.8	140	200
8		200	5.0	7.4	6.8				1.0	150	240
9		200	5.0	7.4	6.8				1.0	140	300
10		180	5.5	7.4	6.8				1.0	130	250
11		180	5.0	7.4	6.8				1.0	120	250
12		180	5.0	7.4	6.8				0.6	110	150
13		200	5.0	7.4	6.8				1.0	110	280
14		230	6.0	7.4	6.8				1.0	130	250
15		230	6.0	7.4	6.8				1.0	130	250
16		235	5.0	7.4	6.8				1.0	130	250
17		200	6.0	7.5	6.8				1.0	140	250
18		220	5.0	7.4	6.8				1.0	140	250
19		180	5.5	7.4	6.8				0.8	140	250
20		180	5.0	7.4	6.8				1.0	130	250
21		180	5.0	7.4	6.8				1.0	130	250
22		185	6.5	7.4	6.8				1.0	120	250
23		165	6.0	7.4	6.8				1.0	110	250
24		160	5.5	7.4	6.8				1.0	110	250
25		180	5.0	7.4	6.8				1.0	110	250
26		170	5.5	7.4	6.6				1.0	90	250
27		150	5.0	7.4	6.8				1.0	90	230
28		155	5.0	7.5	6.6				1.0	80	230
Average		205	5.5	7.4	6.8				0.9	129	221
Max		280	6.5	7.5	6.8				1.0	160	300
Min		150	5.0	7.4	6.6				0.4	80	100

LR8703 SLK

PLANT : Lower Ruvu

YEAR : 1987

MONTH : MAR

DATE	WATER PROD.	Turbidity		pH		Treated	Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated		Raw	Treated			
1		115	5.5	7.4	6.8				0.8	80	180
2		100	4	7.4	6.6				0.8	80	120
3		98	5	7.4	6.6				1	70	300
4		130	5	7.4	7				1	65	275
5		420	6	7.2	6.6				1	160	250
6		560	4.5	7.2	6.6				0.5	170	220
7		620	6	7.2	6.6				1	200	275
8		625	6.5	7	6.2				1	200	270
9		640	7	7	6.4				0.6	200	320
10		615	7.5	7	6.4				0.8	180	90
11		595	6	7	6.4				0.8	180	300
12		380	6	7.2	6.5				1	160	300
13		360	6.5	7.2	6.4				1	160	300
14		420	6.5	7.2	6.5				0.8	160	250
15					POWER FAILURE						
16		430	6	7.2	6.6				0.8		350
17		450	6	7.3	6.6				0.8	220	250
18		445	6.5	7.2	6.6				0.8	220	250
19		450	6	7.2	6.6				0.8	220	250
20		400	6.5	7.3	6.6				0.8	210	250
21		400	6.5	7.2	6.5				0.8	210	190
22		400	8	7.2	6.5				0.8	210	280
23		370	6	7.2	6.5				0.8	180	290
24		330	6	7.3	6.6				0.8	180	280
25		300	5.5	7.3	6.5				0.8	180	280
26		260	5.5	7.2	6.5				0.8	120	270
27		250	5.5	7.2	6.6				0.8	120	270
28		240	5	7.3	6.6				0.8	120	250
29		240	5	7.3	6.6				0.8	120	50
30		205	6	7.3	6.6					110	
31											
AVERAGE		374	5.9	7.2	6.6	#DIV/0!	#DIV/0!	#DIV/0!	0.8	160	249
MAX		640	8.0	7.4	7.0	0.0	0.0	0.0	1.0	220	350
MIN		98	4.0	7.0	6.2	0.0	0.0	0.0	0.5	65	50

LR8704.SLK

PLANT : Lower Ruvu

YEAR: 1987
MONTH: APR

DATE	WATER PROO.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated	Raw	Treated			
1		190	7	7.2	6.7			0.5	110	250
2		170	5.5	7.3	6.7			1	110	300
3		170	6.5	7.3	6.7			1	110	250
4		165	6.5	7.4	6.8			0.6	90	180
5		165	6	7.4	6.8			0.8	90	250
6		180	6	7.4	6.8			0.8	90	250
7		175	6	7.4	6.8			0.8	90	250
8		175	7	7.4	6.8			0.8	90	170
9		180	6.5	7.4	6.8			0.8	100	175
10		190	7	7.3	6.6			0.8	100	165
11		205	6.5	7.3	6.6			0.6	100	210
12		230	6.5	7.3	6.6			0.6	110	250
13		265	6	7	6.6				150	
14		295	5	7	6.6				160	
15		315	5	7	6.6				160	
16		310	5	7.2	6.6			0.3	160	300
17		350	5.5	7.2	6.8			0.8	180	250
18		365	5.5	7.2	6.6			0.8	190	200
19		405	6.5	7.3	6.6			0.8	220	230
20		400	6.5	7.3	6.6			0.8	220	200
21		370	5.5	7.3	6.6			0.4	200	140
22		325	5.5	7.3	6.6			0.8	200	200
23		320	5	7.3	6.6			0.8	190	260
24		300	5	7.3	6.6			0.8	190	250
25		305	5	7.2	6.6			0.8	180	250
26		320	6.5	7.3	6.6			0.6	190	250
27		370	5.5	7.2	6.5			0.8	200	250
28		390	6	7.2	6.6			0.8	270	250
29		650	6	7	6.6			0.6	280	250
30		680	5	7	6.6			0.8	280	250
31										
AVERAGE		298	5.9	7.2	6.7	#DIV/0!	#DIV/0!	0.7	157	231
MAX		680	7.0	7.4	6.8	0.0	0.0	1.0	280	300
MIN		165	5.0	7.0	6.5	0.0	0.0	0.3	90	140

LR8706.SLK

PLANT : Lower Ruvu

YEAR: 1987

MONTH: Jun

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated	Raw	Treated			
1		360	5	7.2	6.6	82	50	0.8	200	220
2		300	5	7.2	6.6	84	48	0.6	210	
3		280	5	7.3	6.6	88	50	0.4	210	120
4		280	5	7.3	6.8	90	72	0.4	190	200
5		250	5	7.3	6.8	92	72	0.6	180	175
6		250	5	7.3	6.8	88	70	0.6	170	200
7		230	5	7.3	6.8	90	72	0.5	170	120
8		200	5.5	7.4	6.8	90	70	0.6	150	220
9		200	5	7.4	6.8	94	72	0.8	160	230
10		200	5	7.4	6.6	96	52	0.8	160	250
11		200	4	7.5	6.6	98	52	0.8	160	220
12		198	4	7.5	7	96	64	0.6	160	220
13		198	4	7.4	7	96	62	0.2	160	40
14		190	4	7.4	7	96	64	0.8	140	250
15		190	4	7.4	7	96	62	0.8	140	240
16		180	4	7.4	7	96	64	0.8	140	230
17		180	5	7.4	6.8	94	64	0.8	140	250
18		176	5	7.4	6.8	96	64	0.8	140	250
19		178	4.5	7.4	6.8	94	62	0.8	140	220
20		175	4.5	7.4	7	96	64	0.6	140	210
21		195	4.5	7.5	6.8	96	64	0.5	140	160
22		180	4	7.4	7	102	68	0.6	140	170
23		165	4	7.5	7	100	66	0.8	140	250
24		170	4	7.5	7	102	68	0.8	140	250
25		170	4	7.4	7	100	66	0.8	120	250
26		165	5	7.4	7	98	66	0.8	120	160
27		160	4	7.5	7	100	68	0.5	120	150
28		165	4	7.5	7	102	68	0.5	120	150
29		165	4	7.5	7	100	68	0.6	120	200
30		150	4	7.5	7	100	68	0.6	120	180
31										
AVERAGE		203	4.5	7.4	6.9	95.1	64.0	0.7	152	199
MAX		360	5.5	7.5	7.0	102.0	72.0	0.8	210	250
MIN		150	4.0	7.2	6.6	82.0	48.0	0.2	120	40

LR8707.SLK

PLANT : Lower Ruvu

YEAR: 1987

MONTH: Jul

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated	Raw	Treated			
1		158	5	7.5	7	100	68	0.8	130	150
2		158	5	7.4	7	100	70	0.8	130	190
3		150	5	7.4	6.8	98	68	1	130	200
4		150	5.5	7.4	6.8	104	70	1	130	200
5		140	6.5	7.5	6.8	102	68	0.8	100	210
6		140	6	7.4	6.8	102	70	0.8	100	240
7		142	7	7.4	6.8	96	64	0.8	90	210
8		140	7	7.4	6.8	100	70	0.8	90	100
9		145	5.5	7.4	6.8	104	72	0.8	90	160
10		145	4	7.5	7	104	72	0.8	120	200
11		140	4	7.4	7	102	72	1	120	230
12		140	5	7.4	6.8	102	72	0.8	120	200
13		150	4	7.5	6.8	106	70	0.8	120	190
14		142	5	7.5	6.8	104	70	0.8	120	200
15		138	5	7.4	6.8	102	70	0.4	120	90
16		136	5	7.4	6.8	100	68	0.8	120	150
17		140	5	7.4	6.8			1	120	220
18		144	4	7.4	6.6			1	120	230
19		150	4	7.4	6.7			0.8	120	175
20		130	4	7.4	6.6			0.8	120	200
21		130	5	7.4	6.8			0.8	120	200
22		136	5	7.4	6.8			0.8	110	220
23		138	4	7.4	6.6			0.8	110	200
24		130	5	7.5	7	104	74	0.8	110	200
25		125	4.5	7.5	7	102	72	0.8	110	230
26		130	4	7.4	6.8	102	72	1	110	230
27		130	4	7.4	6.8	104	70	0.8	110	220
28		120	4.5	7.5	6.8	104	70	0.8	110	215
29		120	5	7.4	6.8	102	70	0.8	110	200
30		125	4	7.4	7	100	68	0.8	110	210
31										
AVERAGE		139	4.9	7.4	6.8	101.9	70.0	0.8	114	196
MAX		158	7.0	7.5	7.0	106.0	74.0	1.0	130	240
MIN		120	4.0	7.4	6.6	96.0	64.0	0.4	90	90

LR8708.SLK

PLANT : Lower Ruvu

YEAR : 1987
MONTH : Aug

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated	Raw	Treated			
1		130	4	7.4	6.8	104	74	0.8	110	190
2		120	4	7.4	7	102	70	0.8	110	130
3		120	4.5	7.4	6.8	102	72	0.8	110	105
4		120	5	7.4	7	102	70	0.8	110	180
5		125	5	7.4	7	102	72	0.8	110	180
6		120	4.5	7.5	6.8	104	70	0.8	110	200
7		130	4	7.4	6.8	98	68	1	110	220
8		125	4	7.4	7	96	68	1	110	200
9		125	5	7.4	7	100	70	0.8	110	185
10		120	4	7.4	6.8	100	70	0.8	110	190
11		125	5	7.4	6.8	102	74	0.8	110	180
12		130	5	7.4	6.8	100	74	0.8	110	195
13		120	4.5	7.5	6.8	98	68	0.8	110	195
14		115	4.5	7.5	6.8	104	74	1	110	200
15		120	4	7.5	7	102	72	1	110	195
16		120	4.5	7.5	7	104	76	0.6	120	100
17		110	4	7.4	6.8	106	74	0.6	110	150
18		100	4	7.5	6.8	104	72	0.8	110	200
19		105	4.5	7.5	7	104	74	0.8	110	170
20		100	4.5	7.5	7	104	76	0.6	110	170
21		120	5	7.5	7	104	74	0.8	110	200
22		125	5.5	7.5	7	102	74	1	110	210
23		120	4.5	7.4	6.8	100	76	0.8	100	190
24		125	4.5	7.4	6.8	100	876	0.6	140	185
25		130	5	7.4	6.8	100	74	0.8	140	200
26		130	5	7.4	7	102	76	1	140	220
27		130	5	7.4	7	102	76	1	140	210
28		125	5	7.4	6.8	100	74	1	140	220
29		165	4	7.5	7	104	78	1	140	220
30		165	4	7.5	6.8	102	70	0.6	140	120
31										
AVERAGE		124	4.5	7.4	6.9	101.8	99.5	0.8	117	184
MAX		165	5.5	7.5	7.0	106.0	876.0	1.0	140	220
MIN		100	4.0	7.4	6.8	96.0	68.0	0.6	100	100

PLANT: Lower Ruvi

 YEAR: 1987
 MONTH: Sep

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated	Raw	Treated			
1		165	3.5	7.4	6.7	102	70	1	140	200
2		165	3	7.4	6.7	100	70	0.8	140	180
3		150	3	7.4	6.7	100	70	0.8	140	180
4		145	3.5	7.4	6.7	102		0.8	140	170
5		150	3	7.4	6.7		70	0.8	140	180
6		155	3.5	7.4	6.7	100	72	0.6	140	130
7		145	4	7.5	6.8	104	72	1	140	190
8		140	4	7.5	6.8	102	72	1	140	210
9		145	4	7.4	6.8	100	74	1	140	190
10		145	3.5	7.4	6.6	102	70	1	140	180
11		140	3.5	7.5	6.7	102	70	0.8	140	170
12		140	3.5	7.4	6.7	100	70	0.8	140	185
13		140	3.5	7.4	6.7	102	70	1	140	190
14		145	4	7.5	6.8	104	72	1	140	195
15		140	3	7.5	6.6	104	70	1	140	195
16		135	3	7.5	6.7	106	72	0.6	120	155
17		130	3	7.5	6.6	104	70	0.6	120	165
18		100	5.5	77.6	7	108	74	0.8	110	190
19		105	6	7.6	7	108	76	0.8	90	185
20		95	3	7.6	6.7	110	72	1	80	200
21		80	7	7.6	7	110	76	1	80	195
22		65	10	7.6	7.2	108	78	1	80	190
23		55	10	7.6	7	108	76	0.8	75	170
24		55	7	7.6	6.8	110	72	0.8	60	170
25		75	3	7.6	6.7	108	72	0.8	80	165
26		80	3.5	7.6	6.7	110	70	1	60	210
27		90	3.5	7.6	6.7	108	70	1	60	205
28		85	3	7.6	6.6	110	68	1	60	195
29		90	4.5	7.6	6.8	110	72	1	70	180
30		150	3	7.6	6.7	114	72	1	75	190
31										
AVERAGE		120	4.3	9.8	6.8	105.3	71.8	0.9	110	184
MAX		165	10.0	77.6	7.2	114.0	78.0	1.0	140	210
MIN		55	3.0	7.4	6.6	100.0	68.0	0.6	60	130

LR8710.SLK

PLANT : Lower Ruvu

YEAR : 1987

MONTH : Oct

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated	Raw	Treated			
1		180	3	7.6	6.8	112	78	0.8	90	200
2		175	3	7.6	6.8	110	80	0.8	90	105
3		150	4	7.5	6.8	110	80	0.8	90	310
4		95	4	7.5	6.8	110	78	1	60	250
5		55	5	7.5	6.8	112	80	1	40	250
6		55	6	7.5	7	112	82	1	40	215
7		45	7	7.5	7	100	82	1	40	250
8		120	5	7.4	6.8	100	80	1	90	265
9		200	6	7.4	6.8	98	80	1	140	300
10		310	7	7	6.6	84	74	1	180	215
11		300	6.5	6.8	6.5	82	70	0.8	180	230
12		300	6.5	6.8	6.4	84	70	1	180	220
13		300	6.5	7	6.4	86	72	0.8	180	275
14		310	5	7	6.4	86	72	0.8	180	300
15		315	15	7	6.8	84	82	0.8	180	200
16		290	5	7.2	6.5	88	70	1	180	150
17		270	5	7.3	6.8	94	74	0.8	180	250
18		210	5	7.4	6.8	88	76	0.8	160	300
19		210	5	7.4	6.8	88	76	0.8	160	300
20		215	6	7.4	6.8	88	76	0.8	160	140
21		220	5	7.4	6.8	88	76	0.8	160	105
22		215	5.5	7.2	6.6			0.5	160	145
23		215	5	7.2	6.6			0.5	160	190
24		230	5.5	7.2	6.6			0.5	160	190
25		235	5.5	7.2	6.6			0.5	170	190
26		230	5.5	7.2	6.6			0.6	170	100
27		290	6	7	6.6			0.8	180	200
28		290	6.5	7	6.6			0.8	180	225
29		290	6.5	7	6.6			0.8	180	220
30		295	6.5	7	6.6			0.8	180	250
31										
AVERAGE		221	5.8	7.2	6.7	95.4	76.6	0.8	143	218
MAX		315	15.0	7.6	7.0	112.0	82.0	1.0	180	310
MIN		45	3.0	6.8	6.4	82.0	70.0	0.5	40	100

PLANT: Lower Ruvu

 YEAR: 1987
 MONTH: Dec

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)
		Raw	Treated	Raw	Treated	Raw	Treated			
1		575	12	7	6.8	78	76	1.5	280	310
2		400	10	6.8	6.4	84	70	1.5	275	300
3		440	8	7	6.6	72	70	1.5	275	200
4		420	10	7	6.4	78	74	1.5	270	200
5		490	8	7	6.6	79	76	0.8	270	260
6		390	7	7	6.6	76	70	1.5	260	275
7		405	5	7	6.4	78	72	1.5	260	300
8		420	8	7	6.4	75	74	1.5	265	330
9		400	8	7	6.4	79	76	0.8	265	325
10		360	6	7.4	6.6	96	92	1.5	265	240
11		450	6.5	7.4	6.6	98	78	1.5	265	190
12		500	6	7.4	6.4	90	80	0.8	265	180
13		480	6	7.2	6.4	94	85	0.8	265	200
14		450	5.5	7.2	6.8	98	88	1.5	265	290
15		400	5	7.2	6.8	91	84	1.5	265	305
16		440	4.5	7.2	6.8	90	84	1.5	260	310
17		400	4.5	7.2	6.8	94	82	0.8	240	300
18		380	4.5	7.2	6.8	92	82	0.8	200	300
19		360	4.5	7.2	7	93	89	1.5	200	300
20		340	4.5	7.2	7	91	74	1.5	180	285
21		320	4.5	7.2	7	98	76	1.5	180	200
22		390	5	7.2	7	90	78	1.5	220	290
23		340	4.5	7.2	7	91	79	1.5	160	240
24		330	4.5	7.2	7	93	77	0.8	160	280
25		290	4.5	7.2	6.8	92	83	1.5	140	200
26		360	5.5	7.2	7	90	76	0.8	130	190
27		270	5.5	7.2	6.8	93	75	0.8	120	150
28		290	4.5	7.2	7	92	82	1.5	120	150
29		300	4	7.2	7	92	83	1.5	120	150
30		280	6	7.2	7	90	88	1.5	110	225
31										
AVERAGE		389	6.1	7.2	6.7	88.2	79.1	1.3	218	249
MAX		575	12.0	7.4	7.0	98.0	92.0	1.5	280	330
MIN		270	4.0	6.8	6.4	72.0	70.0	0.8	110	150

LR8801.SLK

PLANT : Lower Ruvu

YEAR: 1988

MONTH: Jan

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)	Intake Water
		Raw	Treated	Raw	Treated	Raw	Treated				
1	40480	280	5.5	7.2	6.6	90		1.5	100	220	43200
2	42240	250	6.5	7.2	6.6	92		1.5	110	220	44160
3	42240	260	7	7.5	6.6	90		1.5	140	200	44160
4	40800	260	7.5	7.2	6.6	90		1.5	150	220	43008
5	40960	280	5	7.2	7	90		1.5	175	220	43008
6	42240	300	6	7.2	7	92		1.5	175	200	44160
7	40560	390	8	7.2	6.8	92		0.8	185	200	43008
8	42240	310	6	7	6.4	85		1.5	185	200	44160
9	42240	285	6.5	7.2	6.6	90		1.5	185	195	44160
10	38400	280	6	7.2	6.8	92		1.5	170	190	42240
11	43392	300	6.5	7.2	7	92		1.5	170	200	45472
12	29840	300	5.5	7.2	7	92		1.5	170	220	32640
13	51584	300	6.5	7.2	7	94		1.5	150	185	44160
14	43392	260	5	7.2	7	90		1.5	150	185	45472
15	40480	240	7	7.2	6.8	90		1.5	150	185	44160
16	42624	230	6	7.4	7	94		1.5	100	220	44160
17	38464	240	7	7.4	7	94		1.5	120	190	42240
18	43392	240	6	7.2	6.8	92		1.5	145	195	45472
19	42560	280	7	7.5	6.6	94		1.5	165	195	44160
20	42240	300	7	7.2	6.4	90		1.5	165	200	44160
21	41120	290	6.5	7.2	6.4	90		1.5	165	200	43392
22	41440	295	5.5	7.2	6.4	90		1.5	150	220	43392
23	44160	290	5	7.2	6.8	92		1.5	150	230	48000
24	41120	285	5	7.2	6.6	90		1	98	190	43392
25	41600	280	5	7	6.4	92		1	95	190	44160
26	39520	270	6	7.2	6.8	90		1	100	195	42240
27	41360	290	5.5	7	6.4	80		1	100	200	43392
28	42240	280	5	7.2	6.4	90		0.8	100	200	44160
29	43008	240	5	7.2	6.8	90		0.8	100	190	45472
30	36800	250	5	7.2	6.8	92		0.8	100	190	38400
31	11040	230	5.5	7.2	6.8	90		0.8	100	190	15360
AVERAGE	40444	277	6.0	7.2	6.7	90.4	#DIV/0!	1.3	139	201	42539
MAX	51584	390	8.0	7.5	7.0	94.0	0.0	1.5	185	230	48000
MIN	11040	230	5.0	7.0	6.4	80.0	0.0	0.8	95	185	15360

LR8802.SLK

PLANT : Lower Ruvu

 YEAR: 1998
 MONTH: Feb

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum. (25KG)	Chlorine (KG)	Intake Water
		Raw	Treated	Raw	Treated	Raw	Treated				
1	40528	160	5.5	7.2	6.4	90		1	70	167	42240
2	42240	320	6	7.2	6.4	90		1	135	260	44160
3	40480	420	7	7.3	6.6	92		1.5	250	315	42240
4	18960	440	7.5	7	6	85		0.8	250	110	21120
5	43776	840	7.5	7	6	80		0.8	430	200	46080
6	43776	880	16	7	6	80		0.5	470	185	46080
7	36960	850	16	7	6	80		0.8	350	200	40320
8	41760	800	8	7	6.2	82		1	350	260	44160
9	39360	720	7	7	6.2	82		0.8	210	135	42240
10	40640	550	6.5	7	6	80		0.8	200	175	42240
11	40640	420	5.5	7.2	6	90		1.5	200	295	42240
12	41680	400	8	7.2	6.6	90		1.5	160	270	44160
13	40680	340	5	7.2	6.6	90		1.5		204	32640
14	26566	340	6	7	6.2	80		1.5	150	240	28800
15	41290	300	5	7	6	80		1.5	150	250	44160
16	42960	300	5	7.2	6.4	88		1.5	150	285	46080
17	43200	300	5	7.2	6.4	88		1.5	150	280	46080
18	42432	450	5.5	7.2	6.4	90		1.5	220	210	44160
19	40912	260	6.5	7.2	6.4	88		1	140	155	44160
20	36400	320	5	7.2	6.4	88		0.8	180	180	40320
21	34400	300	6	7.2	6.2	90		1	160	240	36480
22	35264	340	6	7.2	6.2	90		1	160	285	38480
23	40800	300	7	7	6.2	82		0.8	140	160	44160
24	39840	300	7.2	7.2	6.4	86		0.8	130	120	42240
25	38480	240	7.2	7.2	6.6	88		0.8	110	225	40320
26	37760	230	7.2	7.2	6.4	88		1	100	300	40320
27	31968	230	7.2	7.2	6.4	88		1	100	310	36480
28	17760	240	7.2	7.2	6.6	88		1	100	140	21120
29	42000	330	7.2	7.2	6.6	88		0.8	160	180	44160
30	36800	250	5	7.2	6.8	92		0.8	100	190	38400
31	11040	230	5.5	7.2	6.8	90		0.8	100	190	15360
AVERAGE	37140	400	7.0	7.1	6.3	86.5	#DIV/0!	1.1	186	217	39394
MAX	43776	880	16.0	7.3	6.8	92.0	0.0	1.5	470	315	46080
MIN	11040	160	5.0	7.0	6.0	80.0	0.0	0.5	70	110	15360

LR8803.SLK

PLANT : Lower Ruvi

YEAR : 1988

MONTH : Mar

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)	Intake Water
		Raw	Treated	Raw	Treated	Raw	Treated				
1	42320	360	6.2	7.2	6.8	90		1.5	220	240	46000
2	38720	720	20	7.2	6.8	92		1.5	220	280	40320
3	38912	700	18	7.2	6.6	94		1.5	200	300	40320
4	42000	650	20	7.2	6.6	92		1.5	160	270	44160
5	44960	520	15	7.2	6.8	94		1.5	140	280	48000
6	44160	500	18	7.2	7	92		1.5	140	290	48000
7	41040	420	15	7.2	7	90		1.5	140	280	44160
8	41600	400	14	7.4	7	94		1.5		270	44160
9	38560	360	9	7.4	7.4	92		1.5	140	200	40320
10	39920	340	7.4	7.4	7.2	96		1.5	144	200	42320
11	41360	330	5.5	7.2	7	94		1.5	130	240	44160
12	41680	320	5	7.4	6.6	96		1.5	120	240	44960
13	43600	320	6	7.2	6.8	94		1.5	120	200	46080
14	38000	300	7	7.2	6.8	92		0.5	120	250	42240
15	32000	280	8.5	7.2	6.8	90		0.8		300	36480
16	39600	250	6	7.4	6.4	96		0.5	170	300	42320
17	39520	220	5	7.4	6.4	94		1	150	310	42320
18	40560	420	5.5	7.4	6.4	96		1.5	150	300	44160
19	32480	420	6	7.4	6.8	96		1.5	160	50	34720
20	41040	410	6.5	7.2	6.8	90		1.5	160	300	44160
21	44160	440	7	7.2	6.6	92		1	180	310	48000
22	44160	460	5.5	7.2	6.8	92		1	210	190	48000
23	44160	600	5.5	7.2	6.4	92		1	300	250	48000
24	44160	680	15	7	6	86		1	300	300	48000
25	44160	640	8	7	6	86		1	220	300	48000
26	44160	600	15	7.2	7	88		1	240	270	48000
27	44160	610	7.5	7	6.4	82		1	230	230	48000
28	40320	710	6	7	6.4	82		1	340	300	42240
29	42000	700	7	7	6	82		1	360	300	42240
30	36640	870	7.5	7	6	84		1	360	295	40320
31	43600										46080
AVERAGE	41087	485	9.6	7.2	6.7	91.0	#DIV/0!	1.2	197	262	44072
MAX	44960	870	20.0	7.4	7.4	96.0	0.0	1.5	360	310	48000
MIN	32000	220	5.0	7.0	6.0	82.0	0.0	0.5	120	50	34720

PLANT : Lower Ruvu

YEAR: 1988

MONTH: Apr

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)	Intake Water
		Raw	Treated	Raw	Treated	Raw	Treated				
1	43600	870	25	6.8	6.9	85		1	350	300	45080
2	43200	830	25	7	6.9	80		1	350	188	46080
3	44160	830	7	6.8	6.7	78		1	340	300	48000
4	40960	850	10	7	6.7	85		1	240	115	44160
5	42240	860	10	6.8	6.7	80		1	180	164	44160
6	34720	610	7	7	6.4	80		1	140	300	38400
7	34560	580	12	7	6.4	82		1	140	300	38400
8	36480	590	8	7	6.4	84		1	100	300	40320
9	34540	550	8	7	6.4	84		0.5	100	300	38400
10	32000	620	20	7	6.4	85		0.5	100	140	38490
11	39740	530	15	7	6.6	85		0.5	110	215	42240
12	39740	550	15	7	6.8	86		0.5	110	170	42240
13	38400	620	15	7	6.8	86		0.5	140	340	40320
14	38400	560	12	7	6.8	86		0.5	140	330	40320
15	39360	550	20	7.2	6.8	88		0.5	140	320	42240
16	39360	500	20	7	6.8	80		0.5	150	320	42240
17	38800	480	20	7	6.8	80		0.5	120	290	40960
18	38400	520	10	7	6.8	80		0.5	120	320	40320
19	38400	500	25	7	6.8	84		0.5	140	290	40320
20	38400	480	30	7	6.8	84		0.5	120	290	40320
21	38400	465	15	7	6.4	86		1.5	130	290	40320
22	38400	410	20	7	6.8	84		0.6	130	160	40320
23	38400	395	20	7	6.8	82		0.5	130	200	40320
24	39600	380	30	7	6.8	82		0.5	100	270	32640
25	38400	350	35	7	6.8	80		0.8	100	330	40320
26	40320	345	15	7	6.6	80		0.5	100	330	42240
27	39360	350	35	7	6.8	80		1.5	100	330	40320
28	40320	380	20	7.2	7	86		1.5	100	212	42240
29	40320	360	20	7.2	7	86		1.5	100	320	42240
30	40320	340	20	7.2	7	86		1.5	100	395	42240
31											
AVERAGE	38977	542	18.1	7.0	6.7	83.1	#DIV/0!	0.8	147	271	41173
MAX	44160	870	35.0	7.2	7.0	88.0	0.0	1.5	350	395	48000
MIN	32000	340	7.0	6.8	6.4	78.0	0.0	0.5	100	115	32640

PLANT : Lower Ruvu

YEAR: 1988

MONTH: May

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)	Intake Water
		Raw	Treated	Raw	Treated	Raw	Treated				
1	40320	340	30	7	6.8	80		1.5	90	330	41088
2	38640	350	35	7	6.8	80		1.5	90	185	39408
3	36480	345	25	7.2	7	80			90	300	38400
4	40380	330	20	7.2	7	82		0.5	90	250	41088
5	40320	360	10	7.2	7	82		0.5	90	285	41088
6	40320	340	10	7.2	7	78		0.5	70	250	42240
7	37440	320	9.5	7.2	7	78		0.5	65	200	38400
8	38400	320	8	7.2	7	78		0.5	60	225	40320
9	38400	330	8	7.2	7	80		0.5	50	200	40320
10	38400	310	6	7.2	7	80		0.5	50	200	40320
11	38400	350	7	7.2	7	80		0.5	55	200	40320
12	35200	300	7	7.4	7.2	86		0.5	55	230	40320
13	32000	300	6.5	7.2	7	82		0.5	55	225	38400
14	33600	300	9	7.4	7	82		0.5	45	130	38400
15	44160	300	7	7.4	7.2	82		0.5		240	38400
16	44160	270	7	7.4	7.2	82		0.5	40	320	46080
17	44160	270	7	7.2	7			1	40	275	46080
18	44160	280	7	7.2	7			1	40	310	46080
19	44160	280	7	7.4	7			1.5	15	350	46080
20	44160	260	7	7.4	6.8			1.5		350	46080
21	32640	260	7	7.4	6.8			1.5	35	350	34580
22	34560	260	6	7.4	6.8			1.5	35	250	36480
23	45312	250	10	7.4	7			1.5	35	250	48000
24	45716	250	10	7.2	7			1.5	35	350	48000
25	45716	260	7	7.2	7			1.5	25	350	48000
26	45716	250	7	7.4	7			1.5		320	48000
27	45716	230	12	7.4	7			1.5	20	340	48000
28	45716	220	15	7.2	7			1.5	25	350	48000
29	45716	220	15	7.2	7			1.5	30	240	48000
30	43792	220	15	7.2	7			1.5	20	250	48000
31	45716	215	10	7.2	7			1.5	20	250	48000
AVERAGE	40954	285	11.2	7.3	7.0	80.8	#DIV/0!	1.0	49	270	42967
MAX	45716	360	35.0	7.4	7.2	86.0	0.0	1.5	90	350	48000
MIN	32000	215	6.0	7.0	6.8	78.0	0.0	0.5	15	130	34580

LR8806.SLK

PLANT : Lower Ruvu

YEAR : 1988

MONTH : Jun

DATE	WATER PROD.	Turbidity		pH		Alkalinity		Residual Chlorine	Alum (25KG)	Chlorine (KG)	Intake Water
		Raw	Treated	Raw	Treated	Raw	Treated				
1	45696	250	14	7.2	7	88		1.5	25		
2	45696	270	10.6	7.2	7	86		1.5	30	350	48000
3	45696	290	12	7.2	7	86		1.5	35	350	48000
4	32640	245	8	7.2	6.5	78		1.5	35	320	48000
5	37920	230	8.5	7.2	6.6	78		1.5	35	250	34560
6	45696	240	7.5	7.2	6.6	78		1.5	35	250	40320
7	45696	230	8.5	7.2	6.8	78		1.5	35	250	48000
8	45696	230	8	7.2	6.8	78		1.5	35	250	48000
9	34272	230	8	7.2	6.8	88		1	30	250	48576
10	45696	230	10	7.2	6.8	86		1.5	30	300	36480
11	45696	230	8	7.2	6.8	86		1.5	30	300	48576
12	45696	230	10	7.2	7	86		1.5	30	300	48576
13	45696	220	9	7.2	7	86		1	30	310	48576
14	45696	220	7.5	7.4	7	88		1	30	310	48576
15	45696	230	8	7.2	7	86		1.5	30	300	48576
16	43856	230	10	7.2	7	88		1.5	30	300	48576
17	36480	220	10	7.2	7	86		1.5	30	240	45696
18	30720	220	10	7.2	7	86		0.5	30	300	38400
19	40704	190	12	7.2	7	86		0.5	30	240	36480
20	45696	190	12.5	7.2	7	88		0.5	30	300	44160
21	45696	230	10.5	7.2	7	80		0.5	30	270	48576
22	45696	250	20	7.2	6.8	86		0.5	40	300	48576
23	45696	270	9	7.2	7	82		0.5	45	270	48576
24	43792	270	6	7.2	6.4	78		0.5	55	260	46080
25	45696	260	5.5	6.8	6.6	76		0.8	55	250	48576
26	45696	230	6.5	6.8	6.6	78		0.8	55	250	48576
27	44160	230	8	7	6.8	78		0.8	45	260	48080
28	45696	230	8	7.2	6.8	88		1.5	45	300	48576
29	45696	230	5	7.2	6.8	84		1.5	50	250	48576
30	37720	225	7	7.2	6.8	86		1.5	55	250	40320
31	45716	215	10	7.2	7			1.5	20	250	48000
AVERAGE	43287	234	9.3	7.2	6.8	83.5	#DIV/0!	1.2	36	279	45955
MAX	45716	290	20.0	7.4	7.0	88.0	0.0	1.5	55	350	48576
MIN	30720	190	5.0	6.8	6.4	76.0	0.0	0.5	20	240	34560

3. WATER SOURCES FOR THE MTONI SYSTEM*

During the dry season, there is shortage of water available for intake into the treatment works. In this Appendix, the existing information regarding the actual water intake capacity currently available is investigated and the possible alternatives are reviewed.

3.1 EXISTING WATER SOURCES

3.1.1 WATER INTAKE FROM KIZINGA RIVER

Possible water intake from the Kizinga was analyzed based on the river run-off analysis in the past.

(1) BASIC DATA

Table C.3.1 shows rainfall and run-off data for the Kizinga river from November 1967 to October 1976, along with the generated run-off. The generated run-off from November 1967 to October 1976 is produced by the following equations:

$$\begin{aligned} Q &= 8.38 + 0.023 P_e + 0.028 P_{e1} && \text{for annual rainfall} < 1,000 \text{ mm} \\ Q &= 13.76 + 0.037 P_e + 0.045 P_{e1} && \text{for } 1,000 < \text{annual rainfall} < 1,200 \text{ mm} \\ Q &= 21.41 + 0.249 P_e + 0.061 P_{e1} && \text{for } 1,200 \text{ mm} < \text{annual rainfall} \end{aligned}$$

where: Q = monthly run-off in mm
 P_e = monthly run-off - monthly evaporation
 P_{e1} = previous month run-off - evaporation

The data used is the monthly rainfall data from the Dar-es-Salaam Chemical Laboratory (1954 - 1976 and 1922 - 1953) and from Dar-es-Salaam airport. Annual run-off, based on this calculation, is shown in Table C.3.2.

(2) DROUGHT YEAR

In order to estimate the probable drought run-off, generated annual run-off in Table C.3.2 were plotted on a logarithmic probability distribution chart as shown in Figure C.3.1. From this, probable drought run-off can be read as follows:

70 mm per year in 2-year return period

* The contents of this section is summarized in section 4.2.2 "water sources", Main Report.

34 mm per year in 10-year return period

From Table C.3.3 which shows the actual run-off recalculated from Table C.3.1 according to calendar year, 1971 and 1973 can be considered to be the 10 year and the 2 year drought years, respectively.

(3) FLOW RATE

The river flowrate can be calculated from the run-off and the catchment area. Table C.3.4 shows this, while monthly flowrates in the two drought years are given in Figure C.3.2.

(4) CONCLUSION

It appears that the river has enough flow for an intake of 2 mgd for only three months in a year in a 10-year return drought year (1971) and for 6 months only in a year, even in a 2-year return drought year (1973). This indicates that sufficient water intake during the dry season would hardly be possible in most years.

To determine the probability of failure to provide for withdrawal of 2 mgd, the flowrate was plotted against the not-exceeding probability, as indicated in Figure C.3.3. It is apparent that there is a 25 percent probability of failure, and the corresponding probability of failure to provide even withdrawal of 1 mgd is 10 percent.

3.1.2 WATER INTAKE FROM BUZA (KILUNGULE) DAM

(1) STORAGE VOLUME

The storage volume is calculated according to the attached map (see Figure C.3.4), assuming high and low water levels at 70 and 50 feet, respectively.

Level (feet)	Flood Area (m ²)	Volume (m ³)
70	80,875	178,117
60	36,000	69,342
50	9,500	(14,478)
45	0	
	Total	247,117

(2) RIVER FLOW RATE

The flowrate in the Kilungule river is calculated from run-off data for the Kizinga river and from the

catchment area of the Kilungule river, assuming that the run-off pattern for Kilungule river is the same as that for Kizinga river. Results are shown in Table C.3.5 and Figure C.3.5.

(3) SAFE YIELD

The safe yield is estimated by means of a cumulative flow diagram. In this method, cumulative river flow is plotted on the chart, as shown below. During periods where increase in the planned cumulative intake (M-N and R-S in the figure) exceeds the cumulative river flow, river flow is supplemented by storage. Necessary storage volume can be determined from the maximum difference between the river flow curve and the planned intake curve (T-U in the figure).

In the study, the cumulative flow diagrams are prepared for several planned intake amounts, based on a 10-year return drought year (1971), as shown in Figure C.3.6. The maximum storage volumes for each intake amount are plotted against the intake amount in Figure C.3.7. The safe yield of the Kilungule river is 0.45 mgd, which is too low to accommodate the required intake volume of 2 mgd for the Mtoni treatment plant.