Chapter 6

Existing Well Inventory Survey

CHAPTER 6 EXISTING WELL INVENTORY SURVEY

6.1 INTRODUCTION

6.1.1 BACKGROUND OF THE SURVEY

The objectives of the existing well inventory survey are to provide the hydrogeological information related to the existing wells, it is mainly tube well, and to analyse the hydrogeological conditions of the study area. The inventory survey consists of location survey, well structure investigation, on site hydrogeological measurement, on site water quality measurement and interview survey. The survey was carried out during the period of September to December 2004.

6.1.2 OUTLINE OF THE SURVEY

A total of 640 wells for the survey were selected from the 1,399 wells, which has fundamental data collected from DDCA (Drilling and Dam Construction Agency), Regional Water Engineer office and District Water Engineer office. A list of identified existing wells, consisting 229 well in Coast Region and 1170 wells on Dar es Salaam is presented in Data Book. Among 640 selected wells for the survey, a total of 500 wells were measured. Rest of 140 wells were not able to measure due to owner's particular circumstances, unclear location and abandonment. The number of wells collected, surveyed and measured in each district is shown in *Table 6.1*.

Table 6.1 Number of Wells Surveyed

Region	District, Municipal	Number of Existing Wells		
		Collected Data	Surveyed	Measured
Coast	Bagamoyo	37	37	35
	Kibaha	68	68	42
	Kisarawe	92	92	63
	Mkuranga	32	32	28
Sub-total, Coast Region		229	229	168
Dar es Salaam	Ilala	545	143	97
	Kinondoni	280	140	129
	Temeke	346	128	106
Sub-total, Dar es Salaam		1,171	411	332
Total		1,400	640	500

6.2 SURVEY ITEMS AND METHODOLOGIES

The list of the wells measure is annexed as the following section. The survey was carried out in accordance with the following survey items. The survey was conducted through visiting the wells and interviewing owners and users.

1) Location Survey

There are databases or the records of the existing wells established by the institutions concerned. However, no data recorded regarding the location (coordinate) and elevation. For the hydrogeological analysis, especially using GIS system, the location data are the essential. The survey team have visited the all the wells selected and measured the location (Longitude, Latitude) and ground elevation above sea level (masl) by GPS and altimeter.

2) Well structure investigation

The structure of the well, regarding borehole and pipes were investigated by collecting the well completion data from DDCA, and field measurement for verification. The obtained data will be utilized for the examination of preliminary of the water supply facility. The data collected and measured are as follows.

- Drilled depth (m)
- Diameter of borehole (inches)
- Diameter of casing pipe (inches)
- Top of screen pipe (m)
- Bottom of screen length (m)
- Pump type

3) On site hydrogeological measurements

Simplified pumping test were carried out by submersible pump installed or the provided pump (33 liter/min., 70m Head) in case of hand pump well. The items measured by the test are as follows.

- Static Water Level, SWL (m)
- Dynamic Water Level, DWL (m)
- Pumping rate (liter/min)

4) On site water quality measurements

During the simplified pumping test, water sample are collected and measured following parameters of water quality by handy instruments.

- Electric Conductivity (mg/liter)
- pH
- Water Temperature

5) Interview survey

The survey team have visited the wells and interviewed owners and users for the following items.

- Name of Owner
- Well Identification No.
- Drilled Year of Well
- Number of People and Families using the well
- Purpose of the Well (Domestic Water, Livestock Water or the Irrigation)
- Consumption amount for each purpose
- Estimated extracting amount (m3/day) of the water
- Pump operation hours

The conceptualistic structure and water level measured at each well are shown in *Figure 6.1*. The collected data obtained by field measurement and completion report of the wells were compiled, and established the well inventory and database system.

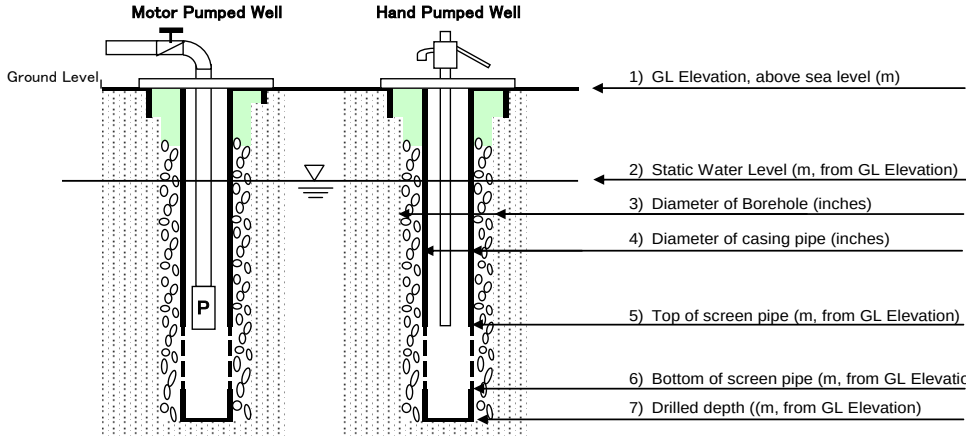


Figure 6.1 Schematic Diagrams of the Existing Wells

6.3 SURVEY RESULTS AND FINDINGS

The locations of the surveyed 500 existing wells are shown in *Figure 6.2*. The survey results regarding the location and hydrogeological measurement are summarized in *Table 6.2* for Coast Region and *Table 6.3* for Dar es Salaam. The survey results regarding the well structure, water quality and water use are summarized in *Table 6.4* for Coast Region and *Table 6.5* for Dar es Salaam.

The distribution of wells is highly densest in the central part of Dar es Salaam especially in Ilala Municipal, while it is very scattering in Coast Region. Although the distribution of the wells are corresponding the distribution of the population, the number of the wells in Bagamoyo District is very small especially where Precambrian formation are distributed. This distribution suggested that the distribution of wells are corresponding not only population but also difficulty of groundwater development.

6.3.1 OPERATIONAL CONDITION

The condition of the well operation was analyzed by comparing the number of drilled wells, abandoned well, depleted wells, malfunctioned or stolen wells and operating well. The abandoned well is the dry well in regard to depleted well is the well dried up after the certain period of operation. The wells which is not operating due to malfunctioned and stolen the equipment such submersible pump, is identified as malfunctioned or stolen wells. The operating well is the well in use at present.

The *Figure 6.3* shows the ratio of the operating condition of the wells by districts.

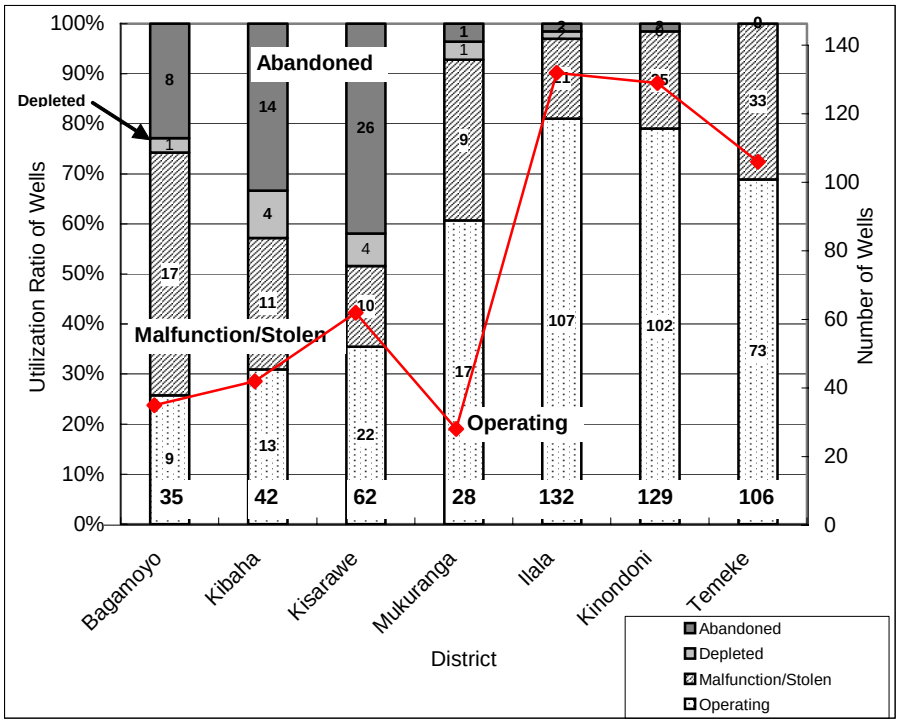


Figure 6.3 Operational Conditions of the Existing Wells

The operation rates are high in Dar es Salaam, these are 68% to 81% of the total number of drilled well. On the other hand, the rates in Coast region are generally low, it is lowest in 25% of Bagamoyo, and is highest in 60% in Mkuranga. This is because of high abandoned rates in Cost Region especially in three districts of Bagamoyo, Kibaha and Kisarawe. These are 23% in Bagamoyo, 33% in Kibaha, and 42% in Kisarawe. The abandoned rates in Dar es Salaam are

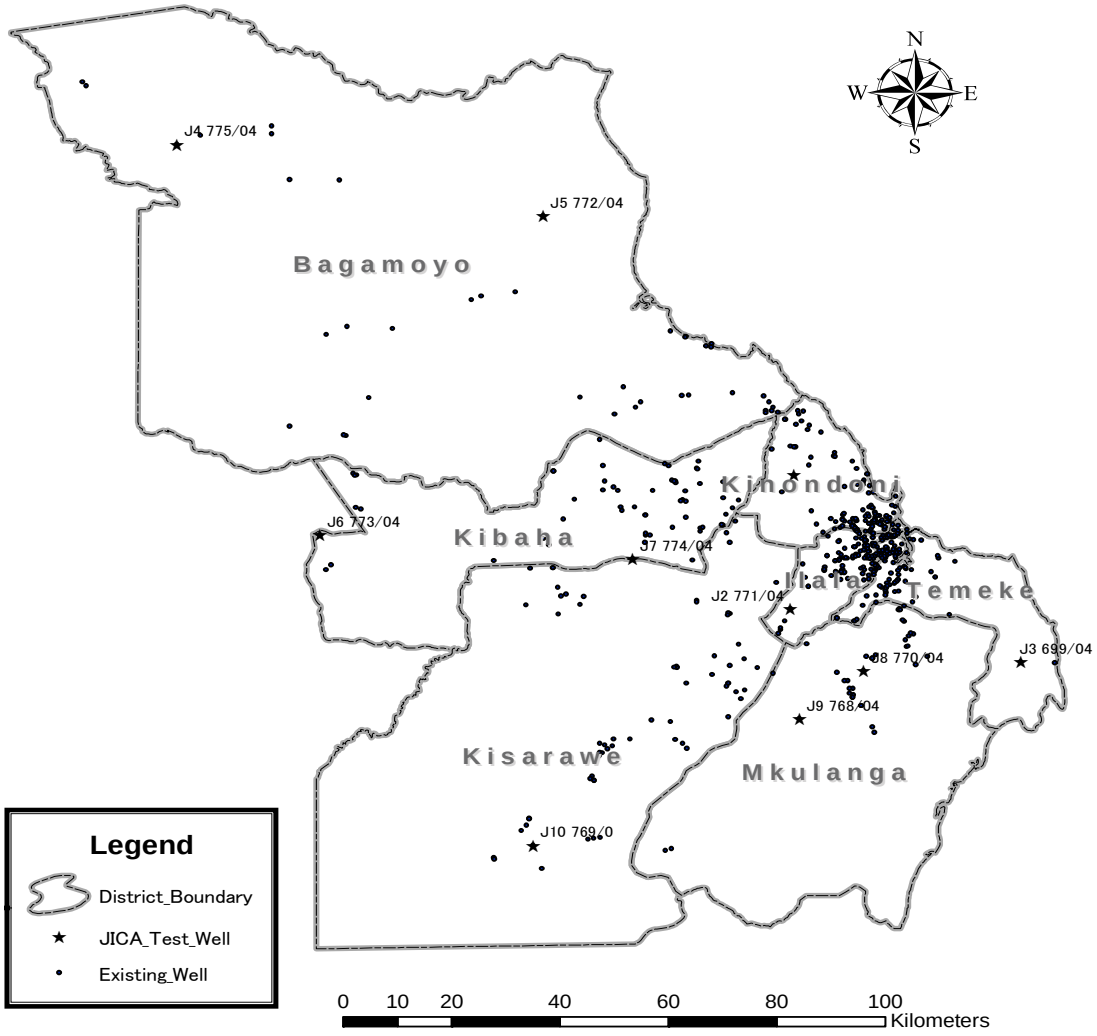


FIGURE 6.2 LOCATION OF EXISTING WELLS AND TEST WELLS

THE STUDY ON WATER SUPPLY IMPROVEMENT IN COAST & DAR ES SALAAM | **JICA**

Table 6.2 Results of Existing Well Survey in Coast Region, Location and Hydrogeology (1/4)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
1	1	152/99	Bagamoyo	Lower Ruvu	UNDP	6	33.80	38	55.90	105	47.0	21.50	43.76	22.26	150.00	6.74	786
2	2	356/99	Bagamoyo	Chasimba	DAWASA	6	35.15	38	50.57	95	50.0	30.00	31.50	1.50	41.67	27.78	1520
3	3	168/99	Bagamoyo	B.moyo Sec	Bagamoyo Sec	6	27.32	38	55.60	**80**	30.0	19.00	21.20	2.20	120.00	54.55	1163
4	4	146/99	Bagamoyo	Zinga Farm	Hon. D. Yona	**6**	**33.53**	**39**	**0.40**	**7**	**95.0**	29.80	31.06	1.26	188.50	149.60	970
5	5	247/99	Bagamoyo	B.moyo Sec School	Bagamoyo Sec.	6	27.43	38	55.57	75	30.0	17.22	21.52	4.30	7.92	132.00	125
6	6	498/2000	Bagamoyo	Nyamatanga	M/s Msuya	6	35.77	39	3.59	95	51.0	42.00	44.00	2.00	15.60	7.80	231
7	7	383/2001	Bagamoyo	Mapinga	M/s Njovu	6	35.53	39	4.20	110	75.0	42.06	51.30	9.24	220.00	23.81	133
8	8	323/2001	Bagamoyo	Mapinga	M/s Msuya	6	35.70	39	4.80	100	61.0	43.27	50.63	7.36	130.67	17.75	1230
9	9	324/2001	Bagamoyo	Mapinga	M/s DAWASA	6	35.50	39	3.58	85	37.0	16	23.15	7.15	377.00	52.73	231
10	10	231/2001	Bagamoyo	Mbegani	M/s Chuo cha Uvuvi	6	28.5	38	58.14	58	34.0	11.60	30.80	19.20	35.00	1.82	170
11	11	88/2001	Bagamoyo	Mbegani	M/s Chuo cha Uvuvi	6	28.36	38	57.69	55	25.0	dry	dry	dry	dry	dry	dry
12	12	114/2001	Bagamoyo	Mbegani	M/s Chuo cha Uvuvi II	6	28.36	38	57.62	14	28.0	7.60	15.20	7.60	78.00	10.26	670
13	13	169/2001	Bagamoyo	Kiwangwa	M/s Village Comm	6	22.40	38	38.55	245	15.0	1.70	8.79	7.09	52.83	7.45	139
14	14	163/2001	Bagamoyo	Kiwangwa	M/s Kiwangwa Vill	6	23.25	38	34.15	250	40.0	dry	dry	dry	dry	dry	dry
15	15	392/2002	Bagamoyo	Mapinga	M/s T. Mbise	6	34.56	39	3.96	85	50.0	26.23	35.48	9.25	126.67	13.69	432
16	16	153/2004	Bagamoyo	Mapinga	M/s B.S.K. Mng'anya	6	33.89	39	3.40	75	60.0	27.80	30.17	2.37	220.00	92.83	521
17	17	32/60	Bagamoyo	Lugoba		6	27.10	38	19.60	270	92.0	dry	dry	dry	dry	dry	dry
18	18	12/63	Bagamoyo	Bagamoyo Town		6	26.70	38	54.10	65	18.0	dry	dry	dry	dry	dry	dry
19	19	48/68	Bagamoyo	Chambezi		6	33.85	38	55.20	85	35.0	dry	dry	dry	dry	dry	dry
21	21	11/69	Bagamoyo	Lower ruvu		6	32.86	38	49.38	55	152.0	0.57	3.57	3.00	13.06	4.35	1958
22	22	86/72	Bagamoyo	Kiwangwa		6	22.85	38	35.10	255	17.0	5.50	13.60	8.10	6.00	0.74	138
23	23	121/72	Bagamoyo	Yombo		6	34.56	38	51.10	85	18.0	dry	dry	dry	dry	dry	dry
24	24	190/73	Bagamoyo	Mindukene		6	26.46	38	26.25	210	10.0	dry	dry	dry	dry	dry	dry
25	25	250/73	Bagamoyo	Malivundo		6	34.10	38	23.86	185	8.0	dry	dry	dry	dry	dry	dry
26	26	251/73	Bagamoyo	Rupungwi		6	9.95	38	20.96	310	8.0	dry	dry	dry	dry	dry	dry
28	28	40/74	Bagamoyo	Mbegani		6	28.10	38	58.20	55	15.0	2.60	2.75	0.15	33.33	222.22	234
29	29	4/76	Bagamoyo	Kibindu		5	59.10	37	55.20	385	32.0	dry	dry	dry	dry	dry	dry
30	30	5/76	Bagamoyo	Kwaruhombo		6	5.030	38	7.03	335	34.0	dry	dry	dry	dry	dry	dry
31	31	6/76	Bagamoyo	Mbwewe		6	4.00	38	14.20	350	26.0	dry	dry	dry	dry	dry	dry
32	32	7/76	Bagamoyo	Mbwewe		6	4.86	38	14.19	360	79.0	dry	dry	dry	dry	dry	dry
33	33	14/81	Bagamoyo	Pongwe Kiona		6	9.89	38	15.95	300	27.0	dry	dry	dry	dry	dry	dry
34	34	67/88	Bagamoyo	Msolwa		6	37.20	38	15.89	235	38.0	dry	dry	dry	dry	dry	dry
35	35	80/88	Bagamoyo	Chalinze		6	38.20	38	21.30	220	36.0	1.50	16.00	14.50	58.33	4.02	148
36	36	130/91	Bagamoyo	Kibindu		5	59.50	37	55.60	385	22.8	dry	dry	dry	dry	dry	dry
37	37	309/2004	Bagamoyo	Lugoba	M/s Village GVT	6	26.19	38	21.70	228	40.0	5.61	37.48	31.87	28.17	0.88	0
38	1	98/99 B	Kibaha	Petro Station	Mdaula	6	38.28	38	21.58	230	50.0	8.67	29.25	20.58	10.00	0.49	
39	2	115/99	Kibaha	Kibaha maili Moja	UNDP	6	45.52	38	55.60	149	60.0	4.08	15.34	11.26	342.83	30.45	564
40	3	355/99	Kibaha	Mbwawa	DAWASA	6	38.70	38	46.98	120	50.0	27.21	28.85	1.64	120.00	73.17	899
41	4	412/99	Kibaha	Gumba	Plan International	6	41.67	38	53.89	113	43.0	27.00	38.90	11.90	12.00	1.01	3500
42	5	7/99	Kibaha	Vikuge	NR	6	47.10	38	51.54	0	36.0	dry	dry	dry	dry	dry	dry
43	6	8/99	Kibaha	Vikuge	NR	6	47.30	38	55.60	170	25.0	15.10	19.54	4.44	23.00	5.18	345
44	7	414/99	Kibaha	Lupunga I	Plan International	6	50.39	38	41.86	75	30.0	7.05	12.80	5.75	3.20	0.56	456
45	8	354/99	Kibaha	Nyumbu	JWTZ DAWASA	6	43.60	38	57.00	160	50.0	dry	dry	dry	dry	dry	dry
46	9	352/99	Kibaha	Miswe	DAWASA	6	35.90	38	48.44	49	50.0	32.05	47.05	15.00	13.17	0.88	565
47	10	415/99	Kibaha	Lukenge	Plan International	6	53.11	38	19.51	216	50.0	dry	dry	dry	dry	dry	dry
48	11	413/99	Kibaha	Kikongo	Plan International	6	47.54	38	43.36	90	42.0	31.40	40.56	9.16	22.00	2.40	690
49	12	410/99	Kibaha	Kitomondo	Plan International	6	52.12	38	36.35	120	32.0	11.52	12.16	0.64	212.83	332.55	328
50	13	473/99	Kibaha	Visiga	Mr. E. Kyendesya	6	44.39	38	48.83	120	35.0	10.83	30.08	19.25	9.17	0.48	7,480
51	14	357/99	Kibaha	Visiga	Mr. Viai	6	43.33	38	47.51	93	38.0	14.70	28.50	13.80	31.00	2.25	1137
52	15	411/99	Kibaha	Lupunga II	Plan International	6	49.71	38	41.36	50	50.0	21.30	47.50	26.20	22.00	0.84	1167
53	16	41/99	Kibaha	Kibaha	Mr. Mwapachu	6	45.20	38	59.33	158	40.0	dry	dry	dry	dry	dry	dry
54	17	21/2000	Kibaha	Soga Sec. School	M/s Plan Inter	6	49.286	38	52.02	0	40.0	dry	dry	dry	dry	dry	dry
55	18	22/2000	Kibaha	Soga II	M/s Plan Inter	6	50.08	38	51.48	159	50.0	29.00	35.60	6.60	12.80	1.94	216

Table 6.2 Results of Existing Well Survey in Coast Region, Location and Hydrogeology (2/4)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
56	19	23/2000	Kibaha	Ngwale Gwata	M/s Plan Inte	6	42.426	38	22.25	145	30.0	4.55	12.25	7.70	26.00	3.38	1324
57	20	24/2000	Kibaha	Lukenge Club	M/s Plan Inter	6	52.55	38	20.01	214	32.0	dry	dry	dry	dry	dry	dry
58	21	25/2000	Kibaha	Gwata Pr. School	M/s Plan Inter	6	42.61	38	22.61	143	NR	dry	dry	dry	dry	dry	dry
59	22	26/2000	Kibaha	Mpiji	M/s Plan Inter	6	52.06	38	56.28	189	57.0	dry	dry	dry	dry	dry	dry
60	23	27/2000	Kibaha	Tumbi	M/s Plan Inter	6	48.18	38	59.30	168	60.0	18.33	48.33	30.00	10.00	0.33	343
61	24	29/2000c	Kibaha	Kibaha kwa Mathias	M/s Dr. J. bake	6	45.40	38	55.29	175	50.0	dry	dry	dry	dry	dry	dry
63	26	32/2000	Kibaha	Boko- Timiza	M/s Plan Inter	6	48.53	38	57.06	168	30.0	16.83	27.85	11.02	6.00	0.54	446
64	27	34/2000	Kibaha	Kongowe	M/s Plan Inter	6	44.39	38	52.31	125	35.0	dry	dry	dry	dry	dry	dry
65	28	35/2000b	Kibaha	Gumba	M/s Plan Inter	6	46.23	38	22.50	181	NR	dry	dry	dry	dry	dry	dry
66	29	37/2000	Kibaha	Msangani	M/s Plan Inter	6	41.14	38	56.85	115	40.0	dry	dry	dry	dry	dry	4100
68	31	76/2000	Kibaha	Gumba	M/s Plan Inter	6	46.39	38	23.05	166	22.0	dry	dry	dry	dry	dry	dry
70	33	118/2000	Kibaha	Msangani Sokoni'I'	M/s UNICEF	6	42.01	38	56.74	131	40.0	dry	dry	dry	dry	dry	dry
71	34	119/2000	Kibaha	Kongowe	M/s Vuai	6	41.608	38	47.29	86		14.55	27.05	12.50	8.80	0.70	184
74	37	144/2000	Kibaha	Boko Mnemela	M/s J.A. Swai	6	48.87	38	57.06	168	38.5	15.43	37.86	22.43	6.00	0.27	
75	38	369/2000	Kibaha	Mfulu	NR	7	10.96	38	50.29	369	112.0	15.43	37.86	22.43	233.33	10.40	1,480
76	39	370/2000	Kibaha	Zogowale	NR	**6**	**46.32**	**38**	**49.14**	**73**	**30.0**	11.33	25.55	14.22	10.17	0.71	690
77	40	247/2001	Kibaha	Disunyala	M/s Plan Inter	6	42.20	38	42.35	69	71.0	23.45	40.93	17.48	88.00	5.03	1500
78	41	72/2001	Kibaha	Simbani - Kibaha	M/s Fursa sawa I	6	43.34	38	54.42	132	98.5	54.4	75.4	21.00	18.85	0.90	1,251
79	42	86/2001	Kibaha	Kumba Galagaza	M/s Fursa Sawa	6	43.20	38	54.25	138	80.0	dry	dry	dry	dry	dry	dry
80	43	89/2001	Kibaha	Msangani	M/s Plan Inter	6	41.92	38	56.73	134	82.8	47.14	60.64	13.50	11.00	0.81	2,900
81	44	90/2001	Kibaha	Msongola	M/s Plan Inter	6	45.33	38	44.47	79	26.0	5.80	27.40	21.60	21.00	0.97	266
82	45	113/2001	Kibaha	Pangani	M/s Plan Inter	6	43.44	38	59.36	161	81.0	42.09	55.80	13.71	7.30	0.53	168
83	46	119/2001	Kibaha	Simbani II	M/s E.O.T.F	6	43.33	38	54.54	137	119.50	57.3	112.02	54.72	9.50	0.17	5,980
84	47	168/2001	Kibaha	Simbani III	M/s E.O.T.F	6	43.50	38	54.59	137	92.00	54.63	85.83	31.20	8.00	0.26	
85	48	170/2001	Kibaha	Kumba Galagaza	M/s Fursa Sawa	6	41.40	38	53.54	109	90.0	dry	dry	dry	dry	dry	dry
86	49	351/2002	Kibaha	Kibaha	M/s Kabundunguru	6	45.44	39	0.92	129	67.00	10.70	52.53	41.83	44.00	1.05	250
90	53	10/72	Kibaha	Kihaha Town		6	47.03	38	59.64	137	171.0	45.00	162.00	117.00	18.83	0.16	6,000
93	56	129/91	Kibaha	Gwata		6	42.71	38	22.42	145	27.0	4.55	17.80	13.25	13.30	1.00	1231
94	57	35/96	Kibaha	Mwanalugali		6	48.11	38	59.18	168	21.0	11.50	17.65	6.15	28.96	4.71	288
97	60	209/98	Kibaha	Boko Mnemela		6	48.43	38	57.30	163	78.0	14.70	40.00	25.30	18.00	0.71	1123
98	61	144/99	Kibaha	Visiga Zegereni		6	44.33	38	47.32	102	40.0	15.30	29.80	14.50	13.00	0.90	477
99	62	353/99	Kibaha	Ruvu Sec School		6	42.20	38	42.35	69	67.0	6.80	21.80	15.00	41.40	2.76	509
100	63	532/2004	Kibaha	Kibaha	M/s PR.WANGWE	6	46.31	39	0.33	11.3	60.0	13.33	35.22	21.89	132.00	6.03	1818
101	64	318/2004	Kibaha	Kibaha Mikongeni	M/s Ally Manda	6	48.45	38	54.30	151	60.0	dry	dry	dry	dry	dry	dry
102	65	516/2004	Kibaha	Kibaha	M/s Mh. Msabaha	6	49.10	38	51.59	163	60.0	8.95	10.10	1.15	21.18	18.42	596
103	66	525/2004	Kibaha	Vikuge I	M/s Village Gvt	6	47.06	38	51.56	163	60.0	dry	dry	dry	dry	dry	dry
104	67	528/2004	Kibaha	Vikuge II	M/s Village Gvt	6	46.22	38	50.50	128	58.0	33.75	0.00	-33.75	1.67	(0.05)	
105	68	554/2004	Kibaha	Kibaha II	Hon. Msabaha	6	49.29	38	51.59	158	60.0	15.05	19.98	4.93	18.58	3.77	596
106	1	498/99	Kisarawe	Mango North 'A'	UNICEF	7	12.32	38	47.00	360	36.00	dry	dry	dry	dry	dry	dry
108	3	497/99	Kisarawe	Boga Mkuvia	UNICEF	7	13.70	38	46.93	365	52.00	dry	dry	dry	dry	dry	dry
109	4	430/99	Kisarawe	Maluwi	Maluwi Village	7	22.94	38	45.80	200	30.0	dry	dry	dry	dry	dry	dry
110	5	496/99	Kisarawe	Boga Shuleni	UNICEF	7	13.33	38	47.00	360	50.00	dry	dry	dry	dry	dry	dry
112	7	494/99	Kisarawe	Boga Mengwa	UNICEF	7	12.65	38	48.23	355	51.00	16.00	23.50	7.50	8.00	1.07	312
113	8	496/99 B	Kisarawe	Boga	UNICEF	7	12.96	38	47.72	356	50.00	30.00	36.40	6.40	10.00	1.56	109
114	9	495/99	Kisarawe	Boga	UNICEF	7	13.39	38	47.18	396	52.00	15.00	NR		14.17		72
115	10	457/99	Kisarawe	Maluwi	Maluwi Village	7	22.86	38	46.37	201	41.0	dry	dry	dry	dry	dry	dry
116	11	477/99	Kisarawe	Maluwi II	VILLAGE	7	22.75	38	47.00	173	30.00	dry	dry	dry	dry	dry	dry
117	12	500/99	Kisarawe	Kitwete Shuleni	UNICEF	7	11.88	38	50.00	360	49.0	24.50	40.90	16.40	32.00	1.95	400
118	13	36/2000	Kisarawe	Cholesamvula	M/s Plan Inter	7	20.65	38	39.87	358	66.l00	21.80	42.20	20.40	48.00	2.35	196
119	14	88/2000	Kisarawe	Msongola	M/s Plan Inter	6	58.476	39	10.744	70	30.0	6.50	NR		25.00		
120	15	89/2000	Kisarawe	Mango Kiboga	M/s UNICEF	7	12.52	38	47.47	345	30.00	12.00	19.70	7.70	20.00	2.60	219
121	16	90/2000	Kisarawe	Msanga Dibidulize	M/s UNICEF	7	15.95	38	46.21	314	32.00	9.00	14.80	5.80	15.00	2.59	2400
122	17	91/2000	Kisarawe	Msanga Kichangani'A'	M/s UNICEF	7	16.42	38	46.43	233	30.00	dry	dry	dry	dry	dry	dry
123	18	92/2000	Kisarawe	Msanga Kichangani'B'	M/s UNICEF	7	16.41	38	46.44	354	30.00	dry	dry	dry	dry	dry	dry
125	20	125/2000	Kisarawe	Msegamo	M/s UNICEF	7	11.87	38	48.37	360	40.00	23.80	36.80	13.00	18.00	1.38	346

Table 6.2 Results of Existing Well Survey in Coast Region, Location and Hydrogeology (3/4)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
126	21	126/2000	Kisarawe	Msanga Sokoni II	M/s UNICEF	7	16.25	38	46.00	330	NR	dry	dry	dry	dry	dry	dry
127	22	#NAME?	Kisarawe	Mkuranga	NR	7	7.209	39	12.354	148	52.00	5.76	18.09	12.33	3.67	0.30	
128	23	176/2000	Kisarawe	Tulini Mzenga	NR	6	56.06	38	45.38	153	36.00			0.00			
130	25	367/2000	Kisarawe	Mtamba	NR	7	3.915	38	54.75	283	27.00	dry	dry	dry	dry	dry	dry
131	26	368/2000	Kisarawe	Mtamba	NR	7	4.00	38	54.73	274	51.00	dry	dry	dry	dry	dry	dry
133	28	493/2000	Kisarawe	Kisarawe	M/s K/Mzumbwi	6	58.00	39	0.00	245	NR	dry	dry	dry	dry	dry	dry
135	30	201/2001	Kisarawe	Chakenge	M/s MoW	6	57.00	38	45.00	141	27.00	dry	dry	dry	dry	dry	dry
136	31	203/2001	Kisarawe	Vihingo Mzenga	M/s MoW	6	52.92	38	42.28	80	40.00	4.95	6.80	1.85	18.50	10.00	176
137	32	207/2001	Kisarawe	Chamalale Mzenga	M/s MoW	6	52.00	36	42.02	85	27.00	13.60	22.30	8.70	30.00	3.45	357
138	33	254/2001	Kisarawe	Muhanga	M/s Plan Inter	7	7.75	38	8.69	300	70.0	2.49	65.73	63.24	40.00	0.63	
139	34	263/2001	Kisarawe	Kitanga	M/s Plan Inter	7	3.00	39	1.50	160	76.00	dry	dry	dry	dry	dry	dry
140	35	265/2001	Kisarawe	Gumba	M/s Plan Inter	7	6.65	39	0.65	160	104.00	18.40	41.39	22.99	94.33	4.10	2660
141	36	12/2001	Kisarawe	Kazimzumbwi	M/s Plan Inter	6	58.15	38	59.82	240	78.00	dry	dry	dry	dry	dry	dry
142	37	13/2001	Kisarawe	Kazimzumbwi	M/s Mlay	6	57.88	38	59.88	235	120.00	dry	dry	dry	dry	dry	dry
144	39	16/2001	Kisarawe	Mkuranga Town	M/s R.C Mission	7	6.965	39	12.42	154	88.00	24.96	62.11	37.15	20.33	0.55	
146	41	38/2001	Kisarawe	Homboza	M/s Plan Inter	7	4.00	39	2.82	150	93.00	1.45	60.00	58.55	88.00	1.50	796
147	42	39/2001	Kisarawe	Kisangire	M/s MoWr	7	26.214	38	41.131	158	48.00			0.00			
148	43	40/2001	Kisarawe	Masaki	M/s Jumuia ya Waislam	7	4.73	38	58.23	300	88.0	dry	dry	dry	dry	dry	dry
149	44	41/2001	Kisarawe	Kibaha kwa mathias	M/s Banduka	6	44.41	38	55.555	158	91.0	67.44	79.80	12.36	11.33	0.92	1,240
150	45	83/2001	Kisarawe	Msimbu	M/s Plan Inter	7	6.47	39	1.55	80	80.00	14.26	48.13	33.87	120.00	3.54	403
151	46	87/2001	Kisarawe	Bwama	M/s Plan Inter	7	12.89	38	55.72	293	80.00	10.70	78.40	67.70	8.83	0.13	468
152	47	117/2002	Kisarawe	Msimbu	M/s Plan Inter	7	7.42	39	1.13	131	80.00	10.70	21.00	10.30	60.00	5.83	592
153	48	201/2002	Kisarawe	Gumba	M/s Plan Inter	7	6.00	38	59.68	220	90.00	dry	dry	dry	dry	dry	dry
154	49	122/2002	Kisarawe	Masaganya	M/s Plan Inter	7	11.91	38	54.51	200	80.00	36.90	38.00	1.10	25.50	23.18	2590
155	50	141/2002	Kisarawe	Maguruwe	M/s Plan Inter	7	1.393	39	0.93	230	57.00	dry	dry	dry	dry	dry	dry
156	51	142/2002	Kisarawe	Gumba II	M/s Plan Inter	7	5.68	38	59.87	195	68.00	dry	dry	dry	dry	dry	dry
157	52	147/2002	Kisarawe	Maguruwe II	M/s Plan Inter	7	1.40	38	1.03	202	42.00	dry	dry	dry	dry	dry	dry
158	53	168/2002	Kisarawe	Gumba III	M/s Plan Inter	7	5.68	38	59.88	195	70.00	12.80	66.00	53.20	18.00	0.34	108
159	54	362/2002	Kisarawe	Mtamba	M/s Plan Inter	7	3.95	38	54.75	265	60.00	dry	dry	dry	dry	dry	dry
160	55	9/2003	Kisarawe	Kiluvya	M/s Matola	6	50.10	39	0.02	140	50.00	dry	dry	dry	dry	dry	dry
161	56	57/2003	Kisarawe	Mtamba	M/s Alfa Match	7	3.82	38	54.70	245	46.00	dry	dry	dry	dry	dry	dry
162	57	227/2003	Kisarawe	Kauzeni	M/s Plan Inter	7	5.68	38	55.63	240	60.00	1.60	32.33	30.73	60.00	1.95	2540
163	58	235/2003	Kisarawe	Masanganya	M/s Plan Inter	7	12.32	38	55.27	185	52.0	22.60	46.80	24.20	18.50	0.76	2310
164	59	446/2003	Kisarawe	Kifuru	M/s Plan Int.	6	56.55	38	56.70	215	70.00	dry	dry	dry	dry	dry	dry
165	60	185/2004	Kisarawe	Kifuru	M/s Plan/Int	6	56.67	38	56.7	212	50.0	dry	dry	dry	dry	dry	dry
167	62	625/2003	Kisarawe	Malangala	M/s DWRS	6	34.05	38	45.02	150	48.00	25.05	34.50	9.45	13.20	1.40	3220
168	63	626/2003	Kisarawe	Mihungwe	M/s DWRS	6	53.00	38	40.00	80	46.00	20.10	24.80	4.70	40.00	8.51	1369
169	64	338/2003	Kisarawe	Mitengwe	M/s DWRS	6	57.05	38	39.57	115	30.00	12.50	25.00	12.50	6.00	0.48	1369
170	65	337/2003	Kisarawe	Mzenga A	M/s DWRS	6	56.00	38	43.08	95	50.00	11.70	33.70	22.00	20.00	0.91	264
171	66	336/2003	Kisarawe	Mzenga B	M/s DRWS	6	55.08	38	42.77	110	50.00	19.00	33.40	14.40	15.00	1.04	1420
172	67	640/2003	Kisarawe	Sungwi	M/s Plan	7	2.67	38	58.47	260	100	dry	dry	dry	dry	dry	dry
173	68	624/2003	Kisarawe	Vihingo	M/s DWRS	6	52.91	38	42.28	80	50.00	4.94	5.80	0.86	20.00	23.26	1758
174	69	339/2003	Kisarawe	Vilabwa	M/s DWRS	6	58.03	38	42.85	115	40.00	10.31	24.00	13.69	10.00	0.73	159
175	70	440/2002	Kisarawe	mtemba		7	3.93	38	54.44	260	60.0	dry	dry	dry	dry	dry	dry
184	79	144/72	Kisarawe	Mzenga		6	55.80	38	43.57	135	33.0	1.07	2.00	0.93	5.00	5.38	174
185	80	180/75	Kisarawe	Mtunani		7	25.00	38	36.33	301	122.0	dry	dry	dry	dry	dry	dry
186	81	171/75	Kisarawe	Chole samvula		7	22.00	38	39.10	303	111.0	dry	dry	dry	dry	dry	dry
187	82	258/75	Kisarawe	Mtunani		7	25.13	38	36.37	295	92.0	dry	dry	dry	dry	dry	dry
189	84	67/79	Kisarawe	Changombe Mfuru		7	9.75	38	52.17	290	52.0	dry	dry	dry	dry	dry	dry
191	86	476/99	Kisarawe	Kisarawe Town		6	54.57	39	4.66	214	40.0	26.80	41.80	15.00	43.32	2.89	1150
192	87	356/2004	Kisarawe	Nyota Njema	Plan Internastional	7	4.57	39	4.38	120	42.0	1.35	33.22	31.87	146.67	4.60	106
193	88	247/2004	Kisarawe	Masanganya	Plan Internastional	7	9.96	38	54.06	290	50.0	25.00	38.00	13.00	31.58	2.43	2671
194	89	334/2004	Kisarawe	Mwanzo Mgumu	Plan Internastional	7	9.40	38	59.88	145	60.0	8.53	46.22	37.69	50.76	1.35	1708
195	90	347/2004	Kisarawe	Mwanzomgumu	Plan Internastional	7	3.72	39	0.00	140	60.0	5.40	42.66	37.26	57.33	1.54	1225
196	91	502/2004	Kisarawe	Cholesamvula I	Plan Internastional	7	20.67	38	39.85	368	60.0	38.50	53.80	15.30	66.00	4.31	148
197	92	503/2004	Kisarawe	Cholesamvula I	Kisarawe	7	21.37	38	39.64	330	48.0	4.00	31.6	27.60	69.47	2.52	216

Table 6.2 Results of Existing Well Survey in Coast Region, Location and Hydrogeology (4/4)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
198	1	28/98	Mkuranga	Hoyoyo	Dr. Salmin	7	5.38	39	11.85	95	62	7.70	31.57	23.87	66.00	2.76	213
199	2	19/98B	Mkuranga	Hoyoyo	Mama Salmin	7	5.37	39	11.50	110	60.0	20.00	51.70	31.70	0.93	0.03	_
200	3	603/99	Mkuranga	Manambaya	Mr. Mtengwa	7	2.70	39	13.68	160	34.0	16.25	24.84	8.59	32.14	3.74	395
201	4	30/2000	Mkuranga	Mwanambaya	M/s Hon. A. H. Mwinyi	7	2.93	39	14.31	120	40	13.60	34.70	21.10	12.00	0.57	417
202	5	177/2000	Mkuranga	Visiga Zegereni	M/s Vicentian Sisters	6	43.98	38	48.36	99	62.0	15.75	24.14	8.39	120.00	14.30	
203	6	251/2000	Mkuranga	Vikindu	NR	7	0.20	39	18.45	89	52.0	1.00	2.50	1.50	40.00	26.67	466
204	7	264/2001	Mkuranga	Vianzi- Vikindu	M/s Jengo	7	2.72	39	19.83	100	70	32.36	42.62	10.26	176.00	17.15	506
205	8	185/2001	Mkuranga	Chamgoi II	M/s AMREF	7	24.20	38	53.58	89	54.0	26.50	38.56	12.06	47.00	3.90	1440
206	9	194/2001	Mkuranga	Kimanzichana	M/s AMREF	7	21.80	39	400	93	60.0	24.93	54.80	29.87	43.00	1.44	147
207	10	195/2001	Mkuranga	Mkuranga Town	M/s AMREF	7	7.23	39	12.33	135	56.0	0.00	49.82	49.82	69.50	1.40	571
208	11	117/2001	Mkuranga	Mkuranga	M/s AMREF	7	8.18	39	13.21	75	72.0	35.80	67.50	31.70	83.33	2.63	403
209	12	112/2001	Mkuranga	Chamgoi	M/s AMREF	7	24.00	38	54.15	124	51.0	29.45	44.75	15.30	7.50	0.49	915
210	13	176/2001	Mkuranga	Vikindu	M/s Valancian Parish	7	1.66	39	17.74	84	70.0	14.06	20.23	6.17	188.50	30.55	131
211	14	1/2002	Mkuranga	Vikindu	M/s Vicentian Fathers	7	1.60	39	17.88	105	60.0	14.90	52. 95	38.05	88.00	2.31	130
212	15	10/2002	Mkuranga	Vikindu	M/s C. Sisters	7	2.93	39	14.31	120	63.0	11.15	21.04	9.89	220.00	22.24	434
213	16	12/2002	Mkuranga	Vikindu	M/s C. Swai	7	0.86	39	17.63	90	45.0	0.00	31. 94	31.94	165.00	5.17	320
214	17	15/2002	Mkuranga	Mbezi Msufini	M/s Msufini	7	10.50	39	14.30	75	48.0	5.90	47.80	41.90	20.00	0.48	1439
215	18	28/2002	Mkuranga	Mbezi gongoni	M/s Gongoni	7	11.10	39	14.52	115	63.0	20.00	60.00	40.00	24.00	0.60	1341
216	19	137/2002	Mkuranga	Mkuranga town	M/s AMREF	7	7.2	39	12.33	127	68.0	14.70	49.00	34.30	10.00	0.29	1439
217	20	144/2002	Mkuranga	Rugwadu	M/s Ndege	6	58.07	39	22.07	100	42.0	14.48	16.52	2.04	330.00	161.76	1412
218	21	256/2002	Mkuranga	Mkuranga	M/s Salvation Sisters	7	8.18	39	13.21	75	60.0	dry	dry	dry	dry	dry	dry
219	22	37/2003	Mkuranga	Vikindu	M/s TTC	7	0.48	39	17.95	120	70.0	12.34	15.80	3.46	146.67	42.39	134
220	23	166/98	Nkuranga	Kizuda	Mr.Joseph	7	6.25	39	12.40	115	36.0	11.13	24.60	13.47	188.50	13.99	282
221	24	32/2004	Mkuranga	Kipara Village	M/s TPC	6	57.53	39	16.95	83	53.0	23.40	40.30	16.90	120.00	7.10	331
222	25	59/2004	Mkuranga	Mama Siti Sec. School	M/s AMREF	7	6.82	39	12.00	125	80.0	32.05	70.56	38.51	88.00	2.29	1777
223	26	324/2003	Mkuranga	Mbanambaya	M/s A.H. Mwinyi	7	2.93	39	14.31	120	70.00	42.80	68.90	26.10	45.00	1.72	329
225	28	29/92	Mkuranga	Mwanambaya		7	2.55	39	14.65	155	30.0	1.10	1.42	0.32	49.82	155.69	265
226	29	111/92	Mkuranga	Kizuda		7	6.25	39	12.04	115	51.0	2.30	18.40	16.10	15.00	0.93	282
227	30	19/98	Mkuranga	Hoyoyo		7	4.48	39	10.77	110	60.0	dry	dry	dry	dry	dry	dry
228	31	177/99	Mkuranga	Vikindu		7	0.12	39	18.17	105	62.0	15.75	26.14	10.39	120.00	11.55	466
229	32	390/2004	Mkuranga	Vikindu	M/s D. Rutagemwa	6	58.853	39	17.499	94	0.0	0.00	4.68	4.68	440.00	94.02	0

Table 6.3 Results of Existing Well Survey in Dar es Salaam, Location and Hydrogeology (1/7)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
137	137	297/99	Ilala	Kipunguni A	M/s DWS	6	52.70	39	11.30	54	56.0	6.50	33.03	26.53	52.83	1.99	790
77	77	221/98	Ilala	Airport	DCA	6	51.84	39	12.35	49	76.0	14.92	63.15	48.23	120.00	2.49	750
47	47	56/97	Ilala	Amana Hospital	DAWASA	6	49.61	39	15.54	49	40.0	10.80	14.55	3.75	302.27	80.61	1072
400	400	321/2002	Ilala	B. Mkapa Sec school	M/s Benjamin M.Sec School	6	49.54	39	16.30	32	50.0	9.97	10.90	0.93	73.33	78.85	1015
395	395	320/2002	Ilala	barabara ya mwinyi	M/s TASAF	6	52.42	39	14.31	45	60.0	12.91	27.70	14.79	146.67	9.92	
2	2	274/97	Ilala	Bonyekwa Segerea	Omar Mahita	6	49.46	39	9.90	110	52.0	9.00	21.12	12.12	240.00	19.80	
8	8	34/97	Ilala	Breweries	Tanzania Brew	6	49.27	39	16.11	23	46.0	10.70	11.20	0.50	253.83	507.67	
95	95	17/99	Ilala	Buguruni	M/s Mosque	6	50.34	39	14.43	61	40.5	8.50	36.90	28.40	12.00	0.42	1012
293	293	208/2001	Ilala	Buguruni	M/s G Urio	6	50.51	39	14.41	61	50.0	11.92	34.13	22.21	176.67	7.95	879
345	345	75/2002	Ilala	Buguruni	M/s Urio	6	50.50	39	14.44	61	60.0	12.62	33.62	21.00	132.00	6.29	889
442	442	105/2003	Ilala	Buguruni	M/s Plan	6	50.20	39	14.34	70	57.0	12.04	24.44	12.40	146.67	11.83	923
287	287	152/2001	Ilala	Chanika	M/s A. Natepe	6	59.56	39	5.15	127	62.0	10.95	52.76	41.81	33.00	0.79	1370
475	475	345/2003	Ilala	Chanika	Dr.Masaburi	6	59.78	39	5.11	110	60.0	13.50	28.36	14.86	37.50	2.52	2000
324	324	3/2002	Ilala	Chanika Dispensary	M/s Manispaa	6	58.82	39	5.54	119	60.0	6.25	16.80	10.55	44.00	4.17	2900
15	15	104/97	Ilala	Chuo cha Magereza	DAWASA	6	53.33	39	10.65	85	62.0	36.45	42.60	6.15	25.00	4.07	1193
68	68	50/98	Ilala	City garden	TBL	6	49.24	39	15.85	36	45.0	6.82	11.00	4.18	300.00	71.77	200
39	39	30/97B	Ilala	Dar Tech. College	DAWASA	6	48.79	39	16.86	22	50.0	8.60	12.60	4.00	375.00	93.75	1447
40	40	19.97	Ilala	Fire Brigade	DAWASA	6	48.75	39	16.46	21	44.0	9.97	11.60	1.63	300.00	184.05	2700
136	136	296/99	Ilala	G. la Mboto Pr.	DAWASA	6	53.08	39	9.50	96	40.0	dry	dry	dry	dry	dry	dry
76	76	7/98	Ilala	Gongo la Mboto	Benedict N. School	6	52.10	39	10.98	74	33.0	16.90	21.50	4.60	27.30	5.93	1064
132	132	290/99	Ilala	Gongo la Mboto	DAWASA	6	52.82	39	9.55	26	93.0	17.46	27.80	10.34	28.60	2.77	1049
133	133	292/99	Ilala	Gongo la Mboto	M/s Masili	6	53.27	39	11.18	66	60.0	86.70	88.80	2.10	1.80	0.86	2670
258	258	23/2001	Ilala	Gongo la Mboto	M/sMwinyimkuu	6	53.81	39	10.18	36	70.0	22.80	29.60	6.80	12.50	1.84	898
263	263	33/2001	Ilala	Gongo la Mboto	M/s Urasa	6	52.10	39	10.98	74	33.0	4.75	4.80	0.05	27.00	540.00	1720
247	247	462/2000	Ilala	Ilala	M/s Mallya	6	49.81	39	15.35	42	50.0	8.86	46.75	37.89	60.00	1.58	1890
13	13	28/97	Ilala	Ilala - Boma	DAWASA	6	53.18	39	9.50	96	30.0	9.20	12.65	3.45	253.83	73.57	1103
372	372	199/2002	Ilala	Ilala Bomani	M/s VIPIMO	6	49.58	39	15.83	36	42.0	6.98	31.90	24.92	188.56	7.57	2000
16	16	281/97	Ilala	Karakata	Mr. Nassor	6	51.79	39	11.65	74	30.0	16.10	25.00	8.90	98.44	11.06	1001
186	186	16/2000	Ilala	Karakata	M/.s A.E.E	6	51.41	39	12.68	56	50.0	10.00	40.90	30.90	18.33	0.59	634
486	486	413/2003	Ilala	Karakata	M/s Masanja	6	51.45	39	12.72	74	45.0	19.05	30.10	11.05	110.00	9.95	_
256	256	20/2001	Ilala	Karakata Pr. Sch	M/s Municipal	6	51.45	39	11.19	67	98.0	16.15	46.52	30.37	440.00	14.49	1342
492	492	429/2003	Ilala	Kariakoo	M/sMunicipal	6	49.48	39	16.48	33	40.0	7.42	13.03	5.61	188.57	33.61	2130
240	240	468/2000	Ilala	Kariakoo Gerezani	M/s Sharif	6	49.51	39	16.46	32	36.0	10.27	25.25	14.98	21.33	1.42	860
113	113	88/99	Ilala	Kidongo chekundu	M/s UNDP	6	49.39	39	16.67	40	30.0	7.36	12.38	5.02	1031	205.38	
322	322	349/2001	Ilala	Kinyerezi	M/s Lidya	6	51.55	39	9.79	74	34.0	18.62	25.90	7.28	186.00	25.55	1290
360	360	151/2002	Ilala	Kinyerezi	M/s Mdeve	6	51.57	39	9.81	76	48.0	24.60	32.60	8.00	12.20	1.53	1240
434	434	91/2003	Ilala	Kinyerezi	M.s Mbiduka	6	51.25	39	10.95	104	42.0	11.70	18.40	6.70	13.10	1.96	5240
285	285	146/2001	Ilala	Kipawa	M/s S.S Bahressa	6	51.63	39	12.63	56	43.0	16.87	35.76	18.89	188.50	9.98	1040
300	300	256/2001	Ilala	Kipawa	M/s Murzar Oil	6	51.50	39	12.94	65	51.0	17.6	41.89	24.29	82.50	3.40	1300
304	304	282/2001	Ilala	Kipawa	M/s R.C Mission	6	51.64	39	12.38	56	50.0	10.84	48.21	37.37	14.67	0.39	_
311	311	318/2001	Ilala	Kipawa	M/s N.P. Banzi	6	50.77	39	11.56	80	45.0	17.82	28.92	11.10	132.00	11.89	977
327	327	11/2002	Ilala	Kipunduni 'A'	M/s John Noni	6	53.47	39	11.44	60	50.0	9.35	17.00	7.65	77.92	10.19	1056
234	234	426/2000	Ilala	Kipunguni 'B'	M/s Malekela	6	53.38	39	11.50	57	60.0	10.72	35.40	24.68	220.00	8.91	1760
417	417	21/2003	Ilala	Kisukuru	M/s Mrema	6	49.98	39	10.88	98	60.0	27.49	43.63	16.14	13.83	0.86	_
429	429	74/2003	Ilala	Kitunda	M/s Municipal	6	54.09	39	11.85	59	60.0	16.30	26.80	10.50	160.00	15.24	536
297	297	249/2001	Ilala	Kitunda Tanzania Bible	M/s Bible Society	6	54.20	39	11.17	68	60.0	18.20	28.60	10.40	62.00	5.96	446
20	20	96/97	Ilala	Kiwalani	DAWASA	6	51.57	39	13.72	50	32.0	7.50	23.30	15.80	23.17	1.47	1355
147	147	331/99	Ilala	Kiwalani M/Mirefu	M/s Mwapimbile	6	51.60	15	14.32	49	48.0	13.80	24.60	10.80	332.00	30.74	1220
66	66	95/98	Ilala	Kiwalani Minazi mirefu	M.S.F	6	51.59	39	14.53	48	41.0	8.59	25.29	16.70	17.60	1.05	343
299	299	251/2001	Ilala	Kupunguni B	M/s Mabula	6	53.45	39	11.19	96	60.0	4.80	32.36	27.56	176.00	6.39	
48	48	180/97	Ilala	Light house	L.S.M LTD	6	51.10	39	13.90	40	50.0	13.84	22.08	8.24	138.83	16.85	1320
35	35	199/97	Ilala	Machinjioni V.nguti	NR	6	50.90	39	13.53	45	30.0	10.70	12.95	2.25	132.00	58.67	1952
228	228	392/2000	Ilala	Madale	M/s Mwasongwe	6	49.89	39	13.71	64	50.0	15.88	25.80	9.92	264.00	26.61	

Table 6.3 Results of Existing Well Survey in Dar es Salaam, Location and Hydrogeology (2/7)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
120	120	159/99	Ilala	Mafuriko	Mafuriko St. Ilala	6	49.82	39	15.33	38	35.0	5.08	14.07	8.99	220.00	24.47	1206
45	45	122/97	Ilala	Magereza	DAWASA	6	53.34	39	10.65	79	60.0	16.30	24.66	8.36	244.50	29.25	
255	255	19/2001	Ilala	Majohe	M/s Municipal	6	54.99	39	7.93	84	98.0	11.15	56.73	45.58	40.00	0.88	1890
128	128	254/99	Ilala	MbagalaMachinjioni	M/s Mlacha	6	53.48	39	16.19	60	60.0	13.05	24.48	11.43	220.00	19.25	928
65	65	128/98	Ilala	Minazi Mirefu III	M.S.F	6	51.59	39	14.52	50	50.0	8.56	23.69	15.13	101.50	6.71	429
93	93	14/99	Ilala	Mnazi Mmoja	City	6	49.10	39	16.81	36	37.0	6.80	11.00	4.20	300.00	71.43	200
37	37	171/97	Ilala	Mnazi Mmoja Hosp	T.nia Red Cross	6	49.27	39	16.51	37	40.0	7.86	9.66	1.80	264.00	146.67	1370
22	22	11/97	Ilala	Msimbazi	TBL	6	49.31	39	15.98	30	45.0	1.00	9.71	8.71	264.00	30.31	1050
89	89	109/97	Ilala	Msimbazi mseto	DAWASA	6	49.35	39	15.42	31	35.0	10.24	23.24	13.00	176.00	13.54	775
404	404	410/2002	Ilala	Msongola	M/s Munucipal	6	58.48	39	10.74	64	70.0	22.32	47.22	24.90	37.67	1.51	4610
129	129	256/99	Ilala	Mtoni kwa Aziz Ally	DAWASA	6	52.34	39	16.42	30	40.0	10.95	18.57	7.62	264.00	34.65	1643
19	19	13/97	Ilala	Muhimbili Hospital	DAWASA	6	48.10	39	16.39	27	31.0	9.20	21.80	12.60	200.00	15.87	1730
501	501	462/2003	Ilala	Pugu Mikongeni	M/s C. Cintika	6	54.98	39	7.92	108	48.0	6.45	13.35	6.90	26.00	3.77	1999
427	427	72/2003	Ilala	Pugu Mnadani	M/s Municipal	6	52.46	39	7.35	104	50.0	7.55	27.55	20.00	120.00	6.00	900
481	481	385/2003	Ilala	Pugu Mwakanga	M/s Col Nsa Kaisi		52.22	39	7.01	95	60.0	3.70	14.97	11.27	45.89	4.07	2800
124	124	184/99	Ilala	Shariff Shamba	MoW	6	49.61	39	15.22	35	36.0	10.20	13.30	3.10	64.10	20.68	1175
33	33	31/97	Ilala	Shule ya Uhuru	DAWASA	6	49.45	39	16.00	28	42.0	9.10	14.66	5.56	264.17	47.51	950
520	520	657/2003	Ilala	T/ Bima	M/s O. Nsanzugwako	6	49.86	39	13.59	81	45.0	19.15	40.45	21.30	20.30	0.95	_
531	531	60/2004	Ilala	T/ Chang'ombe	M/s Kisa Kyejo	6	50.61	39	12.50	46	70.0	14.67	65.45	50.78	22.00	0.43	1840
505	505	599/2003	Ilala	T/ Chang'ombe	M/s Bora Ramadhani	6	50.62	39	12.49	46	50.0	19.34	20.85	1.51	110.00	72.85	1911
516	516	641/2003	Ilala	T/ Mawenzi	M/s Katalaiya	6	52.10	39	10.97	74	50.0	21.55	25.15	3.60	75.00	20.83	1957
518	518	643/2003	Ilala	T/ Sigara	M/s Mizambwa	6	50.62	39	12.50	46	50.0	20.25	45.95	25.70	24.00	0.93	1147
296	296	230/2001	Ilala	Tabata Bima	M/s BGS	6	49.71	39	13.24	47	28.0	12.80	26.80	14.00	9.32	0.67	1890
61	61	223/98	Ilala	Tabata Kisiwani	Yemen Enteprises	6	50.26	39	14.58	48	47.0	11.30	14.08	2.78	264.00	94.96	1121
202	202	171/2000	Ilala	Tabata Kisukulu	M/s Kisili	6	49.90	39	10.98	114	30.0	7.10	21.00	13.90	100.00	7.19	1120
424	424	47/2003	Ilala	Tabata Liwiti	M/s G. Sabuni	6	50.31	39	12.94	46	60.0	15.20	29.15	13.95	120.00	8.60	1070
274	274	74/2001	Ilala	Tabata Matumbi	M/s Apostolic Church	6	49.56	39	14.32	28	35.0	0.00	9.58	9.58	440.00	45.93	613
199	199	165/2000	Ilala	Tabata mawenzi	Mrs Mruma	6	49.62	39	12.67	62	50.0	15.10	35.00	19.90	10.20	0.51	860
384	384	316/2002	Ilala	Ukonga stakishari	Ms Kasimoto	6	49.59	39	14.35	29	35.0	3.53	26.10	22.57	26.33	1.17	1238
49	49	17/97	Ilala	TBL Premises	TBL	6	49.27	39	15.98	38	45.0	11.80	20.60	8.80	216.70	24.63	664
109	109	80/99	Ilala	U. Majumba sita	M/s Wanah	6	51.87	12	11.49	74	43.0	11.99	19.98	7.99	188.50	23.59	950
112	112	87/99	Ilala	Ukonga Banana	M/s Masoyi	6	52.10	39	10.97	74	31.0	16.00	33.00	17.00	83.00	4.88	1883
283	283	144/2001	Ilala	Ukonga Hill Tech	M/s Hilder	6	51.87	39	11.81	74	62.0	5.50	11.61	6.11	485.33	79.43	760
277	277	81/2001	Ilala	Ukonga Madafu	M/s Matekere	6	49.47	39	13.53	49	33.0	8.16	27.13	18.97	12.50	0.66	2010
270	270	65/2001	Ilala	Ukonga Midizini	M/s Mmbena	6	52.14	39	10.61	68	71.0	**9.45**	**50.30**	40.85	55.00	1.35	2110
433	433	90/2003	Ilala	Ukonga Mombasa	M/s Lwiza	6	52.17	39	10.61	76	44.0	12.42	35.10	22.68	33.00	1.46	966
306	306	287/2001	Ilala	Ukonga Staki shari	M/s Staki shari	6	51.50	39	12.94	65	60.0	13.00	14.15	1.15	210.53	183.07	674
391	391	349/2002	Ilala	Ukonga Stakishari	M/s B. Mavura	6	51.91	39	11.08	82	40.0	10.92	12.13	1.21	330.00	272.73	
250	250	4/2001	Ilala	Vinguguti Mtakuja	M/sMunicipal	6	50.45	39	13.55	48	42.2	8.67	18.40	9.73	94.50	9.71	1328
29	29	173/97	Ilala	Vinguguti Hosp	Malaria Project	6	50.89	39	13.52	44	30.0	6.40	14.57	8.17	88.00	10.77	1192
28	28	169/97	Ilala	Vinguguti Kombo	Malaria Project	6	50.47	39	13.85	48	50.0	0.25	9.33	9.08	425.83	46.90	1580
253	253	10/2001	Ilala	Vinguguti Mtambani	M/s Municipal	6	50.75	39	13.78	39	65.0	15.45	22.47	7.02	440.00	62.68	1468
74	74	119/98	Ilala	Vingunguti Ny. Road	Kibo Paper	6	51.13	39	14.03	41	62.0	11.36	17.51	6.15	165.00	26.83	1470
94	94	15/99	Ilala	Vinguguti Pr.Sch	Vingunguti Pr.	6	50.90	39	13.47	50	37.0	14.40	21.00	6.60	95.00	14.39	1401
498	498	441/2003	Ilala	Y/ Vituka	M/s M. Sinani	6	51.81	39	13.56	58	42.0	19.97	22.79	2.82	73.33	26.00	2410
86	86	105/98	Ilala	Yombo Dingubita	M.S.F	6	51.88	39	13.78	60	50.0	11.20	22.54	11.34	33.89	2.99	1549
226	226	378/2000	Ilala	Yombo Majumba Mapya	M/s Seme	6	51.93	39	14.09	51	51.0	*3.84*	*39.50*	*35.66*	*13.50*	0.38	1220
259	259	25/2001	Ilala	Yombo Matangini	M/s Municipal	6	51.92	39	14.38	58	34.0	*11.65*	*23.55*	*11.90*	*33.00*	2.77	1034
		348/2003	Ilala	Chanika	Chanika	7	0.18	39	4.88	110	60.0	12.07	49.73	37.66	66.00	1.75	2000

Table 6.3 Results of Existing Well Survey in Dar es Salaam, Location and Hydrogeology (3/7)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
		4./2002	Ilala	Tabata	Tabata Dispensary	6	49.84	39	13.59	80	48.0	7	31.52	24.52	48.30	1.97	1986
		16/97	Ilala	Tabata Kisukulu	Nuwa	6	50.62	39	12.50	46	35.5	7.43	29.3	21.87	36.00	1.65	3000
696	151	1/2001	Kinondoni	Boko	M/s Roze Ruta	6	37.124	39	8.033	80	48.0	38.18	45.90	7.72	28.17	3.65	3900
762	217	402/2002	Kinondoni	Boko	M/s Uronu	6	37.665	39	7.809	50	60.0	17.30	28.49	11.19	146.67	13.11	4530
796	251	344/2003	Kinondoni	Boko	M/s Mheto	6	37.908	39	9.151	45	50.0	11.18	36.26	25.08	26.40	1.05	1842
671	126	197/2000	Kinondoni	Bunju	M/s Mhe. Sumaye	6	39.532	39	6.574	80	120.0	32.02	66.14	34.12	77.63	2.28	1234
769	224	2/2003	Kinondoni	Bunju	M/s Lugemalila	6	36.661	39	7.188	100	60.0	47.60	50.78	3.18	34.67	10.90	3860
645	100	554/99	Kinondoni	Bunju - Kinondo	M/s P.M.O	6	39.515	39	6.442	90	100.0	dry	dry	dry	dry	dry	dry
717	172	174/2001	Kinondoni	Bunju 'A'	M/s Municipal	6	37.013	39	6.643	90	63.0	43.46	51.49	8.03	52.83	6.58	1256
700	155	27/2001	Kinondoni	Bunju B	M/s Mtenga	6	36.499	39	5.604	70	40.0	29.66	36.94	7.28	52.83	7.26	4120
618	73	185/99	Kinondoni	Chang'ombe	M/s Ngelime	6	50.720	39	15.755	55	39.0	7.53	23.35	15.82	36.67	2.32	2047
567	22	65/97	Kinondoni	Dar Brew	Dar Brew	6	47.736	39	12.701	60	66.0	9.78	22.4	12.62	132.00	10.46	2030
584	39	12/98 B	Kinondoni	External	Mrs. Kiwayo	6	48.480	39	12.526	48	42.0	9.62	23.6	13.98	26.33	1.88	2460
589	44	288/98	Kinondoni	Goba	TATEDO	6	43.944	39	11.488	50	80.0	16.8	24.5	7.70	33.00	4.29	778
552	7	68/97	Kinondoni	K.ndoni Ally Maua	CIP	6	47.306	39	14.605	40	50.0	19.41	28.22	8.81	60.59	6.88	2190
724	179	279/2001	Kinondoni	K/ Mkwajuni	M/s Jesca & Frank	6	47.841	39	15.767	30	30.0	8.4	16.98	8.58	88.00	10.26	676
710	165	130/2001	Kinondoni	Kagera Friends Kona	M/s DAWASA	6	47.939	39	14.508	30	42.4	12.24	30.2	17.96	66.00	3.67	_
617	72	181/99	Kinondoni	Kagera maluwi	M/sNdugumbi	6	47.964	39	14.866	50	60.0	10.86	12.9	2.04	264.00	129.41	2020
734	189	382/2001	Kinondoni	Kawe	M/s Kambarage J. AC	6	43.444	39	13.371	60	50.0	14.95	17.88	2.93	440.00	150.17	8610
812	267	54/2004	Kinondoni	Kawe	M/s N.A Wolf	6	43.800	39	14.042	35	16.0	1.63	10.50	8.87	79.12	8.92	2140
798	253	378/2003	Kinondoni	Kawe Garden (Municipal)		6	41.957	39	12.716	15	22.0	10.96	17.34	6.38	33.00	5.17	1622
611	66	115/99 B	Kinondoni	Kibaha Maili moja	M/s UNDP	6	45.500	38	55.074	145	60.0	4.08	15.34	11.26	342.83	30.45	900
675	130	239/2000	Kinondoni	Kibangu	M/s Municipal	6	47.873	39	12.079	80	40.0	23.2	34.06	10.86	8.50	0.78	1423
568	23	51/97	Kinondoni	Kibuku	Dar Brew	6	47.631	39	12.659	60	63.0	9.62	22.99	13.37	30.00	2.24	2350
569	24	39/97	Kinondoni	Kigogo	NR	6	49.097	39	14.376	35	34.0	7.1	14.3	7.20	440.00	61.11	1278
556	11	40/97	Kinondoni	Kijitonyama	DAWASA	6	46.325	39	14.316	50	50.0	12.78	28.33	15.55	92.31	5.94	5010
744	199	121/2002	Kinondoni	Kijitonyama	M/s C. Mkony	6	46.305	39	14.333	50	60.0	6.1	11.24	5.14	97.00	18.87	4654
758	213	347/2002	Kinondoni	Kijitonyama	M/s Vumilia Elly	6	46.766	39	14.557	30	56.0	10.62	32.26	21.64	62.83	2.90	1692
782	237	207/2003	Kinondoni	Kijitonyama	N.s J. Mdoe	6	46.961	39	14.605	45	40.0	11.6	37.1	25.50	29.33	1.15	4680
800	255	439/2003	Kinondoni	Kijitonyama	M/s Ngombale	6	43.701	39	13.399	45	45.0	11.10	19.20	8.10	240.00	29.63	836
642	97	427/99	Kinondoni	Kilungule	M/s Dissa	6	48.632	39	10.550	85	40.0	14.70	25.80	11.10	14.69	1.32	2280
748	203	165/2002	Kinondoni	Kilungule	M/s Lupimo	6	47.844	39	10.628	110	68.4	30.25	32.21	1.96	264.00	134.69	3500
801	256	455/2003	Kinondoni	Kiluvya	M/s A.H. Mbaga	6	47.792	39	0.571	130	60.0	15.3	42.13	26.83	188.57	7.03	1235
588	43	138/98	Kinondoni	Kimara	Mr. Lumbanga	6	47.458	39	10.145	115	51.0	9.20	27.00	17.80	36.92	2.07	9150
681	136	313/2000	Kinondoni	Kimara Baruti	M/s Madesho	6	47.760	39	11.523	85	40.0	6.60	18.20	11.60	28.35	2.44	7980
597	52	16/99	Kinondoni	Kinduchi Mtongani	M/s Machuve	6	41.155	39	12.304	60	33.0	20.7	29.9	9.20	264.00	28.70	14030
605	60	75/99	Kinondoni	Kinondoni	M/s Gugu	6	47.777	39	16.018	35	30.0	9.41	17.64	8.23	220.00	26.73	1692
666	121	162/2000	Kinondoni	Kinondoni	M/s Msikiniti	6	47.347	39	16.089	30	35.0	5.85	9.35	3.50	132.00	37.71	4890
596	51	37/97	Kinondoni	Kinondoni Pr. School	DAWASA	6	47.285	39	15.690	35	30.0	6.55	7.70	1.15	480.00	417.39	696
692	147	431/2000	Kinondoni	Sinza	M/s Mbaga	6	46.492	39	13.380	35	33.0	1.00	8.25	7.25	28.78	3.97	1300
550	5	14/97	Kinondoni	Lugalo Barracks	DAWASA	6	44.242	39	13.190	45	40.0	21	25.51	4.51	84.00	18.63	4520
562	17	67/97	Kinondoni	M. Nyamala Pr.	DAWASA	6	47.184	39	15.011	60	30.0	9.05	16.58	7.53	428.33	56.88	1221
701	156	48/2001	Kinondoni	M/ Nyamala Kisiwani	M/s Msikitini	6	47.633	39	15.296	55	38.0	11.05	13.60	2.55	52.17	20.46	1220
742	197	93/2002	Kinondoni	Mabibo	M/s NSSF	6	48.443	39	12.540	45	67.0	14.6	63.4	48.80	6.67	0.14	0
658	113	74/2000	Kinondoni	Mabibo External	M/s Mndolwa	6	48.444	39	12.535	61	40.5	9	35.76	26.76	20.50	0.77	1254
779	234	164/2003	Kinondoni	Mabibo Luhanga	M/s E.Mboya	6	48.845	39	14.060	60	40.0	16.45	17.50	1.05	141.20	134.48	2850
600	55	25/99	Kinondoni	Mabibo Makubuli	M/s Mhamilawa	6	48.900	39	12.765	30	36.0	8.98	36.37	27.39	52.83	1.93	5120
650	105	579/99	Kinondoni	Mabwepande	M/s Jairo	6	39.455	39	6.066	100	48.0	36.00	45.00	9.00	10.21	1.13	5680
726	181	316/2001	Kinondoni	Madale	M/s DAWASA	6	41.531	39	7.975	115	102.0	54.7	70.15	15.45	146.67	9.49	3730
590	45	24/98	Kinondoni	Magomeni	Mr. Mbaruku	6	48.073	39	15.060	50	33.0	dry	dry	dry	dry	dry	dry
608	63	110/99	Kinondoni	Magomeni	M/s Ndugumbi Mosque	6	48.092	39	15.223	30	37.0	11.2	26.57	15.37	88.00	5.73	2790
558	13	29/97	Kinondoni	Magomeni Garden	DAWASA	6	48.363	39	15.543	27	43.0	1.94	6.22	4.28	440.00	102.80	753
802	257	459/2003	Kinondoni	Makoka	M/s R. Shirima	6	48.267	39	11.290	80	50.0	dry	dry	dry	dry	dry	dry
789	244	275/2003	Kinondoni	Makoka	M/s A.N Munishi	6	48.493	39	11.097	120	40.0	13.8	20.6	6.80	91.67	13.48	4080

Table 6.3 Results of Existing Well Survey in Dar es Salaam, Location and Hydrogeology (4/7)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
815	270	31/2004	Kinondoni	Makuburi	M/s Hassan Abdul	6	48.718	39	12.616	80	50.0	14.54	50.1	35.56	36.67	1.03	1227
786	241	256/2003	Kinondoni	Makuburi	M/s Teresia Jordan	6	48.645	39	12.664	80	50.0	12.05	36.1	24.05	30.00	1.25	1854
793	248	306/2003	Kinondoni	Makuburi II	M.s RC Mission	6	48.675	39	12.809	51	50.0	27.50	31.00	3.50	41.32	11.81	3150
660	115	82/2000	Kinondoni	Manzese	M/s Midland Bar	6	48.390	39	15.554	40	40.0	11.20	23.40	12.20	11.50	0.94	1980
749	204	284/2002	Kinondoni	Manzese	M/s Miyedu	6	48.023	39	13.967	40	51.0	22.90	25.60	2.70	16.50	6.11	4440
777	232	108/2003	Kinondoni	Manzese	M/s R. C Mission	6	47.731	39	13.657	30	50.0	13.32	27.50	14.18	104.35	7.36	4050
816	271	57/2004	Kinondoni	Manzese	M/s Danda	6	47.998	39	14.012	40	50.0	6.15	15.94	9.79	25.26	2.58	2800
754	209	251/2002	Kinondoni	Manzese TipTop	M/s D. P. Tarimo	6	49.098	39	14.384	46	40.0	8.7	46.18	37.48	60.00	1.60	4350
745	200	125/2002	Kinondoni	Masaki	M/s Kabisa	6	44.980	39	16.688	40	15.0	3.41	9.18	5.77	37.67	6.53	23300
747	202	34/2002	Kinondoni	Masaki	M/s Posta	6	46.170	39	16.620	30	15.0	7.02	9.1	2.08	203.00	97.60	4280
761	216	368/2002	Kinondoni	Masaki	M/s Bargat	6	47.735	39	12.696	61	20.0	12.3	14.05	1.75	94.50	54.00	13480
572	27	125/98	Kinondoni	Masjid Ladwa	The african relief comm.	6	47.139	39	15.718	35	30.0	5.76	23.45	17.69	120.00	6.78	3290
740	195	78/2002	Kinondoni	Mavurunza	M/s M. Mringo	6	48.977	39	9.371	115	50.0	15.45	42.1	26.65	28.67	1.08	4890
684	139	350/2000	Kinondoni	Tegeta Kilimahewa	M/s Ngamilo	6	40.558	39	10.580	70	60.0	16.42	26.5	10.08	120.00	11.90	2156
623	78	268/99	Kinondoni	Mbagala Nzasa V	M/s Mhando	6	55.136	39	15.641	70	54.0	6.1	19.6	13.50	471.50	34.93	311
578	33	97/98	Kinondoni	Mbezi Beach	M/s G. Nsanya	6	43.548	39	12.692	65	39.0	15.3	27.17	11.87	110.00	9.27	9500
818	273	15/2004	Kinondoni	Mbezi Beach	M/s Dr. Mohamed	6	43.211	39	13.456	15	40.0	11.20	20.98	9.78	28.24	2.89	1166
582	37	159/98	Kinondoni	Mbezi Msakuzi	L.D Lyana	6	44.542	39	5.200	140	30.0	dry	dry	dry	dry	dry	dry
819	274	47/2004	Kinondoni	Mbezi Suka	M/s P.Ngoma	6	48.073	39	8.725	125	39.0	18.40	29.36	10.96	41.00	3.74	845
807	262	616/2003	Kinondoni	Mbezi Temboni	M/s Make Interprises	6	46.611	39	8.219	120	60.0	11.34	17.26	5.92	264.00	44.59	571
714	169	156/2001	Kinondoni	Mbuju B	M/s Shuma	6	36.475	39	5.524	30	56.0	24.22	26.05	1.83	146.67	80.15	2340
676	131	258/2000	Kinondoni	Mburahati	M/s Municipal	6	48.023	39	13.967	40	41.0	10.72	14.3	3.58	120.00	33.52	3990
707	162	78/2001	Kinondoni	Mburahati	M/s KKKT	6	42.550	39	13.787	70	40.0	11.41	27.88	16.47	6.67	0.40	4270
727	182	319/2001	Kinondoni	Mburahati	M/s Mathew	6	48.638	39	14.191	50	38.0	13.27	35.2	21.93	24.43	1.11	3050
806	261	615/2003	Kinondoni	Mikicheni	M/s T VT	6	46.257	39	14.302	50	46.0	13.3	20.16	6.86	264.00	38.48	1365
799	254	392/2003	Kinondoni	Mikocheni	M/s Alpher Dry Cleaner	6	46.022	39	14.181	30	32.0	10.04	19.7	9.66	220.00	22.77	3410
606	61	108/99	Kinondoni	Mlalakuwa	M/s JKT	6	43.724	39	12.828	20	21.0	6.21	14.12	7.91	52.80	6.68	4440
712	167	175/2001	Kinondoni	Mpiji - Mbweni	M/s Municipal	6	35.505	39	6.823	50	27.0	13.08	16.07	2.99	94.33	31.55	1286
821	276	17/2004	Kinondoni	Msasani B.Club	M/s JWTZ	6	44.590	39	14.386	50	11.0	2.25	7.22	4.97	52.80	10.62	3340
616	71	161/99	Kinondoni	Msasani Hospital	UNICEF	6	45.998	39	16.267	15	12.0	2.3	7.66	5.36	95.00	17.72	1100
672	127	213/2000	Kinondoni	Msewe	M/s mama Songoro	6	46.918	39	11.481	95	39.0	4.46	31.1	26.64	66.00	2.48	4630
620	75	194/99	Kinondoni	Mtoni Kijichi Primary	Kijichi Pr. School	6	53.203	39	16.879	52	50.0	25.61	33.65	8.04	146.67	18.24	1102
685	140	373/2000	Kinondoni	Muongozo	M/s Mutalemwa	6	35.162	39	4.380	70	30.0	10.97	11.44	0.47	120.00	255.32	964
664	119	141/2000	Kinondoni	Mwananyamala	M/s Msikitini	6	47.092	39	14.820	60	40.0	7.45	8.34	0.89	132.00	148.31	481
757	212	345/2002	Kinondoni	Mwananyamala	M/s Masjid Kidile	6	47.793	39	15.174	50	40.0	5.97	12.96	6.99	69.50	9.94	2050
774	229	34/2003	Kinondoni	Mwenge	M/s Bamaga P. Station	6	48.714	39	12.620	50	50.0	12.50	12.80	0.30	120.00	400.00	1822
549	4	52/97	Kinondoni	Mwenge Pr. School	DAWASA	6	46.191	39	13.981	45	40.0	9.39	24.85	15.46	112.83	7.30	2258
555	10	106/97	Kinondoni	Mzimuni Pr. School	DAWASA	6	48.687	39	15.487	45	46.0	9.7	25.14	15.44	200.00	12.95	1853
794	249	312/2003	Kinondoni	Ocean Road	M/s Gvt Chemist	6	48.677	39	17.805	8	11.0	5.77	6.85	1.08	46.15	42.73	336
678	133	261/2000	Kinondoni	Pugu Primary School	M/s Pugu Pr School	6	53.977	39	7.584	165	55.0	29.27	39.39	10.12	15.50	1.53	1152
654	109	17/2000	Kinondoni	Riverside	M/s Amon Enter	6	48.237	39	12.279	70	40.5	6.61	12.28	5.67	132.00	23.28	3180
687	142	380/2000	Kinondoni	Wazo Hill	M/s Chimbyangu	6	40.156	39	10.541	55	60.0	32.00	34.00	2.00	135.85	67.93	1719
668	123	192/2000	Kinondoni	Sinza	M/s Bishubo	6	43.444	39	13.370	85	20.0	9.14	17.78	8.64	120.00	13.89	1787
763	218	439/2002	Kinondoni	Sinza	M/s Epimark S. Makoi	6	47.193	39	13.653	80	26.0	9.50	10.30	0.80	17.22	21.53	1778
804	259	610/2003	Kinondoni	Sinza	M/s Chisanga	6	46.983	39	13.841	50	46.0	5.78	6.21	0.43	240.00	558.14	1635
570	25	125/97	Kinondoni	St. Peters	DAWASA	6	46.843	39	16.483	22	30.0	9.30	9.45	0.15	67.92	452.80	3390
643	98	459/99	Kinondoni	Tabata Kisiwani	M/s Temu	6	49.160	39	13.027	55	38.0	18.43	35.10	16.67	27.00	1.62	2460
625	80	306/99	Kinondoni	Tabata Kisukulu	M/s DWS	6	49.156	39	13.023	70	56.0	4	25.3	21.30	200.00	9.39	0
690	145	391/2000	Kinondoni	Ubungo Bus Terminal	M/s City	6	47.504	39	12.609	70	62.0	9.11	44.46	35.35	165.00	4.67	1077
622	77	253/99	Kinondoni	Tabata Shuleni	M/s DWS	6	49.835	39	13.592	60	43.0	14.78	23.74	8.96	220.00	24.55	5270
683	138	349/2000	Kinondoni	Kawe	M/s Nsekela	6	44.634	39	13.955	70	18.0	8.26	11.83	3.57	120.00	33.61	1121
577	32	103/98	Kinondoni	Tandale	Bakwata	6	47.093	39	14.821	65	40.0	6.6	9.41	2.81	132.00	46.98	2210
725	180	281/2001	Kinondoni	Tandale	M/s Chocks	6	47.747	39	14.349	25	67.0	15.12	38.39	23.27	188.56	8.10	2590

Table 6.3 Results of Existing Well Survey in Dar es Salaam, Location and Hydrogeology (5/7)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
729	184	326/2001	Kinondoni	Tandale	M/s DAWASA	6	47.601	39	14.524	45	40.0	9.83	36.79	26.96	44.00	1.63	1480
805	260	612/2003	Kinondoni	Tandale	M/s Saleh H. Sagala	6	47.687	39	14.498	50	40.0	13.93	21.70	7.77	32.50	4.18	1121
795	250	315/2003	Kinondoni	Tandale kwa Tumbo	M/s Municipal	6	47.564	39	14.601	30	60.0	8.18	42.45	34.27	88.00	2.57	2230
730	185	328/2001	Kinondoni	Tandale Police Post	M/s DAWASA	6	47.602	39	14.524	30	50.0	11.10	23.70	12.60	67.29	5.34	2360
752	207	300/2002	Kinondoni	Tangibovu	M/s Mboma	6	43.699	39	13.397	35	30.0	15.55	19.98	4.43	62.83	14.18	2160
651	106	2/2000	Kinondoni	Teta - Mpigi	M/s Muwandu	6	35.917	39	6.937	55	21.0	12.58	17.45	4.87	132.00	27.10	4350
688	143	382/2000	Kinondoni	Teta- Mpiji	M/s Katakweba	6	39.760	39	4.231	95	69.0	26.32	35.46	9.14	330.00	36.11	7620
554	9	296/97	Kinondoni	Tondoloni (Kiluvya)	Prime Minister	6	49.062	38	59.726	160	37.0	11.85	18.86	7.01	82.29	11.74	1344
780	235	204/2003	Kinondoni	Town Centre	M/s Mipango	6	49.068	39	17.802	22	15.0	8.5	10.92	2.42	77.67	32.09	1065
627	82	327/99	Kinondoni	Turiani pr. School	DAWASA	6	48.167	39	15.302	30	39.0	7.23	14.69	7.46	206.33	27.66	1304
689	144	390/2000	Kinondoni	Tete-Mpigi	M/s Mahatene	6	35.559	39	7.392	40	30.0	10.52	27.1	16.58	80.00	4.83	7660
648	103	570/99	Kinondoni	Ubongo Kisiwani	M/s Ipembe	6	48.199	39	12.403	55	40.0	8.61	20.4	11.79	101.50	8.61	3540
722	177	255/2001	Kinondoni	Ubungo External	M/s Mussa	6	48.899	39	12.766	50	40.0	25.30	38.90	13.60	46.40	3.41	6530
573	28	363/98	Kinondoni	Ubungo Kibangu	UIHS	6	48.280	39	12.303	54	42.0	dry	dry	dry	dry	dry	dry
595	50	21/97	Kinondoni	Ubungo Maji	DAWASA	6	47.448	39	12.359	105	70.0	30.27	64	33.73	70.00	2.08	8220
652	107	8/2000	Kinondoni	Ubungo marian&Faith	M/s Marian & Faith H.C	6	47.537	39	11.284	98	40.5	11.79	26.58	14.79	120.00	8.11	2015
669	124	193/2000	Kinondoni	Ubungo Mwisho	M/s TANESCO	6	47.610	39	11.327	90	35.0	13.05	24.10	11.05	46.75	4.23	3360
825	280	74/2004	Kinondoni	Upanga	M/s M. Defence	6	48.225	39	16.853	23	32.0	6.63	10.17	3.54	293.33	82.86	746
775	230	39/2003	Kinondoni	Wazo Hill	M/s Hon. Makamba	6	40.526	39	10.455	70	54.0	18.2	20.19	1.99	330.00	165.83	1654
622	77	187/97	Kinondoni	Tabata Shuleni	M/s CIP	6	50.005	39	13.604	55	48.0	20.42	34.53	14.11	106.09	7.52	1632
		26/2003	Kinondoni	Kimar-Baruti	L.Msangi	6	47.076	39	11.341	70	58.0	dry	dry	dry	dry	dry	dry
		82/2002	Kinondoni	Mbezi beach	Mr Msole	6	42.550	39	13.787	50	6.0	dry	dry	dry	dry	dry	dry
		54/2000	Kinondoni	Sinza	Mbuguma	6	47.198	39	14.006	40	40.0	1.94	9.95	8.01	94.30	11.77	1795
		319/2000	Kinondoni	Ubungo	Mr Mbawala	6	47.463	39	12.639	80	60.0	13.50	17.40	3.90	141.70	36.33	940
997	172	379/2000	Temeke	Yombo	M/sMasamu	6	53.327	39	11.228	70	40.0	11.23	36.10	24.87	17.67	0.71	1390
1000	175	399/2000	Temeke	Bunju	M/s Miraji	6	52.796	39	17.468	25	60.0	12.42	24.3	11.88	264.00	22.22	
1095	270	33/2003	Temeke	Buza	M/s Mruta	6	53.410	39	14.442	70	40.0	15.62	21.59	5.97	60.00	10.05	290
1116	291	309/2003	Temeke	Buza	M/s Mwaijange	6	53.717	39	14.437	70	50.0	19.90	21.88	1.98	78.26	39.53	328
1137	312	174/2004	Temeke	Buza	B.L. Nkalyamunu	6	54.131	39	13.951	21	60.0	15.19	59.90	44.71	18.30	0.41	821
827	2	115/97	Temeke	C.C.M Kivukoni	DAWASA	6	49.730	39	18.052	9	24.0	16.15	22.50	6.35	69.90	11.01	915
993	168	356/2000	Temeke	Chalamba Msikitini	M/s Mbagala Disp	6	54.205	39	16.031	60	50.0	14.73	20.92	6.19	120.00	19.39	674
881	56	98/98	Temeke	Chamazi	Dr. Kilonzo	6	57.106	39	13.321	75	37.5	10.83	21.08	10.25	20.30	1.98	265
1138	313	64/2004	Temeke	Chamazi	M/s E.J. Mlay	6	55.999	39	13.728	80	60.0	20.25	48.68	28.43	26.40	0.93	779
1038	213	205/2001	Temeke	Changombe	M/s T.T.C	6	50.868	39	16.409	32	50.0	9.56	13.65	4.09	188.50	46.09	698
1081	256	326/2002	Temeke	Chang'ombe	M/s A. Breweries	6	51.141	39	15.949	30	56.0	8.58	16.28	7.70	264.00	34.29	716
1097	272	41/2003	Temeke	Chang'ombe	M/s Plasco	6	50.628	39	15.650	40	50.0	7.6	26.33	18.73	110.00	5.87	556
1108	283	253/2003	Temeke	Chang'ombe	M/s VETA	6	50.085	39	16.219	30	60.0	14.70	33.70	19.00	135.83	7.15	622
1002	177	428/2000	Temeke	Gongo la mboto	M/s Ngonyani	6	51.578	39	14.590	29	40.0	16.00	35.45	19.45	200.00	10.28	351
859	34	120/97	Temeke	Tandika	DAWASA	6	52.150	39	15.582	52	54.0	17.05	34.1	17.05	77.50	4.55	5490
851	26	98/97	Temeke	Keko Prison	DAWASA	6	50.489	39	16.562	25	52.0	12.96	19.30	6.34	203.39	32.08	924
951	126	552/99	Temeke	Kibada	M/s Commisioner	6	53.945	39	20.613	80	40.0	14.16	18.44	4.28	146.67	34.27	540
836	11	198/97	Temeke	Kibada Hospital	RED CROSS	6	53.351	39	20.240	60	42.0	26.66	28.66	2.00	86.67	43.33	1200
1089	264	454/2002	Temeke	Kibangulile	M/s WEPMO	6	55.563	39	16.591	70	50.0	18.05	36.61	18.56	28.35	1.53	986
863	38	114/97	Temeke	Kibasila	DAWASA	6	51.206	39	16.050	45	39.0	3.5	9.05	5.55	411.67	74.17	720
916	91	196/99	Temeke	Kibugumo	Kibugumo	6	52.212	39	22.610	30	30.0	5.08	19.1	14.02	330.00	23.54	1046
1114	289	286/2003	Temeke	Kiburugwa	M/s Magongo	6	55.108	39	15.674	85	60.0	8.55	21.12	12.57	165.00	13.13	432
1139	314	Feb-04	Temeke	Kiburugwa	M/s Mathew Kawa	6	55.079	39	15.283	70	60.0	15.20	36.15	20.95	165.00	7.88	309
1066	241	85/2002	Temeke	Kigamboni	M/s Umawa	6	49.860	39	19.209	35	40.0	12.08	13.15	1.07	377.17	352.49	2010
933	108	275/99	Temeke	Kilakala Pr. School	M/s DWS	6	52.506	39	14.704	55	60.0	2.6	29.26	26.66	88.00	3.30	469
1142	317	Jan-04	Temeke	Kipunguni II	M/s Anselm	6	53.087	39	11.318	48	56.0	16.70	29.13	12.43	78.77	6.34	_
952	127	553/99	Temeke	Kisarawe II	M/s City Comm	6	53.945	39	20.613	80	48.0	30.45	39.9	9.45	33.00	3.49	2913
1104	279	161/2003	Temeke	Kitunda	M/s A. Range	6	54.264	39	13.474	70	60.0	22.74	60.00	37.26	13.30	0.36	288
1087	262	444/2002	Temeke	Kiwalani	M/s Mandawa	6	51.642	39	13.916	55	50.0	15.2	31.97	16.77	53.33	3.18	1694
1030	205	159/2001	Temeke	Kizuiani Pr. School	M/s E.O.T.F	6	54.648	39	16.521	80	53.0	11.55	31.96	20.41	188.50	9.24	592

Table 6.3 Results of Existing Well Survey in Dar es Salaam, Location and Hydrogeology (6/7)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
1119	294	329/2003	Temeke	Kongowe	M/s TPC	6	57.539	39	17.127	65	60.0	25.35	57.42	32.07	7.33	0.23	496
1143	318	83/2004	Temeke	Kongowe	M/s Fidea Njoka	6	57.439	39	17.037	80	60.0	21.10	51.1	30.00	73.33	2.44	605
1023	198	136/2001	Temeke	Kurasini	M/s Chuo cha Diplomasia	6	51.168	39	16.909	50	38.0	11.71	17.30	5.59	93.51	16.73	339
1133	308	627/2003	Temeke	Kurasini	M/s Mradi wa Maji	6	51.229	39	17.086	45	50.0	10.55	13.93	3.38	171.43	50.72	320
1144	319	50/2004	Temeke	Kurasini	M/s Police main S.	6	50.856	39	17.043	60	42.3	4.00	19.12	15.12	264.00	17.46	428
1124	299	375/2003	Temeke	M. gala Kiburugwa	M/s Mwankusye	6	54.923	39	15.802	75	54.0	9.85	29.06	19.21	88.00	4.58	819
924	99	249/99	Temeke	M.gala kibonde maji	Mama Kafumba	6	54.566	39	16.560	90	53.0	6.25	29.25	23.00	220.00	9.57	583
1003	178	460/2000	Temeke	Mabibo Jeshini	M/s Q Master	6	48.875	39	13.654	43	58.0	11.03	29.85	18.82	335.00	17.80	658
1034	209	308/2001	Temeke	Madale	M/s Sekirasa	6	40.680	39	8.180	135	71.0	50.32	57.24	6.92	82.50	11.92	2910
857	32	159/97B	Temeke	Maji Kurasini	DAWASA	6	50.281	39	17.287	20	32.0	13	14.15	1.15	220.00	191.30	50
846	21	53/97	Temeke	Maji -Temeke	DAWASA	6	51.454	39	15.808	55	27.0	2.58	9.19	6.61	240.00	36.31	496
1118	293	325/2003	Temeke	Majimatitu II	H.N. School	6	56.710	39	14.688	95		40.34	64.18	23.84	7.75	0.33	1550
1112	287	278/2003	Temeke	Makangarawe	M/s DAWASA	6	53.051	39	14.748	50	50.0	17.64	41.12	23.48	264.00	11.24	925
1025	200	147/2001	Temeke	Mbagala Charambe	M/s Mandile	6	55.904	39	15.602	80	60.0	21	26.32	5.32	110.00	20.68	1014
992	167	355/2000	Temeke	Mbagala Dispensary	M/s Tandika Msikitini	6	51.840	39	15.501	60	45.0	20.30	29.84	9.54	144.00	15.09	1069
1130	305	461/2003	Temeke	Mbagala II	M/s Nyange	6	52.720	39	14.783	44	44.0	23.00	25.50	2.50	78.00	31.20	1819
1032	207	163/2001 B	Temeke	Mbagala Kibangulile	M/s E.O.T.F	6	55.530	39	16.928	60	70.0	14.35	20	5.65	188.50	33.36	3150
1106	281	202/2003	Temeke	Mbagala Kibonde Maji	M/s Mwangu	6	54.390	39	16.710	65	54.0	20.10	36.30	16.20	51.43	3.17	1109
1045	220	285/2001	Temeke	Mbagala Kiburugwa	M/s Lusinde	6	54.582	39	15.787	75	36.0	11	18.83	7.83	146.67	18.73	501
1039	214	206/2001	Temeke	Mbagala Kichemchem	M/s Consultant	6	54.410	39	17.650	70	78.0	15.71	28.79	13.08	220.00	16.82	223
1084	259	367/2002	Temeke	Mbagala Kuu	M/s F. Kisaka	6	54.219	39	16.881	65	50.0	27.53	46.00	18.47	30.90	1.67	2870
1100	275	59/2003	Temeke	Mbagara	M/s Alfa Match	6	54.791	39	16.076	70	50.0	17.9	36.15	18.25	194.67	10.67	510
975	150	212/2000	Temeke	Mbande	M/s Municipal	6	58.621	39	12.770	65	40.0	7.3	8.93	1.63	66.00	40.49	738
1019	194	75/2001	Temeke	Mbande	M/s Makaka	6	58.825	39	12.468	77	51.0	17.4	32.96	15.56	30.67	1.97	571
983	158	257/2000	Temeke	Mburahati	M/s Nassor	6	48.330	39	14.298	35	35.0	16.20	25.95	9.75	36.00	3.69	2580
1058	233	29/2002	Temeke	Mgulani	M/s JWTZ	6	51.243	39	16.325	50	43.0	7.81	10.13	2.32	331.67	142.96	931
1076	251	215/2002	Temeke	Mgulani	M/s Jitegemee Sec.	6	51.223	39	16.773	30	56.0	4.82	16.4	11.58	264.00	22.80	436
1145	320	30/2004	Temeke	Mikoroshoni	M/s Sandali P. Sch.	6	51.384	39	14.692	45	44.0	15.30	29.13	13.83	165.00	11.93	567
1040	215	209/2001	Temeke	Mjimwema	M/s A. Ngololo	6	51.804	39	20.918	55	25.0	14.7	22.18	7.48	94.33	12.61	1004
1057	232	24/2002	Temeke	Mjimwema	M/s Ndamagi	6	51.554	39	20.900	25	30.0	13.5	18.1	4.60	220.00	47.83	733
1007	182	483/2000	Temeke	Mtoni Kijichi	M/s Machile	6	53.037	39	17.697	35	65.0	23.24	27.22	3.98	110.00	27.64	162
1063	238	55/2002	Temeke	Mtoni Kijichi	M/s Mwanyika	6	52.873	39	17.645	45	50.0	9.04	19.85	10.81	132.00	12.21	204
1128	303	438/2003	Temeke	Mtoni Kijichi	M/s Kamugisha	6	53.120	39	18.233	16	45.0	18.78	22.17	3.39	220.00	64.90	1230
985	160	263/2000	Temeke	Mtoni kwa Aziz Ally	M/s Jingu	6	51.350	39	16.860	21	39.0	13	17	4.00	120.00	30.00	813
978	153	216/2000	Temeke	Mtoni Sabasaba	M/s B.E.T	6	51.767	39	16.691	37	42.0	15.56	16.52	0.96	132.18	137.69	577
921	96	229/99	Temeke	Mtoni Kijichi	M/s DWS	6	52.916	39	17.100	55	50.0	15.44	28.39	12.95	70.00	5.41	363
1043	218	260/2001	Temeke	Mvuti	M/s John	7	1.362	39	7.693	93	40.0	27.20	32.20	5.00	75.00	15.00	4012
1075	250	33/2002	Temeke	Mwanamsekwa	M/s Manispaa	6	55.383	39	20.380	75	50.0	15.71	31.40	15.69	63.71	4.06	316
974	149	211/2000	Temeke	Mwanamtoti	M/s Municipal	6	53.716	39	16.950	63	51.0	dry	dry	dry	dry	dry	dry
906	81	86/99	Temeke	Mwembe yanga	M/s UNDP	6	51.620	39	15.500	25	53.0	4.1	10.47	6.37	1015.33	159.39	1258
1070	245	269/2002	Temeke	Mwembeladu	M/s Manispaa	6	51.583	39	15.200	60	52.0	9.14	10.48	1.34	293.33	218.91	986
1121	296	331/2003	Temeke	National Std	M/s C.S Police	6	51.266	39	16.316	60	50.0	10.55	24.7	14.15	330.00	23.32	573
82	856	DDCA	9	Temeke	Navy Kigamboni	6	49.800	39	18.440	30	21.0	9.15	10.4	1.25	249.00	199.20	986
979	154	235/2000	Temeke	Njaro	M/s C.B.H.C.C	6	51.170	39	15.350	65	42.0	6.76	9.1	2.34	120.00	51.28	788
1046	221	341/2001	Temeke	Nzasa	M/s Basati Mavula	6	54.900	39	15.066	58	52.0	24.94	31.1	6.16	26.33	4.27	2347
828	3	33/97	Temeke	Police Barracks	DAWASA Task Force	6	50.915	39	16.588	29	10.0	10.9	15.87	4.97	330.00	66.40	500
838	13	102/97	Temeke	RTD II	DAWASA	6	50.63	39	14.813	55	27.0	10.02	21.14	11.12	25.76	2.32	4210
914	89	189/99	Temeke	Segerea	M/s Nyange	6	55.907	39	14.715	16	46.0	20.19	23.31	3.12	101.67	32.59	207
996	171	375/2000	Temeke	Tabata Kisiwani	M/s Kisamo	6	51.238	39	17.760	50	45.0	14.60	16.75	2.15	50.04	23.27	894
994	169	357/2000	Temeke	Tabata Kisukulu	M/s C. rambe msikitini	6	55.422	39	15.600	85	70.0	14.05	36.4	22.35	110.00	4.92	643
1015	190	45/2001	Temeke	Tandika	M/s Islamic School	6	51.788	39	15.633	41	38.0	21.50	25.50	4.00	51.28	12.82	926
1086	261	435/2002	Temeke	Tandika	M/s Watoto Yatima	6	51.800	39	15.300	28	60.0	11.8	29.37	17.57	146.67	8.35	955
1085	260	396/2002	Temeke	Tazara	M/s City Director	6	50.983	39	15.383	55	60.0	12.00	49.00	37.00	111.10	3.00	922
1031	206	161/2001	Temeke	Temeke Mikoroshini	M/s E.O.T.F	6	51.461	39	14.951	75	56.0	10.78	13.56	2.78	188.50	67.81	643

Table 6.3 Results of Existing Well Survey in Dar es Salaam, Location and Hydrogeology (7/7)

No.		BH/No	District	Area/Village	Owner	Latitude		Longitude		GL	Depth	Water Level (mbgl)			Yield	Sc	Cond
Coast	Dist.					Deg.	Min.	Deg.	Min.	(masl)	(mbgl)	SWL	DWE	DD	(l/min)	(l/min/m)	(µS/cm)
984	159	262/2000	Temeke	Temeke NMC	M/s Makwega	6	51.116	39	15.783	33	41.0	12.93	13.55	0.62	120.00	193.55	769
946	121	378/99	Temeke	Temeke U. Taifa	M/s USAID	6	51.367	39	16.045	55	46.0	3.59	7.45	3.86	307.00	79.53	769
973	148	198/2000	Temeke	Tuwangoma	M/s Municipal	6	56.120	39	18.650	95	50.0	dry	dry	dry	dry	dry	dry
1074	249	276/2002	Temeke	Tuwangoma	M/s Manispaa	6	56.660	39	18.366	80	46.0	33.40	35.80	2.40	49.30	20.54	101
887	62	164/98	Temeke	Uwanja wa taifa	N.H.C	6	51.633	39	16.650	44	42.0	11.84	16.29	4.45	330.00	74.16	1348
1072	247	273/2002	Temeke	Veternary	M/s Adri	6	51.000	39	14.983	75	60.0	9.17	11.9	2.73	263.33	96.46	510
991	166	353/2000	Temeke	Vikawe	M/s Mama Mganda	6	58.800	39	12.500	72	70.0	13	29.98	16.98	110.00	6.48	217
842	17	10/97	Temeke	Vingunguti Guti	O.K Plast	6	51.086	39	13.144	65	37.0	9.5	14.1	4.60	157.17	34.17	617
925	100	250/99	Temeke	Viswe Chalambe	DAWASA	6	55.683	39	15.660	85	54.0	15.83	17.78	1.95	244.50	125.38	221
864	39	155/97	Temeke	Vosa Sec School	VOSA Sec School	6	57.139	39	17.472	40	42.0	12.60	21.00	8.40	86.00	10.24	1229
1113	288	283/2003	Temeke	Y. Dovya	M/s S. Tarimo	6	52.633	39	14.583	34	50.0	14	40.12	26.12	264.00	10.11	890
1129	304	442/2003	Temeke	Y/ Buza	M/s R. Mrama	6	53.092	39	14.174	35	46.0	19.53	31.14	11.61	56.00	4.82	584
1146	321	Mar-04	Temeke	Y/ Buza	M/s Mosi Hilary	6	53.758	39	13.964	47	60.0	13.50	40.21	26.71	132.00	4.94	239
1059	234	39/2002	Temeke	Yaleyale Puna	M/s Cost F	7	3.416	39	32.600	23	23.0	11.2	16.38	5.18	45.50	8.78	631
1060	235	41/2002	Temeke	Yaleyale Puna	M/s Howed	7	3.633	39	18.683	20	27.0	18.50	23.10	4.60	63.33	13.77	656
1120	295	330/2003	Temeke	Yombo	M/s Kikundi Siafu	6	52.460	39	14.490	31	60.0	15.35	46.43	31.08	188.57	6.07	475
947	122	390/99	Temeke	Yombo - Machimbo	M/s Rosemary	6	53.126	39	13.544	45	48.0	9.8	31.8	22.00	17.67	0.80	377
1022	197	135/2001	Temeke	Yombo Buza	M/s Renest	6	53.541	39	13.310	55	69.0	16.85	35.15	18.30	220.00	12.02	1248
873	48	48/98	Temeke	Yombo Dovya	M/s Kajuna	6	52.933	39	14.966	70	40.0	15.56	21.14	5.58	132.00	23.66	986
896	71	121/97	Temeke	Yombo Dovya	DAWASA	6	52.710	39	14.786	50	40.0	1.84	35.5	33.66	24.33	0.72	724
929	104	270/99	Temeke	Yombo Makangarawe	M/s DWS	6	53.213	39	14.580	60	60.0	10	17.87	7.87	264.00	33.55	683
1123	298	363/2003	Temeke	Yombo Vituka	M/s Mamale	6	52.850	39	13.424	60	52.0	8.72	42.00	33.28	54.00	1.62	967
932	107	273/99	Temeke	Yombo vituka sec School	M/s Kipawa	6	52.961	39	13.190	46	60.0	1.86	6.47	4.61	264.00	57.27	801

Table 6.4 Results of Existing Well Survey in Coast Region, Well Structure, Water Quality and Water Use (1/3)

Well Identification				Well Structure					Water Quality			Water Use							
No.		B/No	District	Depth	Dia. (inch)		Screen (mbgl)		Cond	pH	Temp.	No. of Per -son	Consumption Rate (m3/d)					Amount	Pump oper. hours
Coast	Dist.			(m)	BH	Cas -ing	Top	Bott -om	(µS/cm)		(℃)		Dome -stic	Live -stock	irriga -tion	Indu -stry	Others	(m^3/d)	
1	1	152/99	Bagamoyo	47.0	12	8	11.5	45.8	786	6.7	30.1	25		0.0	0.0	0.0	0.0	12.0	3
2	2	356/99	Bagamoyo	50.0	10	6	13.5	48.5	1520	7.2	28.2	3000	5.0	0.0	0.0	0.0	0.0	5.0	2
3	3	168/99	Bagamoyo	30.0	8	5	8.1	28.0	1163	7.3	27.3	900	37.8	2.3	5.0	0	2.3	47.4	12
4	4	146/99	Bagamoyo	40.0	8	6	9.0	37.0	970	7.8	30.0	20	1.0	0.0	0.0	0.0	0.0	1.0	12
5	5	247/99	Bagamoyo	30.0	8	6	14.3	28.3	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
6	6	498/2000	Bagamoyo	51.0	10	5	18.0	48.5	231	7.4	29.0	8	0.32	0.0	0.0	0.0	0.0	0.32	12
7	7	383/2001	Bagamoyo	75.0	8	5	20.5	70.5	133	7.8	29.5	4	3.1	0.0	6.0	0.0	0.0	9.1	4
8	8	323/2001	Bagamoyo	61.0	12	5	33.0	58.0	1230	7.5	30.0	6	8.6	0.0	0.0	0.0	0.0	8.6	4
9	9	324/2001	Bagamoyo	37.0	10	5	19.0	34.5	231	7.4	29.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
10	10	231/2001	Bagamoyo	34.0	10	5	7.5	32.5	170	7.3	30.9	0	0.0	0.0	0.0	0.0	0.0	0.0	0
11	11	88/2001	Bagamoyo	25.0	10	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
12	12	114/2001	Bagamoyo	28.0	10	5	9.0	25.0	670	7.1	28.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
13	13	169/2001	Bagamoyo	15.0	10	6	0.0	6.0	139	6.5	29.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0
14	14	163/2001	Bagamoyo	40.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
15	15	392/2002	Bagamoyo	50.0	10	5	_	_	432	7.3	30.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
16	16	153/2004	Bagamoyo	60.0	8	5	18.0	57.1	521	7.1	30.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0
17	17	32/60	Bagamoyo	92.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
18	18	12/63	Bagamoyo	18.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
19	19	48/68	Bagamoyo	35.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
21	21	11/69	Bagamoyo	152.0	8	6	_	_	1958	8.5	28.5	90	11.0	0.0	0.0	0.0	0.0	11.0	14
22	22	86/72	Bagamoyo	17.0	10	6	_	_	138	6.5	29.7	0	0.0	0.0	0.0	0.0	0.0	0.0	0
23	23	121/72	Bagamoyo	18.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
24	24	190/73	Bagamoyo	10.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
25	25	250/73	Bagamoyo	8.0	8	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
26	26	251/73	Bagamoyo	8.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
28	28	40/74	Bagamoyo	15.0	12	6	_	_	234	6.8	28.7	0	0.0	0.0	0.0	0.0	0.0	0.0	0
29	29	4/76	Bagamoyo	32.0	12	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
30	30	5/76	Bagamoyo	34.0	12	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
31	31	6/76	Bagamoyo	26.0	12	6	7.5	21.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
32	32	7/76	Bagamoyo	79.0	12	6	15.0	35.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
33	33	14/81	Bagamoyo	27.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
34	34	67/88	Bagamoyo	38.0	10	6	21.3	27.4	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
35	35	80/88	Bagamoyo	36.0	10	6	18.2	32.0	148	8.0	27.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0
36	36	130/91	Bagamoyo	23.0	8	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
37	37	309/2004	Bagamoyo	40.0	10	5	11.0	38.0	32120	8.2	26.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
38	1	98/99 B	Kibaha																
39	2	115/99	Kibaha	60.0	10	6	11.5	59.0	564	7.5	30.0	300	4.3	0.0	0.0	0.0	0.0	4.3	3
40	3	355/99	Kibaha	50.0	10	6	_	_	899	7.8	28.9	1500	10.3	0.0	0.0	0.0	0.0	10.3	8
41	4	412/99	Kibaha																
42	5	7/99	Kibaha	36.0	8	5	6.0	25.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
43	6	8/99	Kibaha	25.0	8	5	7.5	24.0	345	7.2	28.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0
44	7	414/99	Kibaha	30.0	9.875	6	12.8	28.0	456	6.8	29.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
45	8	354/99	Kibaha	50.0	15.5	6	16.0	47.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
46	9	352/99	Kibaha	50.0	9.88	6	17.7	46.0	565	6.6	28.8	0	0.0	0.0	0.0	0.0	0.0	0.0	0
47	10	415/99	Kibaha	50.0	12	6	13.5	46.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
48	11	413/99	Kibaha	42.0	10.63	6	13.0	38.0	690	78.0	28.9	0	0.0	0.0	0.0	0.0	0.0	0.0	0
49	12	410/99	Kibaha	32.0	10	6	11.5	29.5	328	7.9	28.6	250	10.0	0.0	0.0	0.0	0.0	10.0	12
50	13	473/99	Kibaha																
51	14	357/99	Kibaha	38.0	10	6	10.0	34.0	1137	6.8	28.9	100	4.0	0.0	0.0	0.0	0.0	4.0	12
52	15	411/99	Kibaha	50.0	9.875	6	11.0	47.0	1167	7.2	30.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0
53	16	41/99	Kibaha	40.0	8	4	7.0	22.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
54	17	21/2000	Kibaha	40.0	16	6	8.5	38.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
55	18	22/2000	Kibaha	50.0	16	6	11.5	47.5	216	7.6	28.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0
56	19	23/2000	Kibaha	30.0	9	6	_	_	1324	7.8	25.9	2500	40.0	0.0	0.0	0.0	0.0	40.0	12
57	20	24/2000	Kibaha	32.0	8.625	6	13.1	28.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
58	21	25/2000	Kibaha	60.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
59	22	26/2000	Kibaha	57.0	16	6	9.0	55.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
60	23	27/2000	Kibaha	60.0	16	6	11.0	55.0	333	7.9	30.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0
61	24	29/2000c	Kibaha	50.0	8	5	8.0	47.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
63	26	32/2000	Kibaha	30.0	8	6	10.0	28.0	446	7.2	28.6	250	15.0	0.0	0.0	0.0	0.0	15.0	12
64	27	34/2000	Kibaha	35.0	8	5	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
65	28	35/2000b	Kibaha																
66	29	37/2000	Kibaha	40.0	8.5	6	24.0	37.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
68	31	76/2000	Kibaha																
70	33	118/2000	Kibaha	40.0	14	6	5.8	27.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
71	34	119/2000	Kibaha																
74	37	144/2000	Kibaha																
75	38	369/2000	Kibaha																
76	39	370/2000	Kibaha	30.0	10	5	11.0	26.0	690	7.8	29.4	982	39.2	0.0	2.0	0.0	0.0	41.2	12
77	40	247/2001	Kibaha	71.0	9	5	16.0	67.0	1500	7.9	28.0	460	7.0	0.0	0.0	0.0	0.0	7.0	12
78	41	72/2001	Kibaha																
79	42	86/2001	Kibaha	80.0	10	5	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
80	43	89/2001	Kibaha																
81	44	90/2001	Kibaha	26.0	8	6	6.0	23.0	266	6.9	28.9	0	0.00	0.0	0.0	0.0	0.0	0.0	0
82	45	113/2001	Kibaha	81.0	8	6	10.0	75.0	168	7.9	30.2	0	0.00	0.0	0.0	0.0	0.0	0.0	0
83	46	119/2001	Kibaha																
84	47	168/2001	Kibaha																
85	48	170/2001	Kibaha	90.0	10	5	_	_	_	_	_	0	0.00	0.0	0.0	0.0	0.0	0.0	0
86	49	351/2002	Kibaha	67.0	8	5	_	_	250	6.9	25.9	10	1.00	6.0	8.0	0.0	0.0	15.0	12
90	53	10/72	Kibaha																
93	56	129/91	Kibaha	27.0	8	6	_	_	1231	6.1	26.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0
94	57	35/96	Kibaha	21.0	10	5	_	_	288	7.8	29.5	2790	20.0	0.0	0.0	0.0	0.0	20.0	12
97	60	209/98	Kibaha	78.0	8	5	12.0	75.0	1123	7.1	26.8	0	0.0	0.0	0.0	0.0	0.0	0.0	0
98	61	144/99	Kibaha	40.0	10	6	15.0	35.0	477	7.8	29.1	200	24.6	0.0	0.0	0.0	0.0	24.6	12
99	62	353/99	Kibaha	67.0	10	6	11.0	55.0	509	7.8	29.7	0	0.0	0.0	0.0	0.0	0.0	0.0	0
100	63	532/2004	Kibaha	60.0	8	5	15.5	58.5	1818	7.6	32.9	75	11.8	15.0	0.0	2.0	0.0	28.8	8
101	64	318/2004	Kibaha	60.0	8	5			_		_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
102	65	516/2004	Kibaha	60.0	8	5			596	6.2	30.9	50	6.4	0.0	0.0	0.0	0.0	6.4	5
103	66	525/2004	Kibaha	60.0	8	5	6.4	57.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
104	67	528/2004	Kibaha																
105	68	554/2004	Kibaha	60.0	8	6			592	6.4	32.2	50	6.0	0.0	15.0	0.0	0.0	21.0	9
106	1	498/99	Kisarawe	36.0	8	4	17.0	28.7	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
108	3	497/99	Kisarawe	52.0	8	4	31.5	45.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0

Table 6.4 Results of Existing Well Survey in Coast Region, Well Structure, Water Quality and Water Use (2/3)

Well Identification				Well Structure					Water Quality			Water Use							
No.		B/No	District	Depth	Dia. (inch)		Screen (mbgl)		Cond	pH	Temp.	No. of	Consumption Rate (m3/d)					Amount	Pump
Coast	Dist.			(m)	BH	Cas -ing	Top	Bott -om	(μS/cm)		(℃)	Per -son	Dome -stic	Live -stock	irriga -tion	Indu -stry	Others	(m^3/d)	oper. hours
109	4	430/99	Kisarawe	30.0	8	5	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
110	5	496/99	Kisarawe	50.0	8	4	27.0	38.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
112	7	494/99	Kisarawe	51.0	8	4	24.5	42.0	312	6.6	29.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
113	8	496/99 B	Kisarawe	50.0	8	4	_	_	109	6.1	28.2	2044	81.0	0.0	0.0	0.0	0.0	81.0	12
114	9	495/99	Kisarawe																
115	10	457/99	Kisarawe	41.0	8	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
116	11	477/99	Kisarawe	30.0	8	5	5.0	27.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
117	12	500/99	Kisarawe	49.0	8	4	25.0	41.0	400	6.9	26.7	0	0.0	0.0	0.0	0.0	0.0	0.0	0
118	13	36/2000	Kisarawe	66.0	8	5	15.0	65.0	196	5.1	29.2	3600	180.0	0.0	0.0	0.0	0.0	180.0	12
119	14	88/2000	Kisarawe																
120	15	89/2000	Kisarawe	30.0	8	4	_	_	219	5.8	24.5	500	20.0	0.0	0.0	0.0	0.0	20.0	12
121	16	90/2000	Kisarawe	32.0	8	4	15.6	25.2	2400	6.5	25.1	618	30.0	0.0	0.0	0.0	0.0	30.0	12
122	17	91/2000	Kisarawe	30.0	8	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
123	18	92/2000	Kisarawe																
125	20	125/2000	Kisarawe	40.0	8	4	26.0	38.0	346	6.0	27.9	0	0.0	0.0	0.0	0.0	0.0	0.0	0
126	21	126/2000	Kisarawe	30.0	8	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
127	22	#NAME?	Kisarawe																
128	23	176/2000	Kisarawe																
130	25	367/2000	Kisarawe																
131	26	368/2000	Kisarawe	51.0	8	4	11.5	48.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
133	28	493/2000	Kisarawe	48.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
135	30	201/2001	Kisarawe	30.0	8	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
136	31	203/2001	Kisarawe	40.0	8	4	_	_	176	5.6	35.3	600	24.0	0.0	0.0	0.0	0.0	24.0	12
137	32	207/2001	Kisarawe	27.0	10	6	_	_	357	7.2	27.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0
138	33	254/2001	Kisarawe																
139	34	263/2001	Kisarawe	76.0	8	6						0	0.0	0.0	0.0	0.0	0.0	0.0	0
140	35	265/2001	Kisarawe	104.0	10	6	17.5	101.0	2660	5.9	28.0	320	12.8	0.0	0.0	0.0	0.0	12.8	12
141	36	12/2001	Kisarawe	78.0	8	5	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
142	37	13/2001	Kisarawe	120.0	10	5	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
144	39	16/2001	Kisarawe																
146	41	38/2001	Kisarawe	93.0	8	6	10.0	85.5	796	5.2	34.0	200	8.0	0.0	0.0	0.0	0.0	8.0	12
147	42	39/2001	Kisarawe																
148	43	40/2001	Kisarawe	88.0	8	5	31.0	78.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
149	44	41/2001	Kisarawe																
150	45	83/2001	Kisarawe	80.0	8	5	7.0	76.0	403	5.8	24.6	3800	152.0	0.0	0.0	0.0	0.0	152.0	12
151	46	87/2001	Kisarawe																
152	47	117/2002	Kisarawe	80.0	9.875	6	13.5	77.0	592	6.1	24.9	0	0.0	0.0	0.0	0.0	0.0	0.0	0
153	48	201/2002	Kisarawe	90.0	10	6	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
154	49	122/2002	Kisarawe	80.0	9.98	6	15.0	78.0	2590	7.0	26.2	300	12.0	0.0	0.0	0.0	0.0	12.0	12
155	50	141/2002	Kisarawe	57.0	8.875	5	7.0	50.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
156	51	142/2002	Kisarawe	68.0	8	5	5.5	66.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
157	52	147/2002	Kisarawe	42.0	8	5	6.0	33.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
158	53	168/2002	Kisarawe	70.0	8	5	14.5	65.5	108	6.0	27.8	0	0.0	0.0	0.0	0.0	0.0	0.0	0
159	54	362/2002	Kisarawe	60.0	8	5						0	0.0	0.0	0.0	0.0	0.0	0.0	0
160	55	9/2003	Kisarawe	50.0	8	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
161	56	57/2003	Kisarawe	46.0	8	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
162	57	227/2003	Kisarawe	60.0	8	5	11.0	51.0	2540	6.5	25.0	850	34.0	0.0	0.0	0.0	0.0	34.0	12
163	58	235/2003	Kisarawe	52.0	8	4	28.5	48.0	2310	5.7	26.0	530	26.5	0.0	0.0	0.0	0.0	26.5	12
164	59	446/2003	Kisarawe	70.0	8	5	5.5	64.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
165	60	185/2004	Kisarawe	50.0	8	5	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
167	62	625/2003	Kisarawe	48.0	8	5	_	_	3220	6.8	26.0	300	15.0	0.0	0.0	0.0	0.0	15.0	12
168	63	626/2003	Kisarawe	46.0	8	4	_	_	1369	6.5	26.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0
169	64	338/2003	Kisarawe	30.0	8	4	8.0	28.0	1369	6.5	26.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0
170	65	337/2003	Kisarawe	50.0	8	4	14.8	45.3	264	6.7	26.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0
171	66	336/2003	Kisarawe	50.0	8	4	14.8	47.5	1420	7.1	28.7	400	16.0	0.0	0.0	0.0	0.0	16.0	12
172	67	640/2003	Kisarawe	100.0	12	8	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
173	68	624/2003	Kisarawe	50.0	8	4	_	_	1758	5.6	35.3	600	24.0	0.0	0.0	0.0	0.0	24.0	12
174	69	339/2003	Kisarawe	40.0	8	4	7.0	37.5	159	6.1	26.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0
175	70	440/2002	Kisarawe	60.0	8	6	37.0	56.5				0	0.0	0.0	0.0	0.0	0.0	0.0	0
184	79	144/72	Kisarawe	33.0	8	5	_	_	174	6.4	27.5	400	16.0	0.0	0.0	0.0	0.0	16.0	12
185	80	180/75	Kisarawe	122.0	12	10	18.0	120.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
186	81	171/75	Kisarawe	111.0	6	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
187	82	258/75	Kisarawe	92.0	8	6	_	_	_	_	_	0	0.0	0.0		0.0	0.0	0.0	0
189	84	67/79	Kisarawe	52.0	8	4	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
191	86	476/99	Kisarawe	40.0	9.88	6	7.5	38.0	1150	6.9	26.3	260	10.4	0.0	0.0	0.0	0.0	10.4	12
192	87	356/2004	Kisarawe	42.0	10	5	6.0	41.0	106	6.3	33.0	30	20.0	8.0	12.0	0.0	0.0	40.0	12
193	88	247/2004	Kisarawe	50.0	8	6	11.9	48.0	2671	5.3	27.6	500	25.0	0.0	0.0	0.0	0.0	25.0	12
194	89	334/2004	Kisarawe	60.0	8	5	10.2	58.0	1708	5.8	24.3	800	30.0	0.0	0.0	0.0	0.0	30.0	12
195	90	347/2004	Kisarawe	60.0	8	5	9.0	57.0	1225	5.1	25.2	300	12.0	0.0	0.0	0.0	0.0	12.0	12
196	91	502/2004	Kisarawe	60.0	8	5	39.0	58.0	148	5.5	28.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0
197	92	503/2004	Kisarawe	48.0	8	4	15.0	45.0	216	6.3	28.8	4000	160.0	0.0	0.0	0.0	0.0	160.0	12
198	1	28/98	Mkuranga	62.0	8	5	17.5	60.0	213	7.2	26.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0
199	2	19/98B	Mkuranga	60.0	9	5	21.0	56.5	296	4.8	29.2	45	31.4	0.0	4.0	0.0	0.0	35.4	16
200	3	603/99	Mkuranga	34.0	8	6	25.0	31.0	395	6.3	28.7	40	1.6	0.0	0.0	0.0	0.0	1.6	12
201	4	30/2000	Mkuranga	40.0	8	5	27.0	30.0	417	6.3	28.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0
202	5	177/2000	Mkuranga																
203	6	251/2000	Mkuranga	52.0	8	5			466	6.4	26.2	42	2.1	0.0	0.0	0.0	0.0	2.1	12
204	7	264/2001	Mkuranga	70.0	8	5	20.1	67.0	506	5.8	25.3	600	7.1	0.0	0.0	0.0	0.0	7.1	4
205	8	185/2001	Mkuranga	54.0	8	5	10.1	52.0	1440	6.7	26.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0
206	9	194/2001	Mkuranga	60.0	8	5	25.0	57.0	147	5.3	28.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0
207	10	195/2001	Mkuranga	56.0	8	6	9.7	52.5	571	6.4	26.7	600	34.0	0.0	0.0	0.0	0.0	34.0	12
208	11	117/2001	Mkuranga	72.0	10.6	6	22.0	68.0	403	7.7	25.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0
209	12	112/2001	Mkuranga	51.0	10	5			915	6.0	27.3	300	12.0	0.0	0.0	0.0	0.0	12.0	12
210	13	176/2001	Mkuranga																
211	14	1/2002	Mkuranga	60.0	8	6	28.3	57.5	130	6.2	26.2	25	2.1	0.0	0.0	0.0	0.0	2.1	5
212	15	10/2002	Mkuranga	63.0	8	6	21.0	60.0	434	7.1	25.8	30	7.9	1.2	3.0	0.0	0.0	12.1	4
213	16	12/2002	Mkuranga	45.0	8	5	12.0	40.0	320	7.3	26.8	75	9.0	4.0	0.0	0.0	0.0	13.0	12
214	17	15/2002	Mkuranga	48.0	9	5	15.0	47.5	1439	6.3	26.7	300	15.0	0.0	0.0	0.0	0.0	15.0	12
215	18	28/2002	Mkuranga	63.0	8	5	10.3	61.5	1341	6.9	26.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0
216	19	137/2002	Mkuranga	68.0	8	5	15.5	65.0	1439	6.4	26.7	3300	20.0	0.0	0.0	0.0	0.0	20.0	12
217	20	144/2002	Mkuranga	42.0	8	5	14.9	40.0	1412	6.4	26.9	6	9.6	0.0	0.0	0.0	0.0	9.6	4
218	21	256/2002	Mkuranga	60.0	8	6	15.0	57.5				0	0.0	0.0	0.0	0.0	0.0	0.0	0
219	22	37/2003	Mkuranga	70.0	8	6	13.0	68.3	134	7.1	26.8	100	42.1	0.0	0.0	0.0	0.0	42.1	6
220	23	166/98	Nkuranga	36.0	8	5	8.2	33.4	282	6.3	26.8	0	0.0	0.0	0.0	0.0	0.0	0.0	0
221	24	32/2004	Mkuranga	53.0	8	5	17.5	50.0	331	6.0	26.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0
222	25	59/2004	Mkuranga	80.0	8	6	10.5	77.0	1777	6.5	29.9	400	13.5	0.0	0.0	0.0	0.0	13.5	3
223	26	324/2003	Mkuranga	70.0	8	5	14.5	66.0	329	6.6	28.1	130	10.8	0.0	0.0	0.0	0.0	10.8	4

Table 6.4 Results of Existing Well Survey in Coast Region, Well Structure, Water Quality and Water Use (3/3)

Well Identification				Well Structure					Water Quality			Water Use							
No.		B/No	District	Depth	Dia. (inch)		Screen (mbgl)		Cond	pH	Temp.	No. of	Consumption Rate (m3/d)					Amount	Pump
Coast	Dist.			(m)	BH	Cas -ing	Top	Bott -om	(µS/cm)		(℃)	Per -son	Dome -stic	Live -stock	irriga -tion	Indu -stry	Others	(m^3/d)	oper. hours
225	28	29/92	Mkuranga	30.0	9	5	10.5	25.5	265	6.0	29.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0
226	29	111/92	Mkuranga	51.0	8	5	_	_	282	6.3	26.8	0	0.0	0.0	0.0	0.0	0.0	0.0	0
227	30	19/98	Mkuranga	60.0	9	5	15.0	55.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0
228	31	177/99	Mkuranga	62.0	6	5	_	_	466	6.4	26.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0
229	32	390/2004	Mkuranga						0										

Table 6.5 Results of Existing Well Survey in Dar es Salam, Well Structure, Water Quality and Water Use (1/4)

Well Identification				Well Structure					Water Quality			Water Use							
No.		B/No	District	Depth	Dia. (inch)		Screen (mbgl)		Cond	pH	Temp.	No. of	Consumption Rate (m3/d)					Amount	Pump
Coast	Dist.			(m)	BH	Cas -ing	Top	Bott -om	(μS/cm)		(℃)	Per -son	Dome -stic	Live -stock	irriga -tion	Indu -stry	Others	(m^3/d)	oper. hours
137	137	DDCA	Ilala	56.0	8	6.0	15.8	53.0	790	7.2	28.6	400	20.4	0.0	0.0	0.0	0.0	20.4	10.0
77	77	DDCA	Ilala	76.0	11.0	6.0	20.0	74.0	750	7.1	29.8	200	24.0	0.0	0.0	0.0	0.0	24.0	3.4
47	47	DDCA	Ilala	40.0	9.0	6.0	12.3	37.0	1072	7.8	29.0	1500	72.5	0.0	0.0	0.0	0.0	72.5	4.0
400	400	DDCA	Ilala	50.0	8.0	6.0	10.8	47.0	1015	7.0	30.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
395	395	DDCA	Ilala																
2	2	DDCA	Ilala																
8	8	DDCA	Ilala																
95	95	DDCA	Ilala	40.0	8.0	5.0	8.8	37.8	1012	7.8	29.9	300	7.4	0.0	0.0	0.0	0.0	7.4	2.0
293	293	DDCA	Ilala	50.0	8.0	5.0	16.6	48.4	879	7.8	28.9	250	24.5	0.0	0.0	0.0	0.0	24.5	3.0
345	345	DDCA	Ilala	60.0	8.0	5.0	8.0	57.0	889	6.9	29.9	350	20.6	0.0	0.0	0.0	0.0	20.6	4.0
442	442	DDCA	Ilala	57.0	9.0	6.0	12.0	54.0	923	7.3	29.0	500	55.4	0.0	0.0	0.0	0.0	55.4	6.0
287	287	DDCA	Ilala	62.0	8.0	5.0	21.0	59.8	1370	6.8	28.9	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
475	475	DDCA	Ilala	60.0	8.0	5.0	13.4	57.5	2000	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
324	324	DDCA	Ilala	60.0	8.0	6.0	21.0	57.0	2900	7.2	29.0	2000	10.6	0.0	0.0	0.0	0.0	10.6	4.0
15	15	DDCA	Ilala	62.0	8.0	6.0	27.0	58.6	1193	5.8	28.6	3100	9.0	0.0	0.0	0.0	0.0	9.0	6.0
68	68	DDCA	Ilala	45.0	12.0	8.0	11.0	39.5	200	6.9	30.5	1500	108.0	0.0	0.0	0.0	0.0	108.0	6.0
39	39	DDCA	Ilala	50.0	9.0	6.0	9.4	48.5	1447	7.6	30.0	3000	540.0	0.0	0.0	0.0	0.0	540.0	24.0
40	40	DDCA	Ilala	44.0	8.0	6.0	15.0	39.5	2700	6.8	29.4	0	0.0	0.0	0.0	90.0	0.0	90.0	5.0
136	136	DDCA	Ilala	40.0	10.0	6.0	8.0	37.5	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76	76	DDCA	Ilala	40.0	8.0	5.0	5.5	32.5	1064	7.8	28.6	110	0.8	0.0	0.0	0.0	0.0	0.8	0.5
132	132	DDCA	Ilala	93.0	10.0	8.0	60.0	90.0	1049	6.9	29.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
133	133	DDCA	Ilala	60.0	8.0	5.0	_	_	2670	6.9	28.9	35	0.6	0.0	0.0	0.0	0.0	0.6	6.0
258	258	DDCA	Ilala	70.0	8.0	5.0	12.4	67.0	898	6.8	28.9	50	2.3	0.0	0.0	0.0	0.0	2.3	3.0
263	263	DDCA	Ilala	33.0	8.0	4.0	17.0	30.0	1720	7.0	27.9	10	4.9	0.0	0.0	0.0	0.0	4.9	4.9
247	247	DDCA	Ilala	50.0	8.0	5.0	4.0	48.0	1890	7.5	29.6	80	7.0	0.0	0.0	0.0	0.0	7.0	4.0
13	13	DDCA	Ilala	30.0	9.0	6.0	9.0	24.0	1103	6.6	29.7	250	14.4	0.0	0.0	0.0	0.0	14.4	3.0
372	372	DDCA	Ilala	42.0	8.0	6.0	13.0	40.0	2000	6.8	30.0	0	0.0	0.0	0.0	14.7	0.0	14.7	2.0
16	16	DDCA	Ilala	30.0	8.0	5.0	16.9	32.0	1001	6.8	28.6	180	11.8	0.0	0.0	0.0	0.0	11.8	2.0
186	186	DDCA	Ilala	41.3	8.0	6.0	13.5	38.5	634	7.8	29.2	1500	1.9	0.0	0.0	0.0	0.0	1.9	12.0
486	486	DDCA	Ilala	45.0	8.0	5.0	15.0	42.0	_	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
256	256	DDCA	Ilala	98.0	9.0	6.0	31.0	95.6	1342	7.8	27.3	600	67.5	0.0	0.0	0.0	0.0	67.5	6.0
492	492	DDCA	Ilala	40.0	10.0	6.0	7.0	37.0	2130	7.4	29.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
240	240	DDCA	Ilala	36.0	8.0	5.0	6.0	22.5	860	6.0	30.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
113	113	DDCA	Ilala																
322	322	DDCA	Ilala	40.0	10.0	6.0	10.0	31.0	1290	7.8	29.9	350	22.3	0.0	0.0	0.0	0.0	22.3	2.0
360	360	DDCA	Ilala	50.0	8.0	5.0	12.0	45.0	1240	7.8	29.5	250	2.2	0.0	0.0	0.0	0.0	2.2	3.0
434	434	DDCA	Ilala	44.0	8.0	5.0	12.0	39.0	5240	6.3	26.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
285	285	DDCA	Ilala	43.0	8.0	6.0	12.0	39.8	1040	6.5	29.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
300	300	DDCA	Ilala	50.0	8.0	5.0	5.0	46.0	1300	7.2	27.5	0	0.0	0.0	0.0	13.0	0.0	13.0	12.0
304	304	DDCA	Ilala	50.0	12.0	6.0	47.0	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
311	311	DDCA	Ilala	50.0	8.0	5.0	8.0	42.0	977	5.5	29.8	420	50.0	0.0	4.6	0.0	0.0	54.6	18.0
327	327	DDCA	Ilala	50.0	8.0	5.0	19.0	48.0	1056	7.6	28.1	360	7.0	0.0	0.0	0.0	0.0	7.0	1.5
234	234	DDCA	Ilala	60.0	8.0	5.0	11.0	57.0	1760	7.2	29.8	60	14.4	0.0	0.0	0.0	0.0	14.4	2.0
417	417	DDCA	Ilala	60.0	6.0	5.0	15.5	56.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
429	429	DDCA	Ilala	60.0	6.0	5.0	17.2	59.0	536	7.8	28.4	800	230.4	0.0	0.0	0.0	0.0	230.4	24.0
297	297	DDCA	Ilala	60.0	9.0	6.0	11.0	57.0	446	7.8	29.4	50	22.3	0.0	0.0	0.0	0.0	22.3	6.0
20	20	DDCA	Ilala	33.0	9.0	8.0	5.0	29.0	1355	6.9	29.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
147	147	DDCA	Ilala	48.0	8.0	5.0	6.0	36.0	1220	6.9	30.1	60	10.0	0.0	0.0	0.0	0.0	10.0	0.5
66	66	DDCA	Ilala	41.0	12.0	7.0	6.0	38.5	343	6.8	29.7	1800	3.8	0.0	0.0	0.0	0.0	3.8	5.0
299	299	DDCA	Ilala																
48	48	DDCA	Ilala	50.0	10.0	6.0	26.0	48.0	1320	6.5	29.8	100	5.0	0.0	0.0	5.0	0.0	10.8	2.0
35	35	DDCA	Ilala	30.0	11.0	6.0	12.5	27.5	1952	6.8	29.2	100	21.8	0.0	0.0	0.0	0.0	21.8	4.0
228	228	DDCA	Ilala																
120	120	DDCA	Ilala	15.1	9.0	6.0	9.5	34.0	1206	7.8	29.1	5000	81.6	0.0	0.0	0.0	0.0	81.6	12.0
45	45	DDCA	Ilala		10.0	6.0	32.4	57.0											
255	255	DDCA	Ilala	98.0	8.0	6.0	35.0	95.0	1890	6.8	28.5	1500	4.1	0.0	0.0	0.0	0.0	4.1	3.0
128	128	DDCA	Ilala	60.0	8.0	6.0	15.0	54.0	928	6.7	28.2	1540	185.0	0.0	0.0	0.0	0.0	185.0	14.0
65	65	DDCA	Ilala	50.0	8.0	6.0	12.0	42.0	429	6.9	29.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93	93	DDCA	Ilala	37.0	10.0	6.0	7.3	35.0	200	6.0	30.5	1500	108.0	0.0	0.0	0.0	0.0	108.0	6.0
37	37	DDCA	Ilala	40.0	10.0	6.0	14.0	35.0	1370	7.8	30.0	2000	11.8	0.0	0.0	0.0	0.0	11.8	3.0
22	22	DDCA	Ilala	45.0	10.0	6.0	14.0	40.0	1050	6.8	29.2	100	10.0	0.0	0.0	140.0	0.0	150.0	21.0
89	89	DDCA	Ilala	35.0	10.0	6.0	14.0	32.0	775	7.2	29.8	2000	68.6	0.0	0.0	0.0	0.0	68.6	10.0
404	404	DDCA	Ilala	70.0	8.0	6.0	28.9	69.2	4610	6.8	28.5	200	11.2	0.0	0.0	0.0	0.0	11.2	12.0
129	129	DDCA	Ilala	40.0	8.0	6.0	16.0	30.5	1643	7.5	26.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	19	DDCA	Ilala	31.0	8.0	6.0	10.1	29.2	1730	6.7	30.1	720	72.0	0.0	0.0	0.0	0.0	72.0	6.0
501	501	DDCA 04	Ilala	48.0	8.0	5.0	12.0	45.0	1999	7.9	27.8	1500	9.4	0.0	0.0	0.0	0.0	9.4	6.0
427	427	DDCA	Ilala	50.0	8.0	6.0	8.2	48.5	900	7.8	28.7	120	28.8	0.0	0.0	0.0	0.0	28.8	4.0
481	481	DDCA	Ilala	60.0	8.0	5.0	15.0	57.0	2800	6.8	29.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
124	124	DDCA	Ilala	36.0	11.0	6.0	10.0	33.0	1175	7.8	29.8	400	84.6	0.0	0.0	0.0	0.0	84.6	22.0
33	33	DDCA	Ilala	42.0	10.0	6.0	17.5	39.4	950	7.9	30.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
520	520	DDCA 04	Ilala	45.0	8.0	6.0	11.0	42.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
531	531	DDCA 04	Ilala	70.0	8.0	5.0	25.0	65.0	1840	7.6	29.2	120	3.2	0.0	0.0	0.0	0.0	3.2	3.0
505	505	DDCA 04	Ilala	50.0	9.0	5.0	21.2	46.0	1911	7.2	28.5	100	10.0	0.0	0.0	0.0	0.0	10.0	2.8
516	516	DDCA 04	Ilala	50.0	8.0	5.0	22.3	48.6	1957	6.8	29.0	250	9.0	0.0	0.0	0.0	0.0	9.0	2.0
518	518	DDCA 04	Ilala	50.0	8.0	5.0	26.0	47.0	1147	6.9	28.9	25	3.4	0.0	0.0	0.0	0.0	3.4	3.0
296	296	DDCA	Ilala	28.0	10.0	5.0	17.0	27.5	1890	6.9	30.1	5	0.5	0.0	0.0	0.0	0.0	0.5	0.9
61	61	DDCA	Ilala	47.0	6.0	5.0	11.0	43.0	1121	6.8	30.0	8	1.8	0.0	0.0	0.0	0.0	1.8	1.5
202	202	DDCA	Ilala	30.0	8.0	5.0	4.9	26.5	1120	6.8	30.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
424	424	DDCA	Ilala	60.0	8.0	5.0	20.4	58.7	1070	6.8	29.0	8	11.9	0.0	0.0	0.0	0.0	11.9	3.0
274	274	DDCA	Ilala	35.0	8.0	5.0	11.2	31.0	613	7.8	31.0	15	20.3	0.0	0.0	0.0	0.0	20.3	1.0
199	199	DDCA	Ilala	50.0	8.0	5.0	15.0	37.0	860	7.2	30.1	10	4.0	0.0	0.0	0.0	0.0	4.0	6.5
384	384	DDCA	Ilala	35.0	8.0	5.0	14.0	32.0	1238	7.0	29.8	55	3.0	0.0	0.0	0.0	0.0	3.0	3.0
49	49	DDCA	Ilala	45.0	12.0	8.0	12.0	40.0	664	7.3	30.7	0	0.0	0.0	0.0	78.1	0.0	78.1	6.0

Table 6.5 Results of Existing Well Survey in Dar es Salam, Well Structure, Water Quality and Water Use (2/4)

Well Identification				Well Structure					Water Quality			Water Use							
No.				Depth	Dia. (inch)		Screen (mbgl)		Cond		Temp.	No. of	Consumption Rate (m3/d)					Amount	Pump
109	109	DDCA	Ilala	43.5	9.0	5.0	10.0	41.0	950	7.8	28.1	480	21.3	0.0	0.0	0.0	0.0	21.3	3.0
112	112	DDCA	Ilala	31.0	9.0	6.0	16.8	30.5	1883	8.1	29.1	10	10.0	0.0	0.0	0.0	0.0	10.0	2.0
283	283	DDCA	Ilala	62.0	7.0	6.0	10.0	59.0	760	6.9	28.6	200	78.5	0.0	0.0	0.0	0.0	78.5	3.0
277	277	DDCA	Ilala	33.0	6.0	5.0	31.0	75.0	2010	6.9	28.9	750	1.3	0.0	0.0	0.0	0.0	1.3	2.0
270	270	DDCA	Ilala	70.0	8.0	6.0	15.0	66.0	2110	7.9	28.8	300	8.4	0.0	0.0	0.0	0.0	8.4	3.0
433	433	DDCA	Ilala	44.0	8.0	5.0	11.0	41.0	966	6.9	28.8	60	2.5	0.0	0.0	0.0	0.0	2.5	2.0
306	306	DDCA	Ilala	60.0	8.0	5.0	7.0	53.0	674	6.9	28.6	300	25.3	0.0	0.0	0.0	0.0	25.3	2.0
391	391	DDCA	Ilala																
250	250	DDCA	Ilala	46.0	9.0	6.0	26.0	37.0	1328	7.8	28.5	3000	34.0	0.0	0.0	0.0	0.0	34.0	6.0
29	29	DDCA	Ilala	30.0	8.0	5.0	9.0	27.0	1192	7.8	30.2	800	22.3	0.0	0.0	0.0	0.0	22.3	6.0
28	28	DDCA	Ilala	50.0	8.0	6.0	3.0	18.5	1580	7.9	29.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
253	253	DDCA	Ilala	65.0	9.0	6.0	18.5	58.5	1468	6.9	28.8	2000	30.6	0.0	0.0	0.0	0.0	30.6	2.0
74	74	DDCA	Ilala	60.0	10.0	6.0	18.0	57.5	1470	6.9	28.6	9841	123.4	0.0	0.0	0.0	0.0	123.4	12.0
94	94	DDCA	Ilala	37.0	8.0	5.0	6.0	36.0	1401	7.8	29.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
498	498	DDCA 04	Ilala	42.0	8.0	5.0	12.0	39.5	2410	6.9	29.8	50	16.5	0.0	0.0	0.0	0.0	16.5	4.0
86	86	DDCA	Ilala	50.0	10.0	6.0	10.0	46.0	1549	7.8	28.8	5000	4.1	0.0	0.0	0.0	0.0	4.1	2.0
226	226	DDCA	Ilala	51.0	8.0	5.0	7.5	45.0	1220	7.3	28.9	50	1.1	0.0	0.0	0.0	0.0	1.1	2.0
259	259	DDCA	Ilala	34.0	9.0	6.0	15.4	31.1	1034	7.5	30.4	12000	18.6	0.0	0.0	0.0	0.0	18.6	12.0
		DDCA	Ilala	60.0	6.0	5.0	13.4	57.5	2000	7.8	28.1	200	2.3	0.0	0.0	0.0	0.0	2.3	1.0
		DDCA	Ilala	48.0	9.0	6.0	23.0	45.9	1986	7.2	28.6	2000	9.9	0.0	0.0	0.0	0.0	9.9	3.0
		DDCA	Ilala	35.5	9.0	6.0	7.5	39.0	3000	7.9	29.4	45	10.8	0.0	0.0	0.0	0.0	10.8	12.0
696	151	DDCA	Kinondoni	48.0	10	5	38.0	45.0	3900	6.9	30.9	4	1.0	4.8	0.0	0.0	0.0	5.8	4.0
762	217	DDCA	Kinondoni	60.0	8	5	20.3	57.0	4530	6.5	29.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
796	251	DDCA	Kinondoni	50.0	8	5	29.5	47.8	1842	6.2	30.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
671	126	DDCA	Kinondoni	120.0	8	5	21.0	117.5	1234	6.4	29.7	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
769	224	DDCA	Kinondoni	60.0	10	5	16.0	59.0	3860	6.6	30.9	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
645	100	DDCA	Kinondoni	100.0	9	6	35.0	99.5				0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
717	172	DDCA	Kinondoni	63.0	9	6	10.0	60.5	1256	6.5	27.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
700	155	DDCA	Kinondoni	40.0	10	5	26.5	37.5	4120	6.6	31.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
618	73	DDCA	Kinondoni	39.0	8	5	14.5	36.0	2047	6.2	30.1	38	2.4	0.0	0.0	0.0	0.0	2.4	2.5
567	22	DDCA	Kinondoni	66.0	10	6	14.0	59.0	2030	5.5	29.4	0	0.0	0.0	0.0	69.1	0.0	69.1	24.0
584	39	DDCA	Kinondoni	42.0	8	5	13.0	38.0	2460	5.4	29.0	10	2.6	0.0	0.0	0.0	0.0	2.6	4.0
589	44	DDCA	Kinondoni	80.0	8	6	9.0	26.0	778	7.7	28.3	25	4.0	0.0	0.0	7.5	0.0	11.5	6.0
552	7	DDCA	Kinondoni	50.0	10	6	16.0	48.5	2190	7.0	29.0	300	33.0	0.0	0.0	0.0	0.0	33.0	9.0
724	179	DDCA	Kinondoni	30.0	8	5	7.0	28.0	676	7.7	30.5	18	14.0	0.0	0.0	0.0	0.0	14.0	12.0
710	165	DDCA	Kinondoni	42.4	8	5	15.3	39.9				0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
617	72	DDCA	Kinondoni	59.0	14	6	13.5	54.4	2020	6.1	29.6	95	9.5	0.0	0.0	0.0	2.8	12.3	12.0
734	189	DDCA	Kinondoni	50.0	8	5	9.0	47.8	8610	6.6	30.3	495	10.0	0.0	4.0	0.0	0.0	14.0	2.5
812	267	DDCA 04	Kinondoni	16.0	7	5	4.0	14.0	2140	7.6	30.7	13	1.0	0.0	1.4	0.0	0.0	2.4	0.5
798	253	DDCA	Kinondoni	22.0	8	6	7.0	19.5	1622	6.9	30.5	0	0.0	0.0	10.5	0.0	0.0	10.5	6.0
611	66	DDCA	Kinondoni	60.0	10	6	11.5	57.0	900	6.5	28.6	260	30.9	0.0	0.0	0.0	0.0	30.9	2.0
675	130	DDCA	Kinondoni	40.0	10	5	21.0	38.0	1423	6.0	29.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
568	23	DDCA	Kinondoni	63.0	10	6	7.0	54.0	2350	5.3	29.1	0	0.0	0.0	0.0	6.0	0.0	6.0	4.0
569	24	DDCA	Kinondoni	34.0	12	6	9.0	31.0	1278	6.6	30.5	1500	172.8	0.0	0.0	0.0	0.0	172.8	10.0
556	11	DDCA	Kinondoni	50.0	12.25	8	8.0	33.5	5010	6.5	29.0	350	35.0	0.0	3.7	0.0	0.0	38.7	7.0
744	199	DDCA	Kinondoni	60.0	8	5	12.5	58.0	4654	6.5	29.8	20	3.9	0.0	0.0	0.0	0.0	3.9	3.0
758	213	DDCA	Kinondoni	56.0	8	5	17.0	53.0	1692	7.2	28.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
782	237	DDCA	Kinondoni	40.0	8	5	10.0	37.0	4680	6.3	30.3	9	2.0	4.0	0.0	0.0	0.0	6.0	5.0
800	255	DDCA 04	Kinondoni	45.0	8	5	12.0	42.0	836	7.1	29.9	860	119.6	0.0	10.0	0.0	0.0	129.6	9.0
642	97	DDCA	Kinondoni	39.0	8	5	12.5	35.7	2280	5.9	28.0	15	6.6	4.0	0.0	0.0	0.0	10.6	12.0
748	203	DDCA	Kinondoni	68.4	9	5	22.5	65.2	3500	5.9	27.8	110	9.0	0.0	0.0	0.0	0.0	9.0	1.5
801	256	DDCA 04	Kinondoni	60.0	8	5	18.1	57.0	1235	6.1	27.9	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
588	43	DDCA	Kinondoni	51.0	8	5	15.0	49.0	9150	6.9	28.0	20	2.0	1.3	0.0	0.0	0.0	3.3	1.5
681	136	DDCA	Kinondoni	40.0	8	5	4.5	36.0	7980	6.8	27.9	25	0.7	0.2	0.0	0.0	0.0	0.9	0.5
597	52	DDCA	Kinondoni	33.0	8	5	27.0	33.0	14030	7.1	29.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
605	60	DDCA	Kinondoni	30.0	8	5	9.0	26.4	1692	7.2	28.0	1200	129.6	0.0	0.0	0.0	0.0	129.6	18.0
666	121	DDCA	Kinondoni	35.0	10	5	8.0	33.0	4890	6.7	29.9	400	19.6	0.0	0.0	0.0	0.0	19.6	3.0
596	51	DDCA	Kinondoni	30.0	8	6	7.2	28.4	696	7.3	29.0	460	43.0	0.0	14.6	0.0	0.0	57.6	2.0
692	147	DDCA	Kinondoni	33.0	8	5	10.0	30.0	1300	7.4	28.7	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
550	5	DDCA	Kinondoni	40.0	12	6	16.5	36.0	4520	6.7	30.4	180	16.4	0.0	0.0	0.0	0.0	16.4	11.0
562	17	DDCA	Kinondoni	30.0	15	6	9.0	27.0	1221	7.2	30.0	600	10.0	0.0	1.7	0.0	0.0	11.7	2.5
701	156	DDCA	Kinondoni	38.0	8	5			1220	6.4	30.7	250	9.4	0.0	0.0	0.0	0.0	9.4	3.0
742	197	DDCA	Kinondoni	67.0	10	6	25.0	64.0				0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
658	113	DDCA	Kinondoni	40.5	8	5	7.5	36.0	1254	6.5	25.7	60	4.7	0.0	0.0	0.0	0.0	4.7	4.0
779	234	DDCA	Kinondoni	40.0	8	5	10.0	37.0	2850	6.5	28.7	200	8.5	0.0	0.0	0.0	0.0	8.5	1.0
600	55	DDCA	Kinondoni	36.0	8	5	12.0	37.0	5120	4.6	28.8	20	1.1	0.0	0.0	0.0	0.0	1.1	0.5
650	105	DDCA	Kinondoni	48.0	8	5	34.0	47.0	5680	5.1	28.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
726	181	DDCA	Kinondoni	102.0	10	6	26.0	100.0	3730	6.4	29.0	310	35.0	16.1	0.0	0.0	0.0	51.1	8.0
590	45	DDCA	Kinondoni		8	5	12.0	28.5				0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
608	63	DDCA	Kinondoni	37.0	8	5	7.5	35.5	2790	6.7	29.4	265	3.0	0.0	0.0	0.0	2.2	5.2	1.0
558	13	DDCA	Kinondoni	43.0	17	6	12.0	42.0	753	6.7	28.6	1400	168.5	0.0	0.0	0.0	0.0	168.5	14.0
802	257	DDCA 04	Kinondoni	50.0	8	5	17.5	47.0				0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
789	244	DDCA	Kinondoni	40.0	8	5	7.5	38.0	4080	6.3	29.2	400	9.6	2.0	4.0	0.0	0.0	15.6	3.0
815	270	DDCA 04	Kinondoni	50.0	8	5	11.0	47.5	1227	5.6	29.7	110	6.2	0.0	0.0	0.0	0.0	6.2	3.0
786	241	DDCA	Kinondoni	50.0	8	5	11.0	47.0	1854	5.8	28.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
793	248	DDCA	Kinondoni	50.0	8	5	17.5	47.5	3150	7.0	29.4	200	19.8	0.0	10.0	0.0	0.0	29.8	12.0
660	115	DDCA	Kinondoni	40.0	8	5	9.5	39.5	1980	6.7	29.8	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
749	204	DDCA	Kinondoni	51.0	8	5			4440	6.7	29.4	56	1.9	0.0	0.0	0.0	0.0	1.9	2.0
777	232	DDCA	Kinondoni	50.0	8	5	15.0	47.0	4050	5.9	29.5	120	3.0	0.0	0.0	0.0	2.0	5.0	0.8
816	271	DDCA 04	Kinondoni	50.0	8	5	17.5	47.0	2800	7.2	27.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
754	209	DDCA	Kinondoni	40.0	8	5	12.0	37.0	4350	6.3	28.6	50	10.4	0.0	0.0	0.0	0.0	10.4	3.0
745	200	DDCA	Kinondoni	15.0	7	5	3.0	14.0	23300	7.2	30.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
747	202	DDCA	Kinondoni	15.0	8	5	9.5	13.0	4280	7.2	29.4	130	15.0	0.0	12.5	0.0	0.0	27.5	5.0
761	216	DDCA	Kinondoni	20.0	8	6			13480	7.5	31.0	5	0.4	0.5	0.5	0.0	0.0	1.4	2.0
572	27	DDCA	Kinondoni	30.0	8	5	10.0	26.5	3290	6.9	29.6	200	18.0	0.0	0.0	0.0	0.0	18.0	7.3
740	195	DDCA	Kinondoni	50.0	8	5	14.0	47.0	4890	4.7	27.8	8	0.8	1.1	0.0	0.0	0.0	1.9	1.5
684	139	DDCA	Kinondoni	60.0	8	5	11.0	58.0	2156	5.7	28.1	350	41.7	0.0	40.0	0.0	0.0	81.7	7.0
623	78	DDCA	Kinondoni	54.0					311	5.7	29.5	4170	500.2	0.0	0.0	0.0	0.0	500.2	18.0
578	33	DDCA	Kinondoni	39.0	8	5	13.0	36.5	9500	6.5	29.8	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
818	273	DDCA 04	Kinondoni	40.0	8	5	25.0	36.2	1166	6.6	30.6	15	2.2	0.0	2.0	0.0	0.0	4.2	2.5
582	37	DDCA	Kinondoni	30.0	8	5	11.1	28.5	0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
819	274	DDCA 04	Kinondoni	39.0	8	4	15.0	36.0	845	6.0	29.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
807	262	DDCA 04	Kinondoni	60.0	8	5	15.0	57.0	571	5.3	27.7	450	15.0	6.6	0.0	0.0	0.0	21.6	1.5
714	169	DDCA	Kinondoni	56.0	8	5	8.0	55.0	2340	7.2	31.2	2	0.9	2.0	0.0	0.0	0.0	2.9	0.5
676	131	DDCA	Kinondoni	41.0	11	6	10.0	38.0	3990	6.8	27.2	250	16.0	0.0	0.0	0.0	0.0	16.0	3.0
707	162	DDCA	Kinondoni	40.0	8	5	9.0	36.0	4270	6.7	29.1	670	8.0	0.0	0.3	0.0	0.0	8.3	3.5
727	182	DDCA	Kinondoni	38.0	8	5	10.5	35.0	3050	6.6	28.2	50	1.8	0.0	0.0	0.0	0.0	1.8	1.5
806	261	DDCA 04	Kinondoni	46.0	8	5	15.4	42.2	1365	6.8	29.8	100	1.5	0.0	1.5	0.0	0.0	3.0	0.5
799	254	DDCA	Kinondoni	32.0	8	5	9.0	30.0	3410	7.0	29.6	0	0.0	0.0	0.0	10.1	0.0	10.1	1.4
606	61	DDCA	Kinondoni	21.0	8	6	9.0	20.0	4440	6.8	30.8	800	11.0	0.0	0.8	0.0	0.0	11.8	5.0

Table 6.5 Results of Existing Well Survey in Dar es Salam, Well Structure, Water Quality and Water Use (3/4)

Well Identification				Well Structure					Water Quality			Water Use							
No.				Depth	Dia. (inch)		Screen (mbgl)		Cond		Temp.	No. of	Consumption Rate (m3/d)					Amount	Pump
712	167	DDCA	Kinondoni	27.0	8	5	13.5	25.0	1286	7.1	29.7	900	26.4	0.0	0.0	0.0	0.0	26.4	20.0
821	276	DDCA 04	Kinondoni	11.0	7	5	3.1	9.0	3340	7.2	31.1	200	2.2	0.0	3.0	0.0	0.0	5.2	6.0
616	71	DDCA	Kinondoni	12.0	8	5	2.8	8.3	1100	7.3	32.0	550	12.5	0.0	0.0	0.0	0.0	12.5	22.0
672	127	DDCA	Kinondoni	39.0	8	5	10.0	37.0	4630	6.7	30.2	150	18.0	0.0	0.0	0.0	0.0	18.0	9.5
620	75	DDCA	Kinondoni	50.0	8	6	_	_	1102	6.3	29.7	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
685	140	DDCA	Kinondoni	30.0	8	5	6.0	27.0	964	7.3	29.6	40	5.0	51.4	5.0	0.0	0.0	61.4	13.5
664	119	DDCA	Kinondoni	40.0	8	5	_	_	481	6.7	30.1	197	3.9	0.0	0.0	0.0	0.0	3.9	2.0
757	212	DDCA	Kinondoni	40.0	8	5	18.0	39.0	2050	6.9	29.9	300	4.9	0.0	0.0	0.0	0.0	4.9	2.0
774	229	DDCA	Kinondoni	50.0	8	5	10.0	47.0	1822	6.8	29.8	120	20.0	0.0	0.0	0.0	8.8	28.8	4.0
549	4	DDCA	Kinondoni	40.0	9.875	6	9.0	37.0	2258	7.1	29.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
555	10	DDCA	Kinondoni	46.0	10	6	15.0	46.0	1853	6.6	30.7	490	57.6	0.0	0.0	0.0	0.0	57.6	8.0
794	249	DDCA	Kinondoni	11.0	10	5	6.0	10.9	336	6.7	29.9	108	8.3	0.0	0.0	0.0	0.0	8.3	3.0
678	133	DDCA	Kinondoni	55.0	8	6	_	_	1152	6.9	28.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
654	109	DDCA	Kinondoni	40.0	8	5	5.0	39.4	3180	6.7	29.5	50	2.6	0.0	0.0	0.0	0.0	2.6	3.0
687	142	DDCA	Kinondoni	60.0	8	5	_	_	1719	6.5	28.3	10	1.5	0.0	0.7	0.0	0.0	2.4	0.3
668	123	DDCA	Kinondoni	20.0	8	5	14.0	19.3	1787	6.6	29.1	121	15.4	0.0	0.0	0.0	0.0	15.4	2.5
763	218	DDCA	Kinondoni	26.0	7	5	9.5	23.5	1778	6.6	29.4	60	5.2	0.0	0.0	0.0	0.0	5.2	5.0
804	259	DDCA 04	Kinondoni	46.0	8	5	16.0	42.5	1635	4.2	29.6	6	0.4	0.1	0.7	0.0	0.0	1.2	0.3
570	25	DDCA	Kinondoni	30.0	8	6	10.0	13.0	3390	7.0	30.5	100	10.8	0.0	30.0	0.0	0.0	40.8	10.0
643	98	DDCA	Kinondoni	38.0	8	4.3	_	_	2460	4.8	29.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
625	80	DDCA	Kinondoni	56.0	10	6	12.3	35.0	0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
690	145	DDCA	Kinondoni	70.0	8	6	18.0	59.0	1077	6.3	29.9	2900	199.4	0.0	0.0	0.0	0.0	199.4	24.0
622	77	DDCA	Kinondoni	43.0	10	6	_	_	5270	5.8	28.3	45	5.9	0.0	2.0	0.0	0.0	7.9	2.3
683	138	DDCA	Kinondoni	18.0	8	5	11.5	18.3	1121	7.2	29.8	11	13.9	0.0	0.0	0.0	0.0	13.9	12.0
577	32	DDCA	Kinondoni	40.0	8	5	6.5	37.0	2210	6.7	29.3	300	13.5	0.0	0.0	0.0	0.0	13.5	12.0
725	180	DDCA	Kinondoni	67.0	10	6	16.0	63.0	2590	7.1	29.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
729	184	DDCA	Kinondoni	40.0	9	6	12.5	36.0	1480	7.0	29.2	56	4.0	0.0	0.0	0.0	2.5	6.5	3.0
805	260	DDCA 04	Kinondoni	40.0	8	5	7.0	37.0	1121	7.0	29.6	20	1.9	0.0	0.0	0.0	0.0	1.9	1.0
795	250	DDCA	Kinondoni	60.0	8	5	18.0	57.0	2230	6.4	29.8	50	14.2	0.0	0.0	0.0	0.0	14.2	3.0
730	185	DDCA	Kinondoni	50.0	10	6	9.0	48.0	2360	4.3	29.1	106	12.1	0.0	0.0	0.0	0.0	12.1	3.0
752	207	DDCA	Kinondoni	30.0	8	5	17.0	27.0	2160	6.8	29.8	8	2.4	0.0	3.0	0.0	0.0	5.4	1.5
651	106	DDCA	Kinondoni	21.0	8	5	12.5	20.5	4350	6.5	29.9	5	1.2	0.0	3.0	0.0	0.0	4.2	1.0
688	143	DDCA	Kinondoni	69.0	8	5	29.0	63.0	7620	6.7	29.4	4	0.9	0.0	20.0	0.0	0.0	20.9	5.5
554	9	DDCA	Kinondoni	37.0	8	5	8.5	34.0	1344	7.2	29.3	460	54.6	54.0	0.0	0.0	0.0	108.6	22.0
780	235	DDCA	Kinondoni	15.0	8	6	5.2	14.0	1065	7.0	29.4	150	8.0	0.0	9.9	0.0	0.0	17.9	4.5
627	82	DDCA	Kinondoni	40.0	10	6	13.0	36.0	1304	6.4	28.8	650	60.7	0.0	0.0	0.0	0.0	60.7	20.0
689	144	DDCA	Kinondoni	30.0	8	5	12.0	27.0	7660	6.8	30.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
648	103	DDCA	Kinondoni	40.0	8	5	8.5	35.0	3540	5.7	28.8	100	5.4	0.0	0.0	0.0	0.0	5.4	1.0
722	177	DDCA	Kinondoni	40.0	8	5	7.5	35.4	6530	5.7	29.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
573	28	DDCA	Kinondoni	42.0	8	5	9.5	40.3	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
595	50	DDCA	Kinondoni	70.0	12	6	10.0	68.0	8220	6.2	29.5	370	20.1	0.0	0.0	0.0	0.0	20.1	14.0
652	107	DDCA	Kinondoni	40.5	8	5	7.5	35.0	2015	6.2	30.0	50	2.1	0.0	0.0	0.0	0.0	2.1	1.3
669	124	DDCA	Kinondoni	35.0	8	5	8.5	33.0	3360	6.0	29.1	172	0.0	0.0	0.0	30.9	0.0	30.9	11.0
825	280	DDCA 04	Kinondoni	32.0	10	6	12.0	29.5	746	7.2	31.1	120	12.6	0.0	9.0	0.0	0.0	21.6	3.0
775	230	DDCA	Kinondoni	54.0	8	5	10.0	52.0	1654	5.9	30.0	15	2.4	0.0	9.0	0.0	0.0	11.4	2.0
622	77	DDCA	Kinondoni	48.0	8	5	16.0	46.0	1632	6.2	28.9	1300	152.7	0.0	0.0	0.0	0.0	152.7	24.0
		DDCA	Kinondoni	58.0	8	6	15.2	55.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		DDCA	Kinondoni	6.0	7	_	_	_	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		DDCA	Kinondoni	40.0	8	5	14.8	36.5	1795	6.2	29.1	40	6.0	0.0	0.9	0.0	0.0	6.9	2.5
		DDCA	Kinondoni	60.0	8	5	15.0	58.0	940	6.5	30.5	0	0.0	0.0	0.0	34.0	0.0	34.0	4.0
997	172	DDCA	Temeke	40	_	5	_	_	1390	6.3	30.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1000	175	DDCA	Temeke																
1095	270	DDCA	Temeke	40	10	5	10.5	37.5	290	5.8	30.8	60	7.2	0.0	0.0	0.0	0.0	7.2	8.0
1116	291	DDCA 04	Temeke	50	8	5	11.8	47.5	328	5.9	29.0	220	20.2	0.0	0.0	0.0	0.0	20.2	4.3
1137	312	DDCA 04	Temeke	60	8	5	24.5	57.0	821	6.0	29.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
827	2	DDCA	Temeke	25	10	6	9.0	21.5	915	7.5	30.2	300	8.3	0.0	0.0	0.0	0.0	8.3	2.0
993	168	DDCA	Temeke	50	_	5	_	_	674	6.5	28.6	180	12.0	0.0	2.8	0.0	0.0	14.8	6.0
881	56	DDCA	Temeke	37.5	8	5	10.0	35.5	265	5.7	28.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1138	313	DDCA 04	Temeke	60	8	5	9.0	51.0	779	5.5	28.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1038	213	DDCA	Temeke	50	8	6	9.0	47.8	698	6.5	30.8	500	51.8	0.0	120.0	0.0	0.0	51.8	6.0
1081	256	DDCA	Temeke	56	8	6	_	_	716	6.3	30.5	0	0.0	0.0	3.0	120.0	0.0	123.0	8.0
1097	272	DDCA	Temeke	50	8	6	15.5	46.5	556	6.8	29.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1108	283	DDCA 04	Temeke	60	10	6	_	_	622	5.8	29.9	7000	24.5	0.0	0.0	0.0	0.0	24.5	3.0
1002	177	DDCA	Temeke	40	_	5	_	_	351	7.1	29.2	1600	180.0	0.0	0.0	0.0	0.0	180.0	15.0
859	34	DDCA	Temeke	54	12	8	12.0	51.0	5490	7.2	27.1	700	42.0	0.0	3.5	0.0	0.0	45.5	10.5
851	26	DDCA	Temeke	52	10	6	16.0	49.0	924	6.4	30.3	50	46.0	0.0	3.0	0.0	0.0	49.0	4.0
951	126	DDCA	Temeke	40	10	6	19.5	36.4	540	6.8	30.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
836	11	DDCA	Temeke	42	11	5	19.5	36.6	1200	6.6	32.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1089	264	DDCA	Temeke	50	8	5	7.5	44.0	986	5.1	29.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
863	38	DDCA	Temeke	39	8	5	10.4	33.5	720	5.8	30.9	220	26.0	0.0	0.0	0.0	17.5	43.5	8.0
916	91	DDCA	Temeke	30	10	6	8.0	27.0	1046	7.1	29.6	700	19.7	0.0	0.0	0.0	0.0	19.7	8.0
1114	289	DDCA 04	Temeke	60	8	5	9.5	21.6	432	5.5	30.2	380	45.4	0.0	0.0	0.0	0.0	45.4	10.0
1139	314	DDCA 04	Temeke	60	8	5	15.5	51.5	309	5.3	28.7	10	28.8	0.0	0.0	0.0	0.0	28.8	8.0
1066	241	DDCA	Temeke	40	8	6	13.0	34.0	2010	7.0	28.9	50	3.0	1.5	0.0	0.0	0.0	4.5	4.0
933	108	DDCA	Temeke	60	8	6	19.0	51.0	469	5.5	28.9	500	6.0	0.0	1.4	0.0	0.0	7.4	1.5
1142	317	DDCA 04	Temeke	56	8	5	19.0	_	_	5.3	28.3	130	15.6	0.0	0.0	0.0	0.0	15.6	3.3
952	127	DDCA	Temeke	48	8	6	15.0	45.0	2913	6.8	30.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1104	279	DDCA	Temeke	60	_	_	_	_	288	6.3	29.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1087	262	DDCA	Temeke	50	8	5	13.5	43.5	1694	5.5	28.7	10	7.1	0.0	0.0	0.0	0.0	7.1	2.5
1030	205	DDCA	Temeke	53	8	5	18.5	51.0	592	6.1	28.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1119	294	DDCA 04	Temeke	60	8	5	12.0	57.0	496	7.0	31.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1143	318	DDCA 04	Temeke	60	8	5	21.0	57.0	605	6.8	28.5	10	1.8	0.0	0.0	0.0	0.0	1.8	0.5
1023	198	DDCA	Temeke	38	10	6	6.0	34.5	339	5.2	30.8	60	5.6	0.0	0.0	0.0	0.0	5.6	1.0
1133	308	DDCA 04	Temeke	50	8	6	_	_	320	6.7	30.1	400	20.6	0.0	0.0	0.0	0.0	20.6	2.0
1144	319	DDCA 04	Temeke	42.25	9	6	12.0	39.5	428	6.5	31.2	250	21.6	0.0	0.0	0.0	0.0	21.6	3.0
1124	299	DDCA 04	Temeke	54	8	5	9.5	55.0	819	6.4	30.5	270	7.3	0.0	0.0	0.0	0.0	7.3	4.0
924	99	DDCA	Temeke	53	9	6	25.0	45.0	583	5.4	30.2	1050	123.4	0.0	0.0	0.0	0.0	123.4	10.0
1003	178	DDCA	Temeke	58	10	6	9.9	46.0	658	6.4	30.1	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1034	209	DDCA	Temeke	71	8	5	_	_	2910	6.1	29.7	18	2.0	0.5	29.0	0.0	0.0	31.5	10.0
857	32	DDCA	Temeke	32	8	5	_	_	50	6.8	30.3	50	6.4	0.0	0.0	0.0	0.0	6.4	1.0
846	21	DDCA	Temeke	27	15	6	9.5	20.7	496	7.0	29.3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1118	293	DDCA 04	Temeke	70	8	5	20.0	66.5	1550	7.4	28.7	1500	5.0	0.0	0.0	0.0	0.0	5.0	14.0
1112	287	DDCA 04	Temeke	50	8	5	17.5	47.5	925	5.8	30.2	482	1.8	0.0	0.0	0.0	0.0	1.8	1.5
1025	200	DDCA	Temeke	60	8	5	11.0	58.0	1014	7.0	29.8	305	1.4	0.0	0.0	0.0	0.0	1.4	1.5
992	167	DDCA	Temeke	45	_	6	_	_	1069	5.9	29.9	235	11.2	0.0	0.0	0.0	0.0	11.2	1.3
1130	305	DDCA 04	Temeke	44	8	5	12.0	38.0	1819	6.5	27.1	60	4.7	0.0	0.0	0.0	0.0	4.7	1.0
1032	207	DDCA	Temeke	70	13	6	27.0	68.0	3150	7.2	31.7	60	7.2	0.0	0.0	0.0	0.0	7.2	8.2
1106	281	DDCA	Temeke	54	8	5	15.5	51.0	1109	5.9	28.8	50	6.2	0.0	0.0	0.0	0.0	6.2	2.0
1045	220	DDCA	Temeke	36	8	5	6.0	33.0	501	5.7	29.7	380	44.7	0.0	0.0	0.0	0.0	44.7	13.0
1039	214	DDCA	Temeke	78	8	5	31.0	73.0	223	6.1	27.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1084	259	DDCA	Temeke	50	8	5	_	_	2870	6.6	29.1	170	12.0	0.0	0.0	0.0	0.0	12.0	6.5
1100	275	DDCA	Temeke	50	8	5	11.5	47.5	510	6.2	28.9	120	13.0	0.0	0.0	33.5	0.0	46.5	14.0

Table 6.5 Results of Existing Well Survey in Dar es Salam, Well Structure, Water Quality and Water Use (4/4)

Well Identification				Well Structure					Water Quality			Water Use							
No.				Depth	Dia. (inch)		Screen (mbgl)		Cond		Temp.	No. of	Consumption Rate (m3/d)					Amount	Pump
975	150	DDCA	Temeke	40	10	8	10.0	32.0	738	6.9	27.8	120	15.8	0.0	0.0	0.0	0.0	15.8	12.0
1019	194	DDCA	Temeke	51	8	5	6.0	42.5	571	6.8	29.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
983	158	DDCA	Temeke	35	8	5	12.8	31.9	2580	5.9	29.7	100	13.0	0.0	0.0	0.0	0.0	13.0	6.0
1058	233	DDCA	Temeke	42	10	6	12.0	35.7	931	6.9	29.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1076	251	DDCA	Temeke	56	9	6	15.0	54.0	436	6.7	30.5	720	72.0	0.0	6.5	0.0	0.0	78.5	10.0
1145	320	DDCA 04	Temeke	44	8	6	_	_	567	5.3	27.8	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1040	215	DDCA	Temeke	25	8	6	12.5	23.0	1004	6.7	29.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1057	232	DDCA	Temeke	30	10	5	12.5	27.5	733	7.4	30.8	24	3.4	0.0	0.0	0.0	0.0	3.4	4.0
1007	182	DDCA	Temeke	65	9	5	12.0	62.0	162	5.9	30.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1063	238	DDCA	Temeke	50	8	5	10.5	47.0	204	6.2	29.4	125	13.2	0.0	0.0	0.0	0.0	13.2	3.3
1128	303	DDCA 04	Temeke	45	8	5	_	_	1230	6.2	29.7	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
985	160	DDCA	Temeke	39	8	5	9.5	36.0	813	7.1	30.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
978	153	DDCA	Temeke	42	8	6	9.0	39.0	577	6.8	26.8	300	35.7	0.0	0.0	0.0	0.0	35.7	4.5
921	96	DDCA	Temeke	50	11	6	15.5	48.0	363	6.2	28.8	3000	13.0	0.0	0.0	0.0	0.5	13.5	9.0
1043	218	DDCA	Temeke	40	8	5	10.0	48.0	4012	6.3	20.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1075	250	DDCA	Temeke	50	8	6	_	_	316	6.3	31.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
974	149	DDCA	Temeke	51	10	6	13.5	50.0	_	_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
906	81	DDCA	Temeke	53	15	8	17.0	45.0	1258	7.1	28.3	4000	38.5	0.0	0.0	0.0	0.0	38.5	8.0
1070	245	DDCA	Temeke	52	10	6	_	_	986	6.1	28.1	500	21.6	0.0	0.0	0.0	0.0	21.6	5.0
1121	296	DDCA 04	Temeke	50	8	6	18.0	47.0	573	6.0	27.0	3000	0.4	0.0	18.4	0.0	1.1	19.9	2.3
82	856	31	9	40	10	6	_	_	986	7.0	30.0	3500	16.0	0.0	0.0	0.0	0.0	16.0	4.0
979	154	DDCA	Temeke	40	8	6	_	_	788	5.7	27.8	200	17.0	0.0	0.0	0.0	0.0	17.0	10.0
1046	221	DDCA	Temeke	52	8	5	12.5	49.0	2347	4.0	28.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
828	3	DDCA	Temeke	_	8	6	_	_	500	7.0	27.4	750	94.1	0.0	0.0	0.0	0.0	94.1	8.5
838	13	DDCA	Temeke	27	8	6	9.0	18.0	4210	7.2	28.1	50	6.0	0.0	2.5	0.0	0.0	8.5	5.0
914	89	DDCA	Temeke	46	10	6	_	_	207	5.6	27.9	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
996	171	DDCA	Temeke	45	8	5	16.0	40.5	894	7.7	28.9	320	36.0	0.0	0.0	0.0	0.0	36.0	12.0
994	169	DDCA	Temeke	50	8	5	21.0	69.0	643	6.0	29.4	90	12.7	0.0	0.0	0.0	0.0	12.7	3.0
1015	190	DDCA	Temeke	38	8	6	7.5	36.0	926	6.8	28.2	200	8.0	0.0	1.2	0.0	0.0	9.2	3.0
1086	261	DDCA	Temeke	50	8	5	_	_	955	6.3	26.9	116	51.9	0.0	0.0	0.0	0.0	51.9	8.0
1085	260	DDCA	Temeke	60	13	5	_	_	922	6.7	28.0	1400	80.0	0.0	0.0	0.0	0.0	80.0	12.0
1031	206	DDCA	Temeke	34	56	6	_	_	643	6.0	28.0	500	8.2	0.0	0.0	0.0	0.0	8.2	2.3
984	159	DDCA	Temeke	41	8	6	14.0	38.0	769	6.4	27.0	30	14.4	0.0	0.0	0.0	0.0	14.4	9.0
946	121	DDCA	Temeke	46	10	6	12.0	41.5	769	6.8	27.0	0	0.0	0.0	26.2	0.0	0.0	26.2	6.0
973	148	DDCA	Temeke	50	10	6	15.0	45.0		_	_	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1074	249	DDCA	Temeke	46	8	6	_	_	101	6.3	30.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
887	62	DDCA	Temeke	42	9.5	5	_	_	1348	6.1	29.1	200	8.3	0.0	0.0	0.0	0.0	8.3	2.5
1072	247	DDCA	Temeke	60	10	6	_	_	510	6.9	28.4	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
991	166	DDCA	Temeke	70	10	5	_	_	217	7.2	29.5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
842	17	DDCA	Temeke	37	12	4	_	_	617	6.7	28.7	500	0.4	0.0	0.0	17.0	0.0	17.4	10.0
925	100	DDCA	Temeke	54	15	6	15.4	55.1	221	6.2	28.0	500	14.0	0.0	0.0	0.0	0.0	14.0	3.0
864	39	DDCA	Temeke	42	8	5	13.4	28.7	1229	6.8	27.0	400	10.3	0.0	0.0	0.0	0.0	10.3	2.0
1113	288	DDCA 04	Temeke	50	8	5	13.0	40.0	890	7.0	28.6	40	4.7	0.0	0.0	0.0	0.0	4.7	6.0
1129	304	DDCA 04	Temeke	46	8	5	13.0	43.5	584	6.5	24.9	250	26.9	0.0	0.0	0.0	0.0	26.9	8.0
1146	321	DDCA 04	Temeke	60	8	5	_	_	239	6.4	27.3	15	2.7	0.0	0.0	0.0	0.0	2.7	3.0
1059	234	DDCA	Temeke	23	10	6	11.0	22.0	631	7.1	26.9	15	6.4	0.0	7.0	0.0	0.0	6.4	4.0
1060	235	DDCA	Temeke	27	8	4	19.5	24.5	656	7.6	26.9	6	15.2	0.0	0.0	0.0	0.0	15.2	4.0
1120	295	DDCA 04	Temeke	60	8	5	15.0	57.0	475	5.8	27.8	400	28.4	0.0	0.0	0.0	0.0	28.4	8.0
947	122	DDCA	Temeke	48	8	5	_	_	377	7.1	29.1	40	3.9	0.0	0.0	0.0	0.0	3.9	4.0
1022	197	DDCA	Temeke	69	12	5	10.5	22.5	1248	5.9	28.6	40	14.4	0.0	0.0	0.0	0.0	14.4	2.0
873	48	DDCA	Temeke	40.5	8	4	8.0	23.0	986	6.5	30.1	500	16.0	0.0	0.0	0.0	0.0	16.0	4.0
896	71	DDCA	Temeke	40	10	6	16.0	37.0	724	7.9	28.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
929	104	DDCA	Temeke	60	16	6	12.5	42.0	683	7.3	28.6	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1123	298	DDCA 04	Temeke	52	8	5	10.0	49.0	967	7.0	30.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
932	107	DDCA	Temeke	60	11	6	11.5	54.0	801	5.3	27.4	700	40.0	0.0	9.8	0.0	0.0	49.8	4.0

generally low. The rates of depleted well is relatively high in Kibaha and Kisarawe, it is 10% and 6% respectively. The rates of malfunctioned or stolen wells is extremely high in Bagamoyo, it is 48% of total well. It is also generally high in each district, ranges from 16% (Ilala) to 32% (Mkuranga).

These results suggest that groundwater development is generally difficult in Coast Region due to high abandoned and depleted well rate. Mkuranga shows relatively high success rate among Coast Region, although the rate of malfunctioned or stolen wells is high. Dar es Salaam is better suited for groundwater development. The success rate is very high, it rages from 96% (Ilala) to 100% (Temeke), and very low depleted well rate.

6.3.2 WATER USAGE

The condition of water usage is assumed by the result of interview survey to the owners and users of wells. *Figure 6.4* shows ratio of water usage by the classification of Domestic, Livestock, Irrigation, Industry and Others.

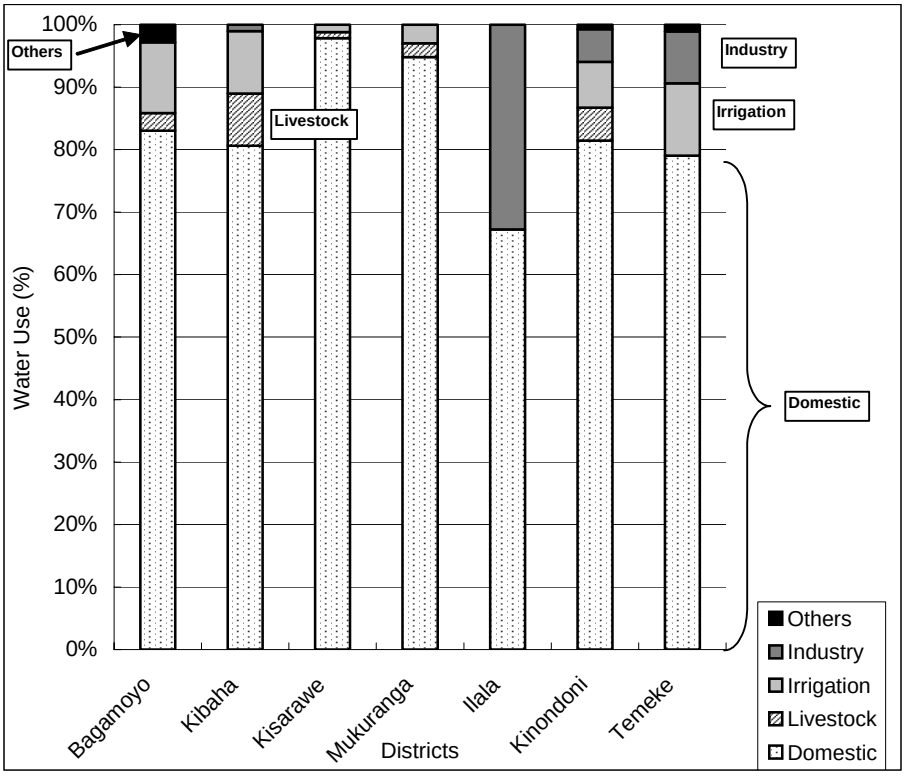


Figure 6.4 Condition of Water Usage

In general, domestic water use is the largest ratio of the water usage. The figure shows this tendency to increase the ratio in Coast Region. The domestic water use in Coast Region shows its range between 80% (Kibaha) and 98% (Kisarawe), while Dar es Salaam shows range between 67% (Ilala) and 81% (Kinondoni). There is industry water use in Dar es Salaam in a degree. It is high in Ilala, 33% of total water usage. In Coast Region, however, almost no industry water use is observed. The livestock water use in some small degree is identified in Bagamoyo, Kibaha, Kisarawe, Mkuranga and Kinondoni.

These results suggest that water usage is generally corresponds the differences of socio-economic condition and urban or community form of the two regions.

Chapter 7

Test Well Drilling

CHAPTER 7 TEST WELL DRILLING

7.1 GENERAL

In order to obtain the hydrogeological information for the evaluation of potential of groundwater resources by geological unit, 10 test wells were constructed. In Dar es Salaam Peri-urban area, three test wells had been constructed. In Coast region, seven test wells had been constructed. The locations of 10 test wells are shown in *Figure 7.1*. This Chapter describes the results of the test well drilling and pumping test.

The locations of test well drilling were selected based on the results of geophysical exploration as well as hydrogeological evaluation of existing data by the study team. Then the meeting with the counterpart personnel was held to make a final decision of the locations. In total, three times of meeting were held in accordance with the progress of geophysical exploration. Since the geophysical exploration and test well drilling had been conducted simultaneously.

The standard design of the well, well head block, well cap and well emblem are shown in *Figure 7.2*, *Figure 7.3*, *Figure 7.4* and *Figure 7.5*, respectively.

The drilling procedure is summarized in *Table 7.1*. Geophysical logging was conducted after the drilling of pilot hole with the diameter of 6-1/2". Pumping test was conducted after completion of drilling.

Table 7.1 Drilling Procedure

Step No.	Work Description	Items and Specification applied
1	Drill a conductor hole to a depth approximately 5 – 10m	Hole size: 15-3/4" or more
2	Install conductor pipe to the drilled depth.	Pipe size: 12"
3	Seal the annular space between the wall of the drilled borehole and the conductor pipe by cementing.	
4	Resume drilling of pilot well to the required depth.	Bit size : 6-1/2"
5	Perform Well Logging through the drilled well	Resistivity, SP, Temperature
6	Determine the position(s) of screen pipes through the instruction of the Client	It was instructed by the Client
7	Ream the well to the required depth	Bit size: 10"
8	Install casing, screen pipes as determined. The appropriate centrarizers were installed to the pipes with instructed intervals by the Client.	Casing size : 5" UPVC or equivalent Screen size : 5" UPVC or equivalent, slot type opening ration more than 5%
9	Make gravel packing for the annular space between the hole wall and casing/screen pipes	Grain size: 2 – 4mm
10	Make clay-packing for the annular space of the upper part of gravel-packing	Approximately 3m thickness
11	Cementation for the annular space above the clay-packing	Up to the top surface
12	Perform the development of the well by air-lifting and/or surging, bailing etc.	Up to the lifted water becomes clean
13	Carry out the pumping test by submersible pump.	Step drawdown test, constant discharge test and time recovery test.
14	Install sanitary seal and construct well head	
15	Construct the Well Head Block and install Well Cap and Emblem	As described in *Figure 7.3 to 7.5*
16	Shift to the next drilling site and clean the just completed drilling site	

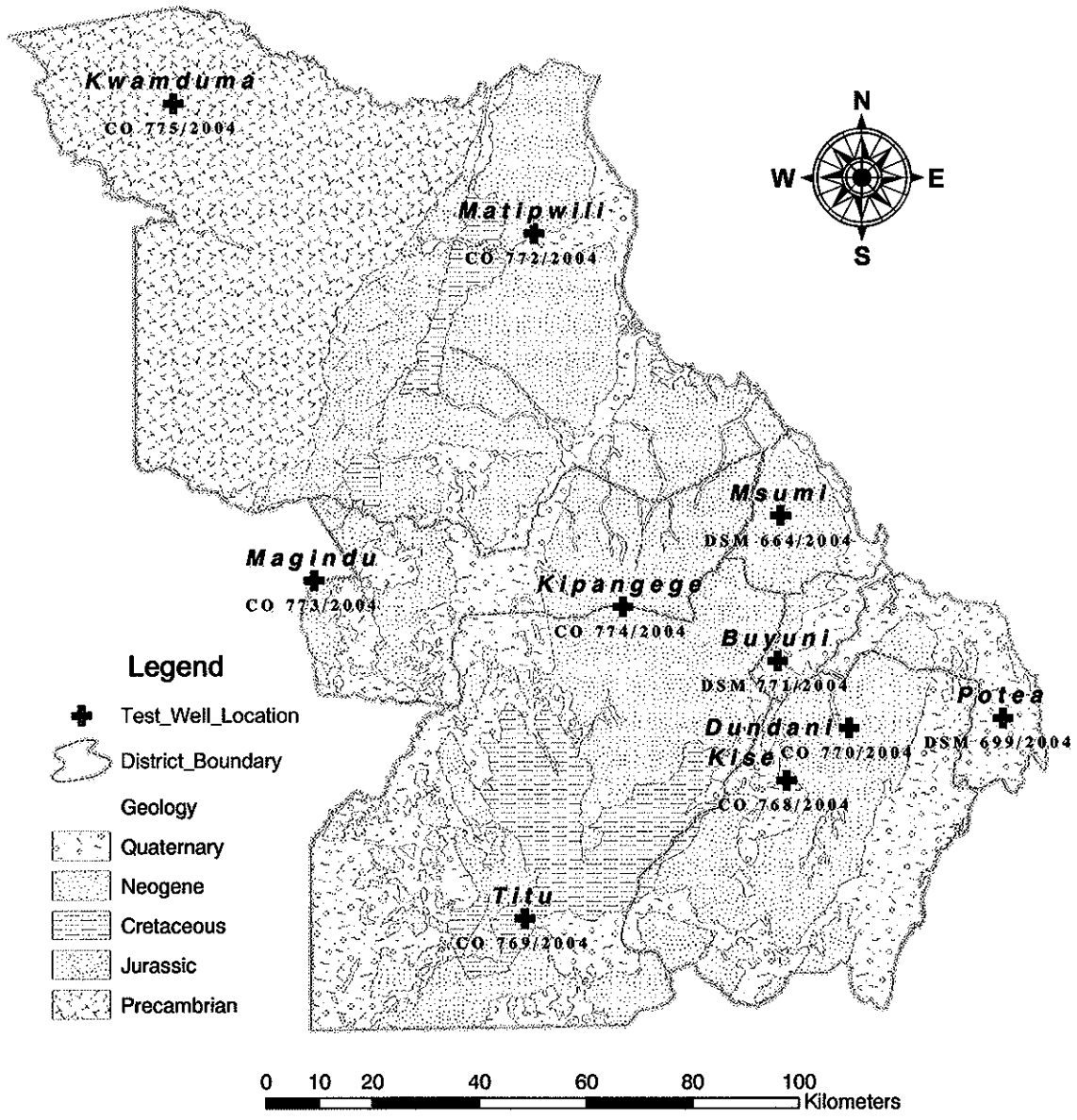


FIGURE 7.1 LOCATION OF TEST WELL

THE STUDY ON WATER SUPPLY IMPROVEMENT IN COAST & DAR ES SALAAM | **JICA**

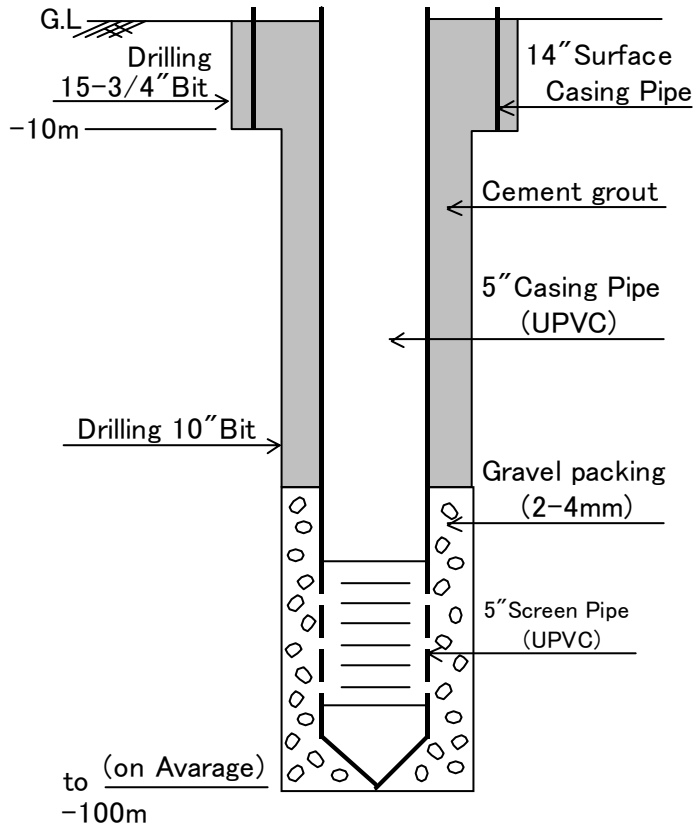


FIGURE 7.2 STRUCTURE OF TEST WELL

THE STUDY ON WATER SUPPLY IMPROVEMENT IN COAST & DAR ES SALAAM | **JICA**

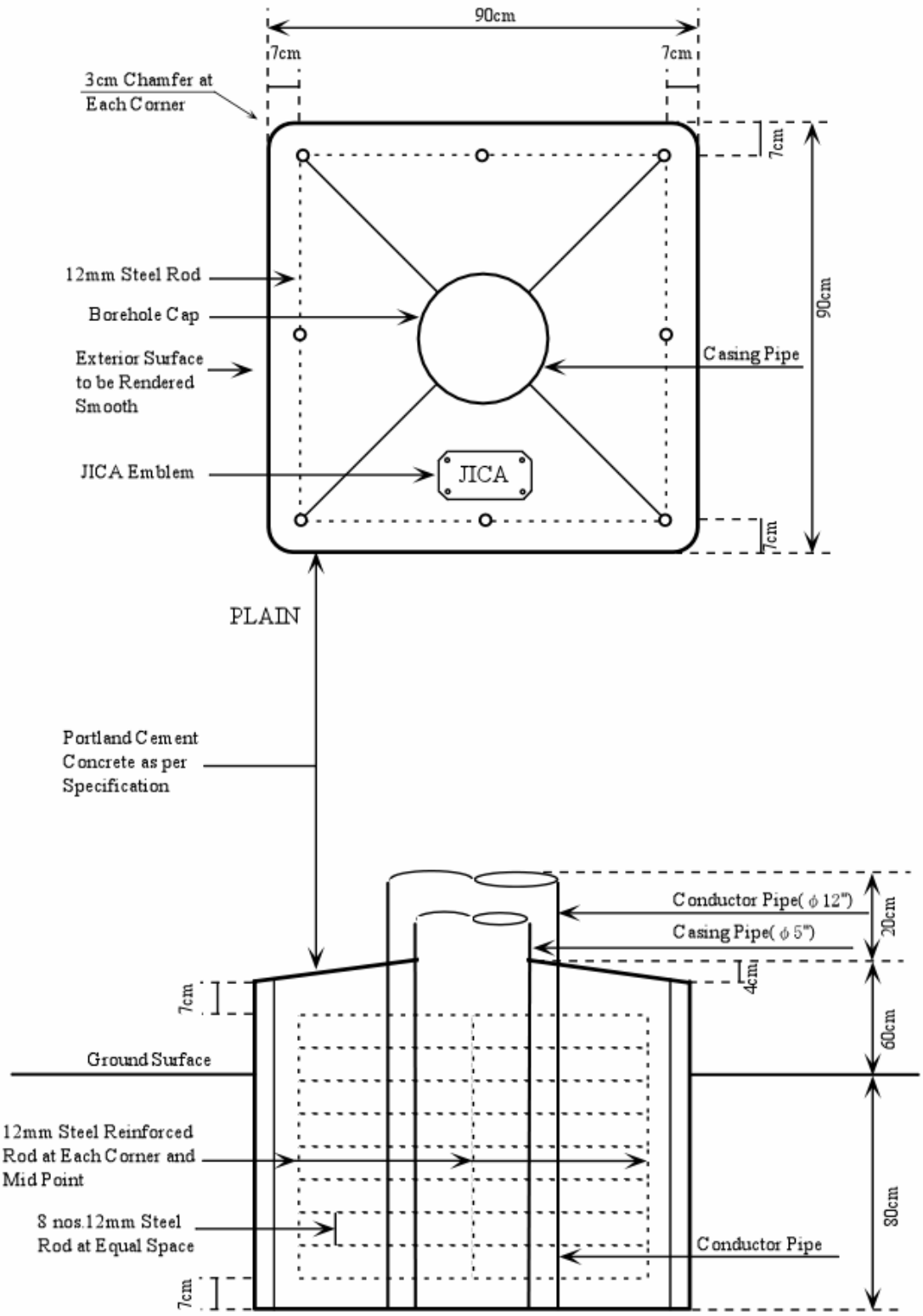


FIGURE 7.3 WELL HEAD BLOCK

THE STUDY ON WATER SUPPLY IMPROVEMENT IN COAST & DAR ES SALAAM	JICA

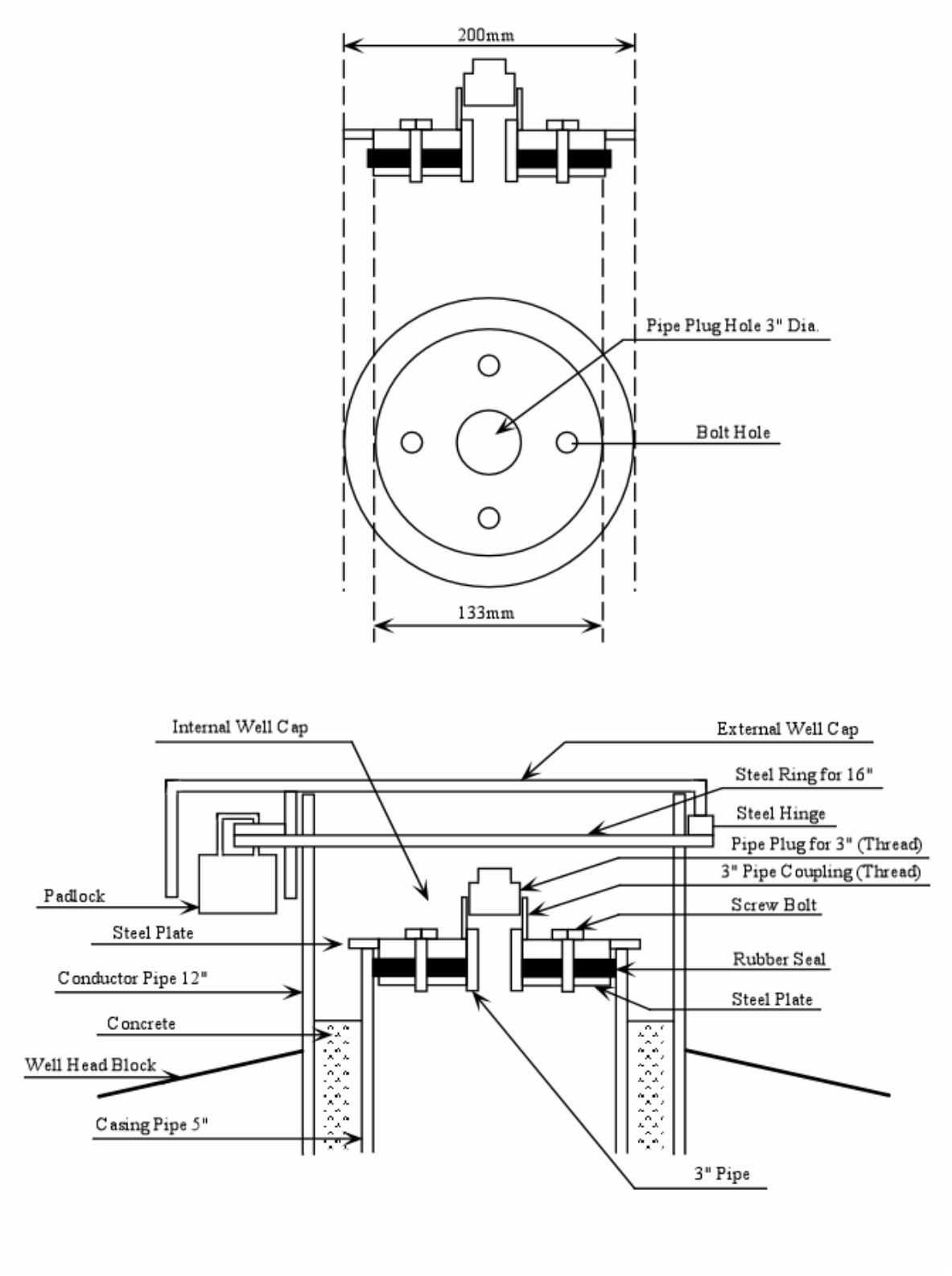
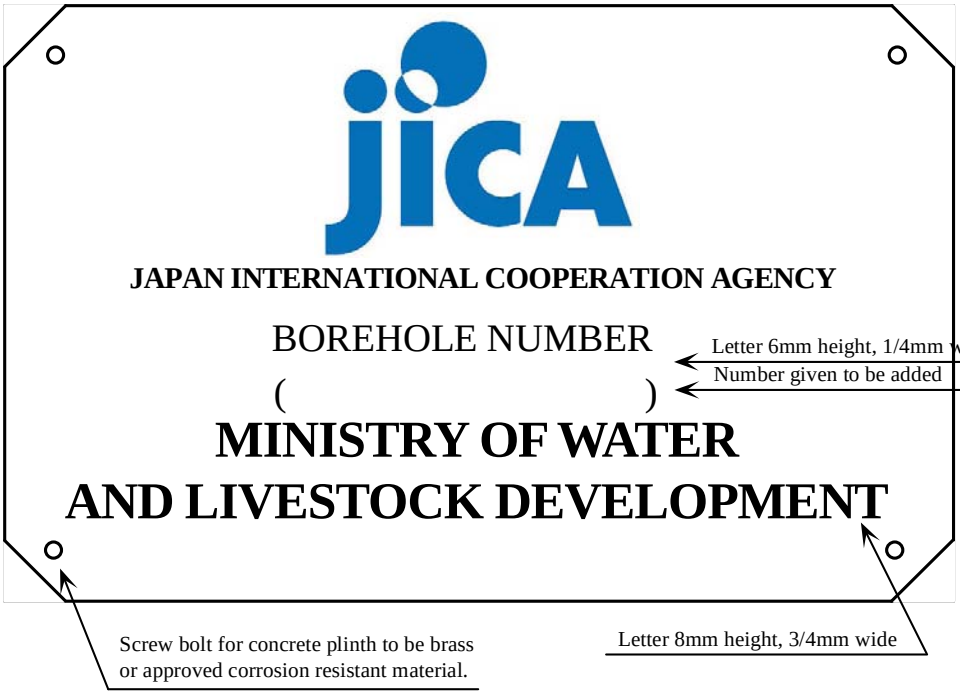


FIGURE 7.4 WELL CAP

THE STUDY ON WATER SUPPLY IMPROVEMENT IN COAST & DAR ES SALAAM | **JICA**



NOTE:

1) All letter to be engraved
2) 3mm aluminum plate 160 x 100mm in size
3) Letters painted with black enamel paint

FIGURE 7.5 WELL EMBLEM

7.2 TEST WELL DRILLING

The schedule of test well drilling is summarized in *Figure 7.6* and the basic data of the test wells are tabulated in *Table 7.2*.

The outlines of the test well drilling of each location are summarized as follows.

7.2.1 MSUMI VILLAGE, KINONDONI MUNICIPALITY

The test well was registered as DSM 664/2004 (J-1). This test well location is selected by following reason. The area of Kinondoni has been regarded as the area with low potential of groundwater resources. Recently, it was reported that some wells with enough yield for water supply have been constructed in the rural area of Kinondoni Municipality. This fact suggests that there is a possibility of the groundwater development in this area by conducting the detailed study. Therefore, in order to obtain the hydrogeological information, this site was selected.

(1) Progress of Work

Mobilization and set up	from 10, November '04 to 11, November '04
Drilling	from 11, November '04 to 20, November '04
Logging	13, November '04
Casing Installation	14, November '04

(2) Construction of Well

Drilled Depth	91 m
Surface Casing	6 m (12 inch diameter)
Borehole Diameter	10 in. (254 mm)
Cased Depth	89.9 m
Screen Position	from 44 m to 56.0 m (11.6 m)
	from 67.6 m to 76.3 m (8.7 m)
	from 79.2 m to 82.1 m (2.9 m)
	from 85.0 m to 87.9m (2.9 m) Total: 26.1 m
Casing/Screen Diameter	I.D: 127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

The geology of the area is Neogene formation which is composed of sand, sandy clay, clayey sand intercalated with limestone.

From 2 to 26m :	Grey, fine to medium sand
From 26 to 56 m :	Grey - whitish, medium to very coarse sand intercalated with limestone.
From 56 to 91 m :	Grey medium to very coarse clayey sandy intercalated with limestone.
Water level measuring:	67.50 mbgl (20, November '04)
	67.85 mbgl (21, November '04)
	67.87 mbgl (29, November '04)

7.2.2 BUYUNI VILLAGE, ILALA MUNICIPALITY

The test well was registered as DSM 771/2004 (J-2). This site was selected to evaluate the following hydrogeological characteristics.

Table 7.2 Results of Test Well Drilling

Borehole Number		Location					Well Structure					Groundwater Information			
		District	Village	Coordinate (degree, minute)		Elevation	Borehole Diameter	Drilled Depth	Cased Depth	Screen*1 Position	Diameter of Casing and Screen	Water Strike	SWL	Yield	EC*2
JICA No.	BH No.			Long.	Lat.	masl	mm	mbgl	m	mbgl	mm	mbgl	mbgl	litter/min	μ S/cm
J-1	DSM 664/2004	Kinondoni	Msumi	39 06.45'	06 42.68'	137	254	89.9	89.9	67.6-76.3, 79.2-82.1, 85.0-87.9	O.D. 140 I.D. 125	45, 51, 72, 80, 86	67.87	20.89	1,864
J-2	DSM 771/2004	Ilala	Buyuni	39 06.11'	06 57.45'	102	254	58	58	20.3-26.1, 40.6-52.2	O.D. 140 I.D. 126	20-26, 40-52	3.65	16.5	765
J-3	DSM 699/2004	Temeke	Potea	39 29.20'	07 03.28'	75	254	75	75	23.6-26.5, 46.8-58.4, 61.3-64.2 67.1-70.0	O.D. 140 I.D. 127	50 64	Artesian	264	587
J-4	CO 775/2004	Bagamoyo	Kwamduma	38 04.68'	06 00.60'	414	254	70	32	17.5-29.1	O.D. 140 I.D. 128	18-20, 24-26	16.3	58.9	964
J-5	CO 772/2004	Bagamoyo	Matipwili	38 42.95'	06 13.93'	10	254	70	35	13.7-22.4, 25.3-28.3, 31.1-34.0	O.D. 140 I.D. 129	21-64	9.5	1.84	7,000
J-6	CO 773/2004	Kibaha	Magindu	38 18.93'	06 49.26'	187	254	100	46.6	22.8-28.6, 40.2-43.1	O.D. 140 I.D. 130	22-28, 40-44	10.6	1.47	2,970
J-7	CO 774/2004	Kibaha	Kipangege	38 50.29'	06 51.94'	138	254	80	80	45.2-53.9	O.D. 140 I.D. 131	22-30, 45-50	40.9	1.40	2,710
J-8	CO 770/2004	Mkuranga	Dundani	39 13.45'	07 04.28'	114	254	80	78	52.0-63.6, 72.3-75.2	O.D. 140 I.D. 132	17-31, 51-63	46.35	38.84	1,090
J-9	CO 768/2004	Mkuranga	Kise	39 07.00'	07 09.61'	97	254	77	77	39.3-48.0, 50.9-62.5, 71.2-74.1	O.D. 140 I.D. 133	40-64, 72-80	14.12	6.00	4,090
J-10	CO 769/2004	Kisarawe	Titu	39 40.30'	07 23.63'	278	254	100	-	-	-	-	dry	-	-

Note) *1 : Screen Position under SWL
*2 : Electric Conductivity measured at Drilling Site
O.D. : Outer Diameter
I.D. : Inner Diameter

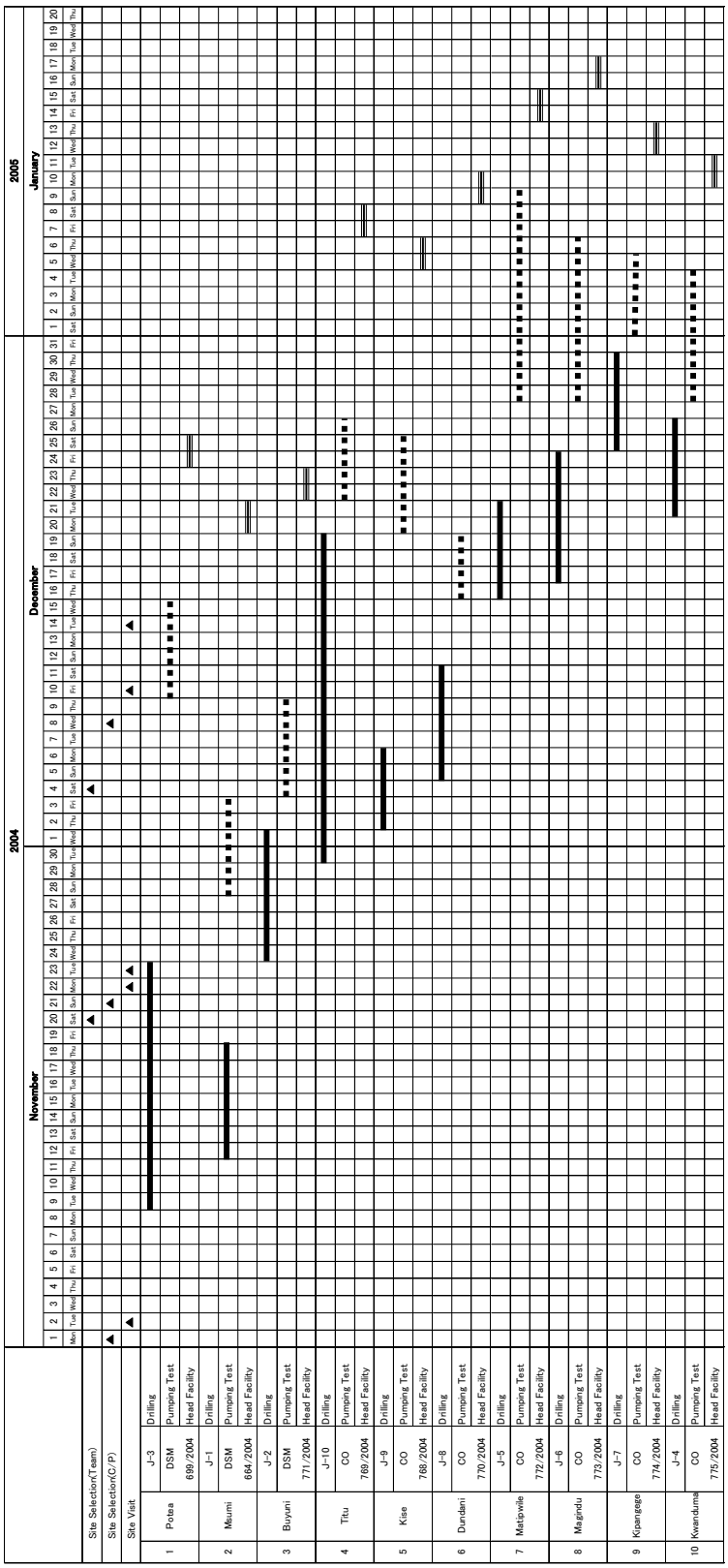


FIGURE 7.6 SCHEDULE OF TEST WELL DRILLING

THE STUDY ON WATER SUPPLY IMPROVEMENT IN COAST & DAR ES SALAAM | **JICA**

- Possibility of existence of the aquifer under clay layer
- Water quality and quantity of the aquifer of Neogene strata
- Geology of the high resistivity part shown in the result of geophysical exploration.

(1) Progress of Work

Mobilization and set up	from 22, November '04 to 23, November '04
Drilling	from 24, November '04 to 29, November '04
Logging	29, November '04
Casing Installation	30, November '04
Air Lifting	30, November '04

(2) Construction of Well

Drilled Depth	80 m
Surface Casing	12 m (12 inch diameter)
Borehole Diameter	10 inch (254 mm)
Cased Depth	58 m
Screen Position	from 20.3 m to 26.1 m
	from 40.6 m to 52.2 m, Total:17.4 m
Casing/Screen Diameter	I.D:127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

From 2 to 13m :	Reddish –grey, fine to medium sand with reddish patches.
From 13 to 28 m :	Grey –whitish, medium to coarse sandy clayey consist with gravel and kaolin
From 28 to 80 m :	Grey medium to very coarse (gravel) clayey sandy intercalated with limestone
Water level measuring :	3.65 mbgl (05, December '04)

(4) Air Lifting Test

The air lifting test conducted before casing installation.

SWL :	3.44 mbgl
Yield :	2500 Liter/h
Temperature :	30.1 C
EC :	88.2 mS/m

7.2.3 POTEA (YALE YALE PUNA VILLAGE), TEMEKE MUNICIPALITY

The test well was registered as DSM 699/2004 (J-3). This test well drilling site was selected by following reasons. In the area of southeast part of Temeke Municipality, the only information of the shallow aquifer is available. There is no available data about Alluvium and Neogene aquifer in this area. Therefore, in order to obtain the aquifer information, this site was selected.

(1) Progress of Work

Mobilization and set up	from 07, November '04 to 08, November '04
Drilling	from 09, November '04 to 18, November '04
Logging	18, November '04
Casing Installation	18, November '04

Air Lifting	Was not conducted.

(2) Construction of Well

Drilled Depth	78 m
Surface Casing	12 m (12 inch diameter)
Borehole Diameter	10 in. (254mm)
Cased Depth	75.2 m
Screen Position	From 23.6 m to 26.5 m
	From 46.8 m to 58.4 m
	From 61.3 m to 64.2 m
	From 67.1 m to 70.0 m, Total: 20.3 m
Casing/Screen Diameter	I.D: 127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

From 3 to 30 m	:	Greenish-black, medium to coarse sand.
From 30 to 37 m	:	Dark-green, clay
From 37 to 75 m	:	Dark-green, medium to very coarse sandy clayey
Water level measuring	:	Artesian well, 0.0 mbgl (18, November '04),
		0.0 mbgl (24, November '04)

(4) Air Lifting Test

The air lifting test was not conducted before casing installation due to soft formation.

7.2.4 KWAMDUMA VILLAGE, BAGAMOYO DISTRICT

The test well was registered as CO 775/2004 (J-4). This test well location was selected by following reasons.

- To detect the fissured aquifer in the Precambrian formation distributed area
- To confirm the low resistivity range of the result of geophysical exploration
- To confirm the geological structure which was detected by geophysical exploration
- To fill the gap of scattered hydrogeological information in this area

(1) Progress of Work

Mobilization and set up	from 23, December '04	to 24, December '04
Drilling	from 25, December '04	to 28, December '04
Logging	28, December '04	
Casing Installation	29, December '04	
Air Lifting	Was not conducted	

(2) Construction of Well

Drilled Depth	70 m
Surface Casing	12 m (12 inch diameter)
Borehole Diameter	10 inch (254 mm)
Cased Depth	32 m
Screen Position	from 17.5 m to 29.1 m, Total: 11.6m
Casing/Screen Diameter	I.D: 127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

From 0 to 2 m	:	Reddish-brown, sand
From 2 to 70 m	:	Grey, fractured, moderately to slightly weathered gneiss
Water level measuring	:	16.3 mbgl (30, December '04)

(4) Air Lifting Test

The air lifting test was not conducted before casing installation.

7.2.5 MATIPWILI VILLAGE, BAGAMOYO DISTRICT

The test well was registered as CO 772/2004 (J-5). This test well site was selected to confirm the possibility of recharge from Quaternary aquifer.

(1) Progress of Work

Mobilization and set up	from 16,December '04	to 17,December '04
Drilling	from 18, December '04	to 23, December '04
Logging	24, December '04	
Casing Installation	24, December '04	
Air Lifting Test	Was not conducted	

(2) Construction of Well

Drilled Depth	70m
Surface Casing	6 m (12 inch diameter)
Borehole Diameter	10 inch (254 mm)
Cased Depth	35 m
Screen Depth	from 13.7 m to 22.4 m
	from 25.3 m to 28.3 m
	from 31.1 m to 34.0 m, (Total 14.5m)
Casing/Screen Diameter	I.D: 127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

From 3 to 11 m:	Yellowish-grey, fine to medium sand.
From 11 to 70 m:	Grey, medium to very coarse sand intercalated with limestone.

(4) Air Lifting Test

The air lifting test was not conducted before casing installation.

7.2.6 MAGINDU VILLAGE, KIBAHA DISTRICT

The test well was registered as CO 773/2004 (J-6). This test well site was selected to obtain the hydrogeologicla information in the Jurassic formation distributed area.

(1) Progress of Work

Mobilization and set up	from 16, December '04	to 17, December '04
Drilling	from 17, December '04	to 21, December '04
Logging	22, December '04	
Casing Installation	23, December '04	
Air Lifting Test	Was not conducted	

(2) Construction of Well

Drilled Depth	102 m (The borehole was sealed and it was filled up with bentonite and cement up to the depth of 46 m.)
Surface Casing	12 m (12 inch diameter)
Borehole Diameter	10 inch (254 mm)
Cased Depth	46 m
Screen Position	from 22.8 m to 28.6 m (2.9 m) from 40.2 m to 43.1 m (2.9 m), Total: 8.7 m
Casing/Screen Diameter	I.D: 127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

From 1 to 25 m	:	Yellowish-grey,fine to medium sandy clayey
From 25 to 100m	:	Grey, fresh to slightly weathered sandstone.

<Fractures >

Fracture	:	25 m to 29 m

(4) Air Lifting Test

The air lifting test was not conducted.

7.2.7 KIPANGEGE VILLAGE, KIBAHA DISTRICT

The test well was registered as CO 774/2004 (J-7). This test well site was selected to fill the gap of scattered hydrogeological information in this area.

(1) Progress of Work

Mobilization and set up	from 25, December '04	to 26, December '04
Drilling	from 26, December '04	to 28, December '04
Logging	29, December '04	
Casing Installation	29, December '04	

(2) Construction of Well

Drilled Depth	80m
Surface Casing	6 m (12 inch diameter)
Borehole Diameter	10 inch (254 mm)
Cased Depth	80 m
Screen Position	from 22m to 30.7 m from 36.5 m to 39.4 m from 45.2 m to 53.9 m, Total: 20.3 m
Casing Diameter	I.D: 127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

From 3 to 15 m	:	Whitish – grey, fine to medium sand
From 15 to 24 m	:	Whitish – grey, medium to coarse sand with traces of limestone
From 24 to 42 m	:	Whitish-grey, coarse to very coarse sand with gravel

(4) Air Lifting Test

The air lifting test was not conducted before casing installation.

7.2.8 DUNDANI VILLAGE, MKURANGA DISTRICT

The test well was registered as CO 770/2004 (J-8). This test well site was selected to obtain the possibility of groundwater near the fault with the direction of northeast-southwest.

(1) Progress of Work

Mobilization and set up	from 1, December '04 to 2, December '04
Drilling	from 2, December '04 to 6, December '04
Logging	6 - 7, December '04
Casing Installation	From 8, December '04 to 14, December '04
Air Lifting Test	Was not conducted

(2) Construction of Well

Drilled Depth	80 m
Surface Casing	6 m (12 inch diameter)
Borehole Diameter	10 inch (254 mm)
Cased Depth	78 m
Screen Position	from 20.1 m to 25.9 m (5.8 m) from 28.8 m to 31.9 m (2.9 m) from 52.0 m to 63.6 m (11.6 m) from 72.3 m to 75.2 m (2.9 m) Total: 23.2 m
Casing/Screen Diameter	I.D: 127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

From 3 to 19 m :	Reddish-brown, fine to medium sand,
From 19 to 24 m :	Whitish-grey, Grey with reddish patches, medium to coarse sand.
From 24 to 28 m :	Whitish grey with reddish patches fine to medium sand.
From 28 to 31 m :	Whitish-grey, medium to coarse sand.
From 31 to 80 m :	Whitish-grey, fine to medium sand.

(4) Air Lifting Test

The air lifting test was not conducted before casing installation.

7.2.9 KISE VILLAGE, MKURANGA DISTRICT

The test well was registered as CO 768/2004 (J-9). This test well site was selected to obtain the hydrogeological information of the Quaternary formation which is surrounded by Neogene and Cretaceous formations.

(1) Progress of Work

Mobilization and set up	from 29, November '04 to 30, November '04
Drilling	from 31, December '04 to 2, December '04
Logging	3, December '04
Casing Installation	4, December '04
Air Lifting Test	Was not conducted

(2) Construction of Well

Drilled Depth	84 m
Surface Casing	6 m (12 inch diameter)
Borehole Diameter	10 inch (254 mm)
Cased Depth	77 m
Screen Position	from 39.3 m to 48 m (8.7 m) from 50.9 m to 62.5m (11.6 m) from 71.2 m to 74.1 m (2.9 m), Total: 23.2 m
Casing/Screen Diameter	I.D: 127 mm, O.D: 140 mm, 5 inch UPVC pipes

(3) Geology

<General Condition>

From 0 to 27 m :	Yellowish-grey, fine to medium sand
From 27 to 31 m :	Yellowish-grey, with reddish patches, medium to coarse sand.
From 31 to 40 m :	Yellowish-grey, medium sand
From 40 to 63 m :	Whitish-grey, coarse to very coarse sand with traces of gravels
From 63 to 70 m :	Whitish-grey, fine sand
From 70 to 84 m :	Whitish-grey, fine to medium sand.

(4) Air Lifting Test

The air lifting test was not conducted.

7.2.10 TITU VILLAGE, KISARAWE DISTRICT

The test well was registered as CO 769/2004 (J-10). This test well site was selected to evaluate the fissure dense part of the Cretaceous formation which was detected by the analysis of satellite imagery.

(1) Progress of Work

Mobilization and set up	from 29, November '04 to 30, November '04
Drilling	from 1, December '04 to 08, December '04
Logging	08, December '04
Casing Installation	No casing was installed
Air Lifting Test	Was not conducted

(2) Construction of Well

Drilled Depth	100 m
Surface Casing	12 m (12 inch diameter)
Borehole Diameter	10 inch (254 mm)
Cased Depth	No casing was installed
Screen Position	No casing was installed
Casing/Screen Diameter	No casing was installed

(3) Geology

<General Condition>

From 0 to 11 m :	Reddish-brown fine sand silt.
From 11 to 100 m:	Yellowish-grey, very fine sand silt, crushed sandstone.

The general geology of the area is sedimentary rocks, which is composed of sandstone and mudstone.

<Fractures and Water>

No major fractures were encountered during drilling.

(4) Air Lifting Test

The air lifting test was not conducted.

7.3 GEOPHYSICAL LOGGING

7.3.1 ITEMS MEASURED

Geophysical logging was carried out when the depth of borehole was reached to the planned depth. The items measured are Resistivity, Spontaneous Potential and Temperature. The results of the logging of each well are shown in the *Appendix E*.

Generally, short normal resistivity logging is used for correlation of lithology and long normal is used for determining true resistivity in thick beds. Spontaneous potential helps to delineate the boundaries of permeable rock units and less permeable beds. Temperature is used for the detection of water seepage formation.

7.3.2 RESULTS OF GEOPHYSICAL LOGGING

The results of geophysical logging of each test well are compiled as Borehole Log. The Borehole Logs are presented in Appendix E of this supporting report. The hydrogeological interpretations of each test wells are summarized as follows.

(1) Msumi Village, Kinondoni Municipality: Well No. DSM 664/2004 (J-1) (*Appendix E Borehole Log: J-1 BH No. DSM 664/2004*)

Long normal indicates around 150 ohm-m from the depth of 26 to 53m, where medium to coarse sand layer without water is distributed. On the other hand, resistivity below 53 m is relatively low which is around 120 ohm-m. This low resistivity part corresponds to the formation of clayey fine to coarse grained sand with water.

(2) Buyuni Village, Ilala Municipality: Well No. DSM 771/2004 (J-2) (*Appendix E Borehole Log: J-2 BH No. DSM 771/2004*)

Long normal resistivity indicates the reversal of the resistivity with the middle normal at the depth of 20 to 27m where water strike was reported by the driller. The resistivity becomes 100 ohm-m at the depth of 58m where the medium to coarse clayey sand with kaoline formation is distributed. According to the information of existing wells in surrounding area, the water quality becomes saline in the formation including kaolin below the depth of 65m, therefore, the lower part was back filled.

(3) Potea (Yale Yale Puna Village), Temeke Municipality: Well No. DSM 699/2004 (J-3) (*Appendix E Borehole Log: J-3 BH No. DSM 699/2004*)

Long normal indicates low resistivity. From the depth of 37 m, where lithology is changed to dark green medium sand from clay, the resistivity becomes slightly low.

(4) Kwamduma Village, Bagamoyo District: Well No. CO 775/2004 (J-4) (*Appendix E Borehole Log: J-4 BH No. CO 775/2004*)

Precambrian basement rocks are distributed in this site, therefore, the fracture of the basement rocks and weathered part were expected to be a groundwater bearing layer. Long normal indicates relatively low resistivity which is less than 200 ohm-m, it may suggest that the basement rock is weathered or fractured.

(5) Matipwili Village, Bagamoyo District: Well No. CO 772/2004 (J-5) (*Appendix E Borehole Log: J-5 BH No. CO 772/2004*)

Long normal indicates very low resistivity which is less than 30 ohm-m. This low resistivity shows the existence of saline water in the formation.

(6) Magindu Village, Kibaha District: Well No. CO 773/2004 (J-6) (*Appendix E Borehole Log: J-6 BH No. CO 773/2004*)

Jurassic formation is distributed in this site, therefore, the fracture of the formation and weathered part were expected to be a groundwater bearing layer. Long normal indicates less than 50 ohm-m from the surface to the bottom. Only slight change was observed at the depth of 24 m, where the boundary between fine to medium clayey sand and weathered sandstone is reported.

(7) Kipangege Village, Kibaha Village: Well No. CO 774/2004 (J-7) (*Appendix E Borehole Log: J-7 BH No. CO 774/2004*)

Long normal indicates relatively low resistivity which is less than 150 ohm-m. At the depth of 60 m where the boundary between sand layer and clay layer is observed, the rsistivity becomes lower which is around 60 ohm-m.

(8) Dundani Village, Mkuranga District: Well No. CO 770/2004 (J-8) (*Appendix E Borehole Log: J-8 BH No. CO 770/2004*)

Long normal resistivity indicates around 200 ohm-m at the depth of 8 to 24m. From 24 to 52m, the resistivity shows around 150 ohm-m and is constant. This depth of the resistivity variation corresponds to the change of the geological formation from reddish to grayish sandy layer, to whitish grey sandy layer. The variation is also observed at the depth of 52m where the water strike was reported by the driller.

(9) Kise Village, Mkuranga District: Well No.CO 768/2004(J-9) (*Appendix E Borehole Log: J-9 BH No .CO 768/2004*)

Long normal indicates extremely low resistivity from the surface to the depth of 26 m. On the other hand, relatively high resistivity which is less than 50 ohm-m, is indicated from the depth of 26 m to the bottom. Considering the Electric Conductivity of the existing well located around 200 m away from the site, it is concluded that the water quality of upper part is saline. Therefore, this part is sealed as shown in *Appendix E*.

(10) Titu Village, Kisarawe District: Well No. 769/2004 (J-10) (*Appendix E Borehole Log: J-10 BH No. 769/2004*)

Cretaceous formation is distributed in this site. In addition, the lineament density is high concentrated. Therefore, the fracture of the formation and weathered part were expected to be a water bearing layer. Long normal indicates low resistivity which is less than 100 ohm-m, and almost flat. During the drilling, the lost circulation of the drilling fluid was continued. This fact suggests that there are some fractures in the formations. Resistivity measurement, however, did not detect the characteristics of those fractures.

7.4 PUMPING TEST

After installing the casing pipes, the pumping test was carried out to estimate aquifer properties. Besides, airlift test was conducted in some cases during the drilling.

7.4.1 METHOD OF PUMPING TEST AND ANALYSIS

The following stages were applied to the pumping test in general, if possible. The yield of some wells, however, was too low to perform the test completely. In such a case, only a short duration constant discharge test and recovery test were conducted.

Phase 1: Provisional Test

A short provisional test was normally done before the commencement of the pumping test. The purpose of the test is to measure the approximate pumping rate and to decide the number of steps for the step drawdown test, and to adjust valve-opening rate to achieve the prescribed pumping rate.

Phase 2: Step drawdown test

Five steps were performed with each step measuring 120 minutes, if possible.

Phase 3: Constant discharge test

The test was done for 48 hours or more, when the yield was enough.

Phase 4: Recovery test

The test commenced immediately on completion of the constant discharge test and continued until the water level returned to its static water level or occasionally over a shorter period.

<Measurement>

The original static water level in the well was always measured before any test pumping commenced. Throughout the duration of each test, the water level in the well was measured and recorded following the observation time schedule listed below:

Time from start of pumping or pumping rate increase (minutes)	Time interval between observations (minutes)
0 - 5	0.5
5 - 10	1
10 - 30	2
30 - 60	5
60 - 120	10
120 - 240	20
240 - 360	40
360 - 720	60
720 - 2880	120
(2880 and longer)	(240)

Electric conductivity of water from the well was recorded during the pumping test at intervals corresponding to those for water level measurements.

<Analysis>

- Aquifer properties were calculated based on the results of constant discharge test and recovery test. Three fundamental analyzing methods, namely Theis type curve analysis, Cooper-Jacob time distance drawdown method and recovery method, were applied. The most of the tests were single-well test without observation wells, or piezometers.

7.4.2 RESULT OF PUMPING TEST

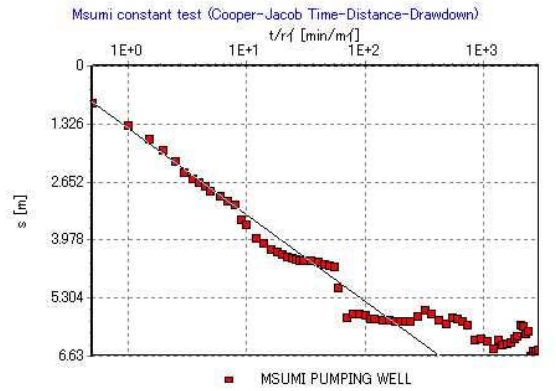
Analysis of pumping test of 10 test wells has been completed. The results were graphed in *Figure 7.7* to *Figure 7.15* and summarized in *Table 7.3*. Specific capacity, which is the discharge per unit of drawdown, was calculated. Transmissivity, which is the flow in m^3/day through a section of aquifer one meter wide under a hydraulic gradient of unity, was calculated. Then the Permeability coefficient, which is representing the relative ability of water to move through a geologic material of a given permeability, was estimated. The Storage coefficient which shows the volume of change which takes into or releases from storage per unit surface area of an aquifer per unit change in head, was also calculated. Calculated storage coefficient of all test wells are categorized that of the confined aquifer. In the analysis, when the fluctuation of discharge rate is observed, the weighted value was calculated.

(1) Msumi Village, Kinondoni Municipality: Well No. DSM 664/2004 (J-1) (*Figure 7.7*)

Table 7.3 Results of Pumping Test of Test Well

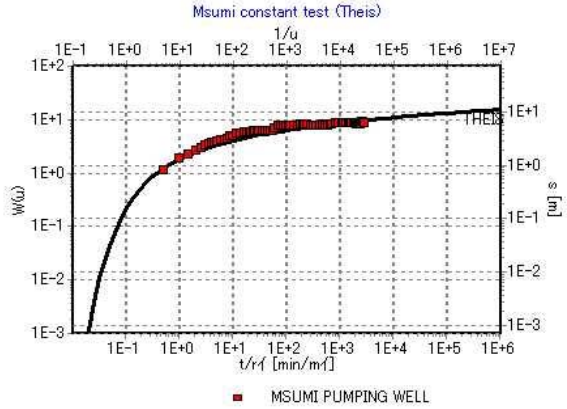
Well No.		Location		Well Depth	Screen Length	Step No. / Constant	Pumping Rate	Duration	Drawdown	Specific Capacity	Transmissivity			Permeability Coefficient			Storage Coefficient		Well Loss	
											Cooper-Jacob time-distance-drawdown	Theis type curve	Thies Recovery	Cooper-Jacob time-distance-drawdown	Theis type curve	Thies Recovery	Cooper-Jacob time-distance-drawdown	Theis type curve	Hantush-Bierschenk	
		Municipality / District	Village	(m)	(m)		Q (l/min.)	(min)	s (m)	Q/s(l/min/m)	T (m^3/day/m)			k (m/day)			no dimension		B (h/m^2)	C (h^2/m^5)
J-1	DSM 664/2004	Kinondoni	Msumi	91	14.5	1st	3.56	120	0.67	5.31	2.77	3.33	1.32	1.91.E-01	2.30.E-01	9.10.E-02	8.29.E-04	9.67.E-04	4.01E+00	1.39E+00
						2nd	5.87	120	1.13	5.19										
						3rd	13.41	120	3.26	4.11										
						4th	19.79	120	8.33	2.38										
						5th	28.13	120	16.57	1.70	Average = 2.5			Average = 1.70E-01			Average = 8.98.E-04			
						Constant	20.89	2880	6.48	3.22										
J-2	DSM 771/2004	Ilala	Buyuni	58	17.4	1st	4.16	120	2.70	1.54	0.939	0.941	0.379	5.40E-02	5.41E-02	2.18E-02	1.69E-04	1.57E-04	2.31E+00	5.85E+00
						2nd	9.72	120	6.19	1.57										
						3rd	14.95	120	12.13	1.23										
						4th	26.47	120	46.33	0.57	Average = 0.75			Average = 4.00E-02			Average = 1.63E-04			
						Constant	16.50	2880	20.48	0.81										
J-3	DSM 699/2004	Temeke	Potea	75	20.3	1st	50.77	120	2.70	18.80	28.4	25.3	40.8	1.40E+00	1.25E+00	2.01E+00	1.07E-05	9.26E-05	7.61E-01	2.26E-02
						2nd	101.50	120	5.16	19.67										
						3rd	165.00	120	8.72	18.92										
						4th	209.50	120	10.65	19.67										
						5th	264.00	120	13.07	20.20	Average = 32			Average = 1.55E+00			Average = 5.17E-05			
						Constant	264.00	2880	14.90	17.72										
J-4	CO 775/2004	Bagamoyo	Kwamduma	32	11.6	1st	13.30	120	1.81	7.35	6.56	7.94	2.02	5.66E-01	6.84E-01	1.74E-01	5.54E-03	4.81E-03	2.52E+00	4.48E-01
						2nd	26.90	120	3.17	8.49										
						3rd	40.20	120	4.49	8.95										
						4th	55.00	120	7.52	7.31										
						5th	66.98	120	12.63	5.30	Average = 5.5			Average = 4.70E-01			Average = 5.18E-03			
						Constant	58.90	2880	10.73	5.49										
J-5	CO 772/2004	Bagamoyo	Matipwili	35	14.5	Constant*	1.84	30	19.6	0.09	0.0473	0.0523	0.0385	3.26E-03	3.61E-03	2.66E-03	1.75E-05	2.14E-05	-	-
											Average = 0.040			Average = 3.17E-03			Average = 1.95E-05			
J-6	CO 773/2004	Kibaha	Magindu	46	8.7	Constant*	1.47	120	35.62	0.04	0.0289	0.0339	0.0781	3.32E-03	3.90E-03	8.98E-03	7.35E-06	9.83E-06	-	-
											Average = 0.040			Average = 5.39E-03			Average = 8.59E-06			
J-7	CO 774/2004	Kibaha	Kipangege	80	8.7	Constant*	1.4	30	18.33	0.08	0.0945	0.0803	0.0470	1.09.E-02	9.23.E-03	5.40.E-03	3.12.E-05	3.37.E-05	-	-
											Average = 0.070			Average = 8.49E-03			Average = 3.25E-05			
J-8	CO 770/2004	Mkukranga	Dundani	81	14.5	1st	8.55	120	2.13	4.01	3.53	4.76	2.60	2.43E-01	3.28E-01	1.79E-01	9.44E-04	7.94E-04	2.45E+00	7.82E-01
						2nd	16.68	120	2.37	7.04										
						3rd	25.38	120	3.80	6.68										
						4th	33.77	120	5.27	6.41										
						5th	38.84	120	6.19	6.27	Average = 3.6			Average = 2.50E-01			Average = 8.69E-04			
						Constant	38.84	2880	7.35	5.28										
J-9	CO 768/2004	Mkuranga	Kise	77	23.2	1st	3.30	120	7.18	0.46	0.232	0.481	0.377	1.00E-02	2.07E-02	1.63E-02	8.16E-04	1.68E-04	3.69E+00	4.42E+01
						2nd	4.99	120	13.88	0.36										
						3rd	6.60	120	19.28	0.34										
						4th	8.35	120	31.06	0.27	Average = 0.36			Average = 1.00E-02			Average = 4.92E-04			
						Constant	6.00	2880	25.39	0.24										
J-10	CO 769/2004	Kisarawe	Titu	100	dry	-	-	-	-	-	-			-			-		-	-

Note) *); Yield was not enough to continue long duration



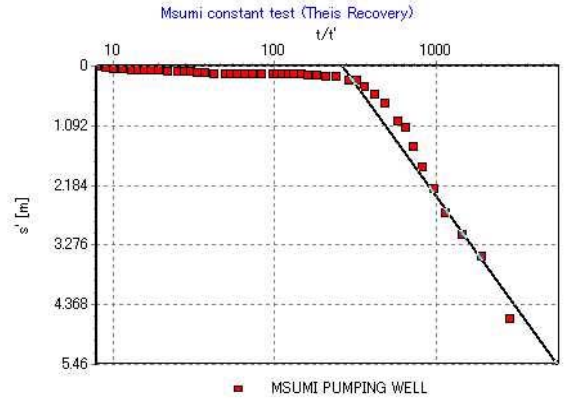
Transmissivity: 2.77E+0 m²/d Storativity: 8.29E-4

Conductivity: 1.06E-1 m/d



Transmissivity: 3.33E+0 m²/d Storativity: 9.67E-4

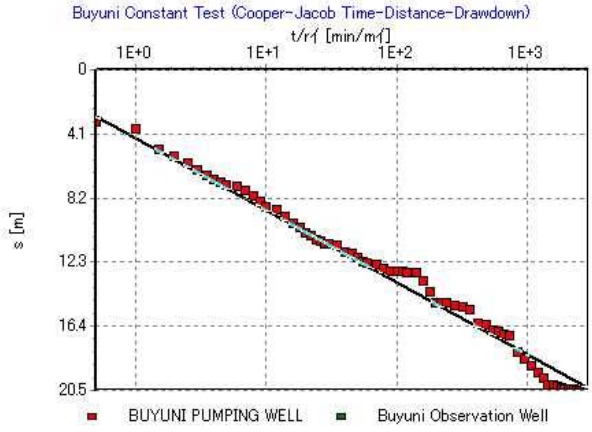
Conductivity: 1.28E-1 m/d



Transmissivity: 1.34E+0 m²/d

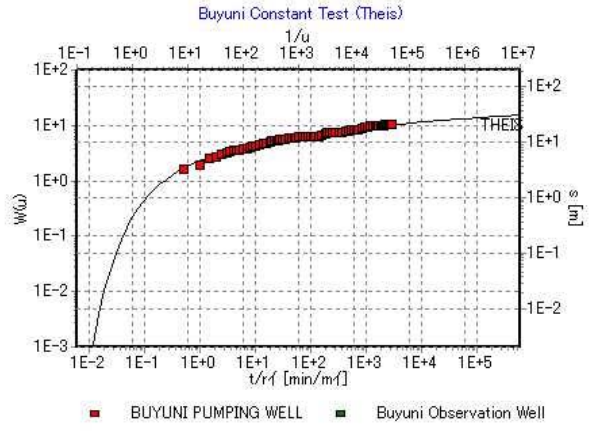
Conductivity: 5.13E-2 m/d

FIGURE 7.7 PUMPING TEST OF TEST WELL NO. DSM 664/2004 (J-1) MSUMI, KINONDONI



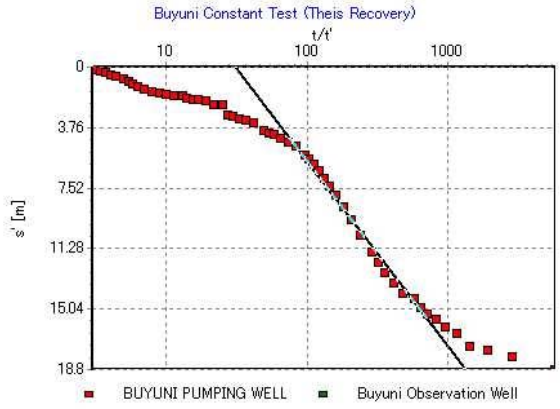
Transmissivity: 9.39E-1 m²/d Storativity: 1.69E-4

Conductivity: 5.40E-2 m/d



Transmissivity: 9.41E-1 m²/d Storativity: 1.57E-4

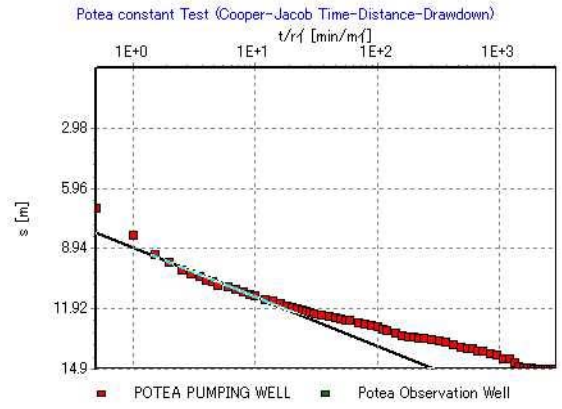
Conductivity: 5.41E-2 m/d



Transmissivity: 3.79E-1 m²/d

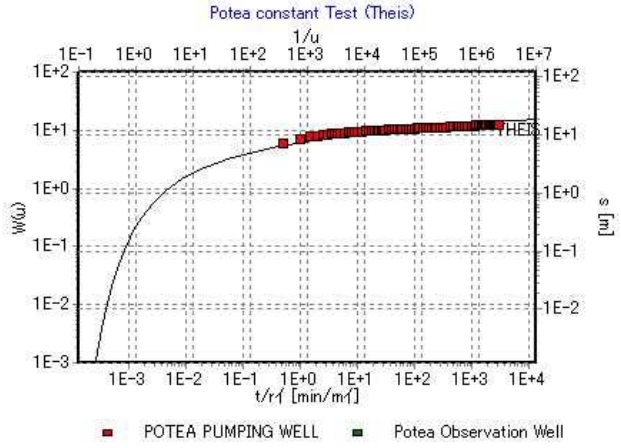
Conductivity: 2.18E-2 m/d

FIGURE 7.8 PUMPING TEST OF TEST WELL NO. DSM 771/2004 (J-2) BUYUNI, ILALA



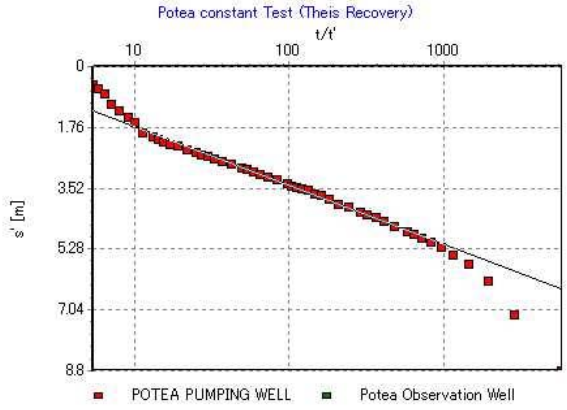
Transmissivity: 2.84E+1 m²/d Storativity: 1.07E-5

Conductivity: 1.40E+0 m/d



Transmissivity: 2.53E+1 m²/d Storativity: 9.26E-5

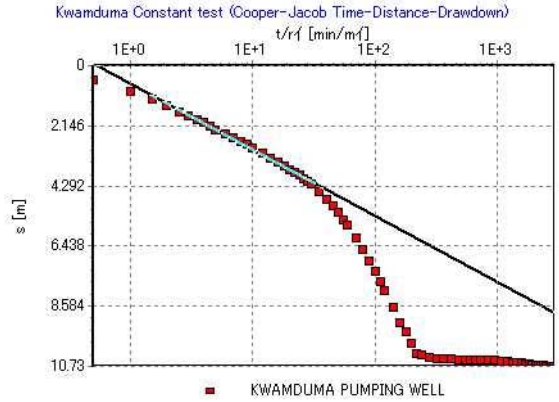
Conductivity: 1.25E+0 m/d



Transmissivity: 4.08E+1 m²/d

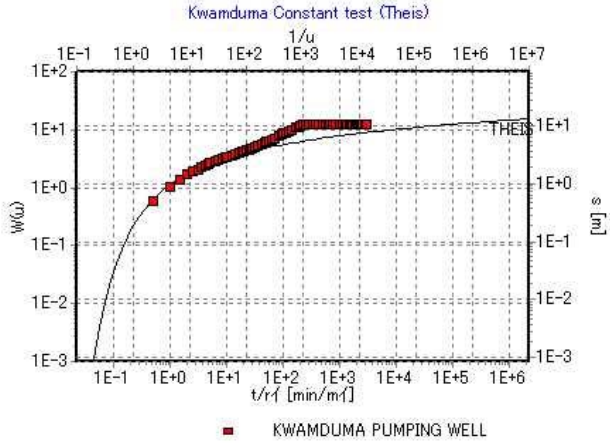
Conductivity: 2.01E+0 m/d

FIGURE 7.9 PUMPING TEST OF TEST WELL NO.DSM 699/2004(J-3) POTEA, TEMEKE



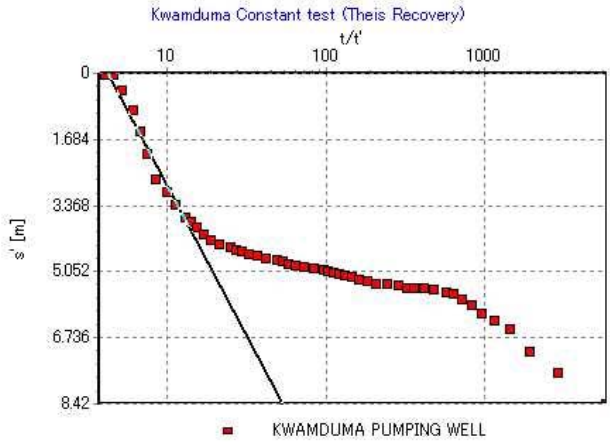
Transmissivity: 6.56E+0 m²/d Storativity: 5.54E-3

Conductivity: 5.66E-1 m/d



Transmissivity: 7.94E+0 m²/d Storativity: 4.81E-3

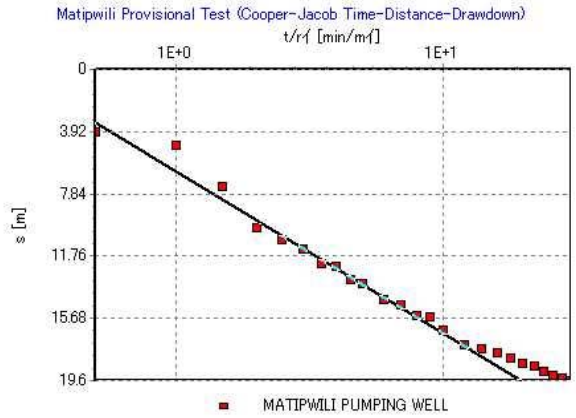
Conductivity: 6.84E-1 m/d



Transmissivity: 2.02E+0 m²/d

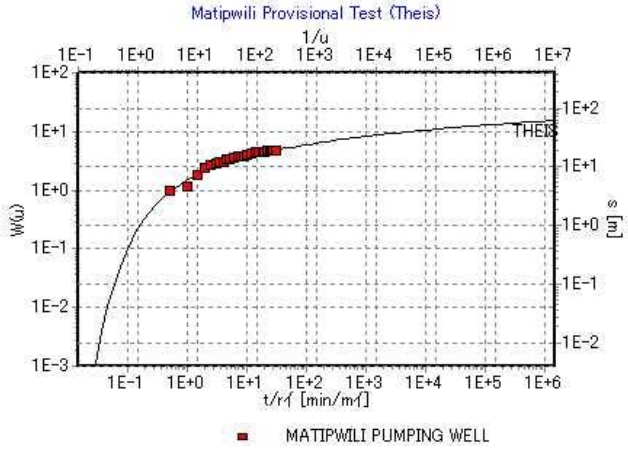
Conductivity: 1.74E-1 m/d

FIGURE 7.10 PUMPING TEST OF TEST WELL NO. CO 775/2004 (J-4) KWAMDUMA, BAGAMOYO



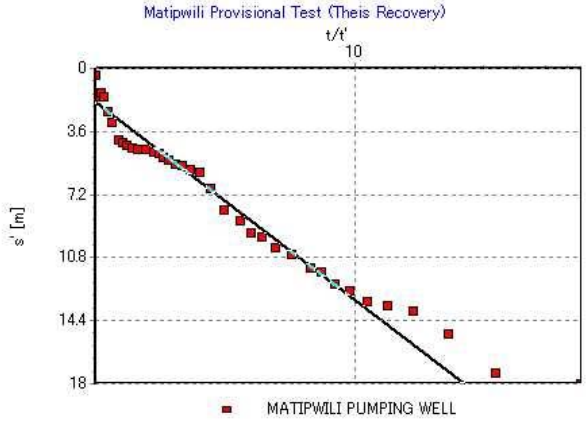
Transmissivity: 4.73E-2 m²/d Storativity: 1.75E-5

Conductivity: 3.27E-3 m/d



Transmissivity: 5.23E-2 m²/d Storativity: 2.14E-5

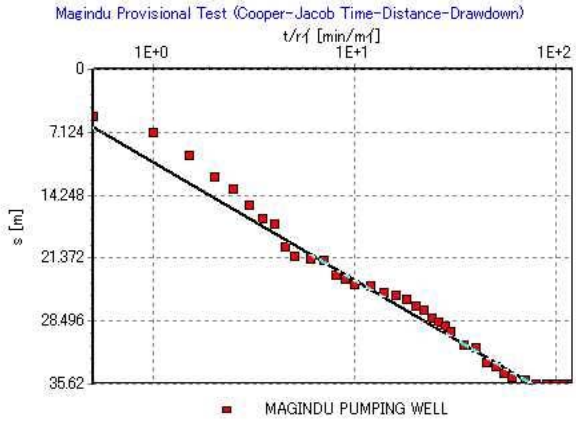
Conductivity: 3.60E-3 m/d



Transmissivity: 3.85E-2 m²/d

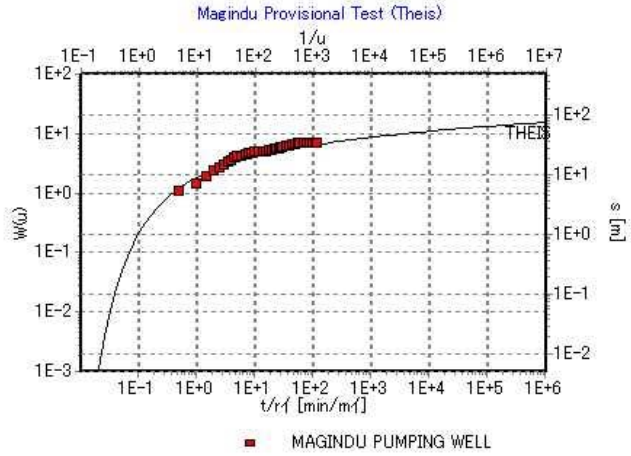
Conductivity: 2.66E-3 m/d

FIGURE 7.11 PUMPING TEST OF TEST WELL NO. CO 772/2004 (J-5) MATIPWILI BAGAMOYO



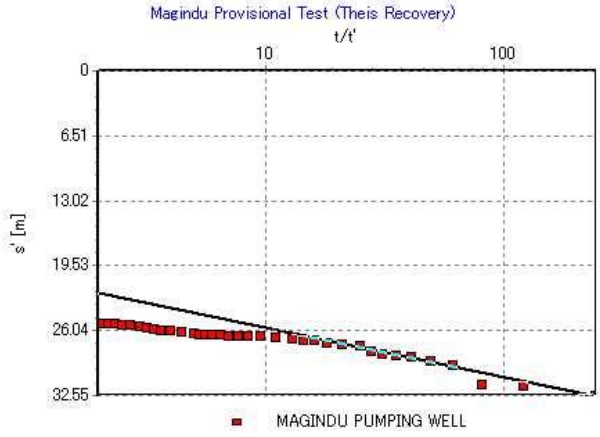
Transmissivity: 2.89E-2 m²/d Storativity: 7.35E-6

Conductivity: 3.33E-3 m/d



Transmissivity: 3.39E-2 m²/d Storativity: 9.83E-6

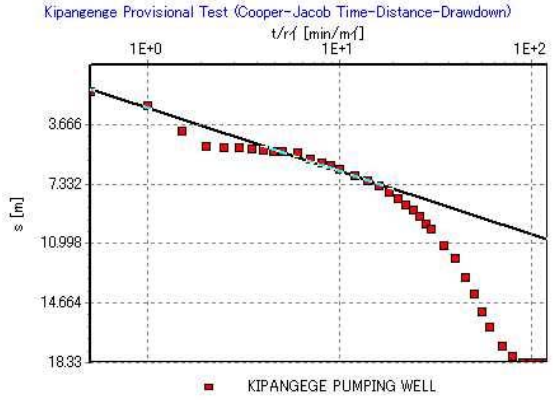
Conductivity: 3.89E-3 m/d



Transmissivity: 7.81E-2 m²/d

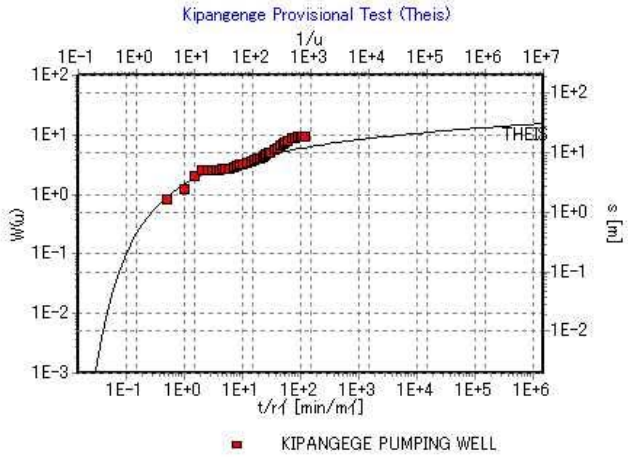
Conductivity: 8.98E-3 m/d

FIGURE 7.12 PUMPING TEST OF TEST WELL NO. CO 773/2004 (J-6) MAGINDU, KIBAHA



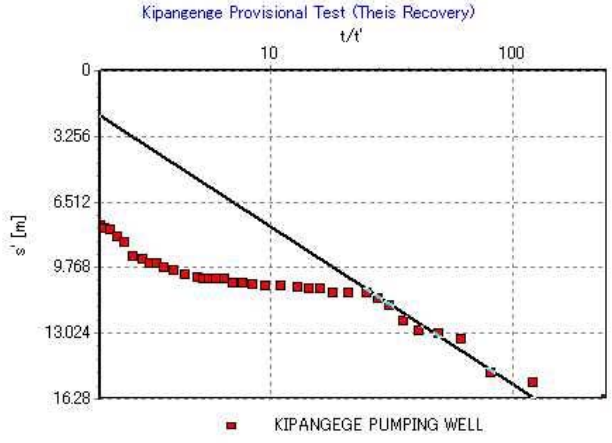
Transmissivity: 9.45E-2 m^/d Storativity: 3.12E-5

Conductivity: 4.66E-3 m/d



Transmissivity: 8.03E-2 m^/d Storativity: 3.37E-5

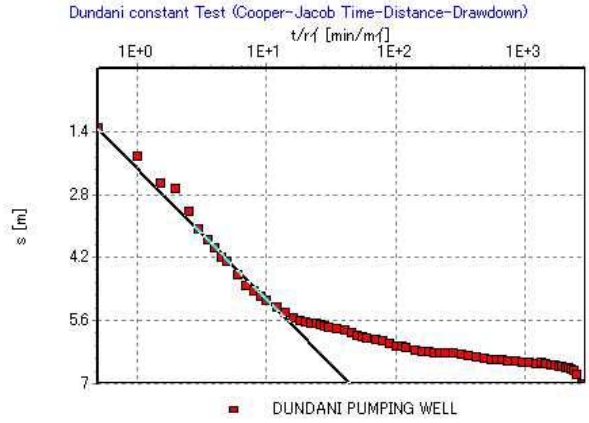
Conductivity: 3.95E-3 m/d



Transmissivity: 4.70E-2 m^/d

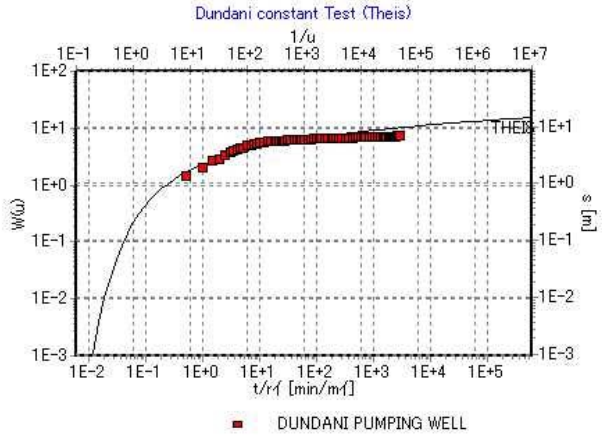
Conductivity: 2.32E-3 m/d

FIGURE 7.13 PUMPING TEST OF TEST WELL NO. CO 774/2004 (J-7) KIPANGEGE, KIBAHA



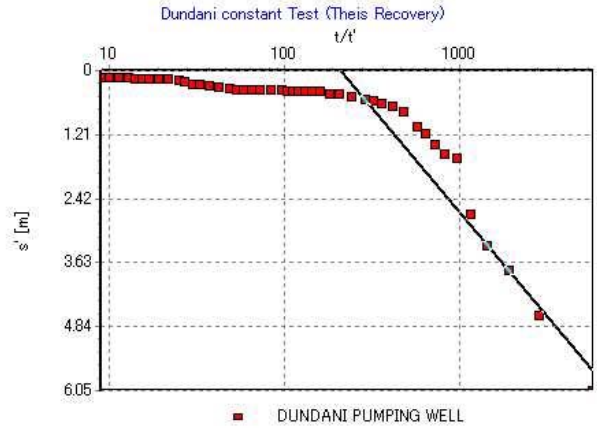
Transmissivity: 3.53E+0 m²/d Storativity: 9.44E-4

Conductivity: 1.52E-1 m/d



Transmissivity: 4.76E+0 m²/d Storativity: 7.94E-4

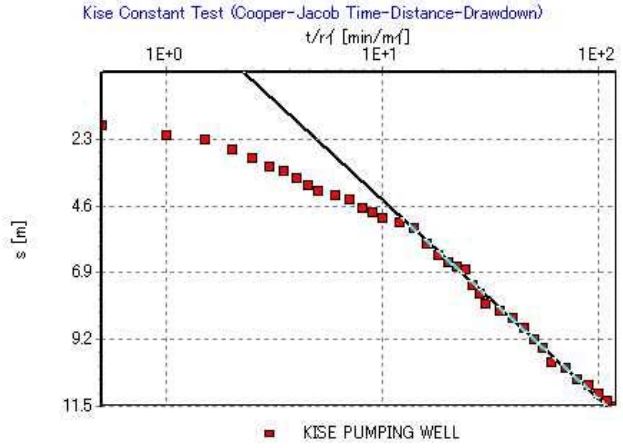
Conductivity: 2.05E-1 m/d



Transmissivity: 2.60E+0 m²/d

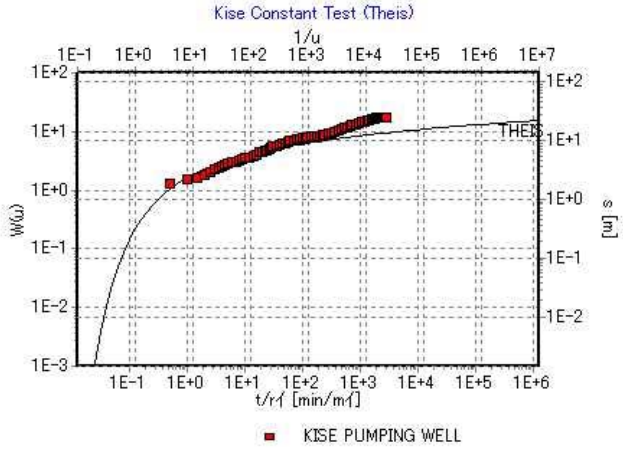
Conductivity: 1.12E-1 m/d

FIGURE 7.14 PUMPING TEST OF TEST WELL NO. CO 770/2004 (J-8) DUNDANI, MKURANGA



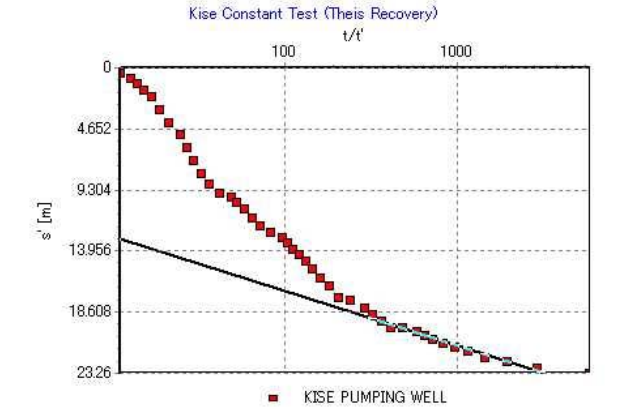
Transmissivity: 2.32E-1 m²/d Storativity: 8.16E-4

Conductivity: 1.00E-2 m/d



Transmissivity: 4.81E-1 m²/d Storativity: 1.68E-4

Conductivity: 2.07E-2 m/d



Transmissivity: 3.77E-1 m²/d

Conductivity: 1.62E-2 m/d

FIGURE 7.15 PUMPING TEST OF TEST WELL NO. CO 768/2004 (J-9) KISE, MKURANGA

This well was drilled up to 81 m, first. The results of drilling and logging showed only a few promising parts. Therefore, the drilling was resumed up to 91 m to find out the possibility of groundwater.

Step draw down test with five steps with two hours duration for each step and the constant discharge test with the pumping rate of 20.89 liters/min were conducted as summarised in the *Table 7.3*. The duration of constant discharge test was 2,880 minutes which corresponds to 48 hours. The final draw down was 6.48 meters. The specific capacity was calculated at 3.22 liters/min/m based on the result of the constant discharge test. Transmissivity was estimated at 2.5 m^2/day. Permeability Coefficient is estimated at 1.70 x 10^{-1} m/day which corresponds to 1.96 x 10^{-4} cm/sec.

(2) Buyuni Village, Ilala Municipality: Well No. DSM 771/2004 (J-2) (*Figure 7.8*)

Step draw down test with four steps with two hours duration for each step and the constant discharge test with the pumping rate of 16.5 liters/min were conducted as summarized in the *Table 7.3*. The duration of constant discharge test was 2,880 minutes which corresponds to 48 hours. The final draw down was 20.48 meters. The specific capacity was calculated at 0.81 liters/min/m based on the result of the constant discharge test. Transmissivity was estimated at 0.75 m^2/day. Permeability Coefficient is estimated at 4.00 x 10^{-2} m/day which corresponds to 2.31 x 10^{-5} cm/sec.

In this site, water level measurement was conducted at the observation well with the depth of 4.98 m which is located 25 m from the test well, however, no change of the water level was observed. This observation results suggest that the clay layer which is distributed from 24 m to 34 m can be regarded as the impermeable layer.

(3) Potea (Yale Yale Puna Village), Temeke Municipality: Well No. DSM 699/2004 (J-3) (*Figure 7.9*)

This artesian well is the most productive well among 10 test wells. Step draw down test with five steps with two hours duration for each step and the constant discharge test with the pumping rate of 264 liters/min were conducted as summarized in the *Table 7.3*. The duration of constant discharge test was 2,880 minutes which corresponds to 48 hours. The final draw down was 14.9 meters. The specific capacity was calculated at 17.72 liters/min/m based on the result of the constant discharge test. Transmissivity was estimated at 32 m^2/day. Permeability Coefficient is estimated at 1.55 x 10^{0} m/day which corresponds to 1.79 x 10^{-3} cm/sec.

In this site, water level measurement was conducted at the observation well with the depth of 20 m which is located 11 m from the test well, however, no change of the water level was observed. This observation results suggest that the clay layer which is distributed from 24 m to 34 m can be regarded as the impermeable layer.

(4) Kwamduma Village, Bagamoyo District: Well No. CO 775/2004 (J-4) (*Figure 7.10*)

This well is situated at the bottom of the gentle valley within the Precambrian rock distributed area. The screen pipes were installed at the fractured part of the gneiss.

Step draw down test with five steps with two hours duration for each step and the constant discharge test with the pumping rate of 58.9 liters/min were conducted as summarized in the *Table 7.3*. The duration of constant discharge test was 2,880 minutes which corresponds to 48 hours. The final draw down was 10.73 meters. The specific capacity was calculated at 5.49 liters/min/m based on the result of the constant discharge test. Transmissivity was estimated at 5.5 m^2/day. Permeability Coefficient is estimated at 4.70 x 10^{-1} m/day which corresponds to 5.43 x 10^{-4} cm/sec.

(5) Matipwili Village, Bagamoyo District: Well No. CO 772/2004 (J-5) (*Figure 7.11*)

The well was poorly productive. Pumping could be conducted only for 30 minutes with the

discharge rate of 1.84 liters/min as summarized in the *Table 7.3*. Pump installation depth was 30 m from the surface. When the pumping was stopped at the dynamic water level of 29.1 m, the drawdown was recorded to be 19.6m. But it was on the way of going down, or not stable yet, at the moment. After the pumping was stopped, the water level was almost recovered within 120 minutes. Aquifer properties were calculated by using these data. Specific capacity was calculated at 0.09 liters/min/m. Transmissivity was estimated at 0.04 m^2/day. Permeability Coefficient is estimated at 3.17 x 10^{-3} m/day which corresponds to 3.66 x 10^{-6} cm/sec.

(6) Magindu Village, Kibaha District: Well No.CO 773/2004 (J-6) (*Figure 7.12*)

The well that is situated in the Jurassic formation distributed area, was poorly productive. Pumping could be conducted for the duration of 120 minutes with the discharge rate of 1.47 liters/min as summarized in the *Table 7.3*. Pump installation depth was 46 m from the ground surface. When the pumping was stopped at the dynamic water level of 45.72 m, the drawdown was recorded to be 35.62m. After the pumping was stopped, the recovery of water level was measured for the duration of 120 minutes. Even after 120 minutes, water level was recovered up to 35.39 m with the recovery of 10.33 m from the 45.72m. Aquifer properties were calculated by using these data. Specific capacity was calculated at 0.04 liters/min/m. Transmissivity was estimated at 0.04 m^2/day. Permeability Coefficient is estimated at 5.39 x 10^{-3} m/day which corresponds to 6.23 x 10^{-6} cm/sec.

(7) Kipangege Village, Kibaha Village: Well No. CO 774/2004 (J-7) (*Figure 7.13*)

The well was poorly productive. Pumping could be conducted only for 30 minutes with the discharge rate of 1.4 liters/min as summarized in the *Table 7.3*. Pump installation depth was 60 m from the surface. When the pumping was stopped at the dynamic water level of 59.22 m, the drawdown was recorded to be 18.33m. Water level seems to be stable at late stage of pumping. After the pumping was stopped, the recovery of water level was measured for the duration of 120 minutes. Even after 120 minutes, water level was recovered up to 48.56 m with the recovery of 10.66 m from the 59.22m. Aquifer properties were calculated by using these data. Specific capacity was calculated at 0.08 liters/min/m. Transmissivity was estimated at 0.07 m^2/day. Permeability Coefficient is estimated at 8.49 x 10^{-3} m/day which corresponds to 9.82 x 10^{-6} cm/sec.

(8) Dundani Village, Mkuranga District: Well No. CO 770/2004 (J-8) (*Figure 7.14*)

Step draw down test with five steps with two hours duration for each step and the constant discharge test with the pumping rate of 38.84 liters/min were conducted as summarised in the *Table 7.3*. The duration of constant discharge test was 2,880 minutes which corresponds to 48 hours. The final draw down was 7.35 meters. The specific capacity was calculated at 5.28liters/min/m based on the result of the constant discharge test. Transmissivity was estimated at 3.6 m^2/day. Permeability Coefficient is estimated at 2.50 x 10^{-1} m/day which corresponds to 2.89 x 10^{-4} cm/sec.

(9) Kise Village, Mkuranga District: Well No.CO 768/2004(J-9) (*Figure 7.15*)

One existing well with the depth of 25 m is located around 150 m away from the test well. Taste of water was salty and was not used for domestic purpose. In addition, the result of geophysical logging showed relatively high resistivity from the depth of 26 m, therefore, upper part of the well which is from 33 m to the surface was sealed.

Step draw down test with four steps with two hours duration for each step and the constant discharge test with the pumping rate of 6.0 liters/min were conducted as summarised in the *Table 7.3*. The duration of constant discharge test was 2,880 minutes which corresponds to 48 hours. The final draw down was 25.39 meters. The specific capacity was calculated at 0.24 liters/min/m based on the result of the constant discharge test. Transmissivity was estimated at 0.36 m^2/day. Permeability Coefficient is estimated at 1.00 x 10^{-2} m/day which corresponds to 1.15 x 10^{-5} cm/sec.

(10) Titu Village, Kisarawe District: Well No. 769/2004 (J-10)

This drilling site is located in the Cretaceous formation distributed area. Drilled depth is 100 m. Any pumping tests have not been done due to completely dried well.

7.5 GROUNDWATER QUALITY ANALYSIS OF TEST WELLS

Groundwater quality analysis for the 9 successful test wells was carried out. Water sample was taken just before stop of constant discharge test. Items measured in the laboratory chemical analysis are given in *Table 7.4*. The results of water quality analysis are shown in *Table 7.5*.

Table 7.4 Measured and Analysis Items

Category	Item
Bacterial Items	Coliforms, Escherichia coli.
Items related to the protection of human health	Cadmium, Cyanide, Lead, Arsenic, Mercury, Selenium, Barium, Fluoride, Hexavalent-chromium, Total-chromium, Nitrate, Nitrite, Boron, Nickel, Antimony, Molybdenum, Organic Carbon(as carbon in chloroform)
Items related to the obstruction of water utilization for drinking and domestic use	Hardness, Calcium, Magnesium, Iron, Manganese, Zinc, Copper, Total solids, Total dissolved solids, Anionic surface active agents, Phenols, Hydrogen sulfide, Ammonium, Total nitrogen, BOD, Potassium permanganate consumption, pH, Taste, Odor, Color, Turbidity, Temperature, Conductivity, Residual chlorine, Sulfate
Items related to the characteristics of groundwater	Chloride, Sodium, Potassium, Bicarbonate, Total alkalinity, Sulfate

The results suggest that there are relationship between water quality and yield. Such characteristics of groundwater are discussed as follows.

In the test wells, EC value of groundwater ranges from 610 to 9,490 micro-S/cm with approximately 3000 micro-S/cm in an average. The average value of 3000 micro-S/cm is a reference value of upper limitation of drinking water use. The facts suggest that 45 % of test wells are not suitable for the drinking water.

Figure 7.16 shows the relationship between well yield and water quality (EC value) of the test wells.

The figure shows that EC value decrease in accordance with the increase of yield. EC value is low in the high yielding wells approximately more than 20 litter/min.

Table 7.6 shows number of samples exceeding the drinking water quality standards.

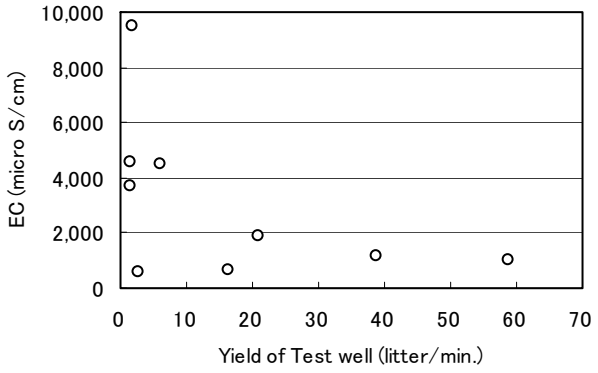


Figure 7.16 Relationship between EC value and Yield of Test Wells

Table 7.5 Results of Water Quality Analysis (Test Wells)

	Water Quality Analysis Items	Tanzania Standard for Rural Water Supplies (1974)	WHO Guideline (2004)*2	J-1 Kinondoni Msumi	J-2 Ilala Buyuni	J-3 Temeke Potea	J-4 Bagamoyo Kwamduma	J-5 Bagamoyo Matipwili	J-6 Bagamoyo Magindu	J-7 Kibaha Kipangege	J-8 Mkuranga Dundani	J-9 Mkuranga Kise
1	Total coliform bacteria (count/100ml)	0	**0**	0	8.0×10	0	4.7×10^3	8.0×10^2	2.6×10^2	4.7×10^2	0	3.0×10^2
2	Escherichia coli (count/100ml)	0	**0**	0	5	0	3.6×10^2	1.5×10^2	1.8×10^2	3.6×10^2	0	2.2×10^2
3	Cadmium: Cd (mg/l)	0.05	**0.003**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4	Cyanide: CN (mg/l)	0.20	**0.07**	0.052	0.059	0.050	0.053	0.057	0.060	0.062	0.066	0.058
5	Lead: Pb (mg/l)	0.1	**0.01**	<0.01	<0.01	<0.01	<0.01	1.00	<0.01	<0.01	<0.01	<0.01
6	Arsenic: As (mg/l)	0.05	**0.01**	0.008	0.010	0.006	0.005	0.010	0.005	0.009	0.007	0.007
7	Mercury: Hg (mg/l)	-	**0.001**	<0.00001	<0.00001	<0.00001	<0.00001	0.00100	<0.00001	<0.001	<0.00001	<0.00001
8	Selenium: Se (mg/l)	0.05	**0.01**	<0.001	<0.001	0.005	0.010	<0.001	<0.001	<0.001	0.010	0.003
9	Barium: Ba (mg/l)	1.00	**0.7**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10	Fluoride: F (mg/l)	8.00	**1.5**	0.30	0.50	<0.01	0.68	<0.01	0.16	0.17	0.50	0.90
11	Hexavalent-chromium : Cr^{6+} (mg/l)	0.05	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.010
12	Total chromium : T-Cr (mg/l)	-	**0.05**	<0.001	<0.001	<0.001	0.020	<0.001	<0.001	<0.001	0.030	0.030
13	Nitrate: (as NO_3 mg/l)	100	**50**	7.50	26.1	4.90	0.10	9.70	13.7	9.30	10.6	<0.01
14	Nitrite: (as NO_2 mg/l)	-	**3/0.2**	0.066	0.023	0.020	<0.001	0.003	0.010	0.062	0.030	0.007
15	Boron: B (mg/l)	-	**0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	Nickel: Ni (mg/l)	-	**0.02**	0.010	<0.001	<0.001	<0.001	0.030	0.020	<0.001	0.010	0.020
17	Antimony: Sb (mg/l)	-	**0.02**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
18	Molybdenum: Mo (mg/l)	-	**0.07**	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100
19	Manganese: Mn (mg/l)	**0.5**	**0.40**	0.04	<0.01	0.10	0.10	2.10	0.50	0.10	<0.01	0.02
20	Organic carbon as carbon in chloroform (mg/l)	**0.5**	-	0.002	0.022	0.012	0.027	0.023	0.012	0.012	0.008	0.002
21	Hardness (as $CaCO_3$ mg/l)	**600**	-	504	139	72.0	164	1,010	970	750	142	1,160
22	Hardness (as $CaCO_3$ mg/l)	-	-	154	36.4	15.2	14.4	136	148	132	22.4	122
23	Magnesium: Mg (mg/l)	-	-	28.9	11.7	8.3	31.1	163	146	102	20.9	178
24	Iron: Fe (mg/l)	**1.0**	-	0.12	0.02	<0.01	0.50	6.40	5.60	0.60	0.02	0.04
25	Zinc: Zn (mg/l)	**15**	-	0.40	0.80	<0.01	<0.01	0.10	0.30	0.50	0.10	5.00
26	Copper: Cu (mg/l)	**3.0**	**2.00**	5.00	2.00	<0.01	<0.01	1.00	3.00	<0.01	1.00	<0.01
27	Chlorides: Cl (mg/l)	**800**	-	450	109	41.2	63.1	1,970	1,050	3,000	213	1,320
28	Residue (mg/l)	-	-	2,030	493	338	729	7,400	3,200	2,510	640	3,060
29	Total filterable residue (mg/l)	**2,000**	-	1,230	350	330	643	6,170	2,990	2,400	630	2,940
30	Surfactants: ABS (mg/l)	**2.0**	-	0.006	0.004	0.006	0.002	0.002	0.003	<0.001	0.002	<0.001
31	Phenolic substance as phenol (mg/l)	**0.002**	-	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001
32	Hydrogen sulfide: H_2S (mg/l)	-	-	0.33	0.62	0.03	0.08	0.09	0.23	0.13	0.36	0.65
33	Ammonium: NH_3 (mg/l)	-	**1.5**	0.68	1.11	<0.01	0.03	0.40	0.43	0.58	0.04	0.17
34	Ammonium: NH_3 (mg/l)	**1.0**	-	0.55	0.87	0.02	0.02	0.31	0.33	0.47	<0.01	0.13
35	BOD_5 (mg/l)	**6**	-	4.3	1.9	1.3	0.8	5.4	5.9	4.6	1.6	5.9
36	PV: Oxygen abs. $KMnO_4$ (mg/l)	**20**	-	7.6	3.4	2.4	1.6	9.2	10.0	8.0	3.0	10.6
37	pH	**6.5 - 9.2**	-	8.3	6.7	7.6	8.1	7.8	7.4	7.7	7.2	6.6
38	Taste	not objectionable	-	Salty	Sweet	Sweet	Sweet	Salty	Salty	Salty	Sweet	Salty
39	Odour	not objectionable	-	UN	UN	UN	UN	UN	UN	UN	UN	UN
40	Colour (TCU mg Pt/l)	**50**	**15**	6	8	6	2	14	<1	<1	8	<1
41	Turbidity: Tr (NTU)	**30**	**5**	7.4	19.0	2.0	4.0	364	146	27.0	1.0	501
42	Temperature (^oC)	-	-	25	25	25	25	25	25	25	25	25
43	Conductivity: EC (microS/cm)	-	-	1,890	640	610	990	9,490	4,600	3,690	1,150	4,520
44	Conductivity: EC (microS/cm)	-	-	-	-	-	-	-	-	-	-	-
45	Sulphate as Mg+Na Salts (mg/l)	-	-	321	134	124	199	3,460	963	715	283	868
46	Sodium: Na (mg/l)	-	-	200	85.0	100	150	1,700	600	500	200	500
47	Potassium: K (mg/l)	-	-	8.0	6.6	16.9	5.2	10.7	10.4	6.6	4.8	13.5
48	Bicarbonate: HCO_3 (as $CaCO_3$ mg/l)	-	-	326	126	72.0	164	300	588	292	142	194
49	Total alkalinity (mg/l)	-	-	326	126	236	380	300	588	292	208	194
50	Sulphate: SO_4 (mg/l)	**600**	-	92.5	37.0	16.0	18.0	1,600	217	113	62.5	190

*1: "MAJI REVIEW" Ministry of Water Development and Power, vol 1, No. 1, July 1974, Dar es Salaam

*2: "WHO Guideline for Drinking Water Quality Third Edition", World Health Organization, Genova 2004

UN : unobjectionable

OB: objectionable

The parameters of total hardness, total dissolved solids (TDS), chloride and bacterial contamination tend to detect in the low yielding well of less than litter/min. In the low yielding wells, contamination of Lead and Nickel are also detected. These results also verify that water quality is generally better in high yielding wells.

Table 7.6 Number of Samples Exceeding Drinking Water Quality Standards

Yield of Test well		More than 10 litter/min.	Less than 10 litter/min.	Total
Total No. of Sample		4 wells	5 wells	9 wells
Microbial aspects	Escherichia Coli.	2	4	6
Items related to the protection of human health	Lead (Pb)	-	1	1
	Nickel (Ni)	-	1	1
items related to the obstruction of water utilization for drinking and domestic use /Items related to the characteristics of groundwater	Total Hardness	-	4	4
	Iron (Fe)	-	2	2
	Manganese (Mn)	-	1	1
	Copper (Cu)	1	-	1
	Total dissolved solids (TDS)	-	4	4
	Turbidity (Tr)	-	3	3
	Chlorides (Cl)	-	4	4
	Sulphate (SO_4^{2})	-	1	1

Drinking Water Quality Standards: Tanzania Standard for Rural Water Supplies (1974) and WHO Guideline (2004)

Since the number of samples of the test wells is small, that accumulation data by further groundwater monitoring would be required.

In conclusion, although it is difficult to discuss the regional distribution of groundwater quality, it is identified that test wells having its yield more than a rage of 10 to 20 litter/min. tend to satisfied water qualities for drinking water use. According to the water supply plan, the yield range of 10 to 20 litter/min. can be applied as Level-1 (hand pump) scheme.

Chapter 8

Database System for Water Supply Planning

CHAPTER 8 DATABASE SYSTEM FOR WATER SUPPLY PLANNING

8.1 INTRODUCTION

In order to formulate the water supply improvement plan, the socio-economic condition, availability of water sources and environmental aspects are essential matters. Furthermore, those conditions have changed depending on the improvement of the economy and variation of environmental conditions. Therefore, it is required to apply the multi-sectoral approach to the latest and reliable information, to reflect these variations occurred on the water supply planning appropriately. From the view points mentioned above, the database system for water supply planning was created. In addition, the Geographical Information System (hereinafter referred to as GIS) was introduced to the study. The GIS technology enables to carry out the spatial analysis by using various data, which is one of the advantages of utilizing GIS.

In this chapter, the design of database created considering the actual utilization of the databases and the outputs created by GIS are described.

8.2 EXISTING DATABASE SYSTEMS

There are three departments and one agency under the Ministry of Water and Livestock Development, which have their own database system related to the rural water supply. The items of each database are concentrated to the information which are required by each organization. The existing conditions of these database systems identified are summarized as follows.

(1) Database of the Department of Policy and Planning

This department has created its own database by using "MS-Access", which is designated as "Water and Sanitation Database". Policy and Planning Department, Ministry of Water and Livestock Development (2004) mentions that the purposes are modernizing the collection, processing and dissemination of the information related to water and sanitation fields. The items of the database are the statistic data of the districts, the sanitation data of the districts, operational condition of pumps of the districts, list of water supply projects, information of lakes, rivers and dams, project contribution, water committee funds of districts and list of water supply schemes.

(2) Database of the Division of Water Resources

Hydrology and Hydrogeology sections are under this Division and these sections created their own databases. The Hydrology section has maintained meteorological and hydrological information by using "Hydata", "ILWIS" and "Arc View". The items of the dataset are rainfall, evaporation, temperature, humidity, wind, dew, radiation and pressure in the whole country. The Meteorological agency, which is another agency dealing with meteorology has its own data. The locations of the observatories belonging to the agency are different from those of Hydrology section. Therefore, they have supplemented the data required for the analysis between them.

The Hydrogeology section, which is also responsible for the control of the borehole drilling and numbering, has maintained the information related to the groundwater resources by using "MS-Access". When a groundwater development is planned, this section is responsible for the evaluation of the potential of groundwater resources. Main items are the borehole information such as yield, static water level, drilled depth and the result of water quality analysis. However, most of the borehole data have no coordinates.

(3) Database of the Division of Rural Water Supply

This division has created the database by using "MS-Access", which is designated as "MOWLD Data Bank on Rural Water Supply". In this database, all data are categorized into and managed according to each water supply scheme. The items of the database are the name of villages

covered by schemes, administrative and institutional aspects, financial and operational items, environmental aspects, water source condition and operational conditions.

(4) Database of the Drilling and Dam Construction Agency (DDCA)

The agency, which belongs to the Ministry of Water and Livestock Development, has created the database by using "MS-Excel". The items of the database are the information of boreholes constructed by DDCA such as the drilled depth, static water level, dynamic water level, yield and related data. In addition, the report named "Borehole Completion Report" is kept in their archives. In this report, the geological description, the result of pumping test, the result of water quality analysis and the borehole structure are included. However, most of the borehole data, especially the old data have no coordinates.

8.3 DATABASE SYSTEM CREATED IN THE STUDY

8.3.1 CONCEPT OF THE DATABASE SYSTEM

The database system shall be accessed easily for the purposes of data collection and updating. The existing databases that were created by each organization under the Ministry are independent each other. The items of each database are concentrated to the information they have require. Each database covers the whole country in various levels such as district and village. However, all organizations have started to collect detailed information i.e. the village level information recently to improve their database systems, since the requirement for water supply planning has shifted to be on the village level basis. Besides, the various information from the different fields such as socioeconomic conditions, water resources conditions and environmental aspects should be analyzed for the formulation of the water supply plan.

Considering the actual tendency in the water sector and necessity of the multi-sectoral approach for the appropriate planning, the database system is to be created to facilitate the access to the data in the system. The database system is, therefore, divided into five fields i.e. Water Supply Conditions, Water Resources Conditions, Socioeconomic Conditions, Environmental Aspects and Administrative Aspects, and is designated as "WSICD (Water Supply Improvement in Coast and Dar es Salaam Peri-Urban) Database" as shown in *Figure 8.1*.

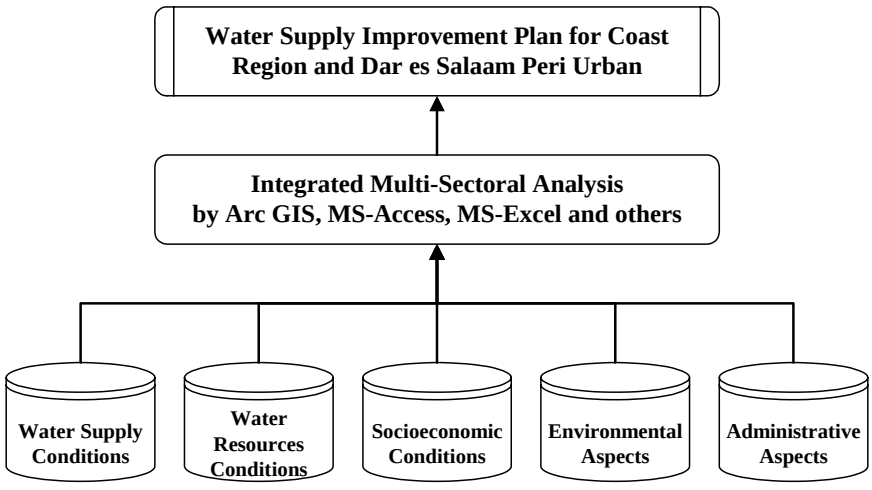


Figure 8.1 Concept of WSICD Database System

8.3.2 DESIGN OF THE DATABASE SYSTEM

The results of investigations, collected data and the results of analysis are classified into five categories in accordance with their characteristics as listed in the *Table 8.1* and filed in the WSICD Database. These data are created by MS-Excel, MS-Access and Arc GIS. *Figure 8.2* shows the design of the WSICD Database for the main groups of data created under five categories. Under each category, two sub folders are created. In the GIS Data folder, the data files for creating maps and results of analysis such as table, polygon, polyline and point data are filed as a shape file and a dbf file. In the Study Data folder, the results of the field investigations and the analysis are filed as a MS-Excel and MS-Access files. The files in GIS Data folder are created from the data of the Study Data folder. In addition to five categories, three folders are created as shown in the *Figure 8.2*. In the Explanation folder, the explanation for the structure of WSICD Database is filed. In the Water Supply Improvement Plan folder, the outcome of the study will be filed. In the Map Files folder, the outputs of GIS analysis such as potential recharge to the groundwater by basin and groundwater resource evaluation map are filed as a map file ("mxd" format which can be opened by Arc GIS).

Table 8.1 Data Created in Each Category of Database

Category of Database			Data Created
1	Water Supply Conditions		-Water quality of existing water source -Existing water supply
2	Water Resources Conditions	Meteorology & Hydrology	-Annual rainfall distribution map -River system, basin and hydrological station -Potential recharge to the groundwater by basin -Potential recharge to the groundwater by district -Potential area of surface water development
		Hydrogeology	-Groundwater resources evaluation map -Hydrogeological map -Depth to water table contour map -Electric conductivity map -Yield contour map
3	Socioeconomic Conditions		-Result of village inventory survey (village and sub-village) -Location of center of village and sub-village with village data -Result of socioeconomic survey
4	Environmental Aspects		-National park -Game reserve -Forest reserve -Vegetation
5	Administrative Aspects		-Study area boundary -District boundary -Village boundary -Road and railway

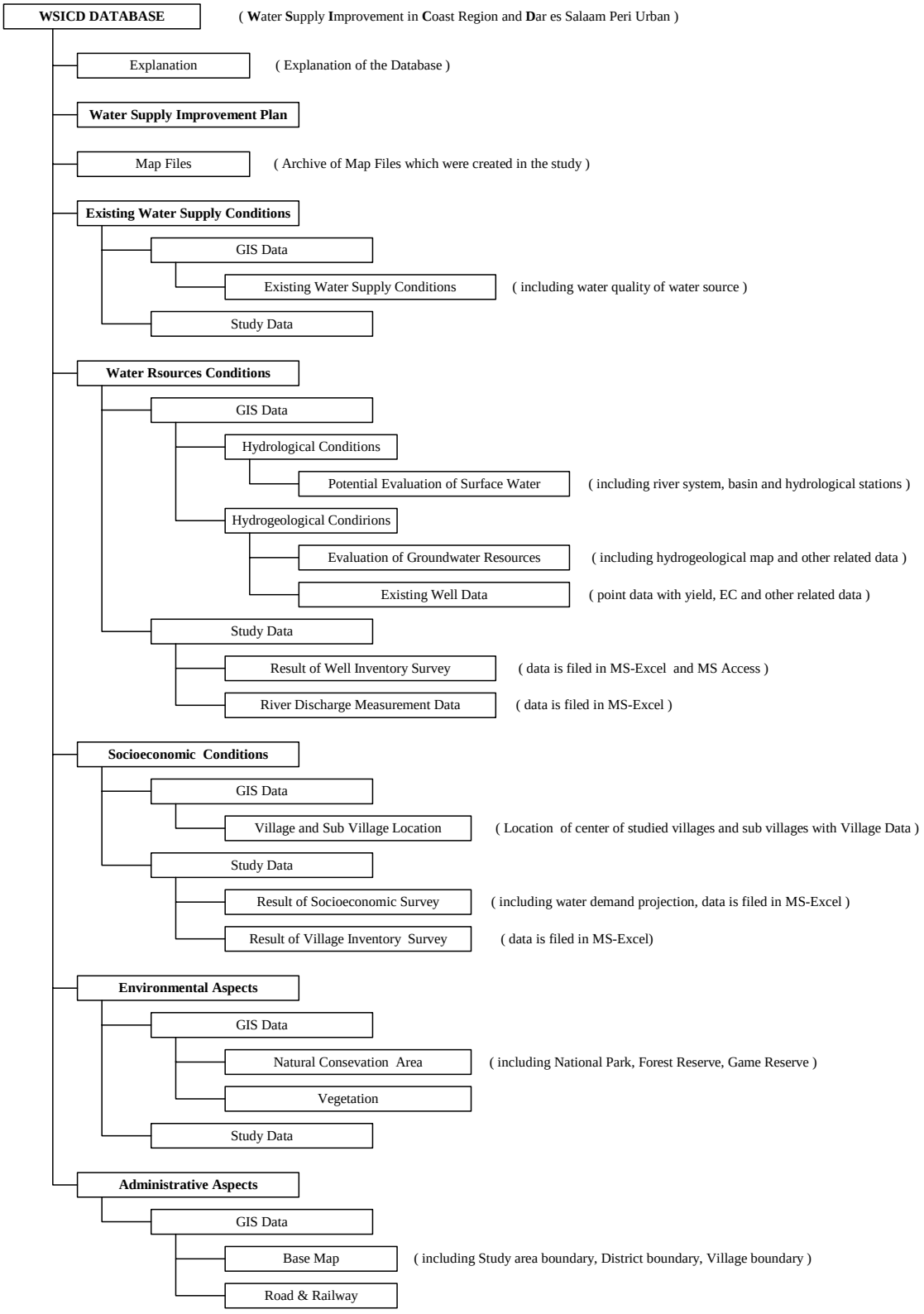


FIGURE 8.2 DESIGN OF WSICD DATABASE SYSTEM

THE STUDY ON WATER SUPPLY IMPROVEMENT IN COAST & DAR ES SALAAM | **JICA**

8.4 DATABASE SYSTEM CREATED WITH GEOGRAPHIC INFORMATION SYSTEM (GIS)

8.4.1 GENERAL

The advantage of the introduction of the GIS is the availability of the spatial analysis of various information. For instance, when the location and name of villages, which are located within 5 km distance from the promising area of groundwater development is required, it makes easy to obtain the results required by using the function of GIS name selection by location. For such kind of work, it has taken long time to obtain the result by the ordinary method using printed maps and documents. The introduction of the GIS, however, contributes to reduce the time for analysis and obtain the results more precisely.

In order to realize effective advantage of the GIS, it should be mentioned that accurate data input and proper technical consideration to the results obtained by GIS analysis are required to prevent the misunderstanding of the results. Considering the characteristics of the advantages of GIS technology, the preparation of maps and analysis were carried out during the study using the developed GIS.

8.4.2 MAPS CREATED BY GEOGRAPHIC INFORMATION SYSTEM (GIS)

(1) Base Map

For the formulation of water supply plan, the administrative boundary such as district boundary and village boundary is fundamental information. In this study, the water supply improvement plan is formulated on the village basis. However, the digital format of village boundary data had not been created yet. Therefore, the study team prepared the digital format of the village boundary with three steps, which are 1) the collection of the boundary data on the prints, 2) the scanning of collected maps and 3) the digitizing of the scanned maps. The base maps provided in the study are listed in the *Table 8.2*.

Table 8.2 List of Base Maps Created

Data		Description	Source	Format
1	Study area boundary	Boundary is modified in accordance with village boundary data	IRA*, Dar es Salaam University.	Shape
2	District boundary	Boundary is modified in accordance with village boundary data	IRA, Dar es Salaam University	Shape
3	Village boundary	Boundary of all villages in the study area is created. The locations of 276 target villages are confirmed.	National Bureau of Statistics (NBS)	Shape

Note: *: Institute of Resources Assessment in University of Dar es Salaam

(2) Evaluation Map

In order to assess the potential of water resources in the study area, hydrological and hydrogeological evaluation were carried out. Evaluation maps were created by the overlay analysis of the results of analysis of the existing data and the field investigations. The created evaluation maps are listed in the *Table 8.3*.

Table 8.3 List of Evaluation Maps Created

	Maps	Shape files used for creating maps	Procedure
1	Potential area of surface water development	-Wami river -Classification of distance from Wami river -Classification of elevation from the surface of Wami river	The potential area is selected along the Wami river considering availability of water supply
2	Potential recharge to the groundwater by basin	-Evapotranspiration -Basin boundary	Distribution of Evapotranspiration was analyzed, then potential of recharge to groundwater was evaluated.
3	Groundwater resources evaluation map	-Geological map -Electric conductivity contour and point data -Yield contour and point data	Intersection of EC polygon and Yield polygon was done, then geological map was overlaid.
4	Hydrogeological map	-Geological map -Yield contour and point data -Depth to water table -Electric conductivity contour and point data	Intersection of Yield polygon and Geological map polygon was done, then EC polyline and Depth to water table polyline data were overlaid.

(3) Location Map of Center of Villages

The location data of 368 villages/mitaas with village information such as population, dwelling type and major water source are filed as a point data. The explanation of the point data created is described in the *Table 8.4*.

Table 8.4 List of Point Data of Village Location

	Name of Point Data	Description
1	Village_Location_Coast_All	A total number of 257 villages surveyed in the Coast Region are filed.
2	Village_Location_DSM_All	A total number of 111 villages surveyed in the Dar es Salaam Peri-Urban are filed.
3	Target_Village_Coast	A total number of 215 target villages selected from all villages surveyed in Coast Region are filed.
4	Target_Village_DSM	A total number of 61 target villages selected from all villages surveyed in Dar es Salaam Peri-Urban are filed.

8.5 RECOMMENDATIONS

The database system is created utilizing the results of the analysis of existing data and the results of field investigations carried out by the study team, i.e. the village inventory survey, socioeconomic survey, existing well inventory survey, geophysical exploration and test well drilling. In order to facilitate continued effective utilization of the database, the following items are recommended.

(1) Improvement of the Accuracy of Locality Information

For the effective application of the database, the locality information is the fundamental matter, especially for the analysis by the GIS. Therefore, it is strongly recommended to determine the coordinate by the Global Positioning System (GPS) when any new data is added to the database. Besides, it is desirable to determine the coordinates even for the existing data.

(2) Periodical Update of the Database

In order to reflect the latest conditions on the water supply planning, it is recommended to carry

out the periodical update of the database with cooperation among related organizations.

(3) Integration of the Database with other Area inside the Wami Ruvu Basin

Since the responsibility of water resources management has been under the Basin Water Office, it is recommended to integrate the database with the data of other areas inside the Wami Ruvu Basin.

REFERENCES

Policy and Planning Department, Ministry of Water and Livestock Development. 2004. Report on National Water and Sanitation Database, 97p.

Chapter 9

Water Resources

CHAPTER 9 WATER RESOURCES

9.1 INTRODUCTION

Availability of the water resources and its development potential are the important elements to decide the alternative of water supply plan. In this study, water resources for both surface water and groundwater were investigated. The investigation carried out during Basic Study period include following items.

(1) For the surface water

- Meteo-hydrological analysis
- Macro water balance consideration
- Examination of the surface water development potential

Meteorological and hydrological analysis was carried out by using collected existing data. Macro water balance of the area is examined to determine the potential recharge of the groundwater. Potential for the surface water is calculated to determine the potential amount for water supply using surface water.

(2) For the groundwater

- Topography and geological analysis
- Existing wells inventory survey
- Geophysical prospecting
- Test well drilling

Based on the results, hydrogeological map and groundwater evaluation map have been prepared. The maps contain the information about groundwater yield, quality (EC), depth to groundwater, existing well location, geological structure and physiographic information such as surface water and contour lines. All the data were inputted to GIS database that was the basis of the hydrogeological and groundwater evaluation maps.

This Chapter describes the results of these investigations and evaluated development potential of water resources both surface water and groundwater. Realization of proposed water supply scheme of piped water supply system (level 2) mostly depends on the availability of groundwater sources. Therefore, the study put emphasis on consideration of groundwater development potential.

However, if groundwater development potential is not sufficient as the source of water supply in a certain village, alternative water source should be selected. In such case, availability of surface water shall be examined. Potential amount and location of surface water was examined from the viewpoint of discharge and actual intake amount. As the result, basic information for the surface water developing plan as a source of water supply was provided. In addition, potential groundwater recharge from rainwater, from the viewpoints of topography, rainfall and runoff was analyzed.

The potential amount and area of the surface water development and water balance consideration are presented in Chapter 2 of this Supporting Report.

9.2 BACKGROUND OF WATER RESOURCES POTENTIAL STUDY

9.2.1 INVESTIGATIONS

A series of Hydrogeological investigations was made during the period of Stage I Basic Study; these are topographical and geological survey, existing well inventory survey, geophysical prospecting and test well drilling. Based on these hydrogeological studies, aquifer and groundwater analyses were made. The result of the analyses is also described in this chapter.

Based on the results, hydrogeological map and groundwater evaluation map have been prepared. The maps contain the information about groundwater yield, quality (EC), depth to groundwater,

existing well location, geological structure and physiographic information such as surface water and contour lines. All the data were inputted to GIS database that was the basis of the hydrogeological and groundwater evaluation maps.

9.2.2 REVIEW OF PREVIOUS STUDIES

There exist large numbers of the tube wells in the study area. Most of them are drilled as the rural water supply by DDCA. The drilling activity was accelerated since the severe drought in 1996. As results, considerable amount of groundwater have been developed in the study area especially in Dar es Salaam.

Several studies related to the groundwater resources were carried out in and around the Study area. In the course of basic study, such study reports have been collected and reviewed by the Study Team. The followings are the studies reviewed and examined in the course of the Study. The result and findings of this review will be used in overall analysis and evaluation of this Study.

(1) Coast/Dar Es Salaam Region Water Master Plan, Ministry of Water, Energy and Minerals Tanzania (CIDA, 1979).

A total of 118 boreholes were drilled to make the assessment of ground water potentials. As the result, the report recommended high ground water development potential at the broad flat apron of quaternary along the Ruvu River.

(2) Morogoro Water Supply Plan, Ministry of Water, Energy and Minerals, Tanzania (DHV, 1980).

The drilling of 15 boreholes and hand-dug wells of more than 500 including the boreholes test were performed to confirm the hydro geological condition of the Morogoro Region. As the result the eastern foot of the Uluguru Mountains is assessed to have high groundwater development potential within the Ruvu River basin.

(3) Sub Sahara Africa Hydrological Assessment, SSDCC, Countries, Country Report: Tanzania Countries, Country Report: Tanzania, (IBRD/UNDP, 1990).

The ground water development prospects throughout Tanzania were described based on the previous investigation and study.

(4) Study on Water Resources Development in the Ruvu River Basin, Ministry of Water, Energy and Minerals, Tanzania (JICA, 1994)

The prospective areas for groundwater development were examined; these are Quaternary deposit along the Ruvu River and the coastal plain of Temeke.

Among these studies, the study area of Coast/Dar es Salaam Region Master Plan (CIDA, 1979) is same as this study. A total of 188 wells were drilled and examined for the assessment of groundwater potential in Coast Region and Dar es Salaam. In this report, however, the potential of groundwater in the two regions was concluded as generally low except for Rufiji District.

9.3 GROUNDWATER OF STUDY AREA

9.3.1 AQUIFER CATEGORY

Figure 9.1 shows the ratio of the number of wells drilled in each geological region of the study area. The data used for this analysis are 500 wells selected from the existing well inventory survey. Since the selection of 500 wells from the database of a total 1,400 wells was made to realize even regional distribution, the percentages shown in Figure 9.1 likely to be representative to whole Study area.

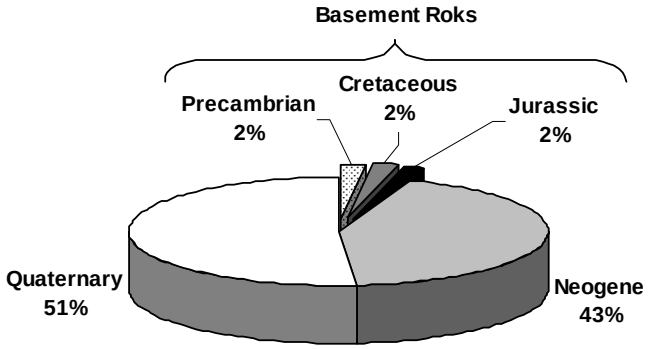


Figure 9.1 Ratio of Number of Wells by Geological Regions

The aquifer of Quaternary and Neogene are categorized as stratum aquifer, while the Precambrian, Cretaceous and Jurassic are categorized as fractured aquifer of the basement rocks. The figure suggest that most of the well drilled in the study area is tapped from Quaternary and Neogene aquifer. The wells drilled to the aquifers of Precambrian, Cretaceous and Jurassic are very few, it is about 6% of the total number of wells in the study area.

(1) Quaternary Aquifer

Geological unit of Quaternary formation exist throughout the study area, mainly in the coastal plain from Dar es Salaam to west part of Mkuranga district, along the main rivers of Ruvu and Wami and their branches and low land between Mkuranga and Msanga-Pugu hills. The thickness of Quaternary deposit varies from 1 meter to 100 m or more in Coast Region (Kent et al, 1971).

The geological feature of the Quaternary is alluvial deposits in coastal plain and deltas, and fluvial deposit along the Ruvu River.

In the Quaternary formation, the groundwater have been developed very actively, accordingly the number of wells is the highest. Almost 50% of the wells in the study area is tapped from Quaternary aquifer. The yield of these wells is generally high, especially in Dar es Salaam region.

(2) Neogene Aquifer

Neogene formation covers the study area extensively, and forms three major hills of Mkuranga, Msanga-Pugu and western part of Bagamoyo plateau.

Neogene sediments consist of interbedded sandy clays and clayey sands with minor lenses of pure sand or clay (Temple, 1970). The gravel of mostly quartz, some feldspar and some Precambrian gneiss, is scattered throughout but always in a clay matrix. Calcareous fragments are common in some localities, usually in a form indicative of secondary recrystallization.

The exceptional feature of the Neogene sediments is the lack of sorting and the consistent presence of the clay matrix. These sediments appear to be coastal plain alluvial sediments, deposited in a fresh to salt water, sub aerial to marine environment. Such deposits are typically a result of an energy environment that involves some sorting and the creation of distinct units of permeable material that can be subsequently tapped as aquifers.

Since the formation is distributed extensively in the study area, large number of wells has been drilled into the Neogene aquifer. It covers about 40% of the total wells in the two regions. The yield of wells differs by area; this phenomenon is due to rapid facies change and clay matrix.

(3) Aquifer in the Basement Rocks

The geological unit of Precambrian, Jurassic and Cretaceous are relevant to the basement of the

study area. The Precambrian formation is distributed in the eastern part of Bagamoyo; and forms Mbwewe and Chalinze Sub Plateau. The band of Jurassic formation observed between Precambrian plateau and Neogene hills in Bagamoyo, along the NNE-SSW trend of Mozambique belt (Holmes, 1948). The Cretaceous formation is distributed south of Kisarawe district, and forms Msanga-Pugu Hills.

The geology of these basement rocks are metamorphic rocks mainly gneiss, schist and crystalline limestone in Precambrian formation, and sedimentary rocks mainly sandstone and/or calcareous sandstone in Jurassic and Cretaceous formations.

Basically, the groundwater is not developed well in these basement rock areas, mainly due to high elevation and difficulty of the occurrence of groundwater in the geology. The number of wells recorded in such basement rocks region is 10 in Precambrian, 11 in Cretaceous and 9 in Jurassic. Compare with the number of existing wells database of 1,400 in total, the number of the wells drilled in the basement rocks are very few.

Most of the wells are abandoned because of no water, or very low yield.

(4) Classification of the Aquifer Type

The geological units of Quaternary and Neogene are classified as stratum aquifer. The stratum aquifer is the aquifers in which intergranular flow is significant. The geological units of Precambrian, Jurassic and Cretaceous are classified as fractured aquifer. The fractured aquifer is the aquifer in which flow is dominantly in fissure, fracture zone and other geological discontinuities.

The aquifer in the study area, therefore, is categorized into two parts: namely, the fractured aquifer and the stratum aquifer.

9.3.2 CLASSIFICATION OF THE WELLS BY YIELD

The yield of existing wells in the study area varies widely. *Figure 9.2* shows the number of wells classified by yield. Though the yield ranges widely from 0 to 2000 litres/min, 209 wells (15%) yielded less than 10 litres/min and 481 wells (34%) yielded more than 100 litres/min. Consequently 51 % of existing wells yielded between 10 and 100 litre/min. Actually, in case of yield less than 10 litre/min, only a hand pump can extract this range of low yield. On the other hand, there are 481 wells (34 %) yielding more than 100 litre/min, which is applicable for the proposed piped scheme (Level-2) by a submersible pump. There are productive aquifers with considerable scale in the area.

Yield (l/min)	Number of Well	Accumulating Total	
		No.	%
0	39	39	3%
0 - 10	170	209	16%
10 - 20	172	381	29%
20 - 30	125	506	38%
30 - 40	82	588	45%
40 - 50	53	641	49%
50 - 60	64	705	54%
60 - 70	43	748	57%
70 - 80	30	778	59%
80 - 90	41	819	62%
90 - 100	15	834	63%
100 - 120	86	920	70%
120 - 140	34	954	73%
140 - 160	29	983	75%
160 - 180	28	1011	77%
180 - 200	50	1061	81%
200 - 250	73	1134	86%
250 - 300	86	1220	93%
300 - 350	37	1257	96%
350 - 400	8	1265	96%
400 - 500	31	1296	99%
500 - 600	7	1303	99%
600 - 700	6	1309	100%
700 - 100	2	1311	100%
1000 - 2000	4	1315	100%

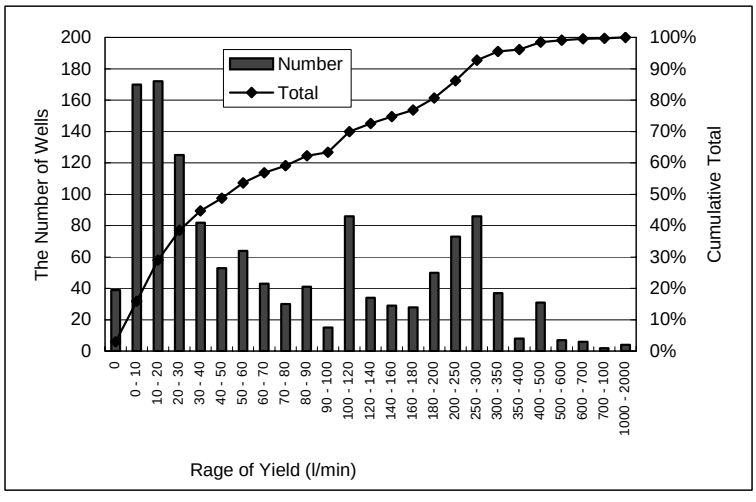


Figure 9.2 Number of Wells Classified by Yield (by 1,400 wells database)

9.3.3 DEPTH AND YIELD OF THE WELLS

The aquifer has been exploited mainly by tube wells installed with a submersible pump or a hand pump. *Figure 9.3* shows the correlation between the depth of well and the yield, using the database of 1,400 wells. Almost 90% of the wells were drilled up to 80 m in depth. The line graph indicates the number of wells for every 5 meters in depth. Bar charts indicate average and median yield from wells classified by depths.

The figure indicates clearly that the average yield decreases for depths below 85 m. The bar charts of the median yield also shows the same tendency. Considering the number of the wells, the graph suggests that a main exploited zone of groundwater is usually in the range of the depth from 30 to 65 m. The median yield of this main exploited zone is in the range of 40 to 60 liter/min. In addition, although the number of sample is small, the graph indicates that a relatively large scale water bearing zone may occur around the depth between 95 m and 100m.

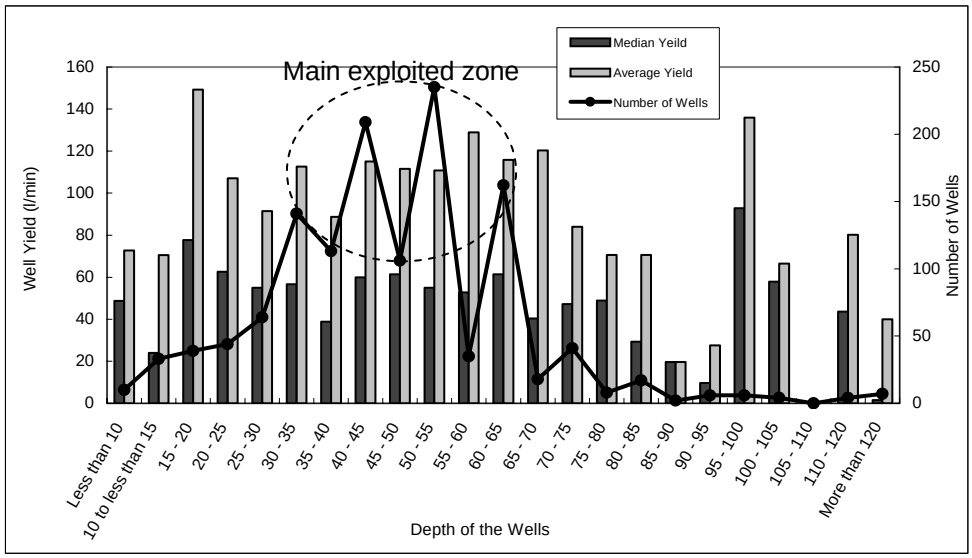


Figure 9.3 Relationship between Average of Well Yield and Well Depth

9.3.4 GROUNDWATER LEVEL

The number of wells and the depth to groundwater level (water surface of the aquifer) by geological formation are graphed as shown in *Figure 9.4*. For the geological formation of Precambrian, Cretaceous and Jurassic, which is fractured aquifer, the number of samples (wells) are too small for the analysis. Generally, the static water level of the fractured aquifer has no regional tendency; it differs for well to well.

Comparatively groundwater level of Neogene is deeper than Quaternary. Moreover, the drawdown of the water level by pumping is higher in Neogene. The results indicate that the Quaternary aquifer is highly confined than the Neogene aquifer.

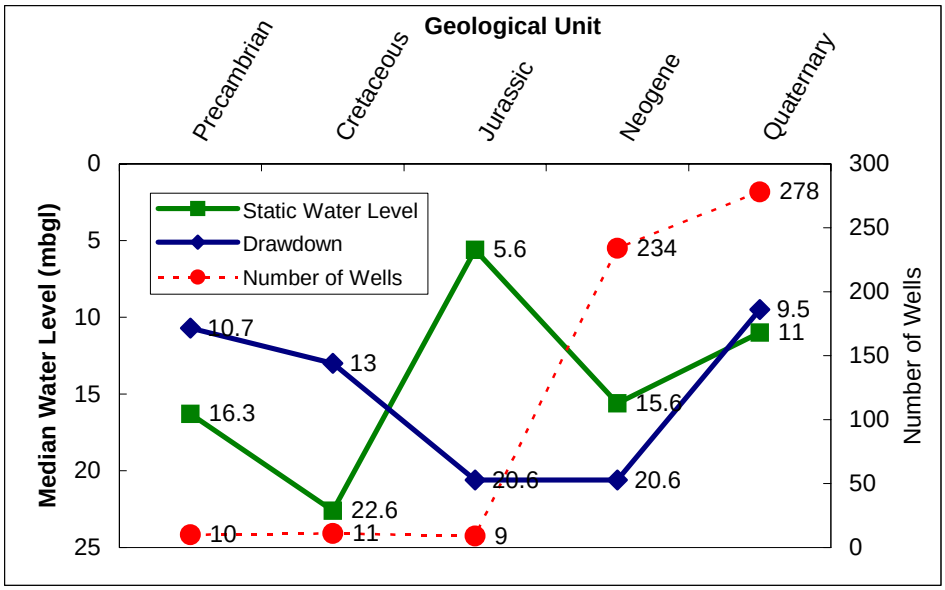


Figure 9.4 Number of Wells and Groundwater Level by Geological Formation

Figure 9.5 shows the distribution of the depth to groundwater surface in a well. The wells with relatively deeper water level are mostly located in western part of Kinondoni and eastern part of Kibaha where the Msanga-Pugu Hills with the altitude of 100 m or more is distributed. And also the central part of the Mkuranga hills has relatively deeper water level than the other area.

In these areas, however, the existing wells are not concentrated and their number is small. These results suggest that the deeper groundwater level is not available because of over extraction from the wells, but because of the high elevation. In the southern part of Msanga-Pugu Hills and Bagamoyo Plateau, there are areas with elevation more than 300m. In these areas, regardless of such high elevation, groundwater level is relatively shallow. This is interpreted as just due to lack of data.

9.3.5 YIELD AND WATER QUALITY

The yields and water qualities by the geological formation is graphed as shown in *Figure 9.6*. The line graph indicates water quality (EC: μ S/cm) and the number of wells. Bar charts indicate average and median yield from wells classified by depths.

For the geological formation of Precambrian, Cretaceous and Jurassic, which is fractured aquifer, the number of samples (wells) are too small for evaluation. However, the yield of these fractured aquifers are generally low, it is only about 10 liter/min in average, almost 0 liter/min in median yield.

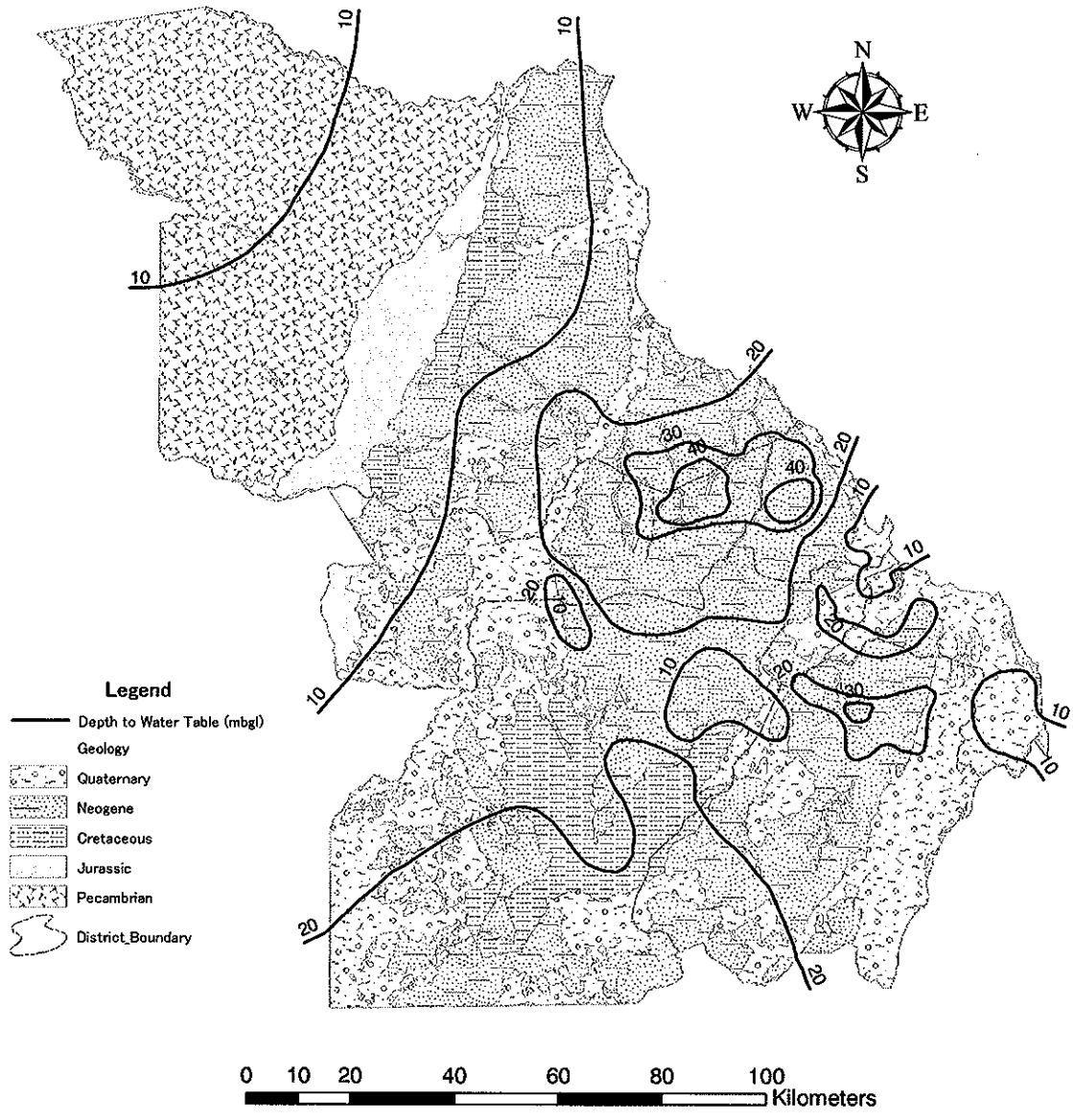


FIGURE 9.5 DEPTH TO THE GROUNDWATER SURFACE

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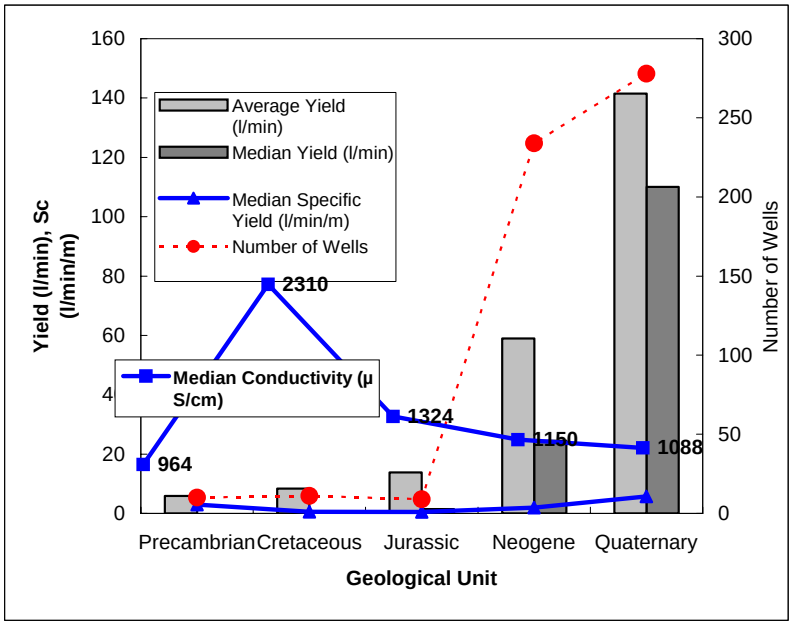

Figure 9.6 Yield and Water Quality by Geological Formation

Quaternary aquifer shows very high yield of more than 100 liter/min in median value. Next to Quaternary aquifer, Neogene aquifer shows relatively higher yield. However, the difference between two aquifers is still large. In Neogene aquifer, median yield is only 24.5 liter/min. Specific yield also shows high value in Quaternary aquifer.

As for the water quality, electric conductivity (EC) shows relatively low value in Neogene and Quaternary aquifers. It is 1150 μ S/cm in Neogene aquifer, and 1088 μ S/cm in Quaternary aquifer.

The yields and water qualities by the districts is graphed as shown in *Figure 9.7*. It should be realized that this analysis is dependent on the distribution of geology by the district.

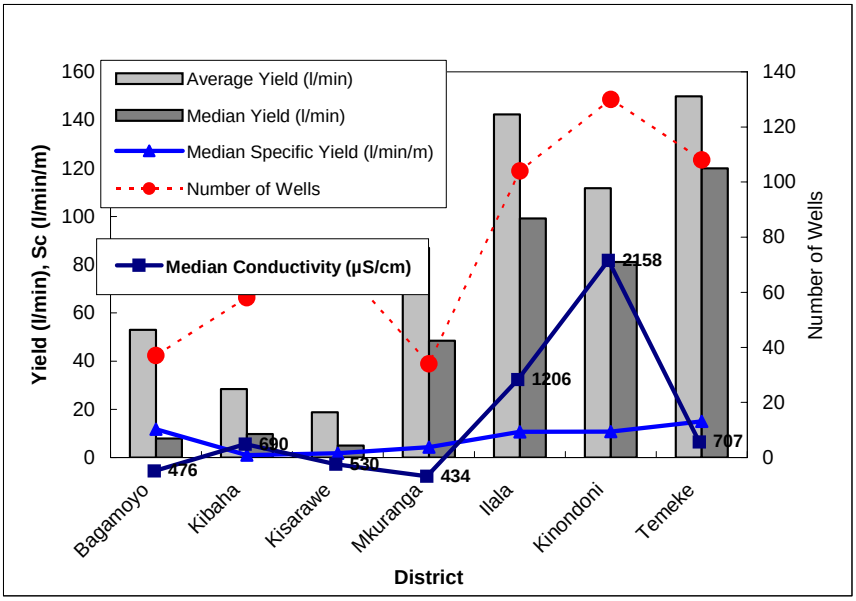

Figure 9.7 Yield and Water Quality by District

In the Dar es Salaam Region of Ilala, Kinondoni and Temeke Municipalities, the yield is generally high, it ranges from 81 (Kinondoni) to 120 liter/min (Temeke) in median yield. In Coast Region, however, the yield is very low; it is less than 10 liter/min (median yield) in Bagamoyo, Kibaha, and Kisarawe. Mkuranga shows relatively high median yield among Coast Region, it is 48 liter/min.

Water quality shows remarkable difference by the area. It is very good in Temeke and Mkuranga. EC is lower than 1000 μ S/cm in both of these districts. On the other hand, Kinondoni shows relatively high EC, it is 2158 μ S/cm. Three districts of Bagamoyo, Kibaha and Kisarawe show good water quality in average, however, the number of samples (wells) is small, it is still difficult to be regarded as the regional characteristics.

9.4 HYDROGEOLOGICAL EVALUATION

9.4.1 AQUIFER PROPERTIES

In the Study, the pumping tests were conducted after the completion of the test wells drilling, which was already described in Chapter 2 of this report. In addition, pumping test data of the existing well were collected. Although there are a lot of existing wells in the area, the pumping test data are not recorded at all in the existing wells. In general, the analysis of the aquifer properties required pumping test duration of more than 24 hours. However, the pumping test duration of the existing well is generally only 3 to 5 hours.

The collected pumping test data were reviewed and a total of 79 wells were identified as analyzable data. The analysed aquifer properties of test and existing wells are summarized in *Table 9.1*.

The specific capacity was calculated using the result of the constant discharge test. The tabulated values of the transmissivity are the mean values of the result of three kinds of analysis. Transmissivity divided by the screen length, if installed with screen pipes, or the length of open hole part was considered to be the estimated permeability (hydraulic conductivity).

9.4.2 AQUIFER POTENTIAL

The *Table 9.2* shows the general guidelines of the evaluation of well potential by transmissivity and specific capacity. In the table, the transmissivity of 10 m^2/day means good potential for domestic water. The withdrawals, or productivity, are expected to be used for a water supply system of a small to moderate scale rural area, which may be nearly the same scale of villages in the Study area.

Table 9.2 Comparison of Transmissivity, Specific Capacity and Well Potential

Transimissivity m^3/day/m			Specific Capacity (litres/min/m)	Groundwater Supply Potential	
1000	Irrigation	Good	1000	Very High	Withdrawals of great regional importance
		Fair			
		Poor	100	High	Withdrawals of lesser regional importance
100					
	Domestic	Good	10	Intermediate	Withdrawals for local water supply
10					
		Fair	1	Low	Smaller withdrawals for local water supply
1					
		Poor	0.1	Very Low	Withdrawals for local water supply with limited consumption
0.1					
		Infeasible	0.01	Interceptiable	Source for local water supply are difficult (if possible) to ensure

after U.S Bureau of Reclamation, Groundwater Manual U.S. Department of Interior, Washington, 1997 (Kashef A. Ismail, Groundwater Engineering P. 366)

after Krasmy, Jiri 1993. GROUND WATER. Vol 31, no2,pp 231

The level of infeasible, or imperceptible, which is below the transmissivity of 0.1 m^2/day, means that groundwater cannot be practically extracted. Poor to fair, or very low to low, means that

Table 9.1 Aquifer Properties Analysed by the Results of Pumping Test

Ser. No.	Well. No	Location		Well Depth	Specific Capacity	Transmissivity	Permeability		Storativity	Geological Unit
		District	Village	(m)	(l/min/m)	*T* (m3/day/m)	*K* (m/day)	*K* (cm/sec)	*S*	
1	J-4 775/2004	Bagamoyo	Kwanduma	32	5.49	5.50	5.48E-04	6.34E-07	5.17E-03	Precambrian
2	130/91	Bagamoyo	Kibindu	75		3.57	2.20E-01	2.55E-04	2.97E-02	Precambrian
3	J-6 773/2004	Kibaha	Magindu	46	0.04	0.04	6.21E-06	7.19E-09	8.59E-06	Jurassic
4	235/2003	Kisarawe	Masanganya	54		1.14	7.00E-02	8.10E-05	2.21E-03	Cretaceous
5	441/99	Kisarawe	Msanga	20		11.10	1.27E+00	1.47E-03	1.07E-03	Creteceous
6	J-1 664/2004	Kinondoni	Msumi	91	3.22	2.50	1.70E-01	1.97E-04	8.98E-04	Neogene
7	J-2 771/2004	Ilala	Buyuni	58	0.81	0.75	5.01E-05	5.80E-08	1.63E-04	Neogene
8	J-5 772/2004	Bagamoyo	Matipwile	35	0.09	0.04	3.67E-06	4.25E-09	1.94E-05	Neogene
9	J-7 774/2004	Kibaha	Kipangege	80	0.08	0.07	8.49E-03	9.83E-06	3.24E-05	Neogene
10	J-8 770/2004	Mkukranga	Dundani	81	5.28	3.63	1.98E-04	2.29E-07	8.69E-04	Neogene
11	169/2001	Bagamoyo	Kiwangwa	25	5.04	8.50	1.46E+00	1.69E-03	6.72E-03	Neogene
12	360/2003-1	Mkuranga	Vikindu	60	0.30	0.14	6.22E-03	7.20E-06	7.02E-04	Neogene
13	360/2003-2	Mkuranga	Vikindu	60	0.27	0.18	8.03E-03	9.30E-06	2.55E-04	Neogene
14	324/2003	Mkuranga	Mbanambaya	70	0.17	0.12	3.88E-03	4.49E-06	4.33E-05	Neogene
15	185/2001	Mkuranga	Chamgoi II	54	2.61	1.50	8.00E-02	9.26E-05	3.31E-03	Neogene
16	28/2002-1	Mkuranga	Mbezi Gogoni	65	0.08	0.05	2.35E-03	2.72E-06	1.83E-05	Neogene
17	28/2002-2	Mkuranga	Mbezi Gogoni	65	0.08	0.03	1.14E-03	1.32E-06	4.10E-05	Neogene
18	37/2003	Mkuranga	Vikindu	70	42.39	60.83	2.99E+00	3.46E-03	3.60E-04	Neogene
19	137/2002	Mkuranga	Mkuranga town	70	0.20	0.13	5.17E-03	5.98E-06	3.50E-04	Neogene
20	176/2001	Mkuranga	Vikindu	70	30.56	6.18	3.00E-01	3.47E-04	1.08E-01	Neogene
21	1/2002	Mkuranga	Vikindu	60	2.31	0.72	4.00E-02	4.63E-05	4.93E-03	Neogene
22	12/2002	Mkuranga	Vikindu	50	5.17	4.80	2.70E-01	3.13E-04	3.39E-03	Neogene
23	15/2002	Mkuranga	Mbezi Msufini	55	0.29	0.35	2.00E-02	2.31E-05	8.96E-05	Neogene
24	264/2001	Mkuranga	Vianzi- Vikindu	72	17.15	14.66	5.60E-01	6.48E-04	4.51E-03	Neogene
25	195/2001	Mkuranga	Mkuranga Town	62	1.39	0.66	3.00E-02	3.47E-05	2.65E-03	Neogene
26	194/2001	Mkuranga	Kimanzichana	62	0.57	0.30	1.00E-02	1.16E-05	4.59E-04	Neogene
27	115/99	Kibaha	Kibaha maili Moja	60	30.45	47.06	2.03E+00	2.35E-03	1.26E-06	Neogene
28	412/99	Kibaha	Gumba	43	1.03	0.91	7.00E-02	8.10E-05	8.40E-04	Neogene
29	354/99	Kibaha	Nyumbu	50	0.46	0.51	4.00E-02	4.63E-05	7.70E-05	Neogene
30	413/99	Kibaha	Kikongo	42	0.82	0.71	4.00E-02	4.63E-05	2.32E-06	Neogene
31	352/99	Kibaha	Miswe	50	1.05	0.57	3.00E-02	3.47E-05	7.62E-04	Neogene
32	473/99	Kibaha	Visiga	36	0.47	0.18	1.00E-02	1.16E-05	7.69E-05	Neogene
33	357/99	Kibaha-1	Visiga	38	0.84	0.36	3.00E-02	3.47E-05	3.75E-04	Neogene
34	357/99	Kibaha-2	Visiga	38	0.95	0.29	2.00E-02	2.31E-05	3.41E-04	Neogene
35	357/99	Kibaha-3	Visiga	38	1.53	0.29	2.00E-02	2.31E-05	3.41E-04	Neogene
36	27/2000	Kibaha	Tumbi	50	0.48	0.15	7.61E-03	8.81E-06	9.16E-04	Neogene
37	32/2000	Kibaha	Boko- Timiza	30	0.54	0.32	2.00E-02	2.31E-05	3.54E-04	Neogene
38	118/2000	Kibaha	Msanga Sokoni'I'	30	0.22	0.58	5.00E-02	5.79E-05	8.89E-05	Neogene
39	28/98	Mkuranga	Hoyoyo	62	2.76	0.89	3.00E-02	3.47E-05	5.21E-03	Neogene
40	166/98	Mkuranga	Kizuda	36	15.24	12.40	8.50E-01	9.84E-04	1.33E-03	Neogene
41	454/2000	Kisarawe	Kisarawe Seminary	30	52.30	28.76	2.47E+00	2.86E-03	4.00E-02	Neogene
42	476/99	Kisarawe	Kisarawe Town	40	0.11	0.63	3.00E-02	3.47E-05	3.19E-04	Neogene
43	370/2000	Kibaha	Zogowale	30	0.72	0.18	1.00E-02	1.16E-05	5.56E-04	Neogene
44	247/99	Bagamoyo	B.moyo Sec School	30	31.06	16.03	1.38E+00	1.60E-03	6.18E-03	Neogene
45	146/99	Bagamoyo	Zinga Farm	40	149.66	266.33	2.30E+01	2.66E-02	1.25E-05	Neogene
46	356/99	Bagamoyo	Chasimba	50	36.70	66.16	2.85E+00	3.30E-03	5.16E-06	Neogene
47	152/99	Bagamoyo	Lower Ruvu	60	10.82	13.73	6.70E-01	7.75E-04	3.02E-06	Neogene
48	209/98	Kibaha	Boko Mnemela	78	0.30	0.18	4.54E-03	5.25E-06	1.70E-04	Neogene
49	579/99	Kinondoni	Mabwepande	48	1.01	0.51	6.00E-02	6.94E-05	6.37E-04	Neogene
50	198/97	Temeke	Kibada Hospital	42	47.10	21.53	1.85E+00	2.14E-03	2.58E-04	Neogene
51	553/99	Temeke	Kisarawe II	48	3.49	4.32	2.90E-01	3.36E-04	2.10E-05	Neogene
52	J-3 699/2004	Temeke	Potea	75	17.72	32.00	1.79E-03	2.07E-06	5.16E-05	Quaternary
53	J-9 768/2004	Mkuranga	Kise	77	0.24	0.36	1.80E-05	2.08E-08	4.92E-04	Quaternary
54	247/2001	Kibaha	Disunyala	60	5.04	2.59	1.10E-01	1.27E-04	5.40E-03	Quaternary
55	414/99	Kibaha	Lupunga I	30	0.25	0.18	1.00E-02	1.16E-05	1.97E-05	Quaternary
56	410/99	Kibaha	Kitomondo	32	332.66	801.66	6.92E+01	8.01E-02	3.53E-05	Quaternary
57	411/99	Kibaha-1	Lidunga II	50	0.19	0.17	1.00E-02	1.16E-05	2.83E-05	Quaternary
58	353/99	Kibaha	Ruvu Sec School	70	2.15	1.96	1.10E-01	1.27E-04	7.55E-04	Quaternary
59	74/2004	Kinondoni	Upanga	50	5.82	2.65	1.80E-01	2.08E-04	4.52E-03	Quaternary
60	31/2003	Kinondoni	Mbweni II	50	34.52	24.30	2.79E+00	3.23E-03	3.60E-03	Quaternary
61	162/2000	Kinondoni	Kinondoni	36	37.71	56.96	3.92E+00	4.54E-03	2.55E-05	Quaternary
62	16/99	Kinondoni	Kinduchi Mtongani	33	46.56	31.13	5.36E+00	6.20E-03	8.24E-01	Quaternary
63	258/2000	Kinondoni	Mburahati	41	33.52	2.43	1.30E-01	1.50E-04	1.38E-02	Quaternary
64	125/98	Kinondoni	Masjid Ladwa	30	6.75	13.72	1.18E+00	1.37E-03	3.02E-05	Quaternary
65	75/99	Kinondoni	Kinondoni	30	26.73	45.10	3.90E+00	4.51E-03	2.45E-05	Quaternary
66	431/2000	Kinondoni	Sinza	33	0.44	0.08	6.16E-03	7.13E-06	1.01E-03	Quaternary
67	363/2003	Temeke	Yombo Vituka	60	0.23	0.11	6.60E-03	7.64E-06	3.78E-04	Quaternary
68	363/2003	Temeke	Yombo Vituka	60	6.34	3.97	2.20E-01	2.55E-04	7.34E-03	Quaternary
69	85/2002	Temeke	Kigamboni	40	352.46	468.30	4.53E+01	5.24E-02	1.85E-05	Quaternary
70	212/2000	Temeke	Mbande	40	73.62	117.33	6.73E+00	7.79E-03	7.66E-06	Quaternary
71	328/2001	Kinondoni	Tandale Police Post	52	0.79	0.50	2.00E-02	2.31E-05	7.22E-04	Quaternary
72	202/2003	Temeke	Mbagala Kibonde Maji	54	3.77	4.31	2.30E-01	2.66E-04	2.06E-04	Quaternary
73	216/2000	Temeke	Mtoni Sabasaba	42	137.69	253.66	1.25E+01	1.44E-02	1.11E-05	Quaternary
74	55/2002	Temeke	Mtoni Kijichi	50	13.19	10.62	5.20E-01	6.02E-04	6.62E-03	Quaternary
75	30/2004	Temeke	Mikoroshoni	50	11.84	3.16	1.50E-01	1.74E-04	2.42E-02	Quaternary
76	217/98	Temeke	Air Port (Ukonga)	81	0.84	1.44	1.60E-01	1.85E-04	4.18E-07	Quaternary
77	98/97	Temeke	Keko Prison	52	19.17	13.10	7.50E-01	8.68E-04	5.35E-03	Quaternary
78	309/2003	Temeke	Buza	50	4.96	4.48	1.90E-01	2.20E-04	6.23E-04	Quaternary
79	209/2001	Temeke	Mjimwema	25	12.60	23.86	2.74E+00	3.17E-03	5.55E-06	Quaternary
80	341/2001	Temeke	Nzasa	52	4.28	7083.33	4.07E+02	4.71E-01	3.67E+01	Quaternary
81	33/2001	Ilala	Gongo la mboto	30	0.23	0.17	1.00E-02	1.16E-05	2.70E-05	Quaternary
82	199/2002	Ilala	Ilala Bomani	60	7.69	4.81	2.70E-01	3.13E-04	1.28E-02	Quaternary
83	11/2002	Ilala	Kipunduni 'A'	60	2.21	1.07	6.00E-02	6.94E-05	2.39E-03	Quaternary
84	23/2001	Ilala	Gongo la mboto	70	0.85	0.43	1.00E-02	1.16E-05	6.67E-04	Quaternary
85	251/2002	Kinondoni	Manzese TipTop	55	82.49	56.03	3.22E+00	3.73E-03	5.12E-02	Quaternary

groundwater can possibly be pumped out by a hand pump. Good, or intermediate, means that groundwater may be withdrawn using a submersible pump for piped water supply scheme.

The result of the test well drilling and existing wells for the Study was evaluated using the above table and also the yield from each of existing well. Based on the results of pumping tests of both Test and Existing wells, the distributions of Transmissivity, Specific Capacity and Yield are examined as shown as *Figures 9.8* and *9.9*, respectively.

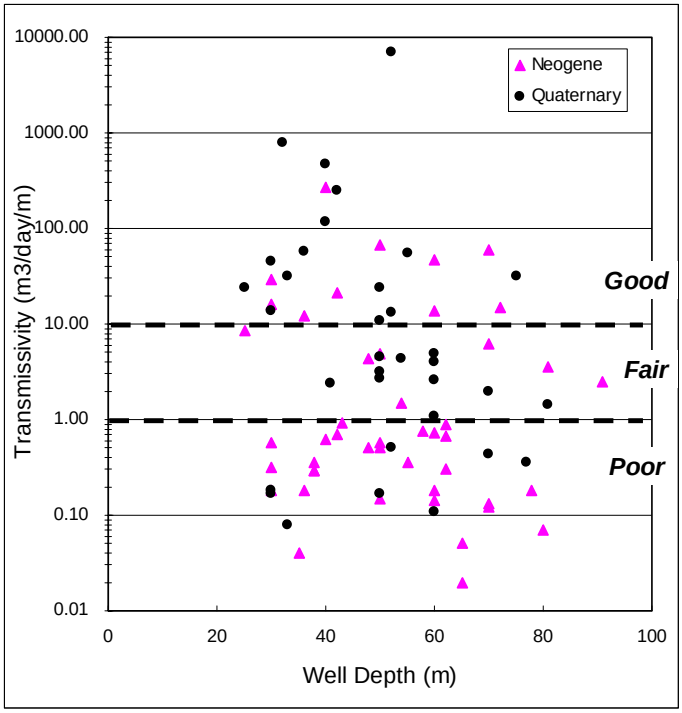

Figure 9.8 Distribution and Evaluation of Transmissivity

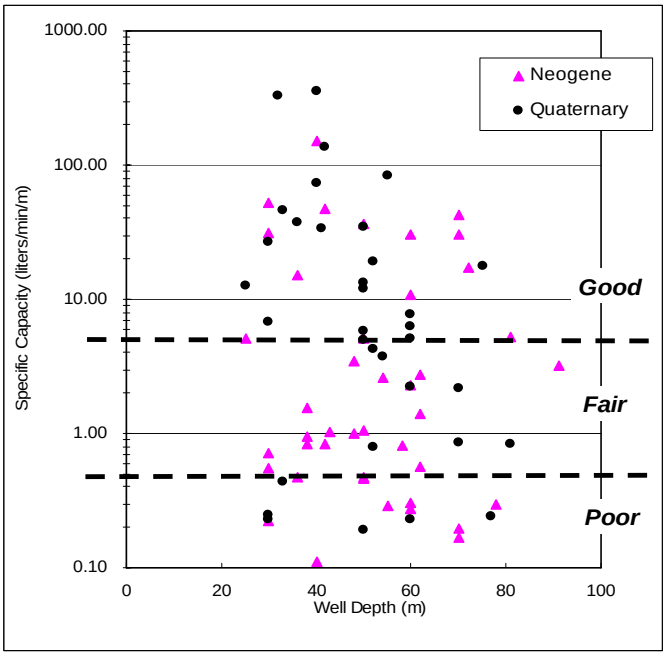

Figure 9.9 Distribution and Evaluation of Specific Capacity

The results of evaluation generally indicate that the Quaternary aquifers have good potential than that of Neogene. For the Neogene aquifers, although the Specific Yield shows Fair to Good potential, the Transmissivity shows rather Poor potential.

9.4.3 HYDRAULIC CONDUCTIVITY

The hydraulic Conductivity of the aquifer can be evaluated by the permeability. Based on the results of pumping tests of both Test and Existing wells, the distributions of Permeability, are evaluated as shown as *Figure 9.10.*

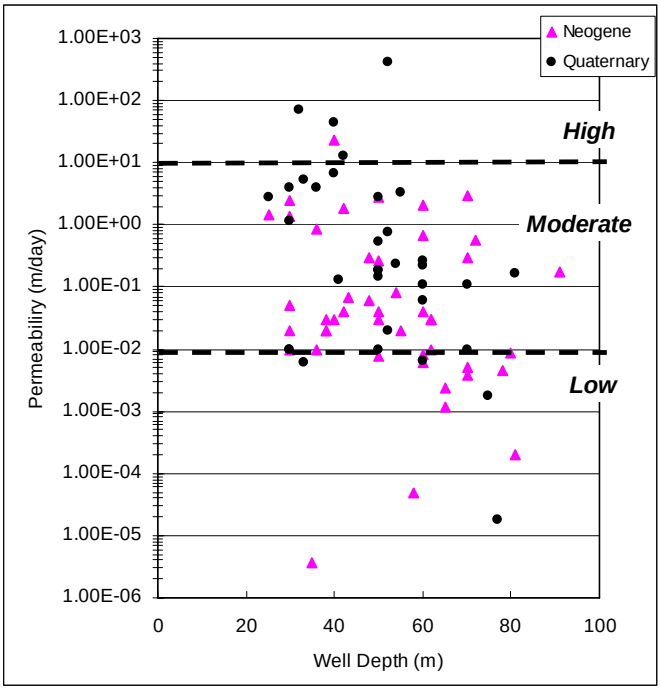

Figure 9.10 Distribution and Evaluation of Permeability

The *Table 9.3* shows the overall ranges of hydraulic conductivity for soils and rocks. The values of massive to fractured basement rocks vary from 10^{-5} to 10^{1} m/day, and for soil vary from 10^{-2} to 10^{4} m/day. The foremost range of the obtained values for each geological unit in the Study area is also shown in the table.

Table 9.3 Evaluation of Hydraulic Conductivity

(m/day)

	10^{4}	10^{3}	10^{2}	10^{1}	1	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}
Quaternary	4.07×10^{2} ←					●	2.05×10^{-1} →				1.80×10^{-5}
Neogene			2.30×10^{1} ←				● 3.00×10^{-2} →				3.67×10^{-6}
Cretaceous					1.27 ←		7.00×10^{-2} →				
Jurassic											▲ 6.21×10^{-6}
Precambrian						2.20×10^{-1} ←			5.48×10^{-4} →		

Relative permeability

Very high	High	Moderate	Low	Very low
Clean gravel	Clean sand and sand and gravel	Fine sand	Silt, clay and mixture of sand, silt and clay	Massive clay
Vesicular and scorioceous basalt and covernous limestone and dolomite	Clean sandstone and fractured igneous and metam orphic rocks	Laminated sandstone shale, and mudstone		Massive igneous and meramorphic rocks

Remarks : ● *Median Value*
: ▲ *Only one sampls*

After Kashef, A.I GROUNDWATER ENGINEERING, 1987
U.S. Bureau of Reclamation, Groundwater Manual, U.S. Department of Interior, Washington, 1977.

The results suggested that for the major two aquifers of both Quaternary and Neogene in the study area, hydraulic conductivity largely vary from "Very Low" to "High". The Quaternary is still has slightly higher range of Hydraulic Conductivity than the Neogene aquifer. For the Cretaceous, Jurassic and Precambrian aquifers, since the number of sample is minimal, scattered result is observed.

9.4.4 GROUNDWATER FLOW

Measured static water levels of 500 existing well were converted to the elevation (masl) datum. *Figure 9.11* shows contour line of the groundwater surface and estimated groundwater flow. There are two major flows in the Neogene and Quaternary aquifers. One is the Ruvu river flow. The groundwater flows from Msaga-Pugu Hills and Bagamoyo Plateau and the converged groundwater flow along the Ruvu River. The other one is flow to alluvial plain of the Dar es Salaam and east part of Mkuranga from Msaga-Pugu Hills.

9.4.5 DISTRIBUTION OF YIELD AND WATER QUALITY

The distribution of yield and water quality, which is result of the analysis made by test and existing wells, are shown in *Figure 9.12 and 9.13* respectively.

The high yielding area of more than 100 liter/min distributes in the whole of Temeke, northern part of Mkuranga, coastal area of Ilala, part of Kinondoni and coastal part of Bagamoyo. Bagamoyo Plateau and central to southern part of Msanga-Pugu Hills show low yield of less than 10 liter/min.

As for the water quality, Kinondoni shows poor quality with EC more than 3,000 μ S/cm, although yield of the district is very high. The Neogene part in Bagamoyo Plateau also shows poor quality with EC more than 3000 μ S/cm. It is very good in Temeke and northern part of Mkuranga, where EC is lower than 1000 μ S/cm. In other areas such as Kisarawe and central of Kibaha, although the map shows good water quality, the distribution of these water qualities will be revised with further accumulation of hydrogeological data, since the available data are very small.

9.4.6 POTENTIAL FOR THE DEVELOPMENT

The potential for water source development is analysed. As described in section 9.5.2, the potential evaluation of the water source is made by the criteria from the planning point of view. There are three ranks of less than 10 letter/min, between 10 to 100 liter/min and more than 100 liter/min.

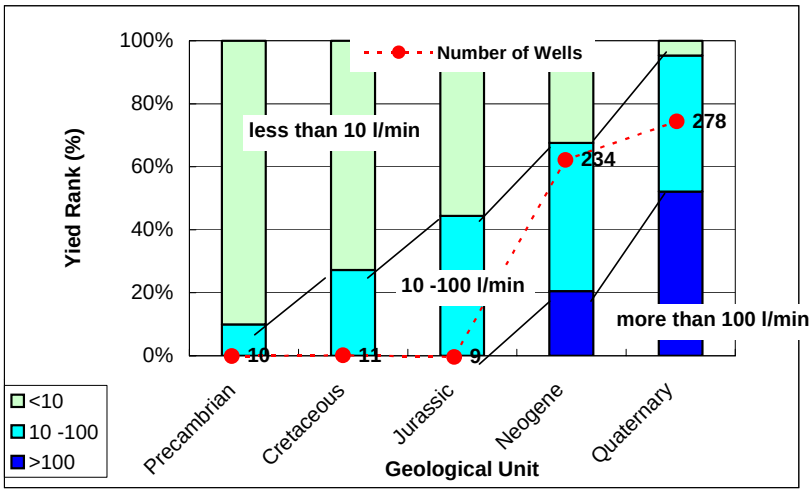

Figure 9.14 Proportion of Yield Rank by Geological Formation

The proportion of these yield ranks by the geological formations is graphed as shown in *Figure 9.14*. The graph suggests that potential for development is high in Quaternary aquifer; more than

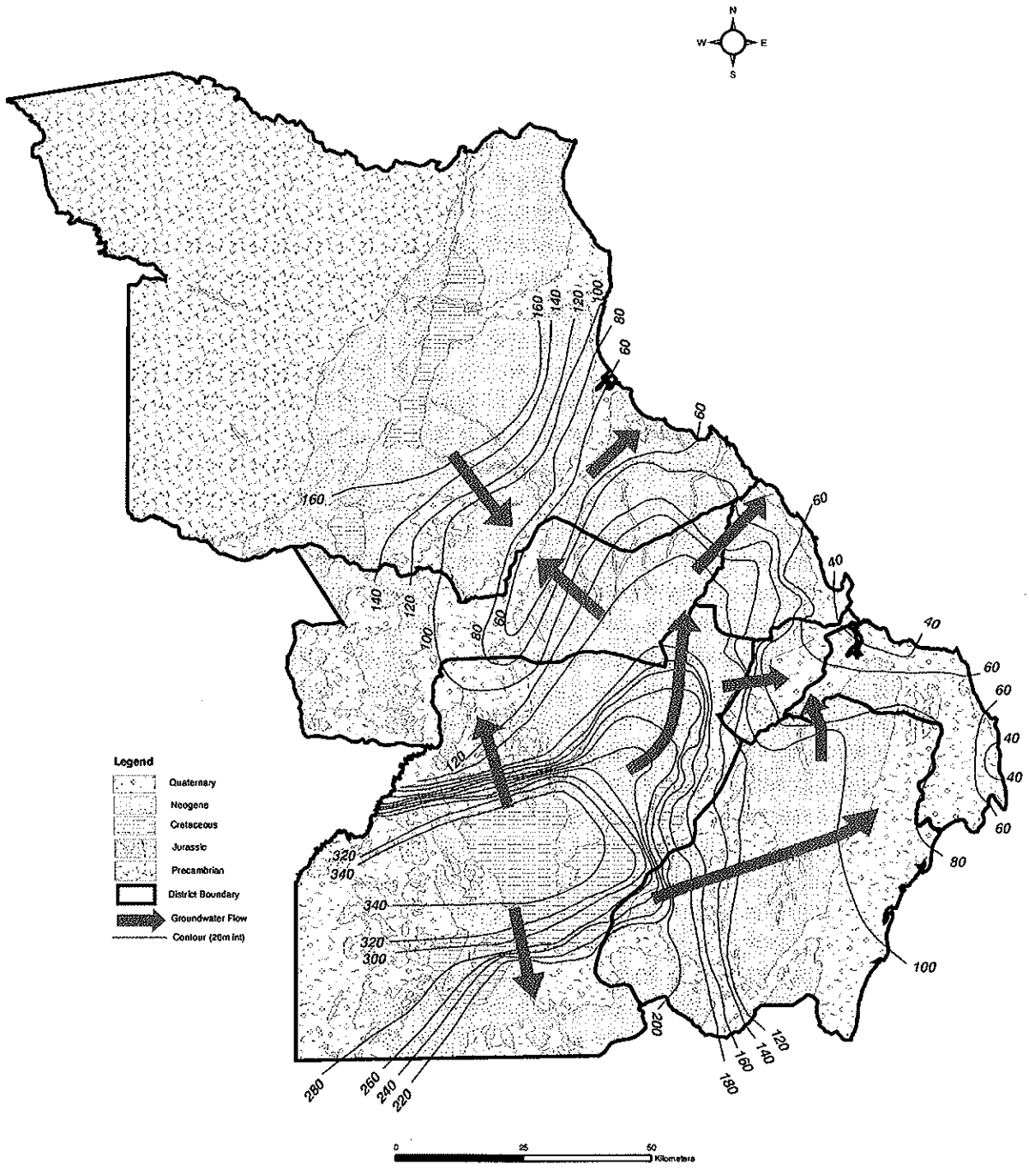

FIGURE 9.11 ELEVATION OF GROUNDWATER SURFACE AND ESTIMATED GROUNDWATER FLOWS

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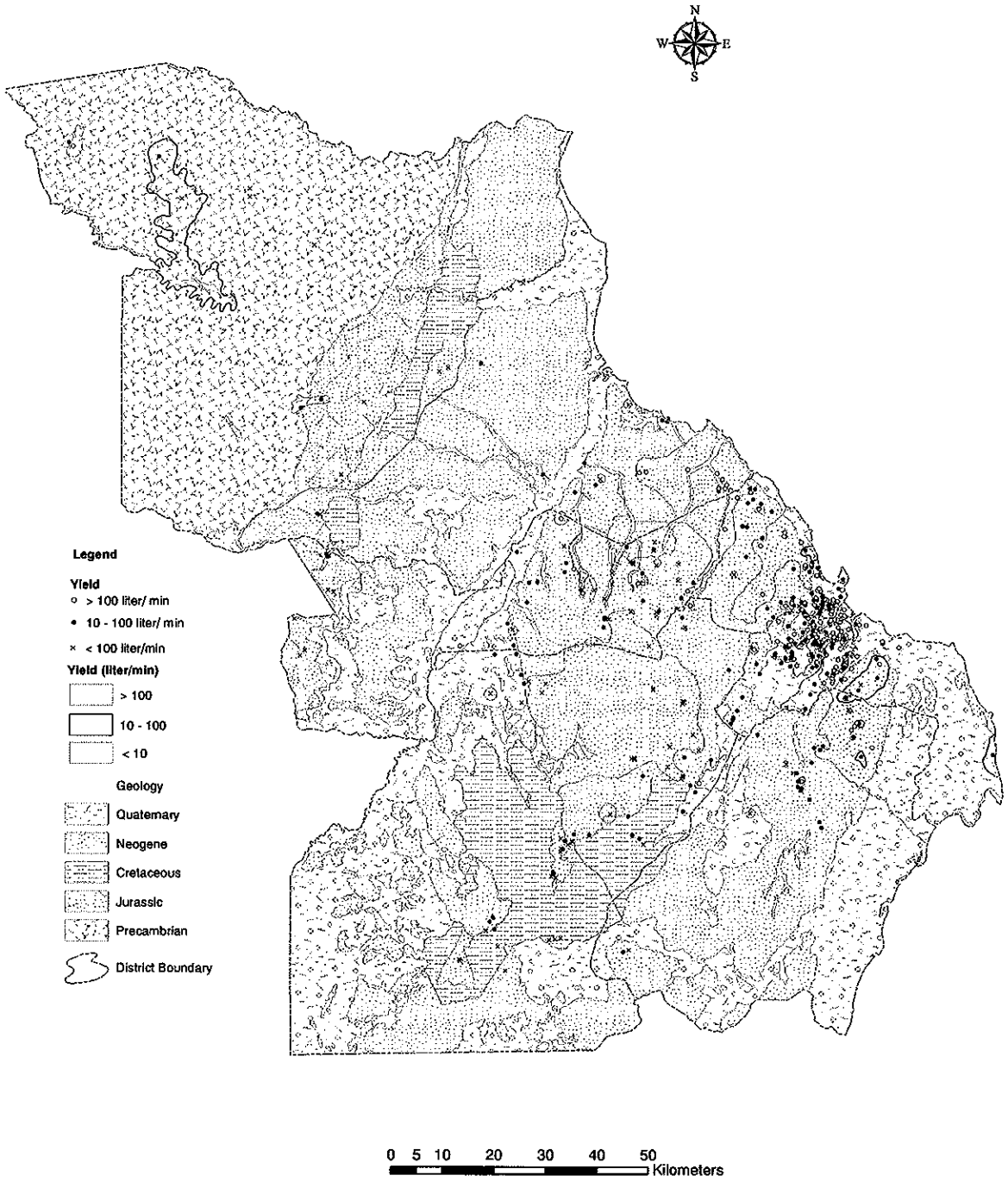

FIGURE 9.12 DISTRIBUTION OF WELL YIELD

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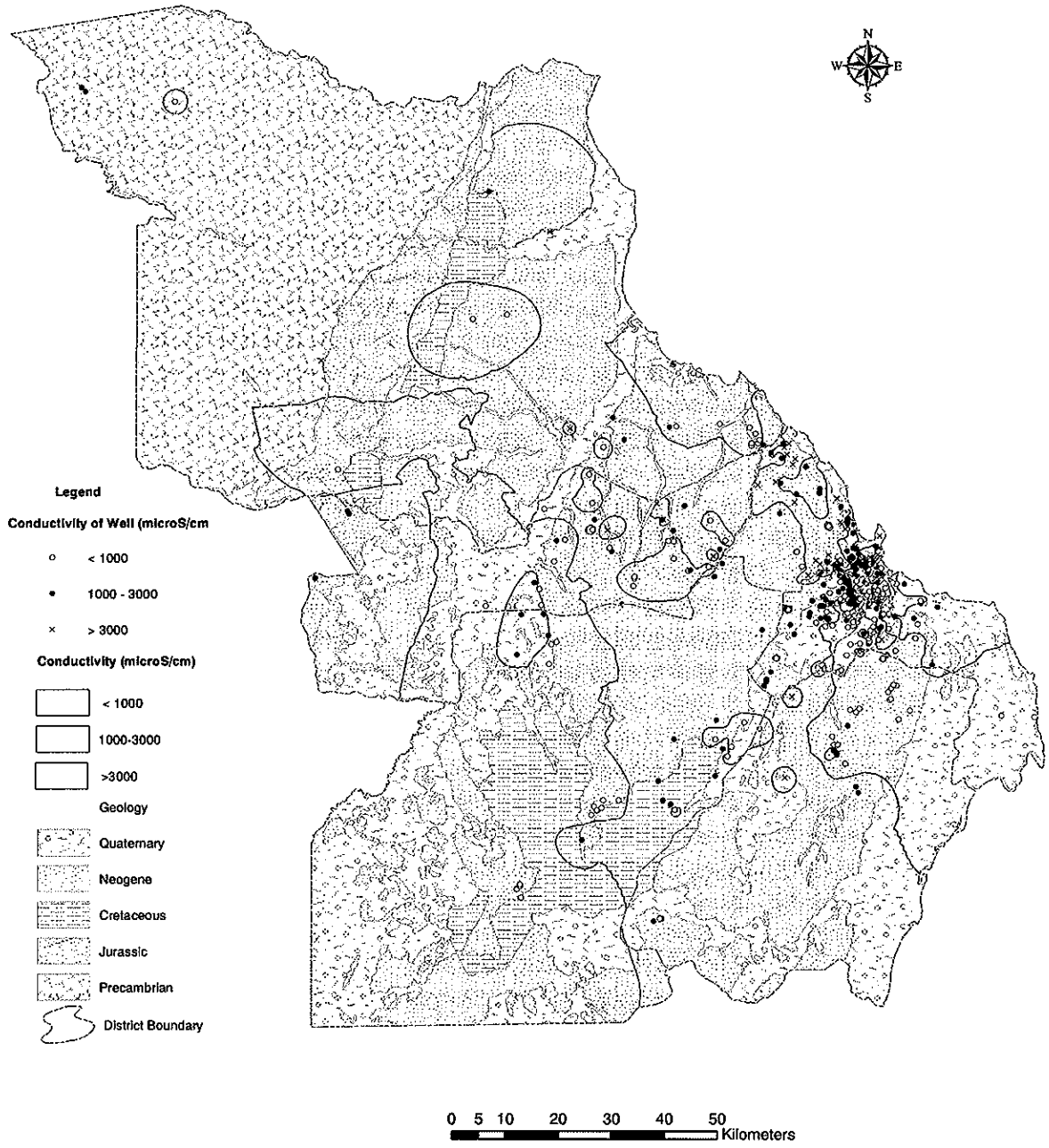

FIGURE 9.13 DISTRIBUTION OF GROUNDWATER QUALITY

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50% of the wells have the potential of more than 100 liter/min of yield. Next to Quaternary, Neogene aquifer shows relatively higher potential with 20% of the wells having potential of more than 100 liter/min.

About basement rocks aquifer, there are no wells having potential of more than 100 liter/min. For Jurassic, Cretaceous and Precambrian, the potential become much lower.

Figure 9.15 shows potential for the development by district. The proportion of the moderate rank of 10 to 100 liter/min is similar in each district. However, potential of more than 100 liter/min. is high in three districts of Dar es Salaam and relatively high in Mkuranga district.

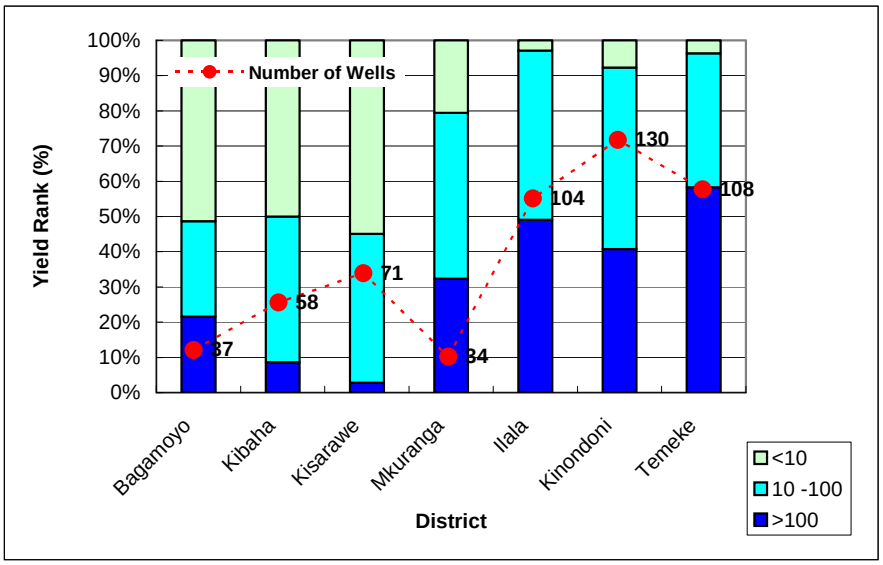

Figure 9.15 Proportion of Yield Rank by District

9.5 GROUNDWATER POTENTIAL EVALUATION

9.5.1 PREPARATION OF HYDROGEOLOGICAL AND GROUNDWATER EVALUATION MAPS

The aquifer in the study area was categorised into two parts: namely, the fractured aquifer and the stratum aquifer. The stratum aquifer is the aquifer in which intergranular flow is significant. The geological units of Quaternary and Neogene are relevant to this aquifer type. The aquifers of Quaternary and Neogene are already developed and utilized in the study area. The fractured aquifer is the aquifer in which flow is dominantly in fissure, fracture zone and other geological discontinuities. The geological units of Precambrian, Jurassic and Cretaceous are relevant to this aquifer type. Since the number of wells in these geological regions is small, there is little information about the aquifer at present.

The hydrogeological map has been prepared as shown in *Figure 9.16*. The map shall be revised with the further accumulation of hydrogeological data in future. The map contain the information on groundwater yield, quality (EC), depth to groundwater, existing well location, geological structure and physiographic information such as surface water and contour lines. Naturally, groundwater yield, or productivity, is one of the most important factors for groundwater exploitation. The quality of groundwater is another essential factor. Pumping and maintenance costs depend on the depth to water. The analyses using GIS show the regional characteristics in the area. Finally, the groundwater resources evaluation map was provided based on the hydrogeological map to contribute to the groundwater development plan. The groundwater resources evaluation map is shown in *Figure 9.17*.

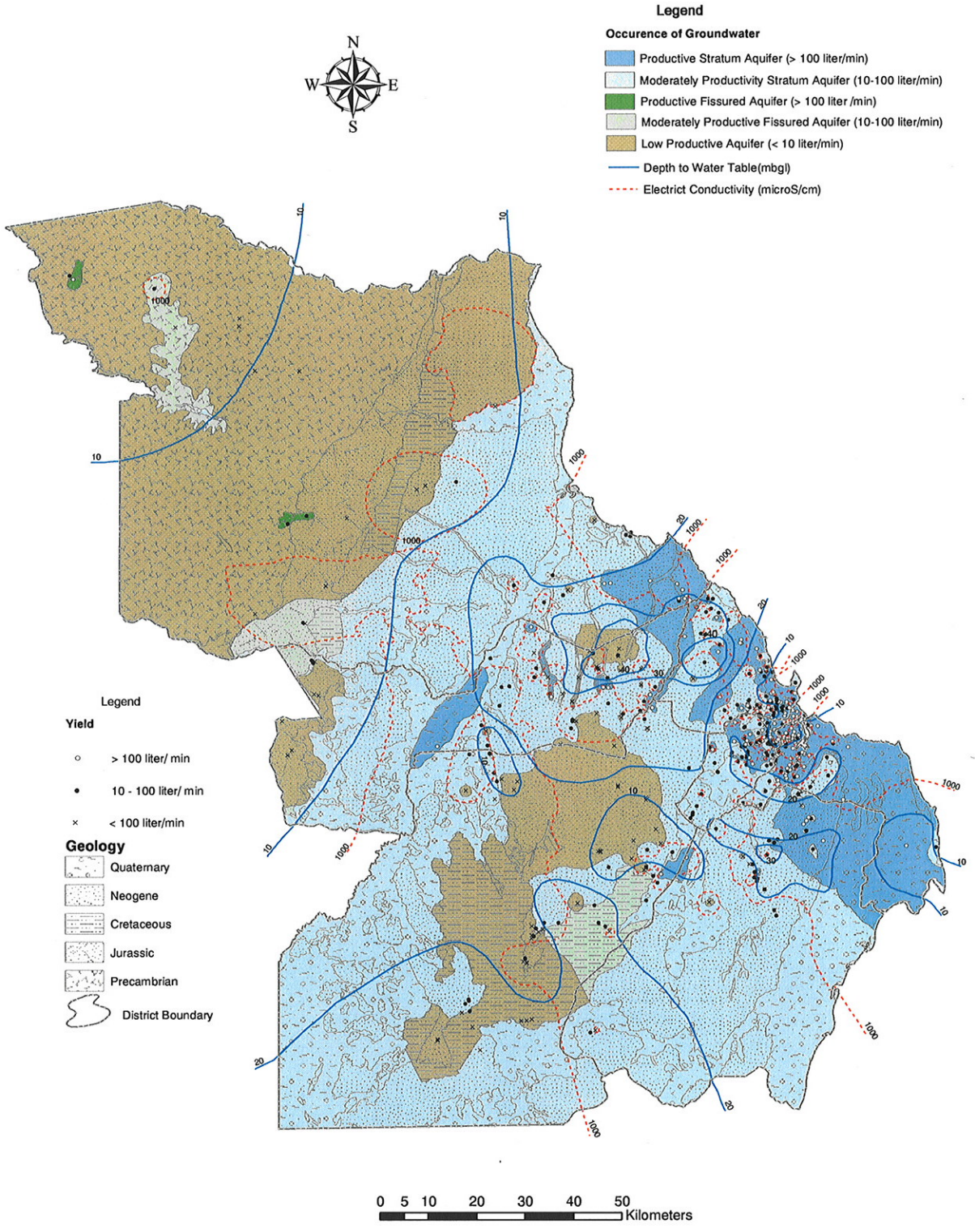

FIGURE 9.16 HYDROGEOLOGICAL MAP

THE STUDY ON WATER SUPPLY IMPROVEMENT IN COAST & DAR ES SALAAM | **JICA**