

Tables

- Identifications of ecosystem functions and natural resource uses will be carried out for 13.0 months between the 4th month to 16th month.
- Investigation of impacts of socio-economic activities including investigation of guarantee river flow will be executed for 10.5 months between the 9th month to 19th month.
- Identification of development opportunity and constrains will be carried out for 2 months from 14th month to 15th month.
- Identification of management issues will be carried out for 2 months from 14th month to 15th month.
- Development of management policy will be carried out for 3.5 months from 20th month to 23th month.
- Technology transfer will be done for 2 months from the 23th month to 24 month.

Through a whole period of the study, the training will be carried out to obtain the required long-term studies and to continue working on the above and related monitoring topics.

Tables



Table 2.1.1 Consumer Price Index by Income Class and Inflation Rate

Year	Lower income class	Middle income class	High income class	Inflation rate
Base: January-June 1975=100				
1972	70.6	70.8	73.9	
1973	82.2	79.5	85.1	9.18
1974	91.4	91.3	93.3	17.01
1975	108.2	105.1	109.3	19.06
1976	118.0	114.9	117.7	10.74
1977	142.8	130.4	134.0	14.08
1978	162.3	141.0	145.1	15.47
1979	177.1	155.7	163.8	7.74
1980	200.3	173.3	185.0	13.40
1981	239.0	216.3	185.0	12.12
1982	270.8	255.9	259.0	21.54
1983	297.9	281.7	285.7	12.30
1984	330.4	312.6	307.0	9.88
1985	364.6	348.4	333.3	12.61
1986	379.2	368.6	346.6	4.73
1987	400.5	405.5	382.4	8.71
1988	440.5	452.7	428.7	12.34
1989	483.1	505.8	475.0	13.46
Base: February-March 1986=100				
1990				15.68
March	151.2	170.5	166.2	-
June	157.0	176.3	171.6	-
September	164.0	182.7	178.8	-
December	175.0	196.0	192.9	-
1991	190.2	211.7	208.7	19.62
March	183.7	202.9	199.5	-
June	189.8	211.9	211.1	-
September	197.8	221.8	215.0	-
December	200.2	224.8	221.5	-
1992	246.4	256.6	242.8	27.50
March	224.2	250.8	234.0	-
June	265.7	259.9	244.3	-
September	267.0	266.3	250.8	-
December	275.1	276.3	262.9	-
1993	359.2	374.3	372.1	46.00
March	305.7	318.3	309.9	58.10
June	363.3	380.1	385.1	101.08
September	405.9	423.1	431.9	55.40
December	418.6	449.0	446.3	16.01
1994	463.5	478.8	485.8	
March	473.2	476.4	481.6	53.91
June	470.0	481.3	493.5	-0.98
September	457.3	479.1	496.0	-8.28
December	-	-	-	-
1995	467.1	498.0	504.5	1.6
1996	508.3	546.6	549.4	9.0
January	482.0	522.4	522.5	-
March	491.4	534.8	540.3	-
June	510.7	549.9	550.7	-
September	524.0	555.9	556.4	-
December	528.5	566.1	576.6	-
1997	-	-	-	-
January	-	-	-	-
March	-	-	-	-
June	-	-	-	-
July	-	-	-	-

Sources:

Quarterly Economic Review, Vol. XXVI No III, January-March 1994, Central Bank of Kenya.
 Unofficial Report on Consumer Price Index for 1993 and 1994, Central Bureau of Statistics.
 Leading Economic Indicators, September 1994, Central Bureau of Statistics.
 National Development Plan for the Period 1994 - 1996, Republic of Kenya.
 Economic Survey 1997, Central Bureau of Statistics.

Note: -Lack of data.

Table 2.1.2 Foreign Exchange Rate (Middle Rate)

Year	US\$1	Yen100
1972	7.143	2.365
1973	6.900	2.464
1974	7.143	2.374
1975	8.250	2.700
1976	8.310	2.840
1977	7.947	3.310
1978	7.404	3.825
1979	7.328	3.046
1980	7.568	3.737
1981	10.286	4.685
1982	12.725	5.440
1983	13.796	5.958
1984	15.781	6.306
1985	16.284	8.120
1986	16.042	10.030
1987	16.515	13.394
1988	18.599	14.800
1989	21.601	15.032
1990	24.084	17.860
March	22.977	14.697
June	23.130	15.108
September	23.334	16.915
December	24.084	17.860
1991	28.074	22.352
March	26.596	19.061
June	28.655	20.795
September	28.664	21.528
December	28.074	22.352
1992	36.216	29.066
March	30.028	22.818
June	32.308	25.696
September	33.536	28.130
December	36.216	29.066
1993	68.163	60.914
March	45.528	39.060
June	65.142	61.178
September	66.962	63.713
December	68.163	60.914
1994		
March	64.858	63.030
June	55.959	56.479
September	48.007	48.750
December	-	-
1995	-	-
1996	-	-
January	56.700	53.700
March	58.400	55.200
June	58.000	45.100
September	56.400	51.400
December	55.200	48.400
1997	-	-
January	54.700	46.500
March	54.900	44.800
June	54.200	47.500
July	57.400	49.800

Sources:

Quarterly Economic Review, Vol. XXVI No III, January-March 1994, Central Bank of Kenya.
 Leading Economic Indicators, September 1994, Central Bureau of Statistics.
 Monthly Economic Review, Central Bank of Kenya, August 1997.

Table 2.2.1 Population Projection Rate 2010 - 2020

Province/ District	(%)					
	2010 - 2015			2015 - 2020		
	Total	Urban	Rural	Total	Urban	Rural
Nairobi	4.57%	4.57%	-	4.56%	4.56%	-
Nairobi	4.57%	4.57%	-	4.56%	4.56%	-
Central	2.34%	6.37%	1.65%	2.34%	6.20%	1.66%
Kiambu	2.47%	6.35%	1.69%	2.47%	6.16%	1.70%
Kirinyaga	2.15%	6.81%	1.76%	2.13%	6.58%	1.74%
Muranga	1.93%	5.34%	1.52%	1.93%	5.19%	1.54%
Nyandarua	2.53%	6.89%	2.30%	2.46%	6.60%	2.22%
Nyeri	2.70%	6.81%	1.26%	2.77%	6.64%	1.41%
Coast	2.76%	4.23%	1.92%	2.74%	4.17%	1.90%
Kilifi	2.90%	7.37%	2.07%	2.86%	7.10%	2.04%
Kwale	2.18%	7.66%	1.81%	2.15%	7.34%	1.78%
Lamu	3.49%	6.73%	2.18%	3.46%	6.50%	2.18%
Mombasa	3.19%	3.19%	-	3.15%	3.15%	-
Taita T.	2.20%	4.98%	1.63%	2.21%	4.85%	1.65%
Tana R.	2.68%	7.27%	1.90%	2.66%	7.03%	1.88%
Eastern	2.70%	7.00%	1.96%	2.66%	6.76%	1.94%
Embu	2.41%	7.05%	1.97%	2.37%	6.79%	1.93%
Isiolo	5.22%	7.87%	2.43%	5.16%	7.52%	2.57%
Kitui	2.22%	7.60%	1.96%	2.17%	7.35%	1.92%
Machakos	2.77%	6.86%	1.90%	2.76%	6.65%	1.89%
Marsabit	3.38%	6.35%	1.80%	3.34%	6.06%	1.85%
Meru	2.66%	7.06%	2.04%	2.62%	6.83%	2.00%
North Eastern	3.11%	6.37%	1.56%	3.18%	6.23%	1.66%
Garissa	3.91%	7.47%	1.60%	3.98%	7.26%	1.74%
Mandera	2.21%	4.59%	1.53%	2.26%	4.59%	1.58%
Wajir	3.08%	6.10%	1.58%	3.13%	5.94%	1.71%
Nyanza	2.04%	5.85%	1.41%	2.07%	5.72%	1.45%
Kisii	1.66%	5.80%	1.31%	1.69%	5.70%	1.33%
Kisumu	3.43%	5.98%	1.77%	3.47%	5.84%	1.88%
Siaya	1.61%	5.22%	1.39%	1.63%	5.12%	1.40%
S. Nyanza	1.67%	5.67%	1.38%	1.68%	5.49%	1.40%
Rift Valley	3.51%	7.76%	2.40%	3.47%	7.57%	2.37%
Baringo	2.62%	6.58%	2.03%	2.60%	6.46%	2.00%
E. Marakwet	2.31%	6.03%	2.16%	2.25%	5.85%	2.10%
Kajiado	4.10%	8.49%	3.06%	4.00%	8.21%	2.96%
Kericho	2.36%	6.50%	1.95%	2.33%	6.40%	1.92%
Laikipia	4.13%	7.60%	2.85%	4.06%	7.41%	2.79%
Nakuru	4.95%	8.21%	2.76%	4.92%	7.98%	2.78%
Nandi	2.49%	7.40%	2.21%	2.43%	7.29%	2.15%
Narok	3.97%	9.27%	3.54%	3.81%	8.92%	3.38%
Samburu	3.83%	7.25%	2.39%	3.83%	7.12%	2.39%
Trans-Nzoia	3.46%	7.79%	2.29%	3.43%	7.60%	2.26%
Turkana	2.16%	7.52%	1.66%	2.16%	7.43%	1.65%
Uasin Gishu	3.95%	7.33%	1.79%	4.02%	7.18%	1.91%
West Pokot	2.53%	7.13%	2.09%	2.49%	6.99%	2.05%
Western	2.59%	7.27%	2.04%	2.55%	6.99%	2.00%
Bungoma	3.12%	7.80%	2.29%	3.05%	7.47%	2.23%
Busia	2.77%	8.70%	2.37%	2.69%	8.27%	2.29%
Kakamega	2.23%	6.45%	1.81%	2.21%	6.23%	1.79%
Total of Kenya	2.89%	5.88%	1.93%	2.87%	5.77%	1.92%

Source: The Study on the National Water Master Plan,
 TI Sectoral Report (A) Socio-Economy, July 1992
 IS Ministry of Water Development of the Republic of Kenya, JICA

Table 2.2.2 Population Projection in the Nation 1995 - 2020

(thousand persons)

Province/ District	1995			2000			2005			2010			2015			2020		
	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
Nairobi	1,780	1,780	0	2,260	2,260	0	2,785	2,785	0	3,465	3,465	0	4,333	4,333	0	5,416	5,416	0
Nairobi	1,780	1,780	0	2,260	2,260	0	2,785	2,785	0	3,465	3,465	0	4,333	4,333	0	5,416	5,416	0
Central	3,696	457	3,239	4,178	691	3,487	4,678	873	3,805	5,249	1,099	4,150	5,892	1,497	4,503	6,616	2,022	4,889
Kiambu	1,093	156	937	1,249	242	1,007	1,405	302	1,103	1,583	376	1,207	1,788	511	1,312	2,021	690	1,427
Kirinyaga	464	30	434	519	45	474	574	58	516	633	74	559	704	103	610	782	141	665
Muranga	983	90	893	1,088	129	959	1,195	156	1,039	1,315	189	1,126	1,447	245	1,214	1,592	316	1,311
Nyandarua	450	19	431	518	32	486	575	39	536	633	48	585	717	67	655	810	92	732
Nyeri	706	162	544	804	243	561	929	318	611	1,085	412	673	1,239	573	716	1,421	790	768
Coast	2,274	769	1,505	2,631	985	1,646	2,993	1,183	1,810	3,390	1,409	1,981	3,885	1,734	2,179	4,446	2,126	2,395
Kilifi	773	103	670	897	159	738	1,025	209	816	1,167	270	897	1,346	385	994	1,550	543	1,100
Kwale	461	22	439	523	43	480	576	53	523	632	65	567	704	94	620	783	134	677
Lamu	73	19	54	87	28	59	102	36	66	120	46	74	142	64	82	169	87	92
Mombasa	570	570	0	673	673	0	784	784	0	904	904	0	1,057	1,057	0	1,235	1,235	0
Taita T.	239	37	202	265	49	216	297	60	237	332	73	259	370	93	281	413	118	305
Tana R.	158	18	140	186	33	153	209	41	168	235	51	184	268	72	202	306	102	222
Eastern	4,629	571	4,058	5,328	879	4,449	6,037	1,135	4,902	6,813	1,446	5,367	7,782	2,028	5,915	8,876	2,812	6,512
Embu	440	32	408	501	51	450	559	65	494	619	82	537	697	115	592	784	160	651
Isiolo	100	50	50	129	79	50	167	106	61	210	136	74	271	199	83	348	285	95
Kitui	784	27	757	884	46	838	976	60	916	1,070	77	993	1,194	111	1,094	1,330	158	1,204
Machakos	1,721	260	1,461	1,986	395	1,591	2,264	510	1,754	2,577	652	1,925	2,955	909	2,115	3,385	1,253	2,322
Marsabit	168	57	111	196	79	117	230	99	131	270	123	147	319	167	161	376	225	176
Meru	1,416	145	1,271	1,632	229	1,403	1,841	295	1,546	2,067	376	1,691	2,357	529	1,870	2,682	736	2,066
North Eastern	424	118	306	514	196	318	597	242	355	697	300	397	813	409	429	950	553	466
Garissa	144	47	97	195	96	99	230	118	112	272	145	127	330	208	137	401	295	150
Mandera	138	27	111	154	37	117	173	44	129	196	54	142	219	68	153	245	85	166
Wajir	142	44	98	165	63	102	194	80	114	229	101	128	267	136	138	311	181	151
Nyanza	4,064	489	3,575	4,517	716	3,801	5,008	891	4,117	5,577	1,110	4,467	6,170	1,475	4,792	6,836	1,948	5,148
Kisii	1,279	80	1,199	1,401	126	1,275	1,523	154	1,369	1,662	189	1,473	1,805	251	1,572	1,962	331	1,679
Kisumu	817	301	516	971	434	537	1,156	547	609	1,381	689	692	1,635	921	755	1,939	1,224	829
Siaya	726	36	690	788	50	738	856	62	794	930	76	854	1,008	98	915	1,092	126	981
S. Nyanza	1,242	72	1,170	1,357	106	1,251	1,473	128	1,345	1,604	156	1,448	1,742	206	1,551	1,894	269	1,662
Rift Valley	6,345	1,053	5,292	7,628	1,755	5,873	9,007	2,390	6,617	10,532	3,139	7,393	12,513	4,562	8,323	14,843	6,570	9,355
Daringo	353	37	316	405	57	348	458	74	384	516	95	421	587	131	466	668	179	514
E. Marakwe	264	8	256	301	14	287	332	17	315	363	20	343	407	27	382	455	36	424
Kajiado	373	58	315	461	98	363	554	138	416	652	183	469	797	275	545	970	408	631
Kericho	1,043	72	971	1,187	118	1,069	1,323	151	1,172	1,467	190	1,277	1,648	260	1,406	1,849	355	1,546
Laikipia	289	65	224	358	105	253	434	143	291	518	188	330	634	271	380	774	388	436
Nakuru	1,197	421	776	1,545	705	840	1,970	981	989	2,464	1,305	1,159	3,137	1,936	1,328	3,989	2,842	1,523
Nandi	555	21	534	637	38	599	711	50	661	784	64	720	886	91	803	999	130	893
Narok	574	33	541	702	58	644	830	84	746	954	113	841	1,159	176	1,001	1,397	270	1,181
Samburu	148	37	111	181	59	122	217	79	138	261	104	157	315	148	177	380	208	199
Trans-Nzoia	507	85	422	616	150	466	723	200	523	842	260	582	998	378	652	1,182	546	729
Turkana	209	12	197	239	25	214	263	31	232	290	39	251	323	56	273	359	80	296
Uasin Gishu	545	185	360	666	297	369	822	401	421	1,009	525	484	1,225	748	529	1,491	1,058	582
West Pokot	288	19	269	330	31	299	370	41	329	412	53	359	467	75	398	528	105	441
Western	3,177	278	2,899	3,656	449	3,207	4,105	576	3,529	4,582	729	3,853	5,208	1,035	4,263	5,906	1,451	4,708
Bungoma	959	123	836	1,130	197	933	1,297	259	1,038	1,476	334	1,142	1,721	486	1,279	2,000	697	1,428
Busia	546	27	519	639	52	587	718	68	650	796	86	710	913	131	798	1,042	194	893
Kakamega	1,672	128	1,544	1,887	200	1,687	2,090	249	1,841	2,310	309	2,001	2,579	422	2,188	2,877	571	2,391
Total of Kenya	26,389	5,515	20,874	30,712	7,931	22,781	35,210	10,075	25,135	40,305	12,697	27,608	46,469	16,897	30,382	53,541	22,371	33,415

Source: The Study on the National Water Master Plan, Sectoral Report (A) Socio-Economy, July 1992, Ministry of Water Development of the Republic of Kenya, JICA.

Table 3.2.1 Estimated Mean Monthly Discharge at Mutonga Dam Site

YEAR	(Unit m ³ /sec)												MEAN
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP.	OCT.	NOV.	DEC.	
1957	64.84	44.22	33.91	171.93	452.11	205.48	73.31	46.84	37.38	46.05	150.56	182.83	126.63
1958	81.52	67.18	65.21	104.57	563.07	283.74	149.05	99.77	60.45	49.15	96.98	162.66	148.61
1959	101.95	54.99	47.61	96.21	256.00	130.15	76.99	67.10	72.10	54.13	101.20	125.85	98.69
1960	66.02	44.49	55.56	169.78	179.42	89.81	61.42	47.00	47.25	73.72	159.45	82.00	90.08
1961	48.80	39.77	38.51	108.91	218.76	83.12	74.91	65.69	110.41	524.22	1,516.60	736.46	298.85
1962	326.32	145.29	105.60	153.97	477.00	174.45	101.47	54.18	82.01	97.28	101.79	94.44	161.99
1963	89.28	65.92	68.23	492.71	673.60	294.89	127.94	90.24	69.61	61.90	149.83	315.32	200.79
1964	189.26	87.55	93.80	477.04	458.31	174.81	99.49	103.75	75.71	95.76	112.21	197.23	181.31
1965	125.08	70.99	57.40	106.31	220.43	104.29	66.34	60.14	48.29	67.95	293.43	158.54	114.93
1966	79.48	64.28	93.17	405.77	336.40	151.52	98.20	75.01	69.70	83.74	379.28	105.52	161.92
1967	64.15	50.44	43.65	113.65	753.65	316.79	143.28	113.32	102.37	191.87	418.27	289.20	216.74
1968	115.17	101.60	227.52	453.65	513.75	297.66	172.22	124.17	89.53	107.14	411.57	669.50	273.57
1969	192.55	143.07	145.46	122.26	254.70	129.37	81.27	73.76	71.64	69.84	115.35	111.71	125.33
1970	80.28	65.23	74.73	439.35	356.57	172.62	102.03	84.53	72.85	77.66	92.85	60.55	139.94
1971	50.56	38.78	31.61	119.86	347.15	154.66	101.03	88.45	68.35	61.73	70.18	76.84	100.77
1972	64.58	73.54	49.52	51.38	163.70	154.87	82.94	64.77	56.65	143.02	401.93	184.59	124.25
1973	116.50	85.56	61.50	134.98	183.98	129.64	78.63	70.79	63.66	71.91	135.63	90.41	101.63
1974	55.11	45.91	50.60	235.54	290.39	124.64	211.46	118.10	83.19	72.69	136.51	87.06	118.21
1975	53.81	45.68	42.05	152.62	203.76	112.87	76.18	70.46	62.93	84.10	109.46	81.29	91.69
1976	53.32	44.67	40.20	105.51	153.92	102.16	71.79	54.45	52.60	59.17	89.24	99.26	77.19
1977	75.10	57.16	60.22	445.03	637.68	231.61	110.00	82.85	63.35	67.55	399.49	269.61	210.25
1978	148.55	100.86	221.26	635.17	476.91	163.46	106.90	86.24	72.50	106.79	218.19	215.18	214.33
1979	145.01	219.65	150.47	343.93	511.06	381.89	153.19	97.94	75.96	86.12	240.21	120.54	210.50
1980	76.54	64.77	59.32	96.27	273.34	149.22	90.66	76.52	64.32	68.20	333.03	188.31	128.38
1981	87.35	63.45	126.42	520.38	508.62	226.37	107.35	79.59	67.76	83.62	141.47	112.29	177.08
1982	83.73	61.87	54.21	203.45	491.94	269.54	111.16	76.93	64.77	226.78	353.26	279.02	189.73
1983	126.47	81.36	63.65	172.60	464.37	171.82	98.59	72.29	61.60	69.12	133.62	96.14	134.30
1984	93.59	63.33	56.49	68.86	86.62	55.87	50.29	47.05	47.53	135.53	241.02	185.71	91.32
1985	89.03	69.67	72.71	342.93	464.79	190.48	99.10	72.48	59.83	61.74	116.17	97.66	144.72
1986	64.86	52.01	54.25	187.24	502.83	237.78	105.02	67.91	54.95	58.69	157.36	262.64	150.46
1987	114.34	68.57	55.08	130.06	206.02	200.78	98.35	84.97	68.06	52.45	134.04	127.12	111.75
1988	74.34	54.07	63.54	527.68	653.87	185.28	99.90	79.06	74.26	95.28	286.96	235.87	202.51
1989	173.74	96.61	79.93	212.97	344.12	166.72	90.58	68.85	62.71	144.23	417.59	389.05	187.26
1990	278.16	105.03	242.11	553.59	451.25	203.86	111.62	84.59	72.08	114.82	243.37	260.25	240.09
MEAN	107.57	74.65	81.96	252.89	384.71	182.80	102.43	79.50	67.80	102.04	248.78	199.14	157.02

Table 3.2.2 Estimated Mean Monthly Discharge at Grand Falls Dam Site

YEAR	(Unit m ³ /sec)												MEAN
	JAN.	FEB.	MAR	APR.	MAY	JUN.	JUL	AUG	SEP.	OCT.	NOV.	DEC.	
1957	75.89	51.64	40.62	181.20	490.43	217.01	89.60	53.27	43.21	52.67	182.70	220.81	140.84
1958	93.45	79.06	74.04	119.77	594.64	295.18	157.43	107.36	67.36	55.82	112.30	185.84	161.86
1959	114.38	64.35	55.00	104.34	278.70	139.69	84.15	73.59	78.14	59.96	117.35	154.47	110.34
1960	76.73	51.75	66.75	204.17	197.65	98.55	68.56	53.69	53.49	88.28	179.30	94.28	102.78
1961	57.44	46.27	44.38	130.40	242.19	92.51	81.77	91.75	115.94	561.57	1,648.16	796.94	325.78
1962	343.80	160.40	118.70	172.82	519.19	191.39	113.60	95.40	92.53	109.81	115.87	108.35	178.92
1963	100.35	75.81	72.79	423.46	717.31	310.81	139.52	100.66	79.23	71.09	177.61	163.23	220.16
1964	221.77	102.08	106.46	511.84	497.70	188.36	111.12	114.42	85.69	108.48	135.92	238.89	201.89
1965	148.74	84.96	68.35	122.00	238.80	115.42	76.28	69.44	57.17	81.15	326.73	176.37	130.50
1966	89.77	73.97	105.17	469.08	382.75	167.55	109.57	84.32	76.21	92.65	447.30	126.91	185.44
1967	74.19	57.83	50.01	128.55	820.96	339.78	156.38	124.74	112.75	210.52	476.56	333.59	240.49
1968	131.03	116.57	258.16	503.16	561.67	324.27	191.30	140.38	103.07	122.39	452.57	733.36	303.60
1969	221.18	154.02	170.17	151.35	238.36	133.17	94.64	86.90	80.53	80.20	134.37	129.36	144.94
1970	91.61	75.10	85.10	468.05	371.48	153.91	110.95	92.04	79.73	84.27	103.08	68.65	151.33
1971	56.92	44.13	36.15	149.27	361.67	163.03	108.07	94.53	74.62	69.77	82.46	87.88	109.96
1972	71.73	79.86	57.57	59.29	181.98	164.70	89.81	69.65	60.26	159.03	445.32	206.93	137.18
1973	130.35	92.35	67.82	142.61	191.60	135.74	83.57	75.12	67.11	76.13	148.73	97.48	109.05
1974	59.15	49.57	59.03	265.86	217.36	130.84	218.29	123.67	87.80	77.29	154.96	105.04	129.03
1975	65.17	50.40	46.09	177.99	212.62	118.71	80.55	74.23	66.22	83.32	127.74	91.15	99.93
1976	59.47	49.49	43.25	113.51	162.29	108.37	76.13	58.26	55.55	62.37	97.29	113.58	83.30
1977	87.19	63.87	68.83	472.09	668.54	248.84	125.03	93.36	74.16	76.42	432.19	331.75	228.69
1978	172.84	116.43	272.39	708.35	541.05	186.61	122.04	98.45	82.88	131.95	245.37	257.38	244.55
1979	177.74	251.56	151.70	372.40	550.22	402.00	167.29	109.69	84.95	95.23	271.43	135.05	233.30
1980	86.14	73.14	66.09	106.66	265.17	157.33	97.54	82.13	69.84	73.69	354.11	200.95	137.73
1981	96.37	70.30	140.18	547.17	542.37	243.67	120.78	99.29	75.42	95.44	157.80	124.95	192.66
1982	95.31	71.73	61.95	222.28	516.21	284.65	122.08	101.94	72.26	246.26	389.07	312.07	207.98
1983	145.83	95.06	73.80	137.28	485.74	183.52	108.12	80.94	69.45	76.02	149.21	107.35	147.00
1984	103.87	69.75	61.85	75.18	93.09	60.38	54.43	51.66	51.37	153.02	279.21	207.78	105.08
1985	98.67	78.21	82.43	374.67	495.02	205.75	109.71	81.76	68.16	69.93	132.26	119.03	159.64
1986	74.58	59.47	61.33	209.31	527.08	251.38	115.67	76.66	62.69	65.95	185.05	299.38	165.67
1987	128.79	78.54	64.50	151.19	218.22	210.80	106.20	91.46	72.30	55.36	147.78	142.04	122.26
1988	82.90	59.54	70.50	565.54	635.84	199.93	108.60	87.61	80.64	108.17	323.27	269.48	220.19
1989	196.94	106.76	92.46	236.63	365.32	151.68	102.03	78.36	71.02	157.51	457.53	427.23	206.12
1990	303.02	121.19	266.14	627.79	475.79	225.25	127.73	96.63	81.20	129.93	282.65	289.21	252.21
MEAN	121.72	84.88	93.99	277.93	411.27	196.03	112.36	83.39	75.08	113.14	278.70	225.55	173.24

Table 3.3.1 Rock Weathering Conditions of Grand Falls Dam Sites

Line DA-DB-DC (upstream)				
Depth of moderately - slightly weathered rock (CM-CH class rock) surface (m)				
Left abutment	4.20	- 9.00	- 3.00	(G95-1, G95-2 & G95-3)
River bed	10.00	approx.		(94-3)
Right abutment	4.05	- 14.05	- 17.80 - 10.10	(BH-3, BH-2, BH-1 & BH-4)
	6.75	- 11.20	- 5.50 - 2.40	(94-2, G95-4, 94-1 & G95-5)
Line DD-DB-DC (midstream)				
Depth of moderately - slightly weathered rock (CM-CH class rock) surface (m)				
Left abutment	1.50	- 7.00		(G95-6 & G95-7)
River bed	2.00			(G95-8)
Right abutment	14.30	- 10.60	- 14.05	(G95-9, G95-10 & BH-2)
	11.20	- 5.50	- 2.40	(G95-4, 94-1 & G95-5)
Line DD-DE (downstream)(River bed: No drill hole)				
Depth of moderately - slightly weathered rock (CM-CH class rock) surface				
Left abutment	1.50	- 7.00		(G95-6 & G95-7)
Right abutment	16.00	- 12.20	- 15.00 - 1.80	(G95-11, G95-12, G95-13 & G95-14)

Source: JICA Study Team

Table 3.3.2 Surface Burden Depth of Grand Falls Dam Site

(Depth and St. length: approximately)

Line DA-DB-DC (upstream)		
Line	Depth of more than 2.8-3.0km/sec(m)	
Left abutment	G95-C	5 - 10m
Right abutment	G95-D	10 - 15m, partly 20 - 25m (near G95-9, between G95-10 and GH-2)
	G95-B	5 - 10m between the river and St. 700m 15 - 25m between St. 700m and 1,250m 10 - 15m between St. 1,250m and the end of the line
Line DD-DB-DC (midstream)		
Line	Depth of more than 2.8-3.0km/sec(m)	
Left abutment	G95-C	5 - 10m
Right abutment	G95-D	10 - 15m, partly 20 - 25m (near G95-9, between G95-10 and GH-2)
	G95-B	5 - 10m between the river and St. 700m 15 - 25m between St. 700m and 1,250m 10 - 15m between St. 1,250m and the end of the line
Line DD-DE (downstream)		
Line	Depth of more than 2.8-3.0km/sec (m)	
Left abutment	G95-E	5 - 15m
Right abutment	G95-F	10 - 20m between the river and St. 300m 5 - 10m between St. 300m and the end of the line
	G95-F	5 - 10m

Source: JICA Study Team

Table 3.3.3 Depth of Sufficiently Low-Pervious Rock Surface
(Unit: m)

Line DA-DB-DC (upstream)				
Left abutment	6.05	- 17.35	-30.20	(G95-1, G95-2 & G95-3)
River bed	10.00	approx.		(94-3)
Right abutment	9.00	- 6.00	-23.50 - 18.55	(BH-3, BH-2, BH-1 & BH-4)
	13.50	- 19.60	-14.55 - 12.00	(94-2, G95-4, 94-1 & G95-5)
Line DD-DB-DC (midstream)				
Left abutment	13.00	- 9.40		(G95-6 & G95-7)
River bed	35.10			(G95-8)
Right abutment	26.00	- 19.10	- 6.00	(G95-9, G95-10 & BH-2)
	19.60	- 14.55	-12.00	(G95-4, 94-1 & G95-5)
Line DD-DE (downstream) (River bed: No drill hole)				
Left abutment	13.00	- 9.40		(G95-6 & G95-7)
Right abutment	9.00	- 19.75	-19.20 - 32.30	(G95-11, G95-12, G95-13 & G95-14)

Table 5.2.1 Existing and Committed Power Plants (1/2)

(A) EXISTING

(A-1) HYDROPOWER STATION

Name of Station	River	No. of Unit	Year Installed	Type of Turbine	Station Capa. (MW)	Effect Capa. (MW)	Ann. Prod. (GWh) in 1996/97
Tana (KPC)	Maragua & Tana	3 2	1932/52 1954/55	Francis	14.4	10.0	83.9
Wanjji (KPC)	Maragua	4	1952	Francis	7.4	7.4	48.1
Sagana Falls (KPLC)	Tana	3	1954/55/60	Francis	1.5	1.1	9.6
Mesco (KPLC)	Maragua	1	1933	Francis	0.4	0.3	2.4
Ndula (KPLC)	Thika	2	1925	Francis	2.0	0.9	5.3
Selby Falls (KPLC)	Sosiani	2	1952	Pelton	0.4	0.4	0.6
Gogo Falls (KPLC)	Kuja	2	1958	Kaplan	2.0	1.0	5.6
Masinga (TARDA)	Tana	2	1981	Kaplan	40.0	40.0	214.6
Kamburu (TRDC)	Tana	3	1974/76	Francis	94.2	84.0	446.3
Gitaru (TRDC)	Tana	2	1978	Francis	145.0	144.0	926.0
Kindaruma (TRDC)	Tana	2	1968	Kaplan	44.0	40.0	230.3
Kiambere (TARDA)	Tana	2	1988	Francis	144.0	136.0	1027.9
Turkwel (KVDA.)	Turkwel	2	1991	Francis	106.0	106.00	353.0
Imported from UGANDA					30.0	0	143.8
Total Existing Power Station (including Imports)					601.3	571.1	3353.6
					631.3	571.1	3497.4

(A-2) THERMAL POWER STATION

Name of Station	Location	No. of Unit	Year Installed	Type of Plant	Station Capa. (MW)	Effect Capa. (MW)	Ann. Prod. (GWh) in 1996/97
Kipevu (Steam)	Coast	3	1964-1976	Steam	75.50	46.0	200.3
Kipevu (GT)	Coast	1	1987	Gas	30.00	30.0	167.7
Nairobi South (GT)	Nairobi	1	1973	Gas	13.50	10.0	5.7
Total Existing Thermal					119.00	86.0	373.7

(A-3) INTERCONNECTED DIESELS

Name of Station	Location	No. of Unit	Year Installed	Type of Plant	Station Capa. (MW)	Effect Capa. (MW)	Ann. Prod. (GWh) in 1996/97
Ruiru	Kiambu	2*	1948/49	Diesel	1.00	0.70	2.6
Nairobi South	Nairobi	8	1954-57	Diesel	11.33	11.33	7.0
Total Existing Thermal					12.33	12.03	9.6

* Both units were retired in March 1997.

** Only 2 units were commissioned and generated for 1 months during 1996/97.

Total station capacity when all 8 units are installed is expected to be 44.5 MW.

Table 5.2.1 Existing and Committed Power Plants (2/2)

(A-4) GEOTHERMAL POWER STATION

Name of Station	Location	No. of Unit	Year Installed	Type of Plant	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1996/97
Olkaria Nairobi	Rift Valley	3	1981-85		45.00	45.00	392.80
Total Existing Thermal					45.00	45.00	392.80

(A-5) ISOLATED POWER STATION

Name of Station	Location	No. of Unit	Year Installed	Type of Plant	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1996/97
Wajir	Central	4	1982, 96	Diesel	1.019		2.5
Mandera	N.East	3	1989, 96	Diesel	0.788		2.1
Garissa	N.East	4	1994	Diesel	2.634		7.2
Lodwar	N.Rift	4	1985, 90, 91, 94	Diesel	0.771		1.7
Moyale	East	2	1990, 95	Diesel	0.639		1.3
Marsabit	East	6	1978-84	Diesel	1.966		3.4
Lamu	Coast	4	1989	Diesel	1.156		3.8
Total Existing Power Station					8.973	0.000	22.0

(A-6) PLANTS PLANNED OR HAVING BEEN STUDIED (PREFEASIBILITY)

Name of Station	River or Location	No. of Unit	Year Installed	Type of Plant	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1996/97
Sondu/Miriu (D/D)	Sondu	2		Hydro	60.0	60.0	330.6 *
Magwagwa (F/S)	Sondu	2		Hydro	120.0	120.0	510.9 *
Mutonga and Low Grand Falls	Tana			Hydro	60.0	59.0	338.0 *
or High Grand Falls	Tana			Hydro	140.0	135.0	715.0 *
Arror (F/S)	Arror	2		Hydro	35.2	35.2	157.0 *
Ewaso A (F/S)				Hydro	90.0	90.0	273.0
Ewaso B (F/S)				Hydro	90.0	90.0	281.0
Gitaru 3rd Unit	Tana			Hydro	72.5	55.0	-
Olkaria II (N.E)	Rift Valley			Geo	64.0	64.0	-
Olkaria III	Rift Valley			Geo	64.0	64.0	-
Kipevu I	Coast			Steam	75.0	75.0	-
Kipevu II	Coast			Steam	75.0	75.0	-
N.E. Olkaria	Rift Valley	2		Geo	61.4	61.4	-
Total					1007.1 (high Grand Falls)		
					1147.1 (low Grand Falls)		

Sources: KPLC Annual Report of the year ended 30th June, 1993, Kenya National Power Development Plan 1991-2010 of ACRES, and KPLC's information

Note: (1) * are shown Table 5 of the Acres Report.

Table 5.2.3 Existing Transmission Line

A. Transmission lines

As of:	220kV. (km)	132kV. (km)	66kV. (km)	40kV (km)	33kV (km)			
					1 oct	2-wire	SWER	U.G.
1980	217.0	1,959	368.0	113.3	1,723.3	11.1	72.7	1.3
1981	217.0	1,959	368.0	113.3	1,954.6	11.2	75.2	1.3
1982	217.0	1,959	368.0	113.3	2,128.3	11.2	75.2	1.3
1983	633.0	1,959	385.0	113.3	2,266.0	12.6	75.2	1.3
1984	633.0	1,975	396.0	113.3	2,284.2	12.6	75.2	1.3
1985	633.0	1,975	398.0	113.3	2,426.3	12.6	75.2	1.3
1986	633.0	1,975	398.0	113.3	2,554.4	12.6	75.2	1.3
1987	633.0	1,975	398.0	113.3	2,606.0	32.9	75.2	1.3
1988	633.0	1,977	400.0	113.3	2,845.0	34.3	75.2	1.4
1989	633.0	1,977	408.0	113.3	2,950.0	36.4	-	1.4
1990	657.0	1,980	444.0	113.3	3,342.0	37.8	-	1.4
1991	877.0	1,980	451.0	113.3	3,451.0	100.3	-	1.4
1992	877.0	1,980	451.0	126.1	2,585.0	116.4	-	1.4
1993	877.0	1,980	451.0	126.1	3,461.5	120.0	-	1.4
1994	877.0	1,980	573.0	126.0	3,686.0	-	-	-
1995	877.0	1,980	573.0	126.0	3,876.0	-	-	-
1996	877.0	1,980	573.0	126.0	3,969.0	-	-	-
Annual growth rate for last 10 years (%)	3.31	0.03	3.71	1.07	4.30	-	-	-

Table 5.2.4 Existing Distribution Line

B. Distribution Line

As of:	11kV (km)						L.V. (km)			
	6-Wires	3-Wires	2-Wires	SWER	U.G. Cable	Arial Cable	Total	O.H.	U.G. Cable	Total
1980	7.7	4,849	358.3	74.4	170.9	1.3	5,461.6	2,160	103.7	2,263.8
1981	7.7	5,096	367.8	49.4	181.4	1.6	5,704.1	2,307	123.0	2,429.8
1982	7.7	5,388	392.0	49.4	186.2	1.6	6,025.1	2,452	128.1	2,579.9
1983	7.7	5,616	424.4	49.4	196.1	2.3	6,295.9	2,591	217.1	2,808.0
1984	7.7	5,770	446.7	49.4	215.5	2.7	6,492.0	2,696	229.1	2,925.1
1985	7.7	6,048	481.1	49.4	254.1	3.2	6,843.5	3,006	240.7	3,247.0
1986	7.7	6,048	489.7	49.6	229.0	3.2	6,827.2	3,263	250.5	3,513.2
1987	7.7	6,146	547.0	49.6	230.0	3.2	6,983.8	3,322	254.0	3,575.8
1988	7.7	6,281	601.0	49.6	236.4	3.2	7,179.1	3,555	263.5	3,818.8
1989	7.7	6,389	617.4	51.3	244.2	3.2	7,312.9	3,827	297.4	4,124.3
1990	7.7	6,527	625.3	51.3	248.2	3.2	7,462.3	3,997	306.1	4,302.6
1991	10.7	6,957	639.7	51.3	254.9	3.2	7,916.3	4,248	329.1	4,576.9
1992	10.7	7,150	639.7	51.3	256.4	3.2	8,110.9	4,467	339.4	4,806.2
1993	10.7	7,436	734.1	51.3	263.2	3.2	8,498.0	4,512	339.4	4,851.7
1994							8,838.0			
1995							9,250.0			
1996							9,372.0			
Annual growth rate for years 1984 -	3.34	2.57	5.09	0.38	2.02	1.60	2.73	5.29	4.01	5.19

Source : KPLC Data and KPLC Annual Report
 Note : SWER - Single wire earth return
 U.G. - Underground

Table 5.2.5 Total Power Supply and KPLC Electricity Sales

Source of Supply (GWh)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1995/96	Average Growth Rate			
																	78-85	85-95		
Hydro	1,053	1,288	1,040	1,302	1,377	1,458	1,471	1,660	828	1,792	2,038	2,449	2,517	2,760	2,776	2,974	3,163	6.72%	11.40%	6.52%
Oil Thermal	292	205	333	293	260	114	174	83	59	168	208	25	97	74	75	59	224	-14.67%	-18.53%	3.25%
Geothermal	-	-	-	260	114	174	83	144	179	374	348	322	336	298	272	272	390	-	-5.52%	0.47%
Diesel	5	1	22	1	1	-	1	2	1	5	3	2	3	3	3	1	1	-12.27%	-11.96%	-16.37%
Gas Turbine	2	1	25	-	-	-	-	4	3	53	65	21	21	21	21	21	192	10.41%	-20.66%	15.36%
Net Imports	217	160	315	194	212	179	215	269	113	211	154	112	174	134	240	273	149	3.12%	-10.73%	-3.79%
(ratio to total supply)	(14.2)	(9.7)	(18.2)	(10.3)	(10.9)	(8.9)	(10.3)	(9.3)	(10.8)	(10.1)	(4.3)	(5.9)								
Uncounted	0	0	0	0	0	0	0	0	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a				
Total Supply Generated	1,529	1,655	1,735	1,879	1,946	2,013	2,094	2,300	1,183	2,603	2,816	2,931	3,148	3,290	3,387	3,600	4,119	6.01%	6.03%	5.23%
Station Use	25	22	29	29	31	29	28	27	16	28	43	27	33	33	30	29	52	1.11%	4.19%	7.12%
Net Generation	1,504	1,633	1,706	1,850	1,915	1,984	2,066	2,273	1,167	2,575	2,773	2,904	3,115	3,257	3,357	3,571	4,067	6.08%	6.05%	5.27%
Growth in Net generation (%)	9.2	8.6	4.5	8.4	3.5	3.6	4.1	10			7.7	4.7	7.3	4.5	3.1	6.4	13.9	-	-	-
T & D Losses (GWh)	203	224	234	255	280	302	282	317	127	347	407	448	453	484	510	566	660	6.57%	8.67%	7.40%
% of Net Generation	13.5	13.5	13.7	13.8	14.6	15.2	13.6	13.9		17.4	17.4	15.4	14.5	14.9	15.2	15.8	16.2			
% of Sales	15.6	15.6	15.9	16	17.1	17.9	15.9	16.2		17.4	18.5	17.4	17.4	17.9	18.5	19.5	20.2			
Total KPLC Sales (GWh)	1,301	1,405	1,468	1,593	1,631	1,677	1,775	1,944	1,038	2,203	2,340	2,418	2,596	2,708	2,760	2,901	3,269	5.91%	5.30%	4.48%
Interconnected KPLC System	-	-	-	1,590	1,628	1,673	1,771	1,940	1,038	2,203	2,340	2,418	2,596	2,708	2,760	2,901	3,269			
Isolated KPLC Load Centres	-	-	-	3	2	4	4	4		10	36	49	66	76	85	104	138			
Total REF Sales (GWh)	-	2	4	6	7	10	15	19	10	25	36	49	66	76	85	104	138			
REF Sales from interconnected System	-	-	-	5	6	9	13	16	10	25	36	49	66	76	85	104	138			
REF Sales at isolated Load Centres	-	-	-	1	1	1	2	3												
Total Sales (GWh)	1,301	1,407	1,472	1,599	1,638	1,687	1,790	1,963	1,048	2,228	2,376	2,467	2,662	2,784	2,845	3,005	3,407	6.05%	5.73%	4.83%
Growth in Sales (%)	8.1	8.1	4.6	8.6	2.4	3.0	6.1	9.7			6.6	3.8	7.9	4.6	2.2	5.6	13.4			
Max. Demand, General	256	269	290	313	317	334	349	387	400	430	461	480	520	550	566	598	648	6.08%	6.35%	4.66%
Load Factor (%)	68.2	70.2	68.1	68.5	70.1	68.8	69.3	67.8	68.2	68.9	69.7	68.2	68.9	68.2	68	68.6	72.2	-0.08%	-0.25%	0.52%

Sources: Acres Report, Table 4.1 & KPLC Information

Note:

- (1) Maximum demand (MW) is for integrated system only and includes station power use.
- (2) Load factor is based on total supply generated for integrated system divided by maximum demand.
- (3) REF means Rural Electrification Fund.

Table 5.2.6 Sales Energy by Categories and Regions (1979-1992/93) (1/2)

Categories and Region	1979	1980	1981	1982	1983	1984	1985	1986 (1-6)	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
Tariff A0 Commercial >7,000KWh/Month															
Nairobi Region	243,715	258,429	273,876	282,853	304,090	322,350	271,113	120,135	265,636	276,604	300,047	323,475	332,016	354,892	371,462
Coast Region	67,410	72,405	79,372	77,909	82,979	86,695	82,605	35,182	71,927	73,747	79,567	83,254	83,013	97,153	89,707
Central Rift Valley	22,977	25,099	27,581	32,781	31,100	32,863	24,672	7,247	17,801	19,282	22,241	23,851	25,658	27,463	29,565
Western Kenya	30,955	33,902	35,369	38,217	39,512	44,061	34,915	13,453	23,090	28,960	31,312	21,794	21,204	24,307	26,587
Mt Kenya Region	16,527	18,685	18,720	19,951	21,981	24,278	19,167	5,768	12,861	13,204	16,003	17,449	21,223	19,909	24,153
North Rift Valley															
Subtotal	381,584	408,720	434,938	451,711	479,662	510,247	432,472	181,785	361,317	411,610	452,190	450,671	500,210	535,061	555,473
Tariff A1-Small Commercial <7,000KWh/Month															
Nairobi Region							60,518	60,677	131,144	144,816	142,607	154,421	186,564	180,081	171,208
Coast Region							13,881	17,537	34,729	40,631	44,927	43,644	52,636	51,618	57,120
Central Rift Valley							11,007	8,038	18,800	20,327	23,139	23,980	26,974	29,755	31,538
Western Kenya							14,246	13,514	31,084	34,255	38,711	28,246	31,054	34,175	33,029
Mt Kenya Region							9,136	8,544	18,173	20,527	21,753	24,036	25,528	28,511	28,653
North Rift Valley												12,338	12,154	11,700	13,084
Subtotal	0	0	0	0	0	0	108,838	108,710	237,930	260,566	271,137	292,665	314,960	333,860	334,632
Tariff A, <7,000KWh/Month-subtotal															
Nairobi Region	243,715	258,429	273,876	282,853	304,090	322,350	331,631	190,812	396,782	421,420	445,654	477,895	498,580	534,983	542,670
Coast Region	67,410	72,405	79,372	77,909	82,979	86,695	96,486	52,719	110,656	114,371	124,514	132,908	141,649	148,771	146,827
Central Rift Valley	22,977	25,099	27,581	32,781	31,100	32,863	35,679	15,285	36,601	39,909	45,380	47,831	52,672	57,218	61,123
Western Kenya	30,955	33,902	35,369	38,217	39,512	44,061	43,151	27,367	54,174	63,235	70,023	50,040	52,298	58,482	59,566
Mt Kenya Region	16,527	18,685	18,720	19,951	21,981	24,278	28,363	14,312	31,034	33,731	37,756	41,485	45,420	52,646	52,646
North Rift Valley												23,176	23,220	24,067	27,053
Subtotal Tariff A	381,584	408,720	434,938	451,711	479,662	510,247	541,310	290,495	629,247	672,366	723,327	773,336	815,170	868,941	890,106
Tariff B0 Irrigation <7,000KWh/Month, 240V or 415V															
Nairobi Region					15,853	33,076	25,676		35,648	34,410	19,965	13,536	23,054	36,187	30,495
Coast Region					178	211	298		287	180	227	275	245	363	399
Central Rift Valley					2,463	8,884	7,962		9,892	10,663	12,529	9,283	13,560	14,268	14,104
Western Kenya					1,717	3,172	3,473		3,347	3,310	2,999	1,527	1,721	1,697	1,493
Mt Kenya Region					411	1,108	578		1,120	1,359	732	717	1,199	1,431	1,320
North Rift Valley												1,274	7	(119)	0
Subtotal	0	0	0	0	20,622	52,451	37,997	0	50,294	50,128	35,472	26,612	39,816	53,887	47,811
Tariff B1 Commercial 7,000-10,000KWh/Month, 240V or 415V															
Nairobi Region	154,395	175,821	180,322	165,782	174,588	185,667	201,923		229,470	236,635	248,558	267,041	274,553	244,484	261,834
Coast Region	75,752	74,514	77,756	82,023	82,448	81,385	78,806		87,000	92,904	84,378	102,451	102,375	110,479	106,437
Central Rift Valley	26,805	27,475	25,009	27,305	28,013	26,933	26,342		34,820	36,203	42,930	44,288	51,328	50,242	45,640
Western Kenya	38,962	39,442	43,341	50,100	52,328	58,342	68,566		72,364	76,624	57,536	37,406	50,023	40,866	41,063
Mt Kenya Region	14,889	15,665	17,269	19,273	24,528	28,289	28,225		32,822	37,059	32,157	29,567	21,733	19,762	20,547
North Rift Valley												25,614	26,797	23,716	25,209
Subtotal	300,804	335,920	344,707	364,463	361,965	382,616	430,862	0	456,466	481,625	466,569	506,367	526,809	489,579	499,730
Tariff B2 Commercial 7,000-10,000KWh/Month, 110V or 33kV															
Nairobi Region	50,259	38,366	34,457	30,019	26,306	24,368	22,517		22,420	18,077	9,949	12,409	12,965	11,317	9,378
Coast Region	2,574	14,642	14,536	6,664	598	588	548		524	1,122	1,340	1,208	1,233	1,169	1,298
Central Rift Valley										81	1,199	3,512	1,305	2,060	1,721
Western Kenya	43,588	48,213	8,308	4,710	4,816	3,369	4,912		4,703	3,521	1,484	2,042	2,204	1,871	1,041
Mt Kenya Region	355	1,923	679	606	441	1,822	1,486		1,138						
North Rift Valley												1,633	794	696	864
Subtotal	96,876	103,144	57,980	41,969	32,161	30,167	29,865	0	28,785	22,781	13,952	20,822	18,431	23,132	14,302
Tariff B3 Commercial 7,000-10,000KWh/Month, 69kV or 132kV															
Nairobi Region	6,327	5,800	5,434		64										
Coast Region	1,112	2,329	2,415												
Central Rift Valley															
Western Kenya															
Mt Kenya Region															
North Rift Valley															
Subtotal	7,439	8,129	7,909		64										
Tariff B 7,000-10,000KWh/Month-subtotal															
Nairobi Region	221,042	222,987	220,273	215,781	216,811	249,141	250,516	127,883	237,538	251,322	277,492	292,566	310,802	297,988	301,707
Coast Region	79,438	91,485	94,717	88,587	83,224	82,124	79,662	51,250	87,811	94,206	85,945	103,962	103,863	112,611	107,134
Central Rift Valley	26,805	27,475	26,009	27,305	30,476	37,817	34,304	22,017	44,712	47,153	56,658	57,063	56,133	66,570	61,465
Western Kenya	82,660	87,665	91,649	94,810	98,961	114,873	126,911	35,031	80,404	83,435	61,999	43,975	53,946	44,464	43,597
Mt Kenya Region	15,244	17,591	17,945	19,178	25,360	31,219	30,291	15,863	35,080	38,418	32,899	30,274	22,902	21,263	21,867
North Rift Valley												23,821	27,588	24,282	26,073
Subtotal Tariff B	425,179	447,193	410,596	406,461	414,752	466,234	471,714	252,050	536,545	554,534	514,963	553,791	585,116	566,563	561,843
Tariff C1 Commercial >10,000KWh/Month, 415V															
Nairobi Region	85,221	81,253	86,720	82,423	78,858	86,102	91,430		106,255	117,974	132,842	148,120	155,757	151,273	205,845
Coast Region	32,075	28,803	25,936	24,463	27,065	33,234	44,395		56,058	62,252	78,127	89,173	94,683	95,900	110,233
Central Rift Valley	14,799	15,031	17,919	18,296	17,102	18,069	12,789		16,209	17,980	18,890	19,563	21,109	25,812	23,936
Western Kenya	16,892	15,792	15,790	18,657	20,057	15,131	17,009		25,074	23,465	50,487	43,341	42,004	43,733	47,367
Mt Kenya Region	2,263	1,774	2,021	2,363	1,868	2,735	3,705		3,750	4,607	16,339	23,397	26,911	28,994	33,456
North Rift Valley												16,155	16,924	19,873	21,855
Subtotal	151,250	142,653	148,386	146,162	145,000	153,271	169,328	0	207,346	232,279	296,465	339,739	357,388	406,585	442,722
Tariff C2 Commercial >10,000KWh/Month, 110V or 33kV															
Nairobi Region	53,374	146,973	166,837	156,018	196,535	192,875	211,999		243,748	250,079	254,870	270,248	300,322	286,214	303,217
Coast Region	158,507	195,510	181,856	190,030	185,285	195,515	196,328		213,643	230,445	241,839	247,159	237,500	221,133	231,517
Central Rift Valley	3,231	3,457	4,370	5,159	3,287	3,442	14,949		16,778	18,544	13,975	13,112	15,627	16,580	18,259
Western Kenya	27,657	33,471	71,865	78,460	82,359	77,183	71,634		85,808	97,002	93,836	40,043	42,388	43,483	50,360
Mt Kenya Region		333	2,853	3,527	3,169	6,472	7,297		22,738	15,177	11,362	11,646	10,843	10,454	10,775
North Rift Valley												58,429	57,908	56,706	53,201
Subtotal	287,969	349,744	427,781	462,194	470,636	475,491	501,147	0	582,115	621,247	615,872	640,637	664,5		

Table 5.2.6 Sales Energy by Categories and Regions (1979-1992/93) (2/2)

Categories and Regions	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Tariff C >100,000 kWh/Month-subtotal															
Nairobi Region	207 257	254 365	290 523	299 021	304 735	313 360	363 366	194 565	334 251	417 388	429 290	458 195	513 735	524 823	547 392
Coast Region	150 582	134 313	209 605	219 091	225 743	242 630	257 669	137 827	234 832	321 620	347 876	370 074	363 851	343 584	377 354
Central Rift Valley	18 033	18 488	22 289	23 425	20 389	19 511	27 738	14 565	32 587	36 524	32 865	32 865	36 736	42 400	42 135
Western Kenya	44 743	43 263	87 655	97 117	132 416	110 843	137 975	73 536	196 511	186 460	203 360	146 587	148 605	166 632	158 489
Mt Kenya Region	2 263	2 107	4 874	5 860	5 027	9 207	10 542	13 292	26 488	19 784	27 651	35 043	33 760	39 448	41 231
North Rift Valley												74 524	74 832	75 579	75 065
Subtotal Tariff C	492 831	515 436	614 945	644 534	653 310	635 548	797 720	433 805	915 509	961 778	1 041 112	1 127 418	1 177 519	1 158 466	1 274 667
Tariff D Interchangeable Off-Peak Supplies															
Nairobi Region	110 007	101 444	105 660	101 757	96 562	103 959	95 536	47 050	100 754	100 317	103 032	105 642	98 971	94 856	100 675
Coast Region	4 537	4 851	4 504	4 321	4 378	4 258	3 848	1 921	3 565	3 149	3 003	2 733	2 622	3 043	2 687
Central Rift Valley	2 475	1 952	1 912	2 177	1 866	2 565	907	979	1 531	1 778	1 862	1 876	1 854	1 903	1 423
Western Kenya	3 888	3 755	3 839	3 742	3 923	3 267	3 448	1 477	2 577	2 926	3 061	1 768	1 634	1 525	1 435
Mt Kenya Region	1 712	1 903	1 886	2 115	1 873	2 067	1 885	1 466	1 650	2 041	2 077	2 248	2 270	1 515	2 036
North Rift Valley												1 433	1 169	1 203	945
Subtotal	122 619	113 915	117 791	114 102	108 602	115 185	126 524	52 833	110 878	110 211	113 035	115 700	106 520	104 445	129 212
Tariff E Street Lighting															
Nairobi Region	6 518	7 110	7 275	6 843	5 738	6 258	5 410	2 529	5 310	7 842	9 033	9 365	9 420	9 473	8 744
Coast Region	1 558	1 843	1 827	2 105	2 134	1 709	1 584	716	1 605	2 065	2 330	1 668	1 969	1 510	1 562
Central Rift Valley	466	521	593	652	1 021	9	600	242	578	652	1 019	715	1 025	643	821
Western Kenya	1 129	1 117	1 125	1 154	1 057	1 022	1 024	525	1 120	1 402	1 306	880	793	856	636
Mt Kenya Region	310	371	319	331	366	295	331	157	318	480	454	536	764	751	583
North Rift Valley												450	475	436	521
Subtotal	10 021	10 962	11 099	11 092	10 376	9 275	8 658	4 159	9 021	12 431	14 152	13 824	14 145	13 745	12 837
Tariff F KPLC Staff															
Nairobi Region	2 300	2 245	2 367	2 493	2 446	2 425	2 544	1 269	2 937	3 376	4 021	4 284	4 363	4 580	4 871
Coast Region	304	332	358	341	613	257	471	266	598	734	816	768	888	958	1 059
Central Rift Valley	72	78	153	206	217	259	235	141	504	277	586	666	737	1 025	965
Western Kenya	209	199	193	206	338	113	272	173	363	424	151	386	476	499	530
Mt Kenya Region	104	125	131	154	174	119	456	130	332	457	386	529	813	774	807
North Rift Valley												228	315	376	431
Subtotal	2 989	2 980	3 232	3 410	3 788	3 176	3 977	1 961	4 735	5 268	5 960	6 859	7 652	8 222	8 673
Total Sales															
Nairobi Region	730 549	846 543	899 944	908 764	930 382	997 496	1 049 033	554 134	1 187 612	1 241 665	1 268 522	1 353 388	1 435 671	1 466 710	1 506 062
Coast Region	343 969	365 229	390 383	392 435	400 071	417 773	439 710	244 701	439 159	536 435	564 484	612 053	614 532	615 877	636 573
Central Rift Valley	70 825	73 611	75 547	88 546	85 069	53 036	99 372	53 229	117 313	125 993	138 350	140 635	159 267	159 809	167 997
Western Kenya	163 590	175 901	175 850	195 246	206 147	224 176	258 831	138 109	306 949	337 882	339 970	240 936	257 754	272 457	294 336
Mt Kenya Region	36 160	40 982	43 878	48 313	54 821	67 185	72 267	45 220	94 902	54 511	101 273	110 114	113 290	106 531	106 567
North Rift Valley	0	0	0	0	0	0	0	0	0	0	0	128 392	127 609	125 943	155 872
Grand Total	1 405 293	1 502 266	1 592 602	1 631 310	1 676 430	1 795 606	1 929 203	1 035 383	2 204 935	2 336 586	2 412 599	2 551 758	2 708 123	2 760 387	2 857 397
Annual Growth Rate		6.90%	6.01%	2.43%	2.77%	7.35%	7.20%			5.97%	3.25%	7.43%	4.49%	1.93%	3.51%
Group Subtotal															
Tariffs (A+E+F)															
Nairobi Region	252 533	267 787	283 458	292 195	312 274	331 036	339 585	184 610	426 023	432 638	458 708	491 565	512 363	549 043	556 285
Coast Region	69 312	74 560	81 567	80 356	85 726	88 664	98 541	53 703	112 950	117 160	127 660	136 334	144 206	151 239	149 444
Central Rift Valley	23 515	25 626	28 337	33 639	32 338	33 113	36 423	15 668	37 663	40 538	45 965	43 211	54 434	58 536	62 909
Western Kenya	32 303	35 218	36 707	39 577	40 947	45 198	50 457	28 065	55 857	65 061	71 520	51 906	53 567	59 836	67 812
Mt Kenya Region	16 941	19 381	19 170	20 445	22 541	24 692	29 139	14 599	31 684	34 668	38 606	42 549	43 328	45 575	28 423
North Rift Valley	0	0	0	0	0	0	0	0	0	0	0	23 854	24 010	24 579	53 758
Subtotal (A+E+F)	394 604	422 682	449 269	466 213	493 826	522 698	554 145	296 645	643 003	690 065	743 459	790 819	836 968	890 908	911 675
Growth Rate		7.11%	6.30%	3.77%	5.92%	5.85%	6.02%			7.32%	7.74%	6.77%	5.44%	6.44%	2.33%
Tariffs (B+C)															
Nairobi Region	428 309	477 312	510 756	514 802	521 546	562 501	613 912	322 474	661 829	706 710	706 782	761 181	824 337	822 811	849 099
Coast Region	270 020	285 798	304 322	307 778	306 967	324 814	337 321	189 077	382 543	415 826	433 821	474 026	467 704	451 555	484 438
Central Rift Valley	44 835	45 963	45 294	50 730	50 665	57 328	62 042	36 582	77 699	83 677	89 523	87 745	106 919	108 970	103 660
Western Kenya	127 369	136 518	139 304	151 927	151 277	175 713	214 926	108 567	247 315	269 895	265 989	187 862	202 553	211 096	232 086
Mt Kenya Region	17 507	19 698	22 822	25 755	30 407	40 426	41 233	29 155	61 968	58 202	60 590	65 317	62 692	60 701	66 098
North Rift Valley	0	0	0	0	0	0	0	0	0	0	0	103 125	102 430	99 561	101 129
Subtotal (B+C)	888 070	965 689	1 025 542	1 050 955	1 074 062	1 160 762	1 263 434	665 895	1 451 054	1 536 310	1 555 108	1 681 239	1 752 635	1 765 034	1 836 510
Growth Rate		8.74%	6.20%	2.48%	2.19%	8.07%	9.36%			5.88%	1.29%	8.04%	4.84%	0.14%	4.05%

Source: National Power Development Plan (1992) and KPLC's information

Table 5.2.7 Regional and National Load Forecast (Reference)

Regions	1995/96 (Actual)	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
REGIONAL LOAD FORECAST																									
1 Nairobi Region																									
Domestic Sales, (GWh)	635.4	674.7	722.8	763.1	807.1	854.7	908.0	961.1	1,020.0	1,083.0	1,150.3	1,222.0	1,298.4	1,379.7	1,466.3	1,553.3	1,656.2	1,760.3	1,870.9	1,983.5	2,113.4	2,246.1	2,387.1	2,536.8	2,695.9
Commerc. & Indust. Sales, (Gwh)	1,057.0	1,116.5	1,161.0	1,234.2	1,312.7	1,398.4	1,485.5	1,580.1	1,680.4	1,786.6	1,899.0	2,017.8	2,143.5	2,276.2	2,418.5	2,564.6	2,721.0	2,892.2	3,069.6	3,241.7	3,439.0	3,644.1	3,860.5	4,089.0	4,330.1
Off-Peak Sales, (GWh)	91.39	105.04	115.75	117.87	120.23	122.79	125.53	128.43	131.48	134.63	137.93	141.34	144.87	148.52	152.28	156.15	160.13	164.23	168.44	172.76	177.21	181.77	186.46	191.27	196.20
Total Energy Sales of KPLC, (GWh)	1,799.8	1,896.3	1,999.5	2,115.2	2,240.0	2,373.9	2,517.1	2,669.6	2,831.9	3,004.3	3,187.2	3,381.2	3,586.7	3,804.5	4,035.0	4,279.1	4,537.4	4,810.7	5,099.9	5,405.9	5,729.6	6,071.9	6,431.1	6,817.1	7,222.2
Growth rate of Energy Sales, (%)	8.2%	5.5%	5.4%	5.8%	5.9%	6.0%	6.0%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	5.9%
Regional Load Factor, (%)	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%
Peak Load, (MW)	355.5	375.1	394.5	418.3	443.9	471.4	500.8	532.2	565.5	601.0	638.6	678.5	720.8	765.6	813.1	863.4	916.7	973.1	1,032.8	1,095.9	1,162.8	1,233.5	1,308.4	1,387.6	1,471.4
Growth rate of Peak Load, (%)	6.7%	5.2%	5.2%	6.0%	6.1%	6.2%	6.2%	6.3%	6.3%	6.3%	6.3%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.0%
2 Coast Region																									
Domestic Sales, (GWh)	205.8	218.5	234.1	247.1	261.4	276.8	293.4	311.2	330.3	350.7	372.5	395.7	420.4	446.8	474.8	504.6	536.3	570.0	605.8	643.9	684.4	727.3	773.0	821.5	873.0
Commerc. & Indust. Sales, (Gwh)	513.0	536.8	558.2	593.4	631.1	671.4	714.3	759.7	808.0	859.0	913.1	970.2	1,030.6	1,094.4	1,161.9	1,233.1	1,308.3	1,387.7	1,471.6	1,560.1	1,653.5	1,752.1	1,856.2	1,966.1	2,082.0
Off-Peak Sales, (GWh)	2.7	3.0	3.3	3.4	3.4	3.5	3.6	3.7	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.5	4.6	4.7	4.8	4.9	5.1	5.2	5.3	5.5	5.8
Total Energy Sales of KPLC, (GWh)	721.5	758.3	795.6	843.9	895.9	951.7	1,011.2	1,074.6	1,142.0	1,213.6	1,289.5	1,369.9	1,455.2	1,545.5	1,641.0	1,742.2	1,849.2	1,962.4	2,082.2	2,208.9	2,342.9	2,484.6	2,634.5	2,793.0	2,960.6
Growth rate of Energy Sales, (%)	8.5%	5.1%	4.9%	6.1%	6.2%	6.2%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.1%	6.0%	6.0%	6.0%	6.0%
Regional Load Factor, (%)	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%
Peak Load, (MW)	140.4	147.5	154.7	164.2	174.3	185.2	196.8	209.2	222.3	236.3	251.1	266.8	283.4	301.0	319.7	339.4	360.3	382.4	405.7	430.4	456.6	484.2	513.5	544.4	577.1
Growth rate of Peak Load, (%)	8.0%	5.1%	4.9%	6.1%	6.2%	6.2%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.0%	6.0%	6.0%	6.0%
3 Central Rift Region																									
Domestic Sales, (GWh)	68.0	72.2	77.3	81.7	86.4	91.5	96.9	102.8	109.1	115.9	123.1	130.7	138.9	147.6	156.9	166.7	177.2	188.3	200.2	212.8	226.1	240.3	255.4	271.4	288.5
Commerc. & Indust. Sales, (Gwh)	117.5	122.9	127.8	135.9	144.5	153.7	163.5	173.9	185.0	196.7	209.0	222.1	236.0	250.8	266.0	282.3	299.5	317.7	336.9	357.2	378.6	401.2	425.0	450.1	478.7
Off-Peak Sales, (GWh)	1.0	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.2
Total Energy Sales of KPLC, (GWh)	186.5	196.3	206.4	218.8	232.2	246.5	261.9	278.2	295.6	314.0	333.6	354.4	378.5	399.8	424.6	450.8	478.5	507.9	539.0	571.8	606.7	643.5	682.4	723.7	767.3
Growth rate of Energy Sales, (%)	-1.3%	5.2%	5.2%	6.0%	6.1%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.0%	6.0%	6.0%
Regional Load Factor, (%)	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Peak Load, (MW)	45.0	47.3	49.8	52.8	56.0	59.5	63.2	67.2	71.4	75.9	80.6	85.6	91.0	96.6	102.6	109.0	115.7	122.8	130.3	138.3	146.7	155.7	165.1	175.1	185.7
Growth rate of Peak Load, (%)	2.3%	5.2%	5.1%	6.0%	6.1%	6.2%	6.2%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.0%
4 Western Region																									
Domestic Sales, (GWh)	72.5	77.0	82.5	87.1	92.1	97.5	103.4	109.7	116.4	123.6	131.3	139.5	148.2	157.5	167.3	177.8	189.0	200.9	213.5	226.9	241.2	256.3	272.4	289.5	307.7
Commerc. & Indust. Sales, (Gwh)	238.2	249.3	259.2	275.5	293.1	311.8	331.6	352.8	375.2	398.9	421.0	450.5	478.5	508.2	539.5	572.6	607.5	644.3	683.3	724.4	767.8	813.5	861.9	912.9	968.7
Off-Peak Sales, (GWh)	1.4	1.5	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.6	2.6	2.7	2.8	2.8
Total Energy Sales of KPLC, (GWh)	312.1	327.8	343.3	364.3	386.9	411.1	436.9	464.3	493.5	524.4	557.2	592.0	628.8	667.8	709.0	752.6	798.8	847.6	899.2	953.8	1,011.5	1,072.5	1,137.0	1,205.2	1,277.2
Growth rate of Energy Sales, (%)	3.1%	5.0%	4.7%	6.1%	6.2%	6.2%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.0%	6.0%	6.0%	6.0%	6.0%
Regional Load Factor, (%)	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%
Peak Load, (MW)	66.8	70.2	73.5	78.0	82.9	88.0	93.6	99.5	105.7	112.4	119.4	126.9	134.8	143.2	152.0	161.4	171.3	181.8	192.9	204.6	217.0	230.1	244.0	258.6	274.1
Growth rate of Peak Load, (%)	11.4%	5.0%	4.7%	6.1%	6.2%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.1%	6.0%	6.0%	6.0%	6.0%
5 Mt Kenya Region																									
Domestic Sales, (GWh)	60.7	64.4	69.0	72.8	77.0	81.6	86.5	91.7	97.4	103.4	109.8	116.7	123.9	131.7	140.0	148.8	158.1	168.0	178.6	189.8	201.7	214.4	227.9	242.2	257.4
Commerc. & Indust. Sales, (Gwh)	69.1	72.3	75.1	79.9	85.0	90.4	96.1	102.3	108.8	115.6	122.9	130.6	138.7	147.3	156.4	166.0	176.1	186.8	198.1	210.0	222.6	235.9	249.9	264.7	280.3
Off-Peak Sales, (GWh)	1.6	1.8	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.2	3.3	3.3
Total Energy Sales of KPLC, (GWh)	131.3	138.5	146.1	154.7	164.0	174.1	184.8	196.2	208.4	221.3	235.1	249.7	265.1	281.8	299.0	317.4	336.9	357.6	379.5	402.8	427.3	453.4	480.9	510.1	540.9
Growth rate of Energy Sales, (%)	-1.0%	5.4%	5.5%	5.9%	6.0%	6.1%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%
Regional Load Factor, (%)	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%
Peak Load, (MW)	37.6	39.8	41.8	44.3	47.0	49.9	52.9	56.2	59.8	63.5	67.5	71.7	76.1	80.9	85.9	91.2	96.9	102.9	109.2	115.9	123.0	130.5	138.5	146.9	155.8
Growth rate of Peak Load, (%)	13.9%	5.4%	5.5%	6.0%	6.1%	6.2%	6.2%	6.2%	6.2%	6.3%	6.3%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.1%	6.1%	6.1%	6.1%	6.1%	6.1%
6 North Rift Region																									
Domestic Sales, (GWh)	34.7	36.9	39.5	41.7	44.1	46.7	49.5	52.5	55.8	59.2	62.9	66.8	71.0	75.4	80.1	85.2	90.5	96.2	102.3	108.7	115.5	122.8	130.5	138.7	147.3
Commerc. & Indust. Sales, (Gwh)	103.9	108.7	113.0	120.1	127.8	135.9	144.8	153.8	163.6	173.9	184.9	196.4	208.7	221.6	235.2	249.7	264.9	281.0	297.9	315.9	334.8	354.7	375.8	398.1	421.5

Table 5.2.8 Regional and National Load Forecast (Low)

Regions	1995/96 (Actual)	1996/97	1997/98	1998/99	1999/00	2000/01	2001/2	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
REGIONAL LOAD FORECAST																									
1 Nairobi Region																									
Domestic Sales, (GWh)	635.4	671.7	714.9	751.8	791.8	834.8	881.2	930.9	984.0	1,040.8	1,100.7	1,164.7	1,232.7	1,301.8	1,381.3	1,462.4	1,548.3	1,639.4	1,735.8	1,838.0	1,945.2	2,060.8	2,182.1	2,310.5	2,446.4
Commerc. & Indust. Sales, (GWh)	1,057.0	1,107.3	1,136.9	1,199.0	1,265.4	1,338.0	1,410.8	1,489.9	1,573.4	1,661.4	1,734.0	1,851.8	1,954.2	2,062.1	2,175.5	2,294.8	2,420.1	2,551.9	2,690.3	2,835.9	2,983.8	3,149.5	3,318.3	3,495.8	3,682.2
Off-Peak Sales, (GWh)	94.39	105.04	115.75	117.87	120.23	122.79	125.53	128.43	131.46	134.63	137.93	141.34	144.87	148.52	152.28	156.15	160.13	164.23	168.44	172.76	177.21	181.77	186.46	191.27	196.20
Total Energy Sales of KPLC, (GWh)	1,796.8	1,884.0	1,967.6	2,063.5	2,177.2	2,293.6	2,417.6	2,549.2	2,688.8	2,836.6	2,992.7	3,157.6	3,331.7	3,515.4	3,709.1	3,913.3	4,128.8	4,355.5	4,594.8	4,846.6	5,112.2	5,392.0	5,686.8	5,997.5	6,324.9
Growth rate of Energy Sales, (%)	8.2%	4.9%	4.4%	5.1%	5.3%	5.3%	5.4%	5.4%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Regional Load Factor, (%)	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%
Peak Load, (MW)	356.5	372.6	387.8	408.5	430.8	454.8	480.0	507.0	535.6	565.8	597.9	631.7	667.4	705.1	744.9	786.8	831.1	877.7	926.9	978.8	1,033.5	1,091.1	1,151.9	1,215.9	1,283.5
Growth rate of Peak Load, (%)	6.7%	4.5%	4.1%	5.3%	5.5%	5.5%	5.6%	5.6%	5.6%	5.7%	5.7%	5.7%	5.7%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%
2 Coast Region																									
Domestic Sales, (GWh)	205.8	217.5	231.5	243.4	256.3	270.3	285.3	301.4	318.8	337.0	356.4	377.2	399.2	422.5	447.3	473.5	501.4	530.9	562.1	595.2	630.2	667.3	706.8	748.2	792.2
Commerc. & Indust. Sales, (GWh)	513.0	532.4	546.0	576.5	608.4	642.4	678.4	718.4	756.5	798.8	843.4	890.3	939.6	991.5	1,046.0	1,103.4	1,163.6	1,227.0	1,293.6	1,363.5	1,437.0	1,514.3	1,595.5	1,680.8	1,770.5
Off-Peak Sales, (GWh)	2.7	3.0	3.3	3.4	3.4	3.5	3.6	3.7	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.5	4.6	4.7	4.8	4.9	5.1	5.2	5.3	5.5	5.6
Total Energy Sales of KPLC, (GWh)	721.5	752.9	781.4	823.2	868.2	916.2	967.3	1,021.5	1,078.9	1,139.6	1,203.7	1,271.5	1,342.9	1,418.2	1,497.6	1,581.4	1,669.6	1,762.5	1,860.5	1,963.6	2,072.3	2,188.8	2,307.4	2,434.5	2,568.3
Growth rate of Energy Sales, (%)	8.5%	4.4%	3.8%	5.3%	5.5%	5.5%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Regional Load Factor, (%)	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%
Peak Load, (MW)	140.4	146.5	152.0	160.1	168.9	178.3	188.2	198.8	210.0	221.8	234.3	247.5	261.5	276.2	291.6	308.0	325.2	343.3	362.4	382.5	403.7	426.1	449.8	474.4	500.5
Growth rate of Peak Load, (%)	8.0%	4.3%	3.8%	5.4%	5.5%	5.5%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
3 Central Rift Region																									
Domestic Sales, (GWh)	68.0	71.9	76.5	80.4	84.7	89.3	94.3	99.6	105.3	111.3	117.8	124.6	131.9	139.6	147.8	156.5	165.7	175.4	185.7	196.7	208.2	220.5	233.5	247.2	261.8
Commerc. & Indust. Sales, (GWh)	117.5	121.9	125.2	132.0	139.3	147.1	155.3	164.0	173.2	182.9	193.1	203.8	215.1	227.0	239.5	252.6	266.4	280.9	296.2	312.2	329.0	346.7	365.3	384.8	405.4
Off-Peak Sales, (GWh)	1.0	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.2
Total Energy Sales of KPLC, (GWh)	186.5	194.9	202.9	213.7	225.3	237.7	251.0	265.0	279.9	295.7	312.4	330.0	348.6	368.2	389.0	410.8	433.8	458.1	483.7	510.7	539.2	569.2	600.8	634.2	669.3
Growth rate of Energy Sales, (%)	-1.3%	4.5%	4.1%	5.3%	5.4%	5.5%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%
Regional Load Factor, (%)	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Peak Load, (MW)	45.0	47.0	48.9	51.5	54.4	57.4	60.8	64.0	67.4	71.4	75.4	79.7	84.2	89.0	94.0	99.3	104.9	110.7	116.9	123.5	130.4	137.6	145.3	153.4	161.9
Growth rate of Peak Load, (%)	2.3%	4.5%	4.1%	5.3%	5.5%	5.5%	5.6%	5.6%	5.6%	5.7%	5.7%	5.7%	5.7%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
4 Western Region																									
Domestic Sales, (GWh)	72.5	78.7	81.6	85.8	90.3	95.3	100.6	106.2	112.3	118.8	125.6	132.9	140.7	148.9	157.6	166.9	176.7	187.1	198.1	209.8	222.1	235.2	249.0	263.7	279.2
Commerc. & Indust. Sales, (GWh)	238.2	247.2	253.8	267.7	282.5	298.3	315.0	332.6	351.3	370.9	391.6	413.4	436.3	460.4	485.7	512.3	540.3	569.7	600.6	633.1	667.2	703.1	740.8	780.4	822.1
Off-Peak Sales, (GWh)	1.4	1.5	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.6	2.6	2.7	2.8	2.8
Total Energy Sales of KPLC, (GWh)	312.1	325.4	337.1	355.2	374.8	395.3	417.3	440.7	465.5	491.6	519.2	548.3	579.0	611.4	645.5	681.5	719.3	759.2	801.2	845.4	891.9	940.9	992.5	1,046.9	1,104.1
Growth rate of Energy Sales, (%)	3.1%	4.3%	3.6%	5.4%	5.5%	5.5%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Regional Load Factor, (%)	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%
Peak Load, (MW)	66.8	69.7	72.1	76.0	80.2	84.7	89.4	94.4	99.7	105.3	111.3	117.5	124.1	131.1	138.4	146.1	154.2	162.8	171.8	181.3	191.3	201.8	212.9	224.6	236.9
Growth rate of Peak Load, (%)	11.4%	4.2%	3.6%	5.4%	5.5%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
5 Mt Kenya Region																									
Domestic Sales, (GWh)	60.7	64.1	68.2	71.7	75.6	79.7	84.1	88.9	93.9	99.3	105.1	111.2	117.7	124.6	131.9	139.6	147.8	156.5	165.7	175.4	185.8	196.7	208.3	220.6	233.5
Commerc. & Indust. Sales, (GWh)	69.1	71.7	73.6	77.6	81.9	86.5	91.3	96.4	101.8	107.5	113.5	119.8	126.5	133.5	140.8	148.5	156.6	165.2	174.1	183.5	193.4	203.8	214.8	226.3	238.3
Off-Peak Sales, (GWh)	1.6	1.8	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.2	3.2	3.3
Total Energy Sales of KPLC, (GWh)	131.3	137.6	143.8	151.4	159.5	168.2	177.6	187.5	198.0	209.1	220.9	233.4	246.6	260.5	275.2	290.8	307.2	324.4	342.7	361.9	382.2	403.6	426.2	450.1	475.2
Growth rate of Energy Sales, (%)	-1.0%	4.8%	4.5%	5.3%	5.4%	5.5%	5.5%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%
Regional Load Factor, (%)	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%
Peak Load, (MW)	37.6	39.4	41.1	43.3	45.6	48.2	50.9	53.7	56.7	60.0	63.4	67.0	70.8	74.8	79.0	83.5	88.3	93.2	98.5	104.1	109.9	116.1	122.6	129.5	136.8
Growth rate of Peak Load, (%)	13.9%	4.7%	4.4%	5.3%	5.4%	5.5%	5.6%	5.6%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%
6 North Rift Region																									
Domestic Sales, (GWh)	34.7	36.7	39.1	41.1	43.3	45.6	48.2	50.9	53.8	56.9	60.2	63.7	67.4	71.3	75.5	79.9	84.6	89.8	94.9	100.5	106.4	112.6	119.3	126.3	133.7
Commerc. & Indust. Sales, (GWh)	103.9	107.8	110.7	116.7	123.2	130.1	137.3	145.0	153.2	161.7	170.8	180.2	190.2	200.7	211.8	223.4	235.6	248.4	261.9	276.1	290.9	306.6	323.0	340.3	358.5
Off-Peak Sales, (GWh)	0.8	0.																							

Table 5.2.9 Regional and National Load Forecast (High)

Regions	1995/96 (Actual)	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
REGIONAL LOAD FORECAST																									
1 Harobi Region																									
Domestic Sales, (GWh)	635.4	678.6	727.9	770.7	817.4	868.1	922.8	981.7	1,045.0	1,112.7	1,185.3	1,262.8	1,345.7	1,434.2	1,528.7	1,629.5	1,737.0	1,851.7	1,973.9	2,104.3	2,243.2	2,391.2	2,549.0	2,717.1	2,896.3
Commerc. & Indust. Sales, (Gwh)	1,067.0	1,127.7	1,190.7	1,278.3	1,372.9	1,474.7	1,583.9	1,700.9	1,828.0	1,959.7	2,102.5	2,255.0	2,417.8	2,591.4	2,778.6	2,974.2	3,184.8	3,409.4	3,648.8	3,904.1	4,176.1	4,466.2	4,775.3	5,104.8	5,456.0
Off-Peak Sales, (GWh)	94.39	105.04	115.75	117.87	120.23	122.79	125.53	128.43	131.45	134.63	137.93	141.34	144.87	148.52	152.28	156.15	160.13	164.23	168.44	172.76	177.21	181.77	186.46	191.27	196.20
Total Energy Sales of KPLC, (GWh)	1,796.8	1,993.3	2,034.3	2,166.8	2,310.6	2,465.6	2,632.3	2,811.0	3,002.4	3,207.1	3,425.7	3,659.2	3,908.4	4,174.2	4,457.6	4,759.8	5,081.9	5,425.3	5,791.2	6,181.1	6,596.5	7,039.2	7,510.8	8,013.2	8,548.4
Growth rate of Energy Sales, (%)	8.2%	6.3%	6.5%	6.5%	6.6%	6.7%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%
Regional Load Factor, (%)	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%	54.5%
Peak Load, (MW)	356.5	377.9	401.8	429.1	458.7	490.6	525.0	561.8	601.2	643.4	688.5	736.7	788.2	843.1	901.8	964.1	1,030.7	1,101.8	1,177.5	1,258.3	1,344.3	1,436.1	1,533.9	1,638.1	1,749.1
Growth rate of Peak Load, (%)	6.7%	6.0%	6.3%	6.8%	6.9%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%	6.8%
2 Coast Region																									
Domestic Sales, (GWh)	205.8	219.1	235.7	249.6	264.7	281.1	298.8	317.9	338.4	360.3	383.8	408.9	435.8	464.4	495.0	527.7	562.5	599.6	639.2	681.4	726.4	774.3	825.4	879.9	937.9
Commerc. & Indust. Sales, (Gwh)	513.0	542.2	572.5	614.6	660.1	709.1	761.6	817.8	878.0	942.3	1,010.9	1,084.3	1,162.5	1,246.0	1,335.0	1,430.0	1,531.3	1,639.3	1,754.4	1,877.1	2,008.0	2,147.4	2,296.0	2,454.5	2,623.3
Off-Peak Sales, (GWh)	2.7	3.0	3.3	3.4	3.4	3.5	3.6	3.7	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.5	4.6	4.7	4.8	4.9	5.1	5.2	5.3	5.5	5.8
Total Energy Sales of KPLC, (GWh)	721.5	764.3	811.5	867.5	928.2	993.7	1,064.0	1,139.4	1,220.1	1,306.4	1,398.7	1,497.2	1,602.4	1,714.7	1,834.4	1,962.1	2,098.3	2,243.6	2,398.4	2,563.5	2,739.4	2,926.9	3,126.8	3,339.8	3,566.8
Growth rate of Energy Sales, (%)	8.5%	5.9%	6.2%	6.9%	7.0%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.0%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%
Regional Load Factor, (%)	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%	58.5%
Peak Load, (MW)	140.4	148.7	157.8	168.8	180.6	193.4	207.1	221.8	237.6	254.4	272.4	291.6	312.2	334.1	357.4	382.3	408.9	437.3	467.5	499.7	534.0	570.6	609.6	651.2	695.5
Growth rate of Peak Load, (%)	8.0%	5.9%	6.2%	6.9%	7.0%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.0%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%
3 Central Rift Region																									
Domestic Sales, (GWh)	68.0	72.4	77.9	82.5	87.5	92.9	98.7	105.0	111.8	119.1	128.8	135.1	144.0	153.5	163.6	174.4	185.9	198.1	211.2	225.1	240.0	255.9	272.7	290.7	309.9
Commerc. & Indust. Sales, (Gwh)	117.5	124.1	131.1	140.7	151.1	162.3	174.4	187.2	201.0	215.7	231.5	248.2	266.2	285.3	305.7	327.4	350.6	375.3	401.7	429.8	459.7	491.7	525.7	562.0	600.6
Off-Peak Sales, (GWh)	1.0	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.2
Total Energy Sales of KPLC, (GWh)	185.5	197.7	210.2	224.5	239.9	256.6	274.5	293.7	314.3	336.3	359.8	384.9	411.7	440.4	470.9	503.5	538.2	575.3	614.7	656.8	701.7	749.5	800.5	854.8	912.7
Growth rate of Energy Sales, (%)	-1.3%	6.0%	6.3%	6.8%	6.9%	6.9%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%	6.8%
Regional Load Factor, (%)	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Peak Load, (MW)	45.0	47.7	50.7	54.2	57.9	61.9	66.3	70.9	75.9	81.2	86.9	93.0	99.5	106.5	113.9	121.8	130.2	139.2	148.7	158.9	169.8	181.4	193.8	206.9	221.0
Growth rate of Peak Load, (%)	2.3%	6.0%	6.3%	6.8%	6.9%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%	6.8%
4 Western Region																									
Domestic Sales, (GWh)	72.5	77.2	83.1	88.0	93.3	99.1	105.3	112.0	119.3	127.0	135.3	144.1	153.6	163.7	174.5	186.0	198.2	211.3	225.3	240.1	256.0	272.9	290.9	310.1	330.5
Commerc. & Indust. Sales, (Gwh)	238.2	251.8	265.8	285.4	306.5	329.2	353.6	379.7	407.7	437.5	469.4	503.4	539.8	578.5	619.9	664.0	711.0	761.1	814.6	871.6	932.3	997.1	1,066.1	1,139.7	1,218.1
Off-Peak Sales, (GWh)	1.4	1.5	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.6	2.6	2.7	2.8	2.8
Total Energy Sales of KPLC, (GWh)	312.1	330.5	350.5	375.0	401.5	430.1	460.7	493.6	528.8	566.4	606.7	649.6	695.4	744.4	796.5	852.2	911.6	974.8	1,042.3	1,114.2	1,190.9	1,272.6	1,359.7	1,452.5	1,551.4
Growth rate of Energy Sales, (%)	3.1%	5.9%	6.1%	7.0%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%
Regional Load Factor, (%)	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%	53.1%
Peak Load, (MW)	66.8	70.8	75.0	80.3	86.0	92.1	98.7	105.8	113.3	121.4	130.1	139.3	149.1	159.7	170.9	182.8	195.6	209.2	223.7	239.1	255.8	273.2	291.9	311.8	333.1
Growth rate of Peak Load, (%)	11.4%	5.9%	6.1%	7.0%	7.1%	7.1%	7.2%	7.2%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.0%	7.0%	7.0%	7.0%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%
5 Mt Kenya Region																									
Domestic Sales, (GWh)	60.7	64.6	69.5	73.6	78.0	82.9	88.1	93.7	99.8	106.2	113.1	120.6	128.5	136.9	145.9	155.6	165.8	176.8	188.4	200.9	214.1	228.3	243.3	259.4	276.5
Commerc. & Indust. Sales, (Gwh)	69.1	73.0	77.1	82.7	88.9	95.4	102.5	110.1	118.2	126.8	136.1	146.0	156.5	167.7	179.7	192.5	206.1	220.7	236.2	252.7	270.3	289.1	309.1	330.4	353.1
Off-Peak Sales, (GWh)	1.6	1.8	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.2	3.2	3.3
Total Energy Sales of KPLC, (GWh)	131.3	139.4	148.5	158.3	168.9	180.4	192.7	206.0	220.2	235.3	251.6	268.9	287.4	307.2	328.2	350.7	374.7	400.2	427.5	456.5	487.4	520.4	555.6	593.0	632.9
Growth rate of Energy Sales, (%)	-1.0%	6.1%	6.6%	6.6%	6.7%	6.8%	6.8%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.7%	6.7%	6.7%
Regional Load Factor, (%)	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%	39.4%
Peak Load, (MW)	37.6	39.9	42.5	45.3	48.4	51.7	55.3	59.1	63.2	67.8	72.2	77.3	82.6	88.3	94.4	100.9	107.8	115.2	123.1	131.5	140.4	150.0	160.1	171.0	182.5
Growth rate of Peak Load, (%)	13.9%	6.1%	6.5%	6.7%	6.8%	6.8%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
6 North Rift Region																									
Domestic Sales, (GWh)	34.7	37.0	39.8	42.1	44.7	47.4	50.4	53.7	57.1	60.8	64.8	69.0	73.6	78.4	83.6	89.1	94.9	101.2	107.9	115.0	122.8	130.7	139.3	148.5	158.3
Commerc. & Indust. Sales, (Gwh)	103.9	109.8	115.9	124.4	133.7	143.6	154.2	165.6	177.8	190.8	204.7	219.5	235.4	252.3	270.3	289.5	310.0	331.9	355.2	380.1	406.5	434.8	464.9	49	

Table 5.2.10 Power Demand Forecast by Substation (Reference)

Substation	Peak Demand in 1996	Peak Demand in 1997	Peak Demand in 2000	Peak Demand in 2008	Peak Demand in 2012
Nairobi Region					
Ruaraka	85	78	94	152	193
North Nairobi			103	168	213
Embakasi	146	135	120	195	248
Jura Road	170	157	124	202	256
Kitui	1	1	1	2	2
Sultan Hamud	2	2	2	3	4
Kiboko	1	0	1	1	1
Mulia Andel	2	2	2	4	5
Thika	22	20	24	40	50
Sub-total	429	395	471	767	972
Coast Region					
Voi	5	4	5	8	11
Maugu	2	1	2	3	3
Mariakani	7	6	7	12	15
Kipevu	105	95	62	100	127
Bamburi	40	36	47	76	97
Kilif	14	12	15	15	15
Rabai	0	0	48	78	99
Sub-total	173	154	186	292	367
Central Rift Region					
Lanet	44	47	50	80	102
Naivasha	9	10	10	17	21
Sub-total	53	57	60	97	123
Western Kenya Region					
Musaga	15	14	16	26	33
Webuye	17	15	18	30	38
Kisume	24	22	26	42	53
Chemosit	26	23	28	45	57
Muhoroni	0	0	0	0	0
Sub-total	82	74	88	143	181
Mt. Kenya Region					
Nanyuki	21	21	25	40	51
Kiganjau	20	20	24	39	49
Kiambere	1	1	1	2	3
Sub-total	42	42	50	81	103
North rift Region					
Lessos	7	8	9	15	19
Eldoret	23	25	31	49	63
Sub-total	30	33	40	64	82
Total Power Demand	809	755	895	1,444	1,828

Table 5.3.1 Gross Regional Domestic Products in the Nation
(1982 constant price)

	(KJ million)													
Industry of origin	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	Growth rate (%)
CURRENCY														
A. Non-Monetary Economy														
Forestry	21.01	21.71	22.48	24.51	26.86	27.72	28.61	29.53	30.46	31.37	32.19	33.04	33.90	4.55%
Fishery	0.82	1.03	1.19	1.29	1.66	1.45	1.50	1.53	1.54	1.49	1.39	1.27	1.15	6.86%
Building/construction	48.02	48.96	50.58	59.09	70.60	65.33	67.65	68.24	71.50	72.93	74.39	75.45	75.84	4.75%
Water collection	19.00	19.29	19.58	20.25	20.66	21.13	21.72	22.56	23.44	24.14	24.87	25.33	25.51	2.70%
Ownership of dwelling	70.74	73.59	76.52	80.55	81.65	86.07	89.33	92.89	96.41	99.71	101.70	102.34	103.18	3.89%
Total	159.59	164.58	170.35	185.69	202.43	201.70	208.82	214.75	223.35	229.64	234.54	237.43	239.58	4.13%
B. Monetary Economy														
1. Enterprises and Non-profit Institutions														
Agriculture	867.33	964.06	979.09	941.05	975.59	1,023.39	1,062.57	1,109.25	1,152.51	1,192.04	1,178.93	1,134.83	1,083.30	3.60%
Forestry	21.97	32.81	23.67	26.44	27.95	29.37	33.69	38.14	40.62	42.65	46.23	48.16	47.58	7.65%
Fishery	6.40	8.33	8.85	8.50	9.43	9.59	10.93	12.27	12.83	13.39	13.10	12.19	11.33	8.55%
Mining/quarrying	5.45	6.61	6.69	7.41	8.11	8.40	9.12	10.15	10.62	11.25	11.97	11.01	11.23	8.39%
Manufacturing	364.13	372.32	389.07	405.84	424.07	448.67	474.34	502.80	532.47	560.34	581.63	588.61	599.21	4.91%
Building/construction	136.73	135.82	114.54	104.53	108.07	112.06	116.68	121.68	131.40	134.30	129.30	122.20	114.01	-0.20%
Electricity/water	45.30	23.72	25.07	26.76	29.03	31.22	33.61	36.47	39.53	43.69	45.97	45.11	43.52	0.40%
Trade/restaurant/hotel	322.56	306.61	315.26	332.60	355.22	389.98	412.53	436.27	455.47	473.69	472.05	478.94	479.56	4.36%
Transport/storage/communication	185.06	195.87	201.51	202.29	206.54	215.42	224.90	234.02	241.06	249.74	259.10	263.60	265.71	3.39%
Finance/insurance/real estate/business services	191.88	209.74	226.04	222.50	244.51	261.02	274.52	291.27	313.11	333.15	353.47	377.94	406.29	6.31%
Ownership of dwelling	135.84	187.78	187.92	184.55	190.34	196.53	205.63	212.20	220.63	229.35	235.31	238.98	239.46	5.99%
Other services	59.32	82.45	86.26	94.20	99.10	104.05	111.74	119.72	127.86	135.93	141.11	144.50	145.68	9.65%
Less imputed bank serv	-80.94	-87.29	-104.10	-99.40	-102.97	-105.94	-113.43	-121.81	-129.12	-134.03	-138.59	-142.03	-148.09	5.76%
Total	2,261.03	2,438.89	2,459.87	2,457.27	2,574.99	2,723.76	2,856.83	3,002.43	3,148.99	3,285.49	3,329.58	3,324.04	3,305.79	4.24%
2. Private Households (Domestic Services)	30.67	32.75	34.88	37.22	39.80	44.00	48.71	55.30	62.36	70.52	78.28	85.26	93.10	9.69%
3. Procedures of Government Services														
Services	425.20	441.35	459.89	473.13	497.25	528.73	554.13	586.16	618.40	645.72	669.10	685.43	699.14	4.75%
Total of Monetary Econo	2,716.90	2,912.99	2,954.64	2,967.62	3,112.05	3,296.49	3,459.67	3,643.89	3,829.75	4,001.73	4,076.96	4,094.73	4,098.03	4.40%
Total Gross Domestic Product at Factor Cost (Non-Monetary and Monetary Economy														
Gross Domestic Product at Factor Cost	165.88	170.69	166.67	162.38	164.61	167.62	169.66	172.34	199.04	190.63	188.31	188.09	177.40	1.56%
COMPOSITE RATE														
A. Non-Monetary Economy														
Forestry	0.73%	0.71%	0.72%	0.78%	0.81%	0.79%	0.78%	0.77%	0.75%	0.74%	0.75%	0.76%	0.78%	
Fishery	0.03%	0.03%	0.04%	0.04%	0.05%	0.04%	0.04%	0.04%	0.04%	0.04%	0.03%	0.03%	0.03%	
Building/construction	1.67%	1.59%	1.61%	1.87%	2.13%	1.87%	1.84%	1.77%	1.76%	1.72%	1.73%	1.74%	1.75%	
Water collection	0.66%	0.63%	0.63%	0.64%	0.62%	0.60%	0.59%	0.58%	0.58%	0.57%	0.58%	0.58%	0.59%	
Ownership of dwelling	2.46%	2.39%	2.45%	2.55%	2.49%	2.46%	2.44%	2.41%	2.38%	2.36%	2.36%	2.36%	2.38%	
Total	5.55%	5.35%	5.45%	5.89%	6.11%	5.77%	5.69%	5.57%	5.51%	5.43%	5.44%	5.48%	5.52%	
B. Monetary Economy														
1. Enterprises and Non-profit Institutions														
Agriculture	30.15%	31.33%	31.33%	29.84%	29.43%	29.25%	28.96%	28.75%	28.44%	28.17%	27.34%	26.20%	25.09%	
Forestry	0.76%	1.07%	0.76%	0.84%	0.84%	0.84%	0.92%	0.99%	1.00%	1.01%	1.07%	1.11%	1.10%	
Fishery	0.22%	0.27%	0.28%	0.27%	0.28%	0.27%	0.30%	0.32%	0.32%	0.32%	0.30%	0.28%	0.26%	
Mining/quarrying	0.19%	0.21%	0.21%	0.23%	0.24%	0.24%	0.25%	0.26%	0.26%	0.27%	0.28%	0.25%	0.26%	
Manufacturing	12.66%	12.10%	12.45%	12.87%	12.79%	12.83%	12.93%	13.03%	13.14%	13.24%	13.49%	13.59%	13.81%	
Building/construction	4.75%	4.41%	3.67%	3.31%	3.26%	3.20%	3.18%	3.15%	3.24%	3.17%	3.00%	2.82%	2.63%	
Electricity/water	1.57%	0.77%	0.80%	0.85%	0.88%	0.89%	0.92%	0.95%	0.98%	1.03%	1.07%	1.04%	1.05%	
Trade/restaurant/hotel	11.21%	9.96%	10.09%	10.55%	10.72%	11.15%	11.25%	11.31%	11.24%	11.19%	10.95%	11.06%	11.06%	
Transport/storage/communication	6.43%	6.36%	6.45%	6.42%	6.23%	6.16%	6.13%	6.06%	5.95%	5.90%	6.01%	6.08%	6.13%	
Finance/insurance/real estate/business services	6.67%	6.82%	7.23%	7.06%	7.38%	7.46%	7.48%	7.55%	7.73%	7.87%	8.20%	8.72%	9.37%	
Ownership of dwelling	4.72%	6.10%	6.01%	5.85%	5.74%	5.62%	5.61%	5.50%	5.44%	5.42%	5.46%	5.52%	5.52%	
Other services	2.06%	2.68%	2.76%	2.99%	2.99%	2.97%	3.05%	3.10%	3.15%	3.21%	3.27%	3.34%	3.36%	
Less imputed bank serv	-2.81%	-2.84%	-3.33%	-3.15%	-3.11%	-3.03%	-3.09%	-3.16%	-3.19%	-3.17%	-3.21%	-3.28%	-3.41%	
Total	78.60%	79.25%	78.72%	77.93%	77.69%	77.86%	77.87%	77.81%	77.69%	77.65%	77.23%	76.73%	76.21%	
2. Private Households (Domestic Services)	1.07%	1.06%	1.12%	1.18%	1.20%	1.26%	1.33%	1.43%	1.54%	1.67%	1.82%	1.97%	2.15%	
3. Procedures of Government Services														
Services	14.78%	14.34%	14.72%	15.00%	15.00%	15.11%	15.11%	15.19%	15.26%	15.26%	15.52%	15.82%	16.17%	
Total of Monetary Econo	94.45%	94.65%	94.55%	94.11%	93.89%	94.23%	94.31%	94.43%	94.49%	94.57%	94.56%	94.52%	94.48%	
Total Gross Domestic Product at Factor Cost														
Gross Domestic Product at Factor Cost	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

Sources:

Statistical Abstract 1986, 1989 and 1991, Central Bureau of Statistics.
Economic Survey, 1994, Central Bureau of Statistics.

Table 5.3.2 Total Exports by Broad Economic Category

(Kl million)						
Category of goods	1989	1990	1991	1992	1993	Growth rate(%)
Food and Beverages	598.19	744.06	817.73	929.12	1,986.09	34.99%
Primary	525.16	637.74	678.06	758.14	1,608.12	32.28%
For industry	208.70	226.27	228.93	210.51	559.74	27.97%
For household consumption	316.46	411.47	449.13	547.63	1,048.38	34.91%
Processed	73.03	106.32	139.67	170.98	377.97	50.83%
For industry	4.98	4.41	9.26	10.14	21.91	44.83%
For household consumption	68.05	101.91	130.41	160.84	356.06	51.24%
Industrial Supplies (Non-food)	219.49	245.59	320.58	371.51	877.60	41.41%
Primary	110.47	118.59	121.46	127.99	224.60	19.41%
Processed	109.02	127.00	199.12	243.52	653.00	56.44%
Fuel and Lubricants	114.48	150.42	266.09	246.50	353.85	32.59%
Primary	0.03	0.03	0.01	0.02	0.01	-24.02%
Processed	114.45	150.39	266.08	246.48	353.84	32.60%
Motor spirit	9.06	18.24	28.82	34.09	57.04	58.40%
Others	105.39	132.15	237.26	212.39	296.80	29.54%
Machinery and Others Capital Equipm	6.53	6.90	10.52	13.77	23.43	37.63%
Machinery & other capital equipme.	5.94	5.79	9.34	12.14	18.74	33.27%
Parts and accessories	0.59	1.11	1.18	1.63	4.69	67.91%
Transport Equipment	4.52	2.61	4.35	8.06	30.59	61.29%
Passenger motor vehicles	0.06	0.15	0.40	0.08	12.42	279.31%
Others	2.12	0.39	0.26	1.44	8.34	40.83%
For industry	2.07	0.36	0.20	1.39	8.31	41.55%
Non-industrial	0.05	0.03	0.06	0.05	0.03	-11.99%
Parts and accessories	2.34	2.07	3.69	6.54	9.83	43.16%
Consumer Goods Not Elsewhere Spec	56.53	82.22	113.44	139.14	353.56	58.14%
Durable	1.31	9.11	1.68	2.07	5.04	40.05%
Semi-durable	12.15	18.54	28.61	35.76	115.17	75.47%
Non-durable	43.07	54.57	83.15	101.31	233.35	52.57%
Goods Not Elsewhere Specified	0.10	0.56	1.11	0.00	0.00	-
TOTAL	999.84	1,232.36	1,533.82	1,708.10	3,625.12	37.99%
Percentage Shares:	1989	1990	1991	1992	1993	
Food and Beverages	598.19	744.06	817.73	929.12	1986.09	
Industrial Supplies (Non-foods)	219.49	245.59	320.58	371.51	877.6	
Fuel and Lubricants	114.48	150.42	266.09	246.5	353.85	
Transport Equipment	4.52	2.61	4.35	8.06	30.59	
Others	63.16	89.68	125.07	152.91	376.99	
	999.84	1232.36	1533.82	1708.1	3625.12	

Total

Source:

Economic Survey, 1994, Central Bureau of Statistics.

Table 5.3.3 Crop Production in 1992 by District

	EMBU	GARISSA	ISIIOLO	KIAMBU	KILIFI	KITUI	LAMU	MJRU	MURANGA	TANA RIVER	THARAKA-NITHI					
	Area Production (ha)	Area Production (ha)	Area Production (ha)	Area Production (ha)	Area Production (ha)	Area Production (ha)	Area Production (ha)	Area Production (ha)	Area Production (ha)	Area Production (ha)	Area Production (ha)					
FOOD CROPS																
Maize	51,419	49,157	324	2,592	34,859	56,472	37,336	85,115	2,174	2,584	76,068	83,864,970	1,353	1,353	14,780	
Sorghum	8,792	2,371	156		820	4,510	18	22,936							2,907	
Millet	8,720	3,890					25,617								7,752	
Rice							1,490						234	468		
Beans	24,912	19,596		284	17,104	9,507	59	16,222			54,908	29,642,220	18,778	154	123	3,076
Cow-peas	9,035	5,277	41				2,248	25,221								
Chick-peas	5,200	1,728														
Pigeon-peas	4,676	2,173		18	63	28		18,791								
Green Grams	6,100	2,934					835	21,038			3,322	5,690	263	210	1,406	
Irish Potatoes	1,607	10,735		14,618	131,562			16,075			144,675	37,223			500	
Cassava	500	6,000		80	590	2,950	186,120	6,160			860	8,170				
Sweet Potatoes	743	13,350		100			680				253	2,532				
Arrow Roots	120	1,380														
FRUITS													85,826	823	8,525	9,528
Bananas	3,082	151,615		3,440	3,087	29,346										
Pasture Fruits	164	2,463					245	2,450								
Pawpaw	746	10,343														
Avocado	289	5,784					240	2,400								
Guaava							160									
Cashewnuts							3	1,454			787					432
Citrus	71	1,780					36	162								
Mangoes	354	3,535		255	75	1,125										
VEGETABLES																
Cabbages	142	2,840					4,600	82,800								
Kales	237	3,585		180	6,250	78,125										
Vegetables							219	1								
Onions	63	945					265	1,988								
Carrots	59	590					2,355	35,325								
Tomatoes	249	9,960		560				121								
French Beans	203	1,015					378	1,701								
CASH CROPS																
Coffee	617	4,189					36,959	24,109		19						29,970
Tea	3	21,055					9,525	78,051								3,180
Cotton	2,000	328,746		14			85	4,711	1,380	1,641						2,000
Tobacco	900	1,000					2,350	43,475								
Cocunut (Nuts)							30,750	1,605	3,145							1,190
Sunflower	910	850														
Castor	250	1,000														
Sisal							655	293	148							
Pyrethrum							365	219								
Macadamia	560	2,650					118	236								
Groundnut	12															13

Source: District Development Plan, MOFND

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (1/10)

Embu District

Division	Slakago	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Ishara/Kathigi Irr	Euroce	55	50	25	Thuchi River	4EB
	Kathiga-Gacru Iri	Kiangombe	100	100	0	Ena River	4EC
	Karerema Iri Scheme	Kiangombe	65	50	0	Ena River	4EC
	Ena Iri Project	Niharwa	180	180	175	Ena River	4EC
Division	Runyenjes	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Kamiugu	Kagaari Nort	28	28	4	Kamiugu Stre	4EC
	Ena Irrigation Schem	Kagaari Sout	160	160	3	Ena River	4EC
	Gacenga Iri Scheme	Kyeni S & N	50	75	75	Gacenga Rive	4EB
	Gasafari	Kyeni South	350	142	1	Iumbogo Riv	4EB
	Kareru Iri Project	Kyeni South	126	126	0	Gitwa River	4EB
Division	Manyatta	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Kevote Iri Project	Gaturi North	35	38	0	Kirurumwe Ri	4EC
	Kianjuki Iri Projec	Gaturi North	30	30	0	Kirurumwe	4EC
	Makengi Iri Project	Gaturi North	40	40	0	Kirurumwe Ri	4EC
	Ikindu Iri Project	Gaturi South	10	14	0	Ena River	4EC
	Kiaragana Iri Proje	Gaturi South	80	600	0	Ena River	4EC
	Kiandundu	Gaturi South	40	45	0	Ena River	4EC
	Gicangai Iri Scheme	Mgimoa	0	115	50	Gicangai Riv	4DC
	Kanyange Iri Projec	Ngandori	30	25	5	Kanyange Spr	4DC
	Riamacini Iri Proje	Ngandori	10	5	5	Kathigari Sp	4DC
	Thambana Ngandori Pj	Ngandori	80	80	0	Thambana Riv	4DC
	Kithanje Kavingazi V	Ngandori	10	60	0	Kapingazi Ri	4DC
	Kivoo Iri Project	Ngandori	13	14	1	Kivoo Spring	4DC
	Kantogondou Iri Proj	Ngandori	5	30	1	Kantogoudou	4DC
	Mwina Irrigation Sc	Nginda	30	30	0	R Rupingazi	4DC
	Kii Iri Scheme	Nginda	20	20	0	Kii River	4DC
	Kamavindi/Gatunduri	Nginda	0	63	63	Kii River	4DC
	Kathigari/ Kithangan	Nginda	36	38	0	Nyanjara Spr	4DC
	Karingi Iri Project	Nginda	18	20	10	Farangi Spr	4DC
	Rupingazi Iri Schem	Nginda	40	50	15	Rupingazi Ri	4DC
	Kiandari Iri Projec	Nginda	30	40	10	Nyanjara Riv	4DC
	Gituri Iri Project	Nginda	5	7	0	Nyajara Rive	4DC
	Kaguma Iri Project	Nginda	30	30	0	Thambana Riv	4DC
	Kambevu	Nginda	10	10	3	Nyanjara Riv	4DC
	Ndaari Iri Project	Nginda	20	20	0	Nyanjara Riv	4DC
	Karau Iri Project	Nginda	6	28	4	Thambana Riv	4DC
	Kierisha	Nginda	14	13	0	Nyanjara Riv	4DC
	Inani	Nginda	0	18	0	Thambana Riv	4DC
	Kathuniri	Nginda	15	17	5	Thambana Ri	4DC
	Kiambutu	Nginda	8	50	2	Nyanjara Riv	4DC
	Rwanyaga/ Gikago	Nginda	32	34	0	Rwanyaga Spr	4DC
	Mukongoro	Nginda	10	10	0	Rupingazi Ri	4DC
	Irati	Nginda	4	4	0	Nyanjara Riv	4DC
	Kiambuigi	Nginda	28	28	0	Kamwangi Riv	4DC
	Kanyiriri	Nginda	30	30	3	Kanyiriri	4DC
Division	Gachoka	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Gategi(Karunguru) Sc	Karaba	50	50	0	Thiba River	4DA
	Wachoro/Inaitune Pj	Karaba	50	50	0	Thiba River	4DA

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (2/10)

Karaba Irr	Karaba	1,000	500	10 Masinga Dam	4DA
Karura	Kiambere	40	40	0 Gitary Dam	4FD
Mashamba Irr Scheme	Makima	200	200	0 Thiba River	4DA
Mbondoni Irr Scheme	Makima	100	80	0 Masinga Dam	4DA
Machan'Ga	Mavuria	50	50	5	4DD
Machanga	Mavuria	50	50	5 Thiba/Tana	4DD
Kangaru Irr Scheme	Mbeti North	60	60	50 Kapingazi Ri	4DD
Rianjeru Cluster	Mbeti South	100	50	15 Rupingazi Ri	4DC
Majimbo Irr Scheme	Municipalit	30	30	1 Kapingazi Ri	4DC

Garissa District

Division	Mbalambala	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Jara Jara	130 Km North Of Gsa	40	4	4		4GB
	Mbalambala Women	131 Km North Of Gsa	12	4	4		4GB
	Galana Male Women	132 Km North Of Gsa	40	4	4		4GB
	Nys Scheme			20	20		4GB
	Saka		40				4GC
	Kori		20	2			4GC
	Burandasa		40	1			4GB
	Maradafa		40	2			4GB
	Debi		40	1			4GB
	Koldere		20	4			4GB
	Gabobe		24	10			4GB
	Sigale		32				4GB
Division	Masalani	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Masalani	Masalani	60	10			4GE
	Koile		1,000	8			4GF
	Gabohey						4GF
Division	Central	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Maendeleo Farm	C/Division	36	36	36		4GC
	Nep Farm	C/Division	4	4	4		4GC
	Halima	C/Division	10	4	4		4GC
	Nip	C/Division	8	5	5		4GC
	Gamadja	C/Division	40	10	10		4GC
	Captain Musa	C/Division	30	5	5		4GC
	Sai Son I Farm	C/Division	2.5	2.5	2.5		4GC
	A.D.C	D-Central	240	20	20		4GC
	Hodan	Centraltownship3 Km	70	4	4		4GC
	Young Muslim	Centraltownship3 Km	64	10	10		4GC
	Gk Demonstration	Centraltownship1/2	40	10	10		4GC
	Muslim Welfare Farm	Centralraya Loc10 Km	40	10	10		4GC
	Pe'S Farm	Centraltownshipnext-	3	3	3		4GC
	Nys School	D-Mbalambala	32	12	12		4GC
	Gk Prison	D-Central-Towushtp-	40	4	4		4GC
	Manyatta Women	Cental	2.3	1.4	1.4		4GC
	Jamhuri	Cental	40	40	40		4GC
	Ifiin	Cental	40	14	14		4GC
	Bouralgi Women	Cental	30	4	4		4GC
	Cymis	Cental	10	1.6	1.6		4GC
	Korakora II	Cental	40	8	8		4GC
	Umoja	Cental	10	14	14		4GC

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (3/10)

Sankuni	Central	10	12	12	4GC	
Holwadag li	Central	20	5	5	4GC	
Raya	Central	10	6	6	4GC	
Ladgera	Central	15	12	12	4GC	
Bakuyu	Central	30	13	13	4GC	
Tawakal	Central	30	25	25	4GC	
Qahira	Central	40	14	14	4GC	
Wathajir	Central	40	6	6	4GC	
Korakora I	Central	30	12	12	4GC	
Segley	Central	40	2	2	4GC	
Maramtu li	Central	60	9	9	4GC	
Nasib	Central	60	11	11	4GC	
Dashey	Central	12	8	8	4GC	
Dolal	Central	8	2.4	2.4	4GC	
First Farm	Central	30	42	42	4GC	
Busmillah	Central	30	11	11	4GC	
Holwadag	Central	40	40	40	4GC	
Korane Farm	Central	8			4GC	
Hussein Farm(Ministe	Central	8			4GC	
Haji Gure	Central	10			4GC	
Riziki					4GC	
Dololomide	Central	40	4.6		4GC	
Medina	Centralbouralgi	60	60		4GC	
Asl-Kheriya	Centralbouralgi	4	4		4GC	
Maridadi	Centralbouralgi	16	16		4GC	
Qabobey	Sarah	40	30		4GC	
Taksoy	Sankuriraya	10	10		4GC	
Khadijah	Sankuriraya	60	30		4GC	
Fortowes	Centralkorakora	60	60		4GC	
Jaribu	Korakora	60	25		4GC	
Bothaya	Korakora	65	50		4GC	
Chiriki	Korakora	45	25		4GC	
Bara	***Sankuni*	40	8		4GC	
Wathajir South	Korakora	50	50		4GC	
Barara	Korakora	60	40		4GC	
Dekabur	Township	42	15		4GC	
Najar	Township	40	24		4GC	
Bahbey	Township	35	14		4GC	
Ali Shunia	Township	50	20		4GC	
Ziwani	Township	32	8		4GC	
Barwako	Korakora	60			4GC	
Bathiya	Township	40	8		4GC	
Aloley	Central Div.raya Loc.	40	22		4GC	
Chiriki	Central Div.Bouralgi	10	10		4GC	
Kulmis	Central bouralgi	50	35		4GC	
Banane	Central Raya	20	14		4GC	
Yarabi	Central Raya	40	24		4GC	
Degaley	Central Township	10	10		4GC	
Baraka	Central Township	15	15		4GC	
Division Bura	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Nanighi	Bura	14	12			4GC
Bura I	Bura	15	5			4GD

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (4/10)

Masababu	Bura		10		4GD
Bura li	Bura	6	6		4GD
Guyo	Bura	20			4GD
Kamuthe	Bura	40	8		4GD
Jaribu	Bura	12	2		4GD
Iidaya	Bura	20	2		4GD
Abaqjera	Bura	24	2		4GD
Galbet	Bura	20	4		4GD

Isiolo District

Division	Garbatulla	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Kinna Irr Scheme	Kinna	234	184	50	Kinna Spring	4GA
	Rapsu Irr Scheme	Kinna	0	0	0	Bisandi Spr	4GA

Kirinyaga District

Division	Ndia	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Mbeti Irr Project	Inoi	68	68	0	Mukengeria R	4DA
	Kibirigwi Irr Scheme	Kiine North	114	114	90	Ragati River	4BB
	Kimucu Irr Project	Kiine North	0	246	0	Rwaitanga R	4BB
	Baricho Mutithi Furr	Mwenua	80	45	45	Rwamuthambi	4BC
	Getuya Irr Project	Mwenua	40	20	0	Rundu River	4BC

Division	Mwea	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Togonye Furrow	Murinduko	0	20	20	Kiye River	4DB
	Mitoini Kombuni Pj	Mutithi	70	70	0	Thiba River	4DA
	Karikoini Irr. Schem	Mutithi	60	60	30	Thiba River	4DA
	Gitoini Irr Project	Mutithi	22	24	0	Nyaikungu Ri	4DA
	Rukanga Irr Project	Mutithi	0	0	0	Rwamuthambi	4BC
	Mithuthi-Ini Irrgat	Tebere	69	69	32	Murubara Riv	4DB

Division	Gichugu	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Gatu S.H Water Proje	Baragwi	24	24	14	Kaboyo River	4DA
	Gatugura Furrow	Baragwi	70	70	40	Kiringa Rive	4DA
	Thimu Gatu Furrow	Baragwi	60	60	25	Mukindu Rive	4DA
	Gikumbo Kirerembe	Baragwi	65	35	30	Thiba River	4DA
	Kaguma Women Group	Kahare	14	14	6	Kiringa Rive	4DA
	Uceumbuga Irr Projec	Ngariana	0	80	0	Kai River	4DB
	Kii Murinduko Irr Pj	Njukinia	200	170	30	Kii River	4DB

Meru District

Division	Tigania East	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Kionmba	Mbeu	300	200	120	Thanantu	4FA
	Machegene	Mbeu	300	300	150	Thanantu	4FA
	Kaburu	Mbeu	35	3	1	Chou Stream	4FA
	Mutha Water Project	Thangaitha	40	135	95	Thanga	4FB
	Mwincha Water Proj.	Thangaitha	65	65	8	Ciamatha Spr	4FB
	Kiambara Water Proj.	Thangaitha	90	90	15	Ciamatha Spr	4FB
	Ithaariu Water Proj.	Thangata	70	70	12	Ithariu Spr	4FB
	Itutha Water Project	Thangatha	70	170	120	Thangatha	4FB
	Amugaa Initiative Pro	Thangatha	160	60	13	Muumba Sprin	4FB
	Mutine Water Project	Thangatha	60	60	10	Thanga Sprin	4FB
	Kunati	Thangatha	420	210	60	Thangatha	4FB

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (5/10)

Division	Karnujine Y. Farmers	Thangatha	280	250	50	Kitibiu	4FA
	South Imenti	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Nyomba Ya Kagia	Abogeta		30	30	0	Irimbene	4FA
Mara Karia Water Proj	Igoji		300	200	0	Mara River	4FB
Mutunguru Water Proj	Igoji		60	40	10	Mutonga Rive	4EA
Gikoi Mweru Irr Sche	Igoji		3,000	2,400	0	Mutonga Rive	4EA
Karigi Water Projec	Igoki		20	5	3	Karigi Stre	4FA
Kirie Water Project	Igoki		200	150	60	Kithino Rive	4FA
Baranga Water Projec	Igoki		220	150	30	Kithino Rive	4FA
Gianturwara Water Fu	Igoki		0	100	60	Mukuo Stream	4FA
Gitinda Water Projec	Igoki		100	50	15	Gakoo Stream	4FA
Kangochine Water Fur	Igoki		200	150	60	Kithino	4FA
Kithino Mari Wat Pro	Igoki		320	216	60	Kithino Rive	4FA
Kirambiri Water Proj	Igoki		360	200	100	Kithino Rive	4FA
Kathuku Water Furrow	Igoki		0	60	60	Kithino Rive	4FA
Mutwatine Water Proj	Igoki		150	100	60	Kithino Spri	4FA
Mburi Water Project	Igoki		150	100	50	Kirogiwe Fur	4FA
Mitunguu Irr Proj	Igoki		500	400	400	Thingithu Rv	4FA
Nyombayathi Water Pj	Kanyakine		300	260	0	Kithino Rive	4FA
Lower Kithangani	Kanyakine		1,500	1,200	160	Kithino Rive	4FA
Muruine Water Proj	Kanyakine		300	260	0	Iraru River	4EA
Gitine Water Project	Kanyakine		250	120	0	Mathanjiri R	4FA
Igokine Water Associ	Kanyakine		360	280	0	Kithino Rive	4FA
Gatankene Water Proj	Kanyakine		120	80	30	Keaje Stream	4FA
Mutonga Water Furrow	Kioji		0	6	6	Mutonga Riv	4EA
Kathigu M.C.K Wat Pj	Mitine		200	140	100	Nthunkwe Riv	4FA
Nkui Water Project	Mitunguu		200	150	60	Kithino Riv	4FA
Muguru Water Project	Mitunguu		50	5,070	0	Thingithu Ri	4FA
Thingithu Water Proj	Mitunguu		100	80	0	Thingithu Ri	4FA
Kithare Water Projec	Mitunguu		100	80	30	Thingithu Ri	4FA
Njurene Water Projec	Nkuene		400	300	80	Marimba Rive	4FA
Ngonyi Water Project	Nkuene		150	120	10	Kithino Rive	4FA
Kaguru-Kirogine Furr	Nkuene		0	100	30	Kithino Rive	4FA
Magundu Water Projec	Nkuene		160	144	10	Thingithu Ri	4FA
Ithambara Water Proj	Nkuene		250	150	60	Kithino Rive	4FA
Kitharu Water Projec	Nkuene		0	20	20	Tharu Stream	4FA
Mutonge Mutune Water	Nkuene		280	80	80	Spring	4FA
Kithino Green Water	"Nkuene,Igoki"		350	300	100	Thagara Riv	4FA
Division	North Imenti	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Tuti Water Project	Giaki		700	400	80	Kuuru River	4FA
Kioru Rungene W. Proj	Giaki		2,600	600	200	Riji River	4FA
Kianjagi Water Proj	Giaki		300	300	250	Riji River	4FA
Kathilune Mujogia Wp	Giaki		600	500	50	Kanyariba R	4FA
Kiburine Furrow I.Pr	Giaki		200	200	50	Kuuru River	4FA
Muguna'Igori	Ntima		450	220	0	Kathita	4FA
Kiriungi W.G. Water.P	Ntima		100	98	0	Riji River	4FA
Mariara	Ntima		1,100	30	0	Mariara Rive	4FA
Mworosa	Ntima		280	206	25	Kathita	4FA
Gatemana Water Proje	Ntima		300	225	0	Riji River	4FA
Magundu	Ntima		350	300	150	Wathita	4FA
Gakumbo	Ntima		2,010	1,340	150	Nkurune	4FA
Ngachuma	Ntima		80	25	25	Ngachuma	4FA

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (6/10)

Kiringa Wendo W.Proj	Ntira	3	180	0	Kathita River	4FA
Mwiteña Kithiu W.P	Ntira	210	180	0	Kathita River	4FA
Kiambogo Factory W.P	Ntira	30	30	0	Kathita River	4FA
Division Igembe	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Ura Swamp	Akachiu	25	25	5	Swamp	4FB
Antubochiu	Akachiu	40	20	15	Mboone	4FB
Gakui	Akachiu	150	60	2	Gakui	4FB
Kindani/Kilili	Akachiu	300	300	0	Kindani	4FB
Kanjoo	Maua	600	400	100	Rujwero	4FB
Nthambiro	Maua	200	150	10	Muthucine	4GA
Gakunku	Maua	100	70	15	Gakunku	4GA
Kitheo	Maua	750	280	30	Kitheo	4GA
Kithetu	Maua	30	30	0	Kathima	4GA
Division C. Imenti	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Kairebi S.H.Group	Gatimbi	50	50	5	Garuri River	4FA
Nkuu-Njumo W. Assoc.	Gatimbi	75	80	0	Mariara Rive	4FA
Ciontare Water Proj.	Gatimbi	2,100	1,000	40	Mariara Rive	4FA
Kieguchia Gatimbi Pr	Gatimbi	4,000	3,600	600	Thingithu R.	4FA
Nkuene-Kathai W.Proj	Gatimbi	600	500	0	Mariara Rive	4FA
Kathenju S.H/W/Proj.	Gatimbi	90	80	0	Gasongi R.	4FA
Kithambaru S.H.Group	Gatimbi	440	160	3	Tbamba Ngomb	4FA
Tabota Water Project	Gatimbi	75	60	0	Kagumba Rive	4FA
Kamenya Water Proj.	Gatimbi	250	200	2	Gatimbi Riv.	4FA
Mukika Water Project	Gatimbi	300	200	2	Gatimbi Rive	4FA
Muguna Mbajone W.Pro	Mwangathia	200	150	0	Guatu	4FA
Gaitu-Kaguma W.Proj	Mwangathia	1,280	1,000	0	Mariara Rive	4FA
Kiiga Water Project	Mwangathia	225	180	0	Rwa-Iri Riv.	4FA
Mutura Women W. Pro	Mwangathia	600	400	30	Mariara Riv.	4FA
Ndamene Water Proj.	Mwangathia	200	200	0	Kauga-Ngogo	4FA
Muungano Women Wat P	Mwangathia	600	500	0	Guatu River	4FA
Maringarino Water As	Mwangathia	680	600	0	Kathita Riv	4FA
Igane Kathigau W.Pr.	Mwangathia	800	320	0	Thingithu R.	4FA
Mujwa-Mututa W. Sche	Mwangathia	2,900	440	2	Thingithu R.	4FA
Kanja Se H.Women Gr.	Mwangathia	840	750	0	Mariara Rive	4FA
Ihuri Water Project	Mwangathia	220	180	8	Mariara Rive	4FA
Karaene Water Proj.	Mwangathia	800	600	0	Mariara Riv	4FA
Ngonga-Makandune	Mwangathia	2,000	400	0	Thingithu Ri	4FA

Muranga District

Division Makuyu	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Punda Mfulia Ph 1	Makuyu	76	76	35	R. Athara	4BF
Punda Mfulia Ph 2	Makuyu	336	336	0	R. Thara	4BF
Division Kiharu	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Kamkaye (Gitari)	Mugoini	50	80	12	River	4BD
Muthithu (Kaga Kiagu)	Mugoini	60	100	8	River	4BD
Karuru/Mbari Ya Hit	Mugoinini	70	120	10	River	4BD
Division Kigumo	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Kanyarini	Nginda	200	300	50		4BE
Ikindu Drainage	Nginda	60	80	20		4BE
Ikuyu Drainage	Nginda	60	80	0		4BE

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (7/10)

Kianjinini Drainage		Nginda	350	400	100	4BE	
Division	Kangema	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Mukangae	Isego & Kany	60	160	0		4BA
	Ihigaini Irr.	Kamacharia	100	100	3	R. Karuma	4AD
	Gathambiro	Kanyenyaini	4	4	0		4AD
	Kagumoini Irr	Kiro	90	96	0	R. Gatuambug	4AD
Division	Kandara	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Nginyi/ Githanji	Gaichanjiru	90	180	0		4BF
	Ngumbo Valley	Gaichanjiru	60	85	40	River	4BF
	Muruka Valley	Muruka	50	50	40	River	4BF
	Makindi Valley	Muruka	45	45	38		4BF
	Thamuru Valley	Muruka	30	30	25	River	4BF
	Kahuma (Naaru) Dr	Muruka	6	6	2	Wells	4BF
	Ngararia Drainage	Muruka	26	26	0		4BF
	Kabuku Valley	Muruka	60	65	45		4BF
	Nguthuru Drainage	Muruka	8	8	3		4BF
Division	Galanga	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Thuita/ Mukurwe Irr	Kihumbuini	150	650	15	River	4BF

Nyeri District

Division	Tetu	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Kagumo	Aguthi	12	12	0	River Kagumo	4AC
	Kiahiti Irr Scheme	Aguthi	0	8	8	River Sagana	4AA
	Gikaka Irr Wat Assoc	Aguthi	6	8	4	R. Kanyiriri	4AB
	Gikumbo	Aguthi	0	0	0	River Gura	4AB
	Nyeri Hill S.H.P	Muboya	0	80	0	R. Muriwgato	4AB
	Kihora Irr S.H.P	Thegenge	100	250	0	River Kagumo	4AB
	Kagumo Irr Project	Thegenge	390	463	20	River	4AB
	Kiunyu Irr Scheme	Thegenge	80	125	2		4AB
Division	Othaya	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Kanithi	Chinga	0	0	0	River	4AC
	Nduye Valley	Iriai-Iri	45	60	0		4AC
	Gikeu S.H. Hort Proj	Karima	0	48	24	River Thuti	4AC
	Kamoko Irr Project	Mahiga	0	0	0	River Mumwe	4AC
Division	Municipality	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Thuta (Kiamwathi)	Mukaro	34	18	18		4AB
	Njengu Scheme	Mukaro	24	10	10		4AB
Division	Mukurweini	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Thiha Sagana Irr Sch	Rutune	120	128	0		4BB
Division	Mathira	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Itoga Farmers		80	80	40	River	
	Ihwagi Green Land	Iriaini	400	500	60		4BB
	Kangocho Water Furro	Iriaini	95	102	40	River	4BB
	Muteithia Irr Wat Pj	Kirimkuyu	350	380	0	River Ragati	4AA
	Hohwe Drainage Proje	Kirimkuyu	24	50	0		4AA
	Rathithi Drainage	Kirimkuyu	55	100	5		4AA
	Kanithi Irr Proj	Kooyu	260	800	0	River Ragati	4BB
	Kimbina Kagonyo Wat	Magutu	0	100	45	River	4AA
	Kanjuri Water Projec	Magutu	0	600	60	River	4AA

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (8/10)

Gikore Water Project	Magutu	100	200	0	River	4AA
Gitunduti Water Proj	Magutu	0	500	0	River	4AA
Upper Magutu Water	Magutu	330	1,232	0	River	4AA
Gaikunu/Kiangima Wat	Magutu	300	400	0	River	4AA
Ruturu	Ruguru	300	500	0		4AA
Sagana Scheme	Ruguru	0	600	300	River Sagana	4AA
Ruiruiru	Ruguru	0	100	40	R. Ruiruiru	4AA
Division Kieni West	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Ruricho	Gataragwa	250	600	36	R. Uasonyiro	4AA
Rurichu	Gataragwa	250	600	36	R. Uasonyiro	4AA
Kiugu Water Project	Mugunda	76	103	40	River	4AA
Kariguini Irr Scheme	Mugunda	0	124	0	R. Kariguini	4AA
Honi Ruhotie	Mweiga	68	172	44	R. Ruhotie	4AB
Kinyaiti Water Proje	Mwiyo	0	0	0	R. Thunthuru	4AB
Mithuni Imi Profil	Mwiyo	74	296	0	River Moyo	4AB
Division Kieni East	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Maragima & Tagwa	Thego	900	1,840	0		4AA
Ngogithi(Mathina)l S	Thego	160	200	200	R. Nairobi	4AA

Tana River District

Division Madogo	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Anoie			20			4GC
Koroso			25	5		4GC
Madogo	Madogo		53	53	Tana	4GC
Madogo Self Help	Madogo		12	10	Tana	4GC
Mulanjo			24			4GC
Sombo	Madogo		10	10	Tana	4GC
Division Garsen	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Golbanti			40		Tana	4GG
Hewani	Salama		32	32	Tana	4GG
Mnazini	Ndera		33	0	Tana	4GG
Ngao	Ngao		200	71	Tana	4GG
Oda	Ngao		24	24	Tana	4GG
Semikaro	Chara		40		Tana	4GF
Wema	Salama		59	59	Tana	4GG
Division Gatole	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Chanani			25	2	Tana	4GE
Chewani			15		Tana	4GE
Ghalamani		10	40	4	Tana	4GF
Laza Minor		100	45	40		4GF
Lenda			40		Tana	4GF
Mkwajuni			25		Tana	4GE
Ndura			40	10	Tana	4GE
Rhoka	Milalulu	60	39	39	Tana	4GE
Division Bura	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
Chewe Self Help	Chewe		10	1.5	Tana	4GE
Hida			25			4GD
Mkomani	Chewe		25	3	Tana	4GE
Murokani			25		Tana	4GO
Nanighi	Nanighi	100	25	2	Tana	4GD

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (9/10)

Shikadabu		10 15 Tana			4GG	
Division	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Amukram		50			4GC
	Gubatu		40			4GC
	Mbalambala	40	20		Tana	4GC
Division	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code
	Banngale	40	40			
	Chenle		20	20		
	Korocho 1st Farm		40	40		
	Mango		15	15		
	Mikomani	40	40			
	Nflindani	40	40			
	Mkwajin		10	10		
	Wanje Bububu	100	100		Tana	
	Wayu		40			

Tharaka-Nith District

Division	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code	
Tharaka	Thanantu	Gikingo	3,000	3,000	0	Thangatha	4FB
	Ura/Runkunu	Kanjoru	800	800	0	Runkunu River	4FB
	Ruungu Prop Irr Proj	Marimanti	400	250	0	Thingithu Ri	4FA
	Nthikuru	Marimanti	80	80	0	Thanantu	4FA
	Nkondi Proposed Sche	Marimanti	400	365	0	Kathitha Riv	4FA
	N'Guuru Gakirwe Ph 1	South Tharak	260	260	260	Kithiu Riv	4FA
	N'Guuru Gakirwe Ph 3	Tunyai	400	400	0	Kithiu River	4FA
	N'Guuru Gakirwe Ph 2	Tunyai	600	600	0	Kithiu River	4FA
	Nkarini Prop Project	Tunyai	300	300	0	Thingithu	4FA
	Tumbura	Turima	500	250	0	Kathitha Riv	4FA
Division	Location	Potential	Area in ha Proposed	Present	Water Source	Basin Code	
Nithi	Gitombani Water Proj	Chogoria	150	70	0	Kaoji Stream	4EA
	Ntumbara	Kajuka	20	20	0	Ruguti River	4EB
	Kandondo	Kajuka	26	26	0	Thuci River	4EB
	Nithini	Kajuki	40	40	0	Mara River	4EB
	Mugere	Kajuki	30	30	0	Mara River	4EB
	Ndeetha Proposed Pj	Kajuki	20	20	0	Naka River	4EB
	Kithinge	Kajuki	10	10	0	Mara River	4EB
	Kramuramba	Kajuki	30	30	0	Mara River	4EB
	Kigatuni	Kajuki	19	18	0	Thuci River	4EB
	Nkarambatu	Kajuki	20	20	0	Mara River	4EB
	Mpangua	Kajuki	18	18	0	Mutonga Rive	4EA
	Kiaritha Women Group	Kamwimbi	20	54	0	Thuci River	4EB
	Muthuari	Kamwimbi	140	140	0	Thuci	4EB
	Ntuntuni Irr Project	Karingani	100	60	0	Tungu River	4EB
	Iruma Magutini Proj	Kiera	400	365	12	N-Mara River	4EA
	Kieni	Kiera	80	80	2	N-Mara River	4EA
	Maara	Kiera	5	5	2	N Maara	4EA
	Thigaa	Kiera	70	70	12	Kirurumwe Ri	4EA
	Kamuu	Magumoni	13	13	0	Kamuu River	4EB
	Nhambo	Magumoni	40	25	15	Kathithuku	4EB
	Inamakithi	Magumoni	28	28	0	Mwirithi Riv	4EB
	Mwirithi	Magumoni	10	10	7	Mwirithi	4EB

Table 5.3.4 Irrigation Scheme List within the Tana River Basin (10/10)

Kamugoro Iri Projec	Magumoni	10	10	0		4FB
Gatwoni Water Scheme	Mugwe	14	40	40	Kathera Rive	4FB
Kamagutu Water Furro	Mugwe	30	20	0	Irigu River	4FB
Mbaraga Irigation	Mugwe	40	40	0	Ruguti River	4FB
Kathima Muchege	Mugwe	38	20	0	Kathima Rive	4FB
Katheru Water Farrow	Mugwe	15	10	0	Katheru Rive	4FB
Irigu Water Farrow	Mugwe	50	40	10	Irigu	4FB
Miigi Womens Group	Mwooge	15	7	0	Miigi Stream	4EB

Table 5.3.5 Water Permit Amount for each Sub-basin

BasinCode	Number	Normal						FLOOD						Unit:m3/day
		Public	Domestic	Minor	Industry	Power	Other	Public	Domestic	Minor	Industry	Power	Other	
4	123	123.34	1053.53	0.00	321.57	0.00	12,002.91	267.14	0.00	0.00	12.61	0.00	0.00	22,188.80
4A	4	4.78	0.00	4.78	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4AA	278	14,221.64	30.83	0.45	3.72	1.92	3,474.41	3,447.85	0.00	0.00	0.00	0.00	0.00	8.38
4AB	222	2,709.85	19.33	24.23	4,004.04	0.00	5.82	58,975.03	0.83	506.49	86,995.41	0.00	0.00	7.33
4AC	151	512,770.71	0.00	1.85	2,469.92	0.00	12.64	284.53	0.00	1,956.73	337.27	0.00	0.00	7,779
4AD	96	30.01	6.46	0.52	20.16	0.00	3.26	81.36	0.00	0.00	4.31	0.00	0.51	1.32
4AG	2	1.52	2.56	0.00	0.00	0.00	0.00	0.00	25.42	0.00	0.00	0.00	0.00	0.00
4B	12	0.59	32.64	0.00	130.58	0.00	0.00	3.33	0.00	0.00	0.00	0.00	0.00	0.00
4BA	74	34.40	0.00	0.00	31.84	0.00	8.16	56.89	0.00	0.00	12.23	0.00	0.00	1.41
4BB	302	874.25	586.09	0.89	199.74	72.02	44.40	2,152.76	0.00	0.00	3.16	0.25	10.00	17.20
4BC	242	114.64	0.14	4.85	19.80	7.52	180.50	1,766.05	7.69	0.00	30.76	138.52	0.00	2.76
4BD	145	32.83	102.10	0.00	102.61	0.00	1.32	434.60	0.00	0.00	18.13	0.00	0.00	0.55
4BE	245	118.58	561.29	0.00	104.18	0.00	16.52	817.22	41.81	0.00	26.35	0.00	0.00	7.28
4BF	86	62.94	2.82	0.27	55.22	69.28	41.95	26.41	0.00	0.00	44.16	0.00	0.00	0.00
4BG	45	23.68	0.00	0.00	1.28	0.00	1.46	1,417.43	0.00	0.00	0.00	0.00	0.00	1.75
4C	13	9.53	0.00	0.00	0.00	0.00	0.00	20.51	0.00	0.00	0.00	0.00	0.00	0.00
4CA	216	134.26	78.24	4.17	62.68	1,960.84	0.13	571.77	0.00	5.68	183.54	0.57	0.90	0.21
4CB	277	422.51	2.78	0.01	207.93	69.28	3.84	245.43	0.14	0.00	264.03	0.00	0.00	0.00
4CC	310	94.54	3,182.61	2.28	884.73	0.00	66.95	780.83	0.00	0.01	2,262.75	0.00	22.78	333.70
4CD	2	0.01	0.00	0.00	2.56	0.00	0.00	1.28	0.00	0.00	0.00	0.00	0.00	0.00
4D	9	0.52	0.00	0.00	1.29	0.00	0.00	91.32	0.00	0.00	242.75	0.00	0.00	0.00
4DA	370	74.18	25.30	2.56	70.06	51.27	152.67	607.95	0.00	0.26	216.15	0.00	0.00	6.66
4DB	152	81.51	0.00	0.52	33.64	0.00	5.26	408.92	0.00	0.35	636.66	0.00	2.56	365.94
4DC	183	140.56	99.32	0.00	69.49	431.50	107.69	645.42	0.59	0.00	33.25	386.37	0.00	290.09
4DD	81	9.13	0.00	0.00	0.00	0.00	0.24	26.91	0.00	0.00	0.00	0.00	0.00	0.41
4DE	4	0.04	0.00	0.00	0.00	0.00	0.00	2.56	0.00	0.00	0.00	0.00	0.00	0.00
4DF	3	0.02	0.00	0.00	0.00	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.00
4E	1	2.05	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00
4EA	97	145.28	110.95	0.53	228.17	0.00	20.01	211.72	630.07	5.78	0.00	0.00	0.00	3.59
4EB	288	1,819.64	476,904.56	0.67	6,458.28	0.39	601.13	15,933.89	16.13	2.30	11.93	0.23	0.00	151.97
4EC	100	91.97	0.25	0.00	60.96	0.00	3.55	176.13	2.56	0.00	10.67	0.00	0.00	13.22
4ED	2	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4F	934	701.97	203.31	0.57	118.55	33.32	325.27	3,548.05	70.35	2.02	198.78	18.47	0.00	416.97
4FR	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4G	32	42.83	2.56	0.00	0.00	0.00	0.00	25.57	0.00	0.00	0.00	0.00	0.00	0.00
4GA	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4GB	2	0.08	0.00	0.00	0.00	0.00	0.00	8.97	0.00	0.00	0.00	0.00	0.00	0.00
4GC	1	0.00	0.00	0.00	0.02	0.00	0.00	3.32	0.00	0.00	3.27	0.00	0.00	0.00
4J1	54	45.73	0.00	0.00	0.00	0.00	0.06	269.26	0.00	0.00	0.00	0.00	0.00	0.31
4JC	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4KA	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4LB	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4S	1	0.17	0.00	0.00	0.00	0.00	0.00	3.59	0.00	0.00	0.00	0.00	0.00	0.00
Total	5,165.00	534,939.57	483,067.67	49.15	13,396.39	2,697.34	27.50	94,012.21	795.59	2,479.62	91,448.17	544.91	46.75	2,829.64

Source : MoWD

Table 5.3.6 Index of Flow Condition

Basin	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4AA	1	0	0	1	1	1	1	1	1	1	1	1
4AB	0	0	0	1	1	1	1	1	1	1	1	1
4AC	1	1	1	1	1	1	1	1	1	1	1	1
4AD	1	1	1	1	1	1	1	0	1	1	1	1
4BA	1	1	1	1	1	1	1	1	1	1	1	1
4BB	1	1	1	1	1	1	1	1	1	1	1	1
4BC	1	1	1	1	1	1	1	1	1	1	1	1
4BD	1	1	1	1	1	1	1	1	1	1	1	1
4BE	1	1	1	1	1	1	1	1	1	1	1	1
4BF	1	1	1	1	1	1	1	1	1	1	1	1
4BG	1	1	1	1	1	1	1	1	1	1	1	1
4CA	1	1	0	1	1	1	1	1	1	1	1	1
4CB	1	1	0	1	1	1	1	1	1	1	1	1
4CC	1	1	0	1	1	1	1	1	1	1	1	1
4DA	1	1	1	1	1	1	1	1	1	1	1	1
4DB	1	1	0	1	1	1	1	1	1	1	1	1
4DC	1	0	0	1	1	1	1	1	1	1	1	1
4DD	1	1	1	1	1	1	1	1	1	1	1	1
4DE	1	1	0	1	1	1	1	1	1	1	1	1
4EA	1	1	1	1	1	1	1	1	1	1	1	1
4EB	1	1	1	1	1	1	1	1	1	1	1	1
4EC	1	1	1	1	1	1	1	1	1	1	1	1
4ED	1	0	0	1	1	1	1	0	0	0	1	1
4FA	1	1	1	1	1	1	1	1	1	1	1	1
4FB	1	1	1	1	1	1	1	1	1	1	1	1
4GA	1	1	1	1	1	1	1	1	1	1	1	1
4GB	1	1	1	1	1	1	1	1	1	1	1	1
4GC	1	1	1	1	1	1	1	1	1	1	1	1
4GD	1	1	1	1	1	1	1	1	1	1	1	1
4GE	1	1	1	1	1	1	1	1	1	1	1	1
4GF	1	1	1	1	1	1	1	1	1	1	1	1
4GG	1	1	1	1	1	1	1	1	1	1	1	1
4HA	1	1	1	1	1	1	0	0	1	0	1	1
4HB	1	1	1	1	1	1	1	1	1	1	1	1
4HC	1	1	1	1	1	1	1	1	1	1	1	1
4JA												
4JB												
4KA												
4KB												

Note: 1= Flood 0=Normal

Source : National Water Master Plan 1992, JICA

Table 5.3.7 Crop Water Requirement

(Unit : mm)

Station	Crop Type	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
Garissa	Type I	67		256	304	342	87		167	86	332	273	212	1820
	Type II	286	259	278	250	278	235	262	263	279	292	211	226	2772
Hola	Type I	21		379	319	335	52		233	145	338	307	271	2021
	Type II	310	311	315	243	264	223	255	281	300	282	237	291	2745
Kabondori	Type I		116	192	113	191	45	67	29	237	237	99	97	1105
	Type II	264	226	194	71	153	129	183	163	245	209	73	135	1638
Kiliakia	Type I			74										74
	Type II	111	128	72						25	23		27	294
Kitui	Type I	85	132		7	197	258	157		163	310	82	148	1213
	Type II	259	283	225	82	190	221	228	251	285	293	24	79	1946
Lamuria	Type I	2	28	127	128	88		58	134	240	218	51	53	749
	Type II	187	157	138	131	211	178	208	180	247	161	91	133	1379
Meru	Type I		26	133		65	99	22	24	232	144		8	639
	Type II	97	187	192		14	127	156	229	225	132			1059
Mwea	Type I		185	247	152	130	17		39	247	276	142	124	1198
	Type II	280	275	228	89	92	153	164	224	264	235	11	198	1839
Mwingi	Type I	100	167	24	88	234	245	135		181	299	143	114	1562
	Type II	284	276	255	138	228	210	205	268	278	281	84	159	2279
Nanyuki	Type I	7	81	159	74	141	403	94		31	125	112	85	694
	Type II	231	216	189	71	85	129	158	158	182	148	100	150	1382
Ngao	Type I	71		288	281	254	33	0	167	87	309	254	286	1554
	Type II	299	283	320	225	196	177	235	264	291	300	225	300	2475
Nyeri	Type I	0	86	168	57	47	68	16	9	63	202	119	40	686
	Type II	278	229	185	63		88	66	165	215	224	107	139	1387
Thika	Type I	127	272	253	57	83	21	16	115	215	296	155	16	1215
	Type II	283	280	208	40	114	132	133	151	242	227	116	185	1592
Yatta	Type I	206		124	147	249	224	25	183	10	253	200	255	1484
	Type II	293	267	234	156	185	185	172	231	268	277	161	216	2095

Type I : specific crops

Type II : Green gram

Source : Water Requirements for Irrigation in Kenya 1985 (Sep.), MOWD

Table 5.3.8 Monthly Irrigation Demand by Sub-basin 1995

Unit: m³/sec

Basin	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4AA	0.000	0.274	0.483	0.169	0.135	0.202	0.046	0.026	0.187	0.581	0.354	0.115
4AB	0.000	0.035	0.062	0.028	0.023	0.032	0.012	0.009	0.030	0.080	0.051	0.021
4AC	0.023	0.031	0.038	0.028	0.027	0.029	0.024	0.023	0.029	0.041	0.034	0.026
4AD	0.000	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.001	0.002	0.001	0.000
4BA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4BB	0.000	0.068	0.119	0.042	0.033	0.050	0.011	0.007	0.046	0.143	0.087	0.029
4BC	0.000	0.034	0.042	0.026	0.022	0.003	0.000	0.007	0.043	0.046	0.025	0.021
4BD	0.000	0.011	0.019	0.007	0.005	0.008	0.002	0.001	0.007	0.023	0.014	0.004
4BE	0.000	0.000	0.047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4BF	0.115	0.273	0.230	0.053	0.075	0.020	0.015	0.104	0.202	0.269	0.145	0.015
4BG	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4DA	0.722	3.107	2.429	1.049	1.644	1.247	0.586	3.270	4.220	2.821	1.426	1.689
4DB	0.448	1.464	2.069	0.558	0.680	0.756	0.351	0.975	2.875	1.845	0.609	0.975
4DC	0.000	0.148	0.178	0.113	0.094	0.013	0.000	0.028	0.184	0.199	0.106	0.089
4DD	0.000	0.029	0.043	0.026	0.043	0.010	0.015	0.006	0.055	0.053	0.023	0.022
4DE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4EA	0.000	0.010	0.047	0.000	0.023	0.036	0.008	0.008	0.084	0.051	0.000	0.003
4EB	0.000	0.019	0.086	0.000	0.042	0.066	0.014	0.016	0.155	0.093	0.000	0.005
4EC	0.000	0.087	0.130	0.079	0.130	0.032	0.046	0.020	0.166	0.161	0.070	0.066
4ED	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4FA	0.000	0.577	2.667	0.000	1.303	2.051	0.441	0.481	4.806	2.887	0.000	0.160
4FB	0.000	0.049	0.226	0.000	0.110	0.174	0.037	0.041	0.407	0.245	0.000	0.014
4GA	0.000	0.011	0.052	0.000	0.025	0.040	0.009	0.009	0.094	0.056	0.000	0.003
4GB	0.008	0.000	0.031	0.038	0.041	0.011	0.000	0.020	0.011	0.040	0.034	0.025
4GC	0.133	0.000	0.508	0.623	0.678	0.178	0.000	0.331	0.176	0.658	0.559	0.420
4GD	0.001	0.000	0.002	0.002	0.003	0.001	0.000	0.001	0.001	0.002	0.002	0.002
4GE	0.065	0.072	0.066	0.053	0.055	0.048	0.053	0.059	0.065	0.059	0.051	0.061
4GF	0.051	0.057	0.052	0.041	0.043	0.038	0.042	0.046	0.051	0.046	0.040	0.048
4GG	0.210	0.220	0.225	0.163	0.138	0.128	0.165	0.185	0.211	0.211	0.163	0.211
4HA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4HB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4HC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4JA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4JB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4KA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4KB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source : JICA Study Team

Table 5.3.9 Monthly Irrigation Demand by Sub-basin 2005

Unit: m³/sec

Basin	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4AA	0.000	1.701	3.002	1.052	0.840	1.256	0.286	0.161	1.163	3.610	2.197	0.715
4AB	0.000	0.368	0.648	0.233	0.187	0.277	0.068	0.041	0.257	0.785	0.480	0.160
4AC	0.023	0.048	0.068	0.039	0.035	0.042	0.027	0.025	0.040	0.077	0.056	0.033
4AD	0.000	0.036	0.064	0.022	0.018	0.027	0.006	0.003	0.025	0.077	0.047	0.015
4BA	0.000	0.057	0.100	0.035	0.028	0.042	0.010	0.005	0.039	0.121	0.073	0.024
4BB	0.000	0.414	0.730	0.256	0.204	0.305	0.070	0.039	0.283	0.877	0.534	0.174
4BC	0.217	0.695	0.603	0.325	0.462	0.362	0.175	0.842	1.141	0.757	0.399	0.496
4BD	0.000	0.090	0.159	0.056	0.045	0.067	0.015	0.009	0.062	0.192	0.117	0.038
4BE	0.000	0.000	0.238	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4BF	0.577	1.368	1.150	0.268	0.377	0.099	0.073	0.523	1.009	1.345	0.728	0.073
4BG	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4DA	1.049	5.023	4.502	1.843	2.570	1.858	0.846	4.494	6.982	4.887	2.320	2.726
4DB	0.448	1.630	2.269	0.685	0.785	0.771	0.351	1.007	3.082	2.068	0.728	1.075
4DC	0.000	0.492	0.594	0.378	0.313	0.042	0.000	0.094	0.614	0.664	0.353	0.298
4DD	0.000	0.055	0.082	0.050	0.082	0.020	0.029	0.012	0.105	0.102	0.044	0.042
4DE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4EA	0.000	0.223	1.030	0.000	0.504	0.793	0.171	0.186	1.857	1.116	0.000	0.062
4EB	0.000	0.098	0.453	0.000	0.221	0.348	0.075	0.082	0.816	0.490	0.000	0.027
4EC	0.000	0.419	0.627	0.381	0.623	0.152	0.219	0.095	0.799	0.773	0.334	0.317
4ED	0.000	0.010	0.014	0.009	0.014	0.003	0.005	0.002	0.018	0.018	0.008	0.007
4FA	0.000	2.980	13.770	0.000	6.730	10.591	2.278	2.485	24.820	14.909	0.000	0.828
4FB	0.000	0.318	1.470	0.000	0.718	1.131	0.243	0.265	2.649	1.591	0.000	0.088
4GA	0.000	0.051	0.237	0.000	0.116	0.182	0.039	0.043	0.427	0.256	0.000	0.014
4GB	0.010	0.000	0.039	0.048	0.052	0.014	0.000	0.026	0.014	0.051	0.043	0.032
4GC	0.236	0.000	0.900	1.105	1.203	0.316	0.000	0.587	0.313	1.168	0.992	0.746
4GD	0.762	0.000	2.911	3.572	3.889	1.022	0.000	1.899	1.011	3.776	3.208	2.411
4GE	0.011	0.000	0.201	0.175	0.178	0.028	0.000	0.124	0.079	0.179	0.168	0.144
4GF	1.586	0.392	2.841	4.280	2.902	3.086	1.480	0.443	2.611	4.646	3.250	3.299
4GG	0.340	0.357	0.364	0.265	0.223	0.208	0.268	0.301	0.342	0.342	0.265	0.342
4HA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4HB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4HC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4JA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4JB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4KA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4KB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: JICA Study Team

Table 5.3.10 Monthly Irrigation Demand by Sub-basin 2020

Unit: m³/sec

Basin	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4AA	0.000	2.928	5.167	1.811	1.445	2.161	0.492	0.277	2.002	6.212	3.782	1.230
4AB	0.000	0.506	0.892	0.319	0.256	0.379	0.091	0.054	0.352	1.079	0.659	0.219
4AC	0.023	0.065	0.098	0.049	0.044	0.054	0.030	0.027	0.052	0.113	0.078	0.041
4AD	0.000	0.071	0.125	0.044	0.035	0.052	0.012	0.007	0.049	0.151	0.092	0.030
4BA	0.000	0.057	0.100	0.035	0.028	0.042	0.010	0.005	0.039	0.121	0.073	0.024
4BB	0.000	0.672	1.186	0.416	0.332	0.496	0.113	0.064	0.460	1.426	0.868	0.282
4BC	0.217	0.695	0.603	0.325	0.462	0.362	0.175	0.842	1.141	0.757	0.399	0.496
4BD	0.000	0.107	0.188	0.066	0.053	0.079	0.018	0.010	0.073	0.226	0.138	0.045
4BE	0.000	0.000	0.238	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4BF	0.738	1.751	1.471	0.342	0.482	0.126	0.093	0.669	1.291	1.721	0.931	0.093
4BG	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4CC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4DA	1.049	5.382	4.935	2.118	2.798	1.889	0.846	4.562	7.430	5.372	2.578	2.943
4DB	0.448	1.660	2.306	0.709	0.805	0.773	0.351	1.012	3.120	2.109	0.750	1.094
4DC	0.000	0.741	0.894	0.568	0.470	0.064	0.000	0.141	0.923	0.999	0.531	0.449
4DD	0.000	0.077	0.115	0.070	0.114	0.028	0.040	0.017	0.146	0.142	0.061	0.058
4DE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4EA	0.000	0.383	1.770	0.000	0.865	1.361	0.293	0.319	3.190	1.916	0.000	0.107
4EB	0.000	0.142	0.657	0.000	0.321	0.506	0.109	0.119	1.185	0.712	0.000	0.040
4EC	0.000	0.616	0.921	0.560	0.916	0.223	0.321	0.139	1.175	1.137	0.491	0.465
4ED	0.000	0.019	0.029	0.017	0.029	0.007	0.010	0.004	0.037	0.035	0.015	0.014
4FA	0.000	4.142	19.136	0.000	9.352	14.719	3.165	3.453	34.493	20.719	0.000	1.151
4FB	0.000	0.587	2.714	0.000	1.326	2.087	0.449	0.490	4.892	2.938	0.000	0.163
4GA	0.000	0.077	0.355	0.000	0.173	0.273	0.059	0.064	0.639	0.384	0.000	0.021
4GB	0.013	0.000	0.048	0.059	0.064	0.017	0.000	0.031	0.017	0.062	0.053	0.040
4GC	0.338	0.000	1.293	1.587	1.728	0.454	0.000	0.844	0.449	1.677	1.425	1.071
4GD	2.023	0.000	7.731	9.487	10.329	2.715	0.000	5.044	2.684	10.027	8.520	6.403
4GE	0.265	0.294	0.269	0.215	0.226	0.197	0.218	0.240	0.265	0.241	0.209	0.249
4GF	5.010	0.563	9.063	14.554	9.477	10.163	4.217	0.505	8.906	16.389	11.461	11.609
4GG	0.472	0.495	0.505	0.367	0.310	0.289	0.371	0.417	0.475	0.474	0.367	0.474
4HA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4HB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4HC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4JA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4JB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4KA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4KB	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source : JICA Study Team

Table 5.4.1 Municipal/Industrial Water Demand Projection

	Rural		Urban		Rural Demand		Urban Demand		Livestock		Indust.		Total Demand (m ³ /d)	Per Capita Demand (l/d/c)	Demand (m ³ /s)
	Popul.	Popul.	Resid. (m ³ /d)	Non-res. (m ³ /d)	Total (m ³ /d)	Resid. (m ³ /d)	Non-res. (m ³ /d)	Total (m ³ /d)	Water (m ³ /d)	Water (m ³ /d)	Water (m ³ /d)	Total (m ³ /d)			
Nairobi															
1990	0	1,413,100	0	0	0	175,048	29,286	204,334	192	128,300	332,826	236	3.85		
1995	0	1,780,000	0	0	0	220,498	36,891	257,388	225	167,417	425,030	239	4.92		
2000	0	2,260,000	0	0	0	286,173	46,839	333,011	257	218,953	552,221	244	6.39		
2005	0	2,785,000	0	0	0	352,651	57,719	410,370	301	249,690	660,361	237	7.64		
2010	0	3,465,000	0	0	0	448,284	71,812	520,097	345	281,668	802,110	231	9.28		
2015	0	4,333,000	0	0	0	560,582	89,801	650,383	389	318,681	969,454	224	11.22		
2020	0	5,416,000	0	0	0	700,695	112,247	812,942	433	360,559	1,173,933	217	13.59		
Kirinyaga															
1990	413,000	19,400	7,641	3,428	11,068	2,403	402	2,805	2,764	457	17,095	881	0.20		
1995	434,000	30,000	12,152	3,602	15,754	3,716	622	4,338	3,060	657	23,809	794	0.28		
2000	474,000	45,000	17,064	3,934	20,998	5,698	933	6,631	3,355	857	31,841	708	0.37		
2005	516,000	58,000	18,576	4,283	22,859	7,344	1,202	8,546	3,754	1,058	36,216	624	0.42		
2010	559,000	74,000	29,068	4,640	33,708	9,574	1,534	11,107	4,152	1,258	50,225	679	0.58		
2015	610,000	103,000	31,720	5,063	36,783	13,326	2,135	15,460	4,551	1,423	58,217	565	0.67		
2020	665,000	141,000	34,580	5,520	40,100	18,242	2,922	21,164	4,949	1,610	67,823	481	0.78		
Muranga															
1990	833,776	65,000	15,425	6,920	22,345	8,052	1,347	9,399	4,709	673	37,126	571	0.43		
1995	893,000	90,000	25,004	7,412	32,416	11,149	1,865	13,014	5,022	965	51,416	571	0.60		
2000	959,000	129,000	34,524	7,960	42,484	16,335	2,674	19,008	5,334	1,257	68,083	528	0.79		
2005	1,039,000	156,000	37,404	8,624	46,028	19,754	3,233	22,987	5,879	1,545	76,438	490	0.88		
2010	1,126,000	189,000	58,552	9,346	67,898	24,452	3,917	28,369	6,424	1,833	104,524	553	1.21		
2015	1,214,000	245,000	63,128	10,076	73,204	31,697	5,078	36,775	6,969	2,074	119,022	486	1.38		
2020	1,311,000	316,000	68,172	10,881	79,053	40,883	6,549	47,432	7,514	2,346	136,345	431	1.58		

Table S.4.2 Municipal/Industrial Water Demand Projection

	Rural Demand		Urban Demand		Livestock		Indust.		Total Demand (m ³ /d)	Per Capita Demand (l/d/c)	Per Demand (m ³ /s)		
	Popul.	Urban Popul.	Resid. (m ³ /d)	Non-res. (m ³ /d)	Total (m ³ /d)	Resid. (m ³ /d)	Non-res. (m ³ /d)	Total (m ³ /d)				Water (m ³ /d)	Water (m ³ /d)
Nyeri													
1990	540,096	107,200	9,992	4,483	14,475	13,279	2,222	15,501	3,916	2,521	36,413	340	0.42
1995	544,000	162,000	15,232	4,515	19,747	20,068	3,357	23,425	4,172	3,546	50,889	314	0.59
2000	561,000	243,000	20,196	4,656	24,852	30,770	5,036	35,806	4,427	4,570	69,655	287	0.81
2005	611,000	318,000	21,996	5,071	27,067	40,267	6,591	46,857	5,208	5,489	84,621	266	0.98
2010	673,000	412,000	34,996	5,586	40,582	53,303	8,539	61,841	5,989	6,407	114,819	279	1.33
2015	716,000	573,000	37,232	5,943	43,175	74,132	11,875	86,007	6,770	7,249	143,201	250	1.66
2020	768,000	790,000	39,936	6,374	46,310	102,206	16,373	118,579	7,551	8,202	180,642	229	2.09
Embu													
1990	361,491	20,400	6,688	3,000	9,688	2,527	423	2,950	2,655	488	15,781	774	0.18
1995	408,000	32,000	11,424	3,386	14,810	3,964	663	4,627	2,907	694	23,039	720	0.27
2000	450,000	51,000	16,200	3,735	19,935	6,458	1,057	7,515	3,159	900	31,509	618	0.36
2005	494,000	65,000	17,784	4,100	21,884	8,231	1,347	9,578	3,469	1,095	36,026	554	0.42
2010	537,000	82,000	27,924	4,457	32,381	10,609	1,699	12,308	3,779	1,290	49,758	607	0.58
2015	592,000	115,000	30,784	4,914	35,698	14,878	2,383	17,262	4,089	1,460	58,508	509	0.68
2020	651,000	160,000	33,852	5,403	39,255	20,700	3,316	24,016	4,399	1,651	69,322	433	0.80
Meru													
1990	1,121,545	91,900	20,749	9,309	30,057	11,384	1,905	13,289	8,814	1,637	53,797	585	0.62
1995	1,271,000	145,000	35,588	10,549	46,137	17,962	3,005	20,967	9,867	2,331	79,302	547	0.92
2000	1,403,000	229,000	50,508	11,645	62,153	28,997	4,746	33,743	10,921	3,024	109,841	480	1.27
2005	1,546,000	295,000	55,656	12,832	68,488	37,354	6,114	43,468	12,283	3,685	127,924	434	1.48
2010	1,691,000	376,000	87,932	14,035	101,967	48,645	7,793	56,438	13,646	4,346	176,397	469	2.04
2015	1,870,000	529,000	97,240	15,521	112,761	68,439	10,964	79,403	15,008	4,917	212,089	401	2.45
2020	2,066,000	736,000	107,432	17,148	124,580	95,220	15,254	110,474	16,370	5,563	256,987	349	2.97

Table 5.4.3 Municipal/Industrial Water Demand Projection

	Rural		Urban		Rural Demand		Urban Demand		Livestock		Indust.		Total Demand (m ³ /d)	Per Capita Demand (l/d/c)	Per Capita Demand (m ³ /s)
	Popul.	Urban Popul.	Resid. (m ³ /d)	Non-res. (m ³ /d)	Total (m ³ /d)	Resid. (m ³ /d)	Non-res. (m ³ /d)	Total (m ³ /d)	Water (m ³ /d)	Total (m ³ /d)	Water (m ³ /d)	Total (m ³ /d)			
Mackakos (Assuming that water to two thirds of area will be supplied from the other source.)															
1990	440,000	55,333	8,140	3,652	11,792	6,854	1,147	8,001	3,110	1,024	23,927	432	0.28		
1995	487,000	86,667	13,636	4,042	17,678	10,736	1,796	12,532	3,385	1,433	35,028	404	0.41		
2000	530,333	131,667	19,092	4,402	23,494	16,672	2,729	19,401	3,660	1,842	48,397	368	0.56		
2005	584,667	170,000	21,048	4,853	25,901	21,526	3,523	25,050	4,102	2,197	57,250	337	0.66		
2010	641,667	217,333	33,367	5,326	38,693	28,118	4,504	32,622	4,544	2,553	78,411	361	0.91		
2015	705,000	303,000	36,660	5,852	42,512	39,201	6,280	45,480	4,986	2,888	95,866	316	1.11		
2020	774,000	417,667	40,248	6,424	46,672	54,036	8,656	62,692	5,428	3,268	118,060	283	1.37		
Kiambu															
1990	866,000	105,500	16,021	7,188	23,209	13,069	2,186	15,255	4,827	9,405	52,696	499	0.61		
1995	937,000	156,000	26,236	7,777	34,013	19,325	3,233	22,558	5,248	12,884	74,702	479	0.86		
2000	1,007,000	241,538	36,252	8,358	44,610	30,585	5,006	35,591	5,669	16,362	102,232	423	1.18		
2005	1,103,000	302,000	39,708	9,155	48,863	38,241	6,259	44,500	6,407	19,006	118,775	393	1.37		
2010	1,207,000	376,000	62,764	10,018	72,782	48,645	7,793	56,438	7,144	21,649	158,013	420	1.83		
2015	1,312,000	511,000	68,224	10,890	79,114	66,111	10,590	76,701	7,882	24,494	188,190	368	2.18		
2020	1,427,000	690,000	74,204	11,844	86,048	89,269	14,300	103,569	8,619	27,713	225,949	327	2.62		
Isiolo															
1990	47,000	27,896	870	390	1,260	3,456	578	4,034	7,465	172	12,930	464	0.15		
1995	50,000	50,000	1,400	415	1,815	6,194	1,036	7,230	9,426	245	18,716	374	0.22		
2000	50,000	79,000	1,800	415	2,215	10,003	1,637	11,641	11,386	318	25,560	324	0.30		
2005	61,000	106,000	2,196	506	2,702	13,422	2,197	15,619	18,594	388	37,303	352	0.43		
2010	74,480	136,000	3,873	618	4,491	17,595	2,819	20,414	25,802	458	51,165	376	0.59		
2015	83,000	199,000	4,316	689	5,005	25,746	4,124	29,870	33,010	518	68,403	344	0.79		
2020	95,000	285,000	4,940	789	5,729	36,872	5,907	42,779	40,218	586	89,311	313	1.03		

Table 6.2.1 Principal Feature of Major Hydropower Facility

	Unit	Masinga		Kamburu		Gitaru Kindaruma		Kiambere		Mutonga Grand Falls		High	
		1981	2056	1974, 1976	2050	1978	2053	1968	2043	1988	2063	Low	High
Commissioning Year													
Retirement Year													
Hydrology													
Catchment Area	(km ²)	7,335		9,520		9,520		9,807		11,975		15,365	17,570
Average Flow	(m ³ /s)	87.4		107.5		107.8		108.0		111.2		145.4	160.7
Design Flood	(m ³ /s)	2,700		4,650		4,650		3,600		5,500		10,900	12,800
Dam and Reservoir													
Dam Volume	(mil. m ³)									8.75		0.81	5.56
Dam Height	(m)									110		47	83
Dam Crest El.	(m)									705		555	517
Reservoir Area	(km ²)	116.0		15.2		3.1		2.5		25.0		10.9	65.7
Dead Storage	(mil. m ³)	156.0		24.0		1.0		1.0		100.0		49.5	305.9
Live Storage	(mil. m ³)	1,410.0		135.0		12.5		7.5		485.0		82.5	935.2
Total Storage	(mil. m ³)	1,566.0		159.0		13.5		8.5		585.0		132.0	1,261.1
Regulation Ratio(=Live S./Inflow)		0.512		0.040		0.004		0.002		0.138		0.018	0.188
Head													
Reservoir FSL	(m)	1,056.5		1,006.5		924.0		780.4		700.0		550.0	512.0
Reservoir MOL	(m)	1,031.0		990.0		922.0		776.8		663.5		538.5	491.4
Average TWL	(m)	1,006.0		935.3		780.0		743.4		542.0		510.6	441.1
Gross Head	(m)	50.5		71.2		144.0		37.0		158.0		39.4	70.9
Net Rated Head	(m)	49.0		66.6		141.7		36.5		148.8		39.0	69.1
Power Plant													
Turbine Type		Kaplan		Francis		Francis		Kaplan		Francis		Francis	Francis
Installed Capacity	(MW)	40.0		94.2		145.0		44.0		144.0		60.0	140.0
Maximum Output	(MW)			84.0		145.0		44.0		140.0		60.0	140.0
Firm Output	(MW)	12.9		64.0		145.0		44.0		92.0		59.4	135.2
Unit Nos.		2		3		2		2		2		2	2
Plant Max. Discharge	(m ³ /s)	91.8		142.5		113.4		137.7		104.4		174.0	227.0
Revolving speed	(rpm)	300.0		273.0		272.7		214.3		300.0			211.0
Waterway													
Headrace Tunnel	(nos.)	1		1		-		-		1		1	2
Dia. x Length	(m)	3.5 x 245		4.69x160		-		-		6.1x4,060		-	-
Manning's coefficient		0.013								0.015			
Penstock	(nos.)	-		3		2		2		-		-	-
Dia. x Length	(m)	-		2.7x35		4.2 x 317		4.7x49		-		-	-
Tailrace Tunnel	(nos.)	-		1		1		(Open)		1		1	1
Dia. x Length	(m)	-		8.21x2900		8.8x4775		-		6.25x1,400		-	-
Manning's coefficient		-								0.015			

Table 6.3.1 Comparison of Development Alternatives

(Unit: 1,000 US\$)

Work Item	Mutonga	Low G/F	Low G/F + Mutonga	HGF
I. PROJECT COST				
1. Civil Works				
1.1 Preparatory Work	3,270	19,166	22,436	21,266
1.2 Diversion Tunnel	21,843	39,618	61,461	29,988
1.3 Main Dam and Cofferdam	13,248	82,186	95,434	289,032
1.4 Spillway	41,717	36,708	78,425	101,660
1.5 Power Tunnels/Shafts	4,512	8,683	13,195	4,820
1.6 Surge Tank and Penstock	506	4,716	5,222	0
1.7 Powerhouse	6,581	14,124	20,705	17,294
1.8 Tailrace and Outlet Channel	1,933	3,675	5,608	6,920
Total (1)	93,610	208,876	302,486	470,980
2. Metal Work	30,364	40,449	70,813	37,879
3. Generating and Substation Equipment	45,498	63,798	109,296	71,440
4. Transmission Line	1,481	9,707	11,188	9,707
Total of Direct Construction Cost (1 to 4)	170,953	322,830	493,783	590,006
5. Eng. Service and Administration	17,095	32,283	49,378	59,001
6. Land Aquisition/Compensation	4,942	15,169	20,111	30,969
7. Physical Contingency	17,909	37,029	54,938	76,598
Project Cost (1 to 7)	210,899	407,311	618,210	756,574
8. Economic Cost (89%)	187,700	362,507	550,207	673,351
II. POWER OUTPUT				
1. Installed Capacity (MW)	60	140	200	200
2. Firm Output (MW)	58	134	192	197
3. Average Energy (GWh/year)	337	715	1,052	1,108
III. ECONOMIC EVALUATION				
1. Power Benefit (x 10 ⁵ \$/year)	7.0	16.3	23.3	20.4
2. Energy Benefit (x 10 ⁵ \$/year)	23.8	50.4	74.2	78.1
3. Annual Benefit (x 10 ⁶ \$/year)	30.8	66.7	97.5	98.5
4. Present Worth of Cost (x 10 ⁵ \$/year)	161.9	297.8	387.9	514.1
5. Present Worth of Benefit (x 10 ⁵ \$/year)	182.1	351.8	455.6	414.4
6. Benefit/Cost	1.12	1.18	1.17	0.81
7. Net Present Worth (x 10 ⁵ \$)	20.2	54.0	67.7	-99.7
8. Internal Rate of Return (%)	13.4	13.8	13.8	10.1
9. Unit Generation Cost (¢/kWh)	8.1	7.9	7.9	11.0

Remarks: Unit generation cost is obtained by dividing present worth of cost by present worth of average energy at discount rate of 12 % for 50 years in the year of commissioning power generation.

Table 6.3.2 Estimated Monthly Discharge at Mutonga Dam Site

Unit : m³/s

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1947	110.42	72.56	86.35	317.68	677.57	336.37	188.38	113.68	86.99	73.95	183.56	122.57	192.51
1948	58.06	42.82	51.78	153.87	224.03	150.36	98.12	75.89	62.49	83.76	201.34	233.36	119.73
1949	93.34	63.60	27.32	122.88	111.59	77.19	54.11	49.91	38.11	42.31	82.72	100.96	72.00
1950	65.06	39.80	70.12	315.24	337.99	172.54	104.29	105.94	119.98	77.89	145.17	106.26	128.36
1951	51.94	32.57	54.01	466.73	395.93	314.14	150.43	127.11	84.00	143.63	349.24	371.15	212.24
1952	178.52	96.61	48.83	101.07	314.13	126.23	84.61	75.59	65.19	92.06	139.56	117.63	117.63
1953	59.21	33.60	29.70	166.99	465.86	280.20	136.53	71.08	57.71	108.29	197.91	154.68	99.06
1954	74.49	40.62	45.02	93.09	175.03	109.41	69.96	74.35	78.95	92.09	131.06	126.13	143.51
1955	70.81	58.11	43.10	330.28	475.06	231.05	122.08	96.86	66.95	91.46	134.03	123.14	92.45
1956	167.88	104.03	79.79	171.93	462.11	205.48	73.31	37.38	78.27	83.36	181.61	116.99	116.99
1957	64.84	44.22	33.91	104.57	563.08	283.74	149.05	99.77	60.45	46.05	150.56	182.88	126.63
1958	81.52	67.18	68.21	169.78	179.42	89.81	61.42	47.00	72.10	54.13	101.20	162.66	148.61
1959	101.95	54.99	47.61	108.94	218.76	83.12	74.91	85.69	47.25	78.72	159.45	82.00	98.69
1960	66.03	44.61	55.56	153.97	477.01	174.49	101.47	84.18	110.41	52.22	1516.60	736.46	90.09
1961	48.80	39.77	38.51	477.04	673.60	294.89	127.95	90.24	110.41	52.22	1516.60	736.46	298.85
1962	326.32	145.29	105.60	477.04	673.60	294.89	127.95	90.24	110.41	52.22	1516.60	736.46	298.85
1963	89.28	65.92	68.23	477.04	673.60	294.89	127.95	90.24	110.41	52.22	1516.60	736.46	298.85
1964	189.26	88.19	93.80	477.04	673.60	294.89	127.95	90.24	110.41	52.22	1516.60	736.46	298.85
1965	125.08	70.99	57.40	106.31	220.43	104.29	66.34	60.14	48.29	67.95	149.83	149.83	200.79
1966	79.48	64.28	93.18	405.77	336.40	151.52	98.20	76.01	69.70	83.74	379.28	105.52	161.92
1967	64.15	50.44	43.86	113.65	733.65	316.79	148.28	113.32	102.57	107.88	418.27	269.20	216.74
1968	115.17	94.72	227.53	453.05	254.70	120.37	81.27	75.76	71.64	69.84	115.35	111.71	125.33
1969	192.55	143.07	145.46	122.26	254.70	120.37	81.27	75.76	71.64	69.84	115.35	111.71	125.33
1970	80.28	65.23	74.73	439.35	356.57	172.62	102.03	84.53	72.85	77.66	92.85	60.55	139.94
1971	50.58	38.78	31.61	119.86	347.15	154.66	101.03	88.45	68.36	61.78	70.18	76.84	100.77
1972	64.58	74.15	49.52	51.39	163.70	154.87	82.94	64.77	56.05	143.02	401.98	184.59	124.50
1973	116.50	85.56	61.51	131.98	183.98	129.64	78.63	70.79	63.06	71.91	135.63	90.42	101.63
1974	55.11	45.91	50.60	235.84	200.39	121.64	211.46	118.10	83.19	72.69	136.51	87.06	118.21
1975	58.81	45.68	42.05	152.62	203.76	112.87	76.18	70.46	62.99	84.10	109.46	81.29	91.69
1976	53.52	44.56	40.20	105.51	153.92	102.16	71.79	54.45	52.60	59.17	89.24	99.26	77.18
1977	78.10	57.16	60.22	445.03	637.68	231.61	110.00	82.85	63.35	67.85	399.49	289.61	210.24
1978	148.55	100.86	221.26	635.17	496.91	163.46	106.90	86.24	72.50	106.79	218.20	215.18	214.34
1979	145.01	219.65	150.47	343.93	511.06	381.89	153.19	97.94	75.96	86.12	240.21	120.55	210.50
1980	76.54	65.07	59.32	96.27	273.34	149.22	90.66	76.52	64.32	68.20	333.03	188.31	128.40
1981	87.35	63.45	126.42	520.38	508.62	226.37	107.35	79.89	67.76	83.62	141.47	112.29	177.08
1982	83.78	61.87	54.21	203.45	491.95	269.54	111.16	76.93	64.77	226.78	353.26	279.02	189.72
1983	126.47	81.36	63.65	172.60	464.37	171.82	98.50	72.29	61.60	69.12	133.62	96.14	134.29
1984	93.59	63.54	56.49	68.86	86.62	55.87	50.29	47.05	47.53	135.53	241.02	185.71	94.34
1985	89.03	69.67	72.71	342.93	464.79	190.48	99.10	72.48	59.83	61.74	116.17	97.66	144.72
1986	64.86	52.01	54.25	187.24	502.83	237.78	105.02	67.91	54.95	58.69	157.37	262.64	150.46
1987	114.34	68.88	56.08	130.06	206.02	200.78	98.35	84.93	68.06	52.45	134.04	127.12	111.76
1988	74.34	63.54	527.69	527.69	653.87	185.28	99.90	79.06	74.26	95.28	286.96	215.87	202.53
1989	173.74	96.61	79.98	212.97	344.12	166.72	90.58	68.85	62.71	144.23	417.59	389.05	187.26
1990	278.16	105.03	242.11	588.89	451.25	208.86	111.62	84.59	72.08	114.82	243.37	260.25	230.09
1991	204.68	110.01	146.28	227.23	463.03	263.21	153.45	115.92	78.03	105.01	205.96	112.36	182.19
1992	108.29	81.48	80.82	151.42	273.01	187.75	145.18	122.42	77.57	77.21	158.49	193.29	138.08
1993	153.33	220.63	148.38	141.21	308.28	188.65	121.27	85.71	63.40	46.02	96.68	129.27	141.90
1994	45.92	37.26	48.06	159.00	453.61	321.64	184.27	90.71	62.15	101.58	591.87	253.56	194.14
1995	106.41	74.46	78.29	237.91	373.98	189.24	106.97	83.70	69.27	97.46	233.91	187.52	152.03

Table 6.3.3 Estimated Monthly Discharge at Grand Falls Dam Site

Year	Month												Mean
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
1947	123.15	83.72	100.70	347.14	708.01	352.70	169.56	121.18	94.41	360.20	163.46	141.22	207.45
1948	68.96	53.14	65.23	177.02	246.87	163.57	107.86	86.95	69.22	96.50	227.73	290.34	137.20
1949	112.63	80.03	28.44	134.92	125.05	86.85	61.30	86.85	43.44	45.74	87.93	110.08	81.02
1950	77.66	49.89	89.93	352.29	363.97	186.78	114.35	115.42	127.07	82.65	160.88	118.50	153.28
1951	62.23	39.04	66.59	503.09	427.43	331.65	168.99	140.19	92.10	157.79	386.08	421.38	233.05
1952	197.17	111.62	52.04	113.74	328.94	138.21	91.92	82.15	70.51	98.20	155.23	94.71	127.86
1953	69.69	41.40	59.24	114.11	209.18	116.59	69.94	79.57	62.78	116.71	229.39	189.93	112.46
1954	89.01	48.84	33.60	153.16	488.82	293.99	146.14	117.99	85.54	90.05	157.90	148.55	156.88
1955	84.59	69.08	52.13	107.75	192.64	120.62	78.16	51.00	72.90	88.98	145.18	128.92	102.66
1956	185.20	117.52	100.65	359.92	509.94	248.88	134.88	107.00	86.65	94.10	200.57	126.05	189.33
1957	75.89	51.64	40.62	181.20	490.48	217.01	80.60	53.27	43.21	52.67	182.70	220.82	140.84
1958	93.45	79.06	74.04	119.78	594.64	295.18	157.48	167.36	67.36	55.82	112.30	185.84	161.86
1959	114.38	64.35	55.00	104.34	278.70	295.18	84.15	73.59	78.14	59.96	117.35	154.48	110.34
1960	76.73	51.89	66.75	204.17	197.65	98.55	68.86	53.40	53.40	88.28	179.30	94.28	102.80
1961	57.44	46.27	44.38	130.40	242.19	92.51	81.77	91.75	115.94	561.57	1648.18	796.94	325.78
1962	348.80	160.41	118.70	172.82	519.19	191.39	113.80	191.39	92.53	109.81	115.87	108.55	178.92
1963	100.35	75.81	77.79	428.46	717.32	310.81	139.52	100.66	79.23	71.09	177.61	108.55	220.16
1964	221.77	102.49	106.36	511.84	497.70	111.12	188.36	111.12	85.69	108.48	135.92	238.89	201.92
1965	148.74	84.96	68.95	122.00	236.80	115.42	76.28	69.44	57.17	81.15	326.73	176.37	130.50
1966	89.77	73.97	105.17	469.08	382.75	167.55	109.57	84.32	76.21	92.65	447.30	126.91	185.44
1967	74.19	57.84	50.01	128.55	820.96	339.78	156.38	124.74	112.75	210.52	476.56	353.59	240.49
1968	131.06	109.74	258.16	503.16	561.67	324.27	191.30	140.38	103.07	122.39	452.57	738.36	303.01
1969	221.18	164.02	170.17	151.35	238.36	138.17	94.64	92.04	79.73	86.90	134.37	129.36	144.94
1970	91.61	75.10	36.18	468.05	371.48	183.91	110.95	94.53	74.62	69.77	82.46	87.88	109.96
1971	56.92	44.13	57.57	59.29	181.98	164.70	89.81	69.65	60.26	159.03	445.32	206.93	137.22
1972	130.35	92.35	67.82	142.61	191.60	135.74	83.57	75.12	67.11	76.13	148.74	97.48	109.05
1973	65.17	50.40	46.09	265.86	217.46	130.84	218.29	123.67	87.80	77.29	154.96	105.04	129.08
1974	59.15	49.87	59.03	178.00	212.62	118.71	80.55	74.23	66.22	88.32	127.74	91.15	99.93
1975	65.17	50.40	43.25	113.51	162.29	108.37	76.13	58.26	55.55	62.37	97.29	113.58	83.29
1976	59.47	49.40	63.87	472.09	698.55	248.84	125.04	95.36	74.16	76.42	432.19	331.75	228.69
1977	87.19	116.43	272.39	708.35	544.06	186.01	122.04	98.46	82.88	131.95	245.37	257.38	244.85
1978	172.84	177.74	181.70	372.40	550.22	402.00	167.29	109.69	84.95	95.23	271.48	135.06	233.30
1979	36.14	73.45	66.09	106.66	285.17	157.33	97.54	82.13	69.84	73.69	354.11	200.95	137.76
1980	96.38	70.30	61.95	547.17	542.37	243.67	120.78	90.29	75.42	95.44	389.07	312.08	207.98
1981	95.31	71.73	81.95	222.28	516.21	294.65	122.08	101.94	72.26	246.26	207.78	107.35	192.06
1982	145.86	95.06	73.80	187.28	486.74	183.52	108.19	80.94	69.45	153.02	149.71	107.35	146.99
1983	103.87	69.98	61.85	374.67	495.02	60.38	54.43	51.06	51.37	69.93	279.21	119.04	159.63
1984	98.67	78.21	61.38	209.31	527.08	251.38	115.67	76.06	62.70	65.95	185.05	299.38	165.67
1985	74.58	78.54	64.50	151.19	218.22	210.80	106.20	91.46	72.30	55.37	147.78	142.01	122.26
1986	128.79	78.54	70.80	565.54	685.84	199.94	108.61	87.61	80.64	108.17	323.28	269.48	220.22
1987	82.90	59.84	92.46	236.64	365.32	181.68	102.03	78.36	71.02	157.52	457.53	427.23	206.12
1988	196.94	106.76	266.14	627.79	475.79	225.25	127.73	96.63	81.20	129.93	282.66	289.21	252.21
1989	303.02	121.19	170.86	258.35	490.13	286.67	173.70	128.98	82.67	113.78	245.13	137.21	204.01
1990	223.17	126.75	100.42	176.34	296.81	198.78	152.89	128.98	82.67	81.05	171.21	208.34	151.37
1991	125.18	235.20	158.26	154.07	323.10	203.48	131.28	94.35	70.63	52.28	109.13	142.35	153.46
1992	167.29	57.24	55.99	150.26	467.37	332.00	193.18	98.46	68.54	120.10	634.57	281.48	208.80
1993	129.67	93.92	117.59	262.15	349.20	202.62	116.96	92.69	76.45	107.31	291.46	212.12	167.80
1994	120.66	85.12	90.82	262.15	349.20	202.62	116.96	92.69	76.45	107.31	291.46	212.12	167.80
Mean	120.66	85.12	90.82	262.15	349.20	202.62	116.96	92.69	76.45	107.31	291.46	212.12	167.80

Table 6.3.4 Monthly Mean Flow at 4F13 (without Project, 2020 Water Abstraction)

(Unit: m³/s)

	Monthly Mean Flow (m ³ /s)												Daily				
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Min.	Avg.	Max.	Min.	Max.
1957	126.48	111.40	105.51	112.58	212.68	177.82	70.58	81.13	88.39	87.90	131.74	156.05	70.58	122.02	212.68	60.40	380.46
1958	106.72	79.52	69.23	92.32	246.00	255.44	128.78	116.00	104.93	105.27	114.36	154.75	62.23	131.11	255.44	62.63	440.60
1959	102.02	74.83	65.36	75.69	114.70	75.98	68.31	65.25	67.79	65.87	103.10	131.65	65.25	84.58	131.65	60.45	153.22
1960	85.89	67.71	69.56	128.90	93.25	67.55	66.97	64.77	60.26	70.80	113.22	90.45	60.26	82.40	138.90	60.25	149.98
1961	76.94	65.40	62.16	117.10	127.50	77.50	68.62	64.83	60.22	210.80	1203.22	764.99	60.22	249.11	1293.22	60.20	2077.11
1962	320.99	147.40	119.29	158.59	384.48	148.86	89.33	113.83	107.64	118.02	109.65	83.91	83.91	158.48	384.48	80.78	664.72
1963	77.34	71.38	77.89	173.86	598.40	268.52	111.49	116.21	107.45	108.53	147.67	187.35	71.38	170.51	598.40	67.63	854.92
1964	173.57	132.51	118.96	296.13	458.10	146.71	85.24	115.50	108.18	110.05	116.01	165.51	85.24	169.04	458.10	65.93	897.09
1965	126.09	102.94	110.97	95.75	117.37	117.37	74.37	71.34	63.66	67.35	165.24	118.97	63.66	99.31	165.24	63.62	185.07
1966	84.54	76.71	93.01	232.24	246.01	125.26	90.72	112.32	112.48	128.42	314.05	114.94	76.71	144.22	314.05	69.08	470.56
1967	93.23	79.32	71.62	102.99	459.60	297.19	128.00	132.72	120.05	168.08	352.59	277.54	71.62	190.24	459.60	66.21	733.60
1968	159.15	138.74	190.26	359.98	522.07	231.51	162.88	152.96	119.54	130.18	298.84	645.74	119.54	268.49	645.74	115.97	1224.42
1969	216.44	173.32	159.57	174.93	165.01	95.26	88.73	85.11	78.04	94.01	120.12	110.91	78.04	130.12	216.44	71.77	301.36
1970	99.36	88.76	81.24	230.92	187.71	105.16	89.76	106.80	113.87	118.46	104.25	80.59	80.59	117.49	230.92	73.16	428.41
1971	74.45	66.45	64.00	114.63	127.48	88.85	80.69	78.08	70.29	72.48	90.29	90.19	63.00	84.79	127.48	62.48	230.75
1972	80.21	70.33	66.04	71.80	99.05	83.52	78.89	70.47	62.77	79.20	181.63	127.68	62.77	89.46	181.63	61.36	327.42
1973	121.08	91.94	79.61	91.53	88.46	92.52	76.05	80.52	69.76	76.86	192.14	82.75	69.76	87.77	121.08	66.50	272.72
1974	71.17	77.67	80.32	156.32	108.03	77.61	95.97	95.08	73.54	79.16	120.65	98.06	71.17	94.46	156.32	65.28	334.45
1975	77.42	67.22	70.36	133.94	129.53	92.89	77.05	81.43	67.16	73.19	110.83	85.28	67.16	83.86	133.94	61.85	331.07
1976	71.78	65.07	18.12	64.07	84.71	78.56	72.05	67.88	30.04	24.93	68.03	86.93	18.12	61.01	86.93	5.56	154.14
1977	64.85	30.05	27.72	108.19	190.31	306.83	100.80	118.83	108.89	110.99	236.02	230.64	27.72	132.84	236.02	12.67	342.28
1978	172.88	134.72	194.35	612.58	504.46	144.04	100.44	123.47	114.89	142.63	185.82	188.80	100.44	218.26	612.58	88.48	1126.82
1979	170.75	198.50	155.89	213.03	449.18	359.52	138.60	126.85	114.00	118.95	193.57	113.90	112.90	195.99	449.18	89.89	722.85
1980	106.05	88.74	79.32	91.60	108.63	83.59	76.86	72.56	70.23	76.08	200.37	134.25	70.23	99.02	200.37	66.92	304.57
1981	104.69	86.09	131.23	297.62	464.49	201.02	102.08	119.15	115.96	117.78	119.35	93.84	86.09	163.28	464.49	76.47	666.71
1982	87.40	80.09	76.46	137.61	193.85	224.01	102.28	132.88	114.80	172.46	269.74	220.97	76.46	151.55	269.74	73.54	371.95
1983	164.06	131.66	114.44	162.47	248.30	132.42	90.72	110.84	112.18	110.14	120.44	101.10	90.72	133.23	248.30	81.94	456.33
1984	94.69	78.59	79.59	81.73	75.73	67.61	67.30	65.71	63.94	98.27	159.29	136.55	63.94	88.25	159.29	60.94	266.52
1985	99.89	92.80	89.80	184.13	193.67	114.85	94.18	88.93	72.84	80.48	108.87	110.35	72.84	110.91	193.67	70.51	324.26
1986	85.58	71.79	73.59	118.57	209.19	130.46	94.32	109.73	105.39	101.15	133.89	186.05	71.79	119.93	209.19	64.88	384.21
1987	126.48	92.90	87.59	101.10	88.79	108.30	85.08	94.17	75.75	71.95	108.55	93.38	71.95	94.50	126.48	65.04	193.19
1988	78.67	71.40	85.73	272.48	532.36	159.03	87.61	114.61	113.25	137.27	227.53	208.85	71.40	174.07	532.36	67.47	875.59
1989	174.85	115.70	125.51	159.25	145.18	107.69	91.44	96.26	109.19	161.38	329.91	293.15	91.44	159.13	329.91	81.51	628.75
1990	255.03	138.17	305.78	540.29	436.19	184.20	108.82	119.72	111.91	142.33	222.12	246.42	108.82	225.92	540.29	95.94	669.07
Min.	64.85	30.05	18.12	64.07	75.73	67.61	60.97	64.77	30.04	24.93	68.03	80.59	18.12	61.01	86.93		
Avg.	121.55	95.88	97.14	180.53	247.57	145.21	92.50	98.99	90.86	106.83	199.84	176.67	74.28	137.80	320.12		
Max.	320.99	198.50	205.78	612.58	598.40	359.52	162.88	152.96	120.05	210.80	1293.22	764.99	119.54	263.49	1293.22		
Daily Min.	46.20	22.20	5.56	15.17	66.01	63.05	64.16	62.44	10.99	9.64	22.37	57.56				5.56	
Daily Max.	559.14	341.47	427.59	1126.82	898.82	630.87	212.65	162.04	131.61	759.90	2077.11	1438.09					2077.11

Table 6.3.5 Monthly Mean Flow at 4F13 (with IGF Irrigation Oriented, 2020 Water Abstraction)

(Unit:m³/s)

	Monthly Mean Flow												Daily				
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Min.	Avg.	Max.	Min.	Max.
1977	145.43	130.42	136.00	119.00	162.00	128.74	66.85	113.00	80.08	159.00	102.00	72.00	66.85	118.51	169.00	38.00	233.86
1978	121.62	98.26	136.00	119.00	162.00	183.94	125.03	127.65	117.20	159.00	102.00	72.00	72.00	127.56	183.94	38.00	318.12
1979	116.45	93.85	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	98.78	169.00	15.00	169.00
1980	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1981	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	220.59	1023.18	15.00	2073.53
1982	323.02	182.94	137.00	122.54	349.30	145.39	85.71	125.52	119.92	159.00	102.00	72.00	72.00	160.41	549.30	54.51	661.49
1983	38.00	80.64	136.00	119.00	169.00	265.30	107.64	128.16	119.72	159.00	102.00	72.00	38.00	161.25	542.03	23.00	791.62
1984	190.52	151.49	136.02	228.38	459.78	143.70	81.21	127.44	120.46	159.00	102.00	72.00	88.58	165.30	454.78	68.71	825.71
1985	143.14	121.73	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	103.32	169.00	15.00	169.00
1986	38.00	66.31	136.00	119.00	169.00	115.86	87.12	124.27	124.74	159.00	102.00	72.00	38.00	132.55	244.14	23.00	380.91
1987	110.46	97.81	136.00	119.00	169.00	294.90	124.68	143.30	132.28	172.08	306.09	274.72	97.81	186.67	328.73	27.53	631.32
1988	175.92	157.92	207.47	292.55	518.75	278.03	164.71	131.72	159.00	102.00	226.80	642.66	131.72	259.53	642.66	71.01	1221.34
1989	233.41	187.71	180.48	143.42	169.45	48.31	84.87	113.00	74.01	159.00	102.00	72.00	48.31	130.64	233.41	38.00	298.17
1990	64.34	107.82	136.00	119.40	195.25	69.13	85.75	118.74	126.17	159.00	102.00	72.00	15.00	115.47	195.25	38.00	227.00
1971	38.00	63.75	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1972	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1973	38.00	24.53	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1974	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1975	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1976	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1977	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1978	189.67	153.84	207.12	519.03	501.14	140.70	96.71	135.41	127.20	159.00	102.00	72.00	96.71	214.38	549.03	70.86	1123.08
1979	182.46	223.20	172.31	170.61	421.81	356.25	135.73	137.98	126.20	159.00	102.00	72.00	104.49	192.15	421.84	69.06	729.53
1980	123.08	107.45	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	100.46	169.00	15.00	169.00
1981	62.22	104.84	148.08	230.18	461.17	197.55	98.48	131.10	128.30	159.00	102.00	72.00	62.22	157.91	461.17	38.00	663.39
1982	64.24	90.03	136.00	119.00	169.00	156.62	97.85	144.80	127.00	181.77	221.43	215.88	64.24	144.39	221.43	38.00	283.34
1983	180.66	150.36	136.39	123.65	216.78	124.51	87.23	122.72	124.42	159.00	102.00	72.00	72.00	133.31	216.78	38.00	227.00
1984	66.24	97.50	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	94.90	169.00	15.00	169.00
1985	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	38.00	99.39	169.00	23.00	169.00
1986	38.00	77.47	136.00	119.00	169.00	51.37	90.35	121.60	118.00	159.00	102.00	72.00	38.00	109.67	169.00	23.00	169.00
1987	143.71	111.38	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	102.51	169.00	15.00	227.00
1988	38.00	23.00	136.00	119.00	169.00	155.70	83.82	126.55	125.69	159.00	102.00	72.00	23.00	158.09	529.03	23.00	872.27
1989	192.11	134.36	142.48	127.77	169.00	40.23	87.78	113.00	116.63	170.59	278.00	290.72	40.23	155.22	290.72	38.00	465.61
1990	263.49	165.94	196.40	499.55	432.87	180.78	105.42	131.50	123.81	159.00	102.00	72.00	105.42	222.10	499.55	35.96	665.33
Min.	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	74.96	169.00	15.00	169.00
Avg.	106.59	91.02	143.09	159.80	256.40	109.05	64.48	121.92	90.80	157.79	156.54	148.76	45.58	134.11	298.26	23.00	298.26
Max.	323.02	223.20	207.47	549.03	542.03	356.25	159.61	164.71	132.28	181.77	1023.18	761.91	131.72	259.53	1023.18	38.00	2073.53
Daily Min.	38.00	23.00	10.79	47.81	63.82	38.00	15.00	113.00	52.00	7.52	20.88	65.63	7.52	7.52	2073.53	7.52	2073.53
Daily Max.	555.95	227.00	227.00	1123.08	895.50	627.39	209.65	200.76	151.51	227.00	2073.53	1435.01	131.72	259.53	1023.18	38.00	2073.53

Table 6.3.6 Monthly Mean Flow at 4F13 (with HGF Irrigation Oriented, 2020 Water Abstraction)

(Units:m³/s)

	Monthly Mean Flow (m ³ /s)												Daily				
	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Min.	Avg.	Max.	Min.	Max.
1957	183.79	173.79	160.66	120.55	169.00	38.00	23.66	121.71	130.51	159.00	102.00	72.00	23.66	121.22	183.79	15.00	211.00
1958	80.16	111.93	136.05	119.00	169.00	78.75	121.10	156.57	147.28	159.11	102.00	72.00	72.00	123.58	169.00	38.00	191.66
1959	74.30	137.22	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	98.88	169.00	15.00	169.00
1960	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1961	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	787.10	758.42	15.00	200.63	787.10	15.00	2069.48
1962	317.25	211.00	211.00	131.27	227.91	141.45	81.65	154.17	150.00	159.27	104.37	72.00	72.00	163.45	317.25	67.23	552.35
1963	38.00	74.80	136.01	119.00	441.50	261.33	103.61	156.81	149.80	159.19	102.00	72.00	38.00	151.42	444.50	23.00	770.32
1964	196.64	211.00	176.58	139.29	405.61	139.61	77.29	156.08	150.54	159.22	102.00	72.00	72.00	165.49	405.61	38.00	677.48
1965	117.25	165.34	166.12	120.73	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	107.45	169.00	15.00	211.00
1966	38.00	23.00	136.00	119.00	169.00	70.05	83.05	152.90	154.82	159.56	181.93	87.17	23.00	114.54	181.93	23.00	211.00
1967	148.49	141.75	136.41	119.00	230.68	290.10	120.74	172.65	162.34	185.79	212.37	271.25	119.00	182.63	290.10	80.69	553.44
1968	209.13	205.78	211.00	208.23	499.78	274.10	155.32	193.45	161.88	171.27	134.59	639.17	134.59	255.31	639.17	102.00	1217.85
1969	223.42	211.00	211.00	173.98	169.00	38.00	15.00	113.00	112.62	159.00	102.00	72.00	15.00	132.50	223.42	15.00	294.57
1970	38.00	133.96	138.89	130.58	169.00	38.00	52.23	147.40	156.23	159.74	103.97	72.00	38.00	111.67	169.00	15.00	211.00
1971	38.00	57.69	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	89.22	169.00	15.00	169.00
1972	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1973	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1974	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1975	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1976	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1977	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	169.00
1978	38.00	23.00	177.13	436.22	497.38	136.76	92.63	164.06	157.25	169.67	118.79	102.36	23.00	176.10	497.38	23.00	945.70
1979	209.05	211.00	211.00	173.59	343.65	352.32	130.80	167.44	156.34	160.28	104.04	72.00	72.00	191.06	352.32	67.18	693.23
1980	123.33	151.14	136.41	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	104.16	169.00	15.00	172.29
1981	38.00	75.79	176.84	173.75	389.63	193.62	94.40	159.74	158.35	159.40	103.77	72.00	38.00	149.61	389.63	23.00	659.63
1982	38.00	122.85	136.20	119.00	169.00	38.00	83.15	151.32	154.53	159.35	102.00	72.00	38.00	133.11	199.21	23.00	274.91
1983	209.93	204.16	169.77	120.75	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	94.93	169.00	15.00	170.82
1984	38.00	125.42	136.71	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	91.13	169.00	15.00	169.00
1985	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	147.94	159.00	102.00	72.00	15.00	100.32	169.00	15.00	169.14
1986	38.00	74.28	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	108.52	169.00	15.00	211.00
1987	163.64	155.19	142.74	120.67	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	142.47	405.55	23.00	729.28
1988	38.00	23.00	136.00	119.00	405.55	151.62	79.95	155.22	155.67	173.99	105.89	165.70	23.00	142.47	405.55	23.00	729.28
1989	210.15	199.82	180.65	121.25	169.00	38.00	15.00	113.00	113.35	191.30	177.03	287.23	15.00	151.32	287.23	15.00	462.12
1990	255.09	211.00	211.00	434.04	429.11	177.13	100.84	160.37	153.91	175.21	112.36	195.57	109.84	217.97	434.04	72.00	661.09
Min.	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	211.00
Avg.	101.28	108.00	154.89	146.73	233.21	91.64	51.91	135.23	107.88	163.15	133.59	132.53	35.15	130.01	268.27	15.00	2069.48
Max.	317.25	211.00	211.00	436.22	499.78	352.32	155.32	193.45	162.34	191.30	787.10	758.42	134.59	255.31	787.10	102.00	2069.48
Daily Min.	38.00	23.00	136.00	119.00	169.00	38.00	15.00	113.00	52.00	159.00	102.00	72.00	15.00	86.33	169.00	15.00	2069.48
Daily Max.	552.35	211.00	211.00	945.70	870.51	623.46	204.97	211.00	191.97	211.00	2069.48	1431.52					

Table 6.3.7 List of Scheme

Garissa District					
Name	Area(A)	Name	Area(A)	Name	Area(A)
Dash	20.0	Fort2	20.0	Young2	20.0
Dolal	2.4	Fort3	20.0	Masalani1	20.0
Cymis	10.0	Jar1	20.0	Masalani2	20.0
Kora1	20.0	Jar1	20.0	Gabobey1	20.0
Kora2	20.0	Jar1	20.0	Gabobey2	20.0
Segley1	20.0	Buthaya1	25.0	Gabobey3	20.0
Segley2	20.0	Buthaya2	20.0	Galana	20.0
Wathajir	20.0	Buthaya3	20.0	Saka1	20.0
Qharira	20.0	Chiriki1	20.0	Saka2	20.0
Kora1	15.0	Chiriki2	25.0	Kori	20.0
Aloley1	20.0	Wath1	20.0	Burand1	20.0
Aloley2	20.0	Wath2	15.0	Burand2	20.0
Chiriki	10.0	Wath3	15.0	Marad1	20.0
Kulmis1	20.0	Bar1	20.0	Marad2	20.0
Kulmis2	15.0	Bar2	20.0	Debi1	20.0
Kulmis3	15.0	Bar3	20.0	Debi2	20.0
Banane	20.0	Dekabur1	20.0	Koldere	20.0
Yarabil	20.0	Dekabur2	22.0	Gabobe	24.0
Yarabi2	20.0	Najar1	20.0	Sigale1	15.0
Degaley	10.0	Najar2	20.0	Sigale2	17.0
Baraka	15.0	Bahbey2	20.0	Nanighi	14.0
Medina1	20.0	Bahbey1	15.0	Bura1	15.0
Medina2	20.0	Ali1	20.0	Masababu	10.0
Medina3	20.0	Ali2	15.0	Bura2	6.0
Asi	4.0	Ali2	15.0	Guyo	20.0
Maridadi	16.0	Ziwani1	15.0	Kamuthe1	20.0
Qabobey1	20.0	Ziwani2	17.0	Kamuthe2	20.0
Qabobey2	20.0	Barwako1	20.0	Jaribu	12.0
Taksoy	10.0	Barwako2	20.0	Hidaya	20.0
Khadi1	20.0	Barwako3	20.0	Abaqdera	24.0
Khadi2	20.0	Bathiya1	20.0	Galbet	20.0
Khadi3	20.0	Bathiya2	20.0		
Fort1	20.0	Young1	20.0		

Tana River District					
Name	Area(A)	Name	Area(A)	Name	Area(A)
Laza1	20.0	Semi2	20.0	Miko1	20.0
Laza2	20.0	Nanighi1	20.0	Miko2	20.0
Laza3	20.0	Nanighi2	20.0	Mnazini1	20.0
Rhoka	20.0	Nanighi3	20.0	Mnazini2	10.0
Madogo1	20.0	Nanighi4	20.0	Korocho1	20.0
Ngao1	20.0	Nanighi5	20.0	Wanje1	20.0
Wema1	20.0	Bangale1	20.0	Wanje2	20.0
Mango	15.0	Bangale2	20.0	Wanje3	20.0
Ghalamani	10.0	Mili1	20.0	Wanje4	20.0
Wayu1	20.0	Mili2	20.0	Wanje5	20.0
Wayu2	20.0	Mbala1	20.0		
Semikaro1	20.0	Mbala2	20.0		

Source : MOALD

Table 6.3.8 Engine Power Requirement

Garissa District													
Name	Area(A)	Q	H	Pp	P	P	Name	Area(A)	Q	H	Pp	P	P
Dash	20.0	80.8	10.0	13.9	16.9	22.9	Dekabur1	20.0	80.8	10.0	13.9	16.9	22.9
Dolal	2.4	9.7	10.0	1.7	2.0	2.7	Dekabur2	22.0	88.8	10.0	15.3	18.6	25.2
Cymis	10.0	40.4	10.0	6.9	8.5	11.4	Najar1	20.0	80.8	10.0	13.9	16.9	22.9
Kora1	20.0	80.8	10.0	13.9	16.9	22.9	Najar2	20.0	80.8	10.0	13.9	16.9	22.9
Kora2	20.0	80.8	10.0	13.9	16.9	22.9	Babbey2	20.0	80.8	10.0	13.9	16.9	22.9
Segley1	20.0	80.8	10.0	13.9	16.9	22.9	Babbey1	15.0	60.6	10.0	10.4	12.7	17.2
Segley2	20.0	80.8	10.0	13.9	16.9	22.9	Ali1	20.0	80.8	10.0	13.9	16.9	22.9
Wahajir	20.0	80.8	10.0	13.9	16.9	22.9	Ali2	15.0	60.6	10.0	10.4	12.7	17.2
Qbarira	20.0	80.8	10.0	13.9	16.9	22.9	Ali2	15.0	60.6	10.0	10.4	12.7	17.2
Kora1	15.0	60.6	10.0	10.4	12.7	17.2	Ziwani1	15.0	60.6	10.0	10.4	12.7	17.2
Alokey1	20.0	80.8	10.0	13.9	16.9	22.9	Ziwani2	17.0	68.6	10.0	11.8	14.4	19.4
Alokey2	20.0	80.8	10.0	13.9	16.9	22.9	Barwako1	20.0	80.8	10.0	13.9	16.9	22.9
Chiriki	10.0	40.4	10.0	6.9	8.5	11.4	Barwako2	20.0	80.8	10.0	13.9	16.9	22.9
Kulmi1	20.0	80.8	10.0	13.9	16.9	22.9	Barwako3	20.0	80.8	10.0	13.9	16.9	22.9
Kulmi2	15.0	60.6	10.0	10.4	12.7	17.2	Bathiya1	20.0	80.8	10.0	13.9	16.9	22.9
Kulmi3	15.0	60.6	10.0	10.4	12.7	17.2	Bathiya2	20.0	80.8	10.0	13.9	16.9	22.9
Banane	20.0	80.8	10.0	13.9	16.9	22.9	Young1	20.0	80.8	10.0	13.9	16.9	22.9
Yarabi1	20.0	80.8	10.0	13.9	16.9	22.9	Young2	20.0	80.8	10.0	13.9	16.9	22.9
Yarabi2	20.0	80.8	10.0	13.9	16.9	22.9	Masalani1	20.0	80.8	10.0	13.9	16.9	22.9
Degaley	10.0	40.4	10.0	6.9	8.5	11.4	Masalani2	20.0	80.8	10.0	13.9	16.9	22.9
Baraka	15.0	60.6	10.0	10.4	12.7	17.2	Gabobey1	20.0	80.8	10.0	13.9	16.9	22.9
Medina1	20.0	80.8	10.0	13.9	16.9	22.9	Gabobey2	20.0	80.8	10.0	13.9	16.9	22.9
Medina2	20.0	80.8	10.0	13.9	16.9	22.9	Gabobey3	20.0	80.8	10.0	13.9	16.9	22.9
Medina3	20.0	80.8	10.0	13.9	16.9	22.9	Galana	20.0	80.8	10.0	13.9	16.9	22.9
Asi	4.0	16.2	10.0	2.8	3.4	4.6	Saka1	20.0	80.8	10.0	13.9	16.9	22.9
Muridadi	16.0	64.6	10.0	11.1	13.6	18.3	Saka2	20.0	80.8	10.0	13.9	16.9	22.9
Qabobey1	20.0	80.8	10.0	13.9	16.9	22.9	Kori	20.0	80.8	10.0	13.9	16.9	22.9
Qabobey2	20.0	80.8	10.0	13.9	16.9	22.9	Burand1	20.0	80.8	10.0	13.9	16.9	22.9
Taksoy	10.0	40.4	10.0	6.9	8.5	11.4	Burand2	20.0	80.8	10.0	13.9	16.9	22.9
Khadi1	20.0	80.8	10.0	13.9	16.9	22.9	Marad1	20.0	80.8	10.0	13.9	16.9	22.9
Khadi2	20.0	80.8	10.0	13.9	16.9	22.9	Marad2	20.0	80.8	10.0	13.9	16.9	22.9
Khadi3	20.0	80.8	10.0	13.9	16.9	22.9	Debil	20.0	80.8	10.0	13.9	16.9	22.9
Fort1	20.0	80.8	10.0	13.9	16.9	22.9	Debil2	20.0	80.8	10.0	13.9	16.9	22.9
Fort2	20.0	80.8	10.0	13.9	16.9	22.9	Koldere	20.0	80.8	10.0	13.9	16.9	22.9
Fort3	20.0	80.8	10.0	13.9	16.9	22.9	Gabobe	24.0	96.9	10.0	16.7	20.3	27.5
Jar1	20.0	80.8	10.0	13.9	16.9	22.9	Sigale1	15.0	60.6	10.0	10.4	12.7	17.2
Jar1	20.0	80.8	10.0	13.9	16.9	22.9	Sigale2	17.0	68.6	10.0	11.8	14.4	19.4
Jar1	20.0	80.8	10.0	13.9	16.9	22.9	Nanighi	14.0	56.5	10.0	9.7	11.9	16.0
Buthaya1	25.0	100.9	10.0	17.4	21.2	28.6	Bura1	15.0	60.6	10.0	10.4	12.7	17.2
Buthaya2	20.0	80.8	10.0	13.9	16.9	22.9	Masababu	10.0	40.4	10.0	6.9	8.5	11.4
Buthaya3	20.0	80.8	10.0	13.9	16.9	22.9	Bura2	6.0	24.2	10.0	4.2	5.1	6.9
Chiriki1	20.0	80.8	10.0	13.9	16.9	22.9	Guyo	20.0	80.8	10.0	13.9	16.9	22.9
Chiriki2	25.0	100.9	10.0	17.4	21.2	28.6	Kamuthc1	20.0	80.8	10.0	13.9	16.9	22.9
Wauh1	20.0	80.8	10.0	13.9	16.9	22.9	Kamuthc2	20.0	80.8	10.0	13.9	16.9	22.9
Wauh2	15.0	60.6	10.0	10.4	12.7	17.2	Jaribu	12.0	48.5	10.0	8.3	10.2	13.7
Wauh3	15.0	60.6	10.0	10.4	12.7	17.2	Hidaya	20.0	80.8	10.0	13.9	16.9	22.9
Bar1	20.0	80.8	10.0	13.9	16.9	22.9	Abaqdera	24.0	96.9	10.0	16.7	20.3	27.5
Bar2	20.0	80.8	10.0	13.9	16.9	22.9	Galbet	20.0	80.8	10.0	13.9	16.9	22.9
Bar3	20.0	80.8	10.0	13.9	16.9	22.9							

Tana River District													
Name	Area(A)	Q	H	Pp	P	P	Name	Area(A)	Q	H	Pp	P	P
Laza1	20.0	80.8	10.0	13.9	16.9	22.9	Nanighi5	20.0	80.8	10.0	13.9	16.9	22.9
Laza2	20.0	80.8	10.0	13.9	16.9	22.9	Bangale1	20.0	80.8	10.0	13.9	16.9	22.9
Laza3	20.0	80.8	10.0	13.9	16.9	22.9	Bangale2	20.0	80.8	10.0	13.9	16.9	22.9
Rhoka	20.0	80.8	10.0	13.9	16.9	22.9	Miti1	20.0	80.8	10.0	13.9	16.9	22.9
Madogol	20.0	80.8	10.0	13.9	16.9	22.9	Mdi2	20.0	80.8	10.0	13.9	16.9	22.9
Ngaol	20.0	80.8	10.0	13.9	16.9	22.9	Mbala1	20.0	80.8	10.0	13.9	16.9	22.9
Wema1	20.0	80.8	10.0	13.9	16.9	22.9	Mbala2	20.0	80.8	10.0	13.9	16.9	22.9
Mango	15.0	60.6	10.0	10.4	12.7	17.2	Miko1	20.0	80.8	10.0	13.9	16.9	22.9
Ghalamani	10.0	40.4	10.0	6.9	8.5	11.4	Miko2	20.0	80.8	10.0	13.9	16.9	22.9
Wayu1	20.0	80.8	10.0	13.9	16.9	22.9	Mnazini1	20.0	80.8	10.0	13.9	16.9	22.9
Wayu2	20.0	80.8	10.0	13.9	16.9	22.9	Mnazini2	10.0	40.4	10.0	6.9	8.5	11.4
Semikarol	20.0	80.8	10.0	13.9	16.9	22.9	Korochol	20.0	80.8	10.0	13.9	16.9	22.9
Semi2	20.0	80.8	10.0	13.9	16.9	22.9	Wanje1	20.0	80.8	10.0	13.9	16.9	22.9
Nanighi1	20.0	80.8	10.0	13.9	16.9	22.9	Wanje2	20.0	80.8	10.0	13.9	16.9	22.9
Nanighi2	20.0	80.8	10.0	13.9	16.9	22.9	Wanje3	20.0	80.8	10.0	13.9	16.9	22.9
Nanighi3	20.0	80.8	10.0	13.9	16.9	22.9	Wanje4	20.0	80.8	10.0	13.9	16.9	22.9
Nanighi4	20.0	80.8	10.0	13.9	16.9	22.9	Wanje5	20.0	80.8	10.0	13.9	16.9	22.9

KEY

Q = SCHEME WATER REQUIREMENT OR DISCHARGE IN L/S.

H = TOTAL PUMPING HEAD P = ENGINE POWER IN KW

Pp = PUMP POWER IN KW P = ENGINE POWER IN HP

Source : MOALD

Table 6.3.9 Cost Estimate for Small Holder Pump Irrigation Schemes

1. Crop Water Requirement

$$\begin{aligned}
 E_o &= 7.06 \text{ mm/day} \cdot (\text{October}) \\
 ET_o &= 0.8 \times 7.06 = 5.65 \text{ mm/day} \\
 K_c &= 1.1 \\
 ET_c &= K_c \times ET_o = 1.1 \times 5.65 = 6.2 \text{ mm/day} = \underline{0.721 \text{ l/s/ha}}
 \end{aligned}$$

2. Scheme Water Requirement (SWR)

$$\begin{aligned}
 \text{Efficiency (Eff)} &= 50\% \text{ for surface irrigation} \\
 \text{Days of irrigation/week (days)} &= 6 \\
 \text{Hours of irrigation/day} &= 10 \text{ (pumping max.)}
 \end{aligned}$$

3. Pumping Head (H)

For pump system along the Tana River, the normal total dynamic head is 10 m.

4. Pump Power (P_p)

$$\begin{aligned}
 \text{where } Q &= \text{discharge (m}^3\text{/s)} = \text{SWR} \\
 H &= \text{Total dynamic head, (m)} \\
 E_p &= \text{pump efficiency} = (0.60), \\
 E_t &= \text{Transmission Efficiency} (=0.95 \text{ for "V" belt})
 \end{aligned}$$

5. Engine Power Requirement

Where

$$\begin{aligned}
 S_f &= \text{Safety factor} (= 1.20) \\
 A_f &= \text{Altitude derating factor} \\
 &= 1\% \text{ reduction for every 100 m above sea level} \\
 T_f &= \text{Temperature derating factor} \\
 &= 2\% \text{ reduction for every } 5^\circ\text{C above } 70^\circ\text{C}.
 \end{aligned}$$

$$\text{For Garissa, Altitude} = 128 \text{ m}$$

$$\begin{aligned}
 A_f &= 1.028 \\
 T_f &= 1 \text{ (average temperature for October below } 30^\circ\text{C)}.
 \end{aligned}$$

Table 6.4.1 Project Cost of Alternative Dam Type for Mutonga Dam

(Unit : 1,000 US\$)

Work Item	Alternative Dam Type	
	Rockfill Dam	Concrete Dam
1. Civil Works		
1.1 Preparatory Work	3,270	3,270
1.2 Diversion Tunnel	21,843	15,750
1.3 Main Dam and Cofferdam	13,248	57,663
1.4 Spillway	41,717	13,897
1.5 Power Tunnels/Shafts	4,512	0
1.6 Surge Tank and Penstock	506	254
1.7 Powerhouse	6,581	5,591
1.8 Tailrace and Outlet Channel	1,933	2,000
Total (1)	93,610	98,425
2. Metal Work	30,364	23,269
3. Generating and Substation Equipment	45,498	45,498
4. Transmission Line	1,481	1,481
Total of Direct Construction Cost (1 to 4)	170,953	168,673
5. Eng. Service and Administration	17,095	16,867
6. Land Aquisition/Compensation	4,942	4,942
7. Physical Contingency	17,909	18,276
Project Cost (1 to 7)	210,899	208,758

Table 6.4.2 Project Cost of Alternative Axis and Dam Type for Low Grand Falls Dam

(Unit : 1,000 US\$)

Work Item	Case 1		Case 2		Case 3		Case 4		Case 5	
	Conc. Facing Dam (Upper Axis)	Rockfill Dam (Middle Axis)	Rockfill Dam (Middle Axis)	Combined Dam (Middle Axis)	Rockfill Dam (Lower Axis)	Combined Dam (Lower Axis)	Rockfill Dam (Lower Axis)	Combined Dam (Lower Axis)		
1. Civil Works										
1.1 Preparatory Work	19,166	19,166	19,166	19,166	19,166	19,166	19,166	19,166	19,166	19,166
1.2 Diversion Tunnel	36,226	39,618	19,396	19,396	44,005	19,754	44,005	19,754	19,754	19,754
1.3 Main Dam and Cofferdam	79,988	82,186	130,789	130,789	83,764	129,926	83,764	129,926	129,926	129,926
1.4 Spillway	34,089	36,708	20,420	20,420	32,548	17,426	32,548	17,426	17,426	17,426
1.5 Power Tunnels/Shafts	8,959	8,683	642	642	5,910	643	5,910	643	643	643
1.6 Surge Tank and Penstock	6,340	4,716	0	0	8,888	-	8,888	-	-	-
1.7 Powerhouse	14,124	14,124	13,888	13,888	14,124	13,888	14,124	13,888	13,888	13,888
1.8 Tailrace and Outlet Channel	3,675	3,675	2,957	2,957	3,352	3,325	3,352	3,325	3,325	3,325
Total (1)	202,567	208,876	207,258	207,258	211,757	204,128	211,757	204,128	204,128	204,128
2. Metal Work	40,449	40,449	32,576	32,576	40,449	32,576	40,449	32,576	32,576	32,576
3. Generating and Substation Equipment	63,798	63,798	63,798	63,798	63,798	63,798	63,798	63,798	63,798	63,798
4. Transmission Line	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707	9,707
Total (1 to 4)	316,521	322,830	313,339	313,339	325,711	310,209	325,711	310,209	310,209	310,209
5. Eng. Service and Administration	31,652	32,283	31,334	31,334	32,571	31,021	32,571	31,021	31,021	31,021
6. Land Acquisition/Compensation	15,169	15,169	15,169	15,169	15,169	15,169	15,169	15,169	15,169	15,169
7. Physical Contingency	36,083	37,029	36,393	36,393	37,461	35,923	37,461	35,923	35,923	35,923
Total (1 to 7)	399,425	407,311	396,235	396,235	410,912	392,322	410,912	392,322	392,322	392,322

Table 6.5.1 Project Cost of Alternative Installed Capacity for Mutonga Dam

(Unit: 1,000 US\$)

Work Items	Alternative Installed Capacity			
	40 MW	60 MW	80 MW	100 MW
1. Civil Works				
1.1 Preparatory Work	3,270	3,270	3,270	3,270
1.2 Diversion Tunnel	15,750	15,750	15,750	15,750
1.3 Main Dam and Cofferdam	57,663	57,663	57,663	57,663
1.4 Spillway	13,897	13,897	13,897	13,897
1.5 Power Tunnels/Shafts	0	0	0	0
1.6 Surge Tank and Penstock	180	254	349	439
1.7 Powerhouse	3,941	5,591	8,105	10,179
1.8 Tailrace and Outlet Channel	1,621	2,000	2,376	2,706
Total (1)	96,322	98,425	101,410	103,904
2. Metal Work	22,715	23,269	24,072	24,961
3. Generating and Substation Equipment	34,263	45,498	53,229	60,646
4. Transmission Line	1,481	1,481	1,481	1,481
Total (1 to 4)	154,781	168,673	180,192	190,992
5. Eng. Service and Administration	15,478	16,867	18,019	19,099
6. Land Aquisition/Compensation	4,942	4,942	4,942	4,942
7. Physical Contingency	17,371	18,276	19,151	19,940
Total (1 to 7)	192,572	208,758	222,304	234,973
Economic Cost (89.0%)	171,389	185,795	197,851	209,126

Table 6.5.2 Project Cost of Alternative Installed Capacity for Low Grand Falls Dam

(Unit : 1,000 US\$)

Work Items	Alternative Installed Capacity			
	100 MW	120 MW	140 MW	160 MW
1. Civil Works				
1.1 Preparatory Work	19,166	19,166	19,166	19,166
1.2 Diversion Tunnel	19,754	19,754	19,754	19,754
1.3 Main Dam and Cofferdam	129,926	129,926	129,926	129,926
1.4 Spillway	17,426	17,426	17,426	17,426
1.5 Power Tunnels/Shafts	553	593	613	684
1.6 Surge Tank and Penstock	0	0	0	0
1.7 Powerhouse	12,286	13,186	13,888	14,679
1.8 Tailrace and Outlet Channel	2,697	3,013	3,325	3,685
Total (1)	201,808	203,064	204,128	205,320
2. Metal Work	30,283	31,400	32,576	33,802
3. Generating and Substation Equipment	53,509	58,837	63,798	68,666
4. Transmission Line	9,707	9,707	9,707	9,707
Total (1 to 4)	295,307	303,008	310,209	317,495
5. Eng. Service and Administration	29,531	30,301	31,021	31,750
6. Land Aquisition/Compensation	15,169	15,169	15,169	15,169
7. Physical Contingency	34,946	35,457	35,923	36,407
Total (1 to 7)	374,953	383,935	392,322	400,821
Economic Cost (89.0%)	333,708	341,702	349,167	356,731

Table 8.1 Workable Day (Low Grand Falls and Mutonga)

Work Item	Rainfall	Number of Rainy Day												Suspended Day	Total	Days per Month	
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC				
Excavation	0 - 2	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
	2 - 5	00	00	00	00	00	00	00	00	00	00	00	00	00	00		
	5 - 10	05	02	06	18	10	01	01	04	02	12	17	10	05	10		
	10 - 30	09	01	26	69	13	00	00	01	01	26	64	38	10	10		
	30 - 50	01	00	03	19	05	00	00	00	00	11	14	08	10	10		
	More 50	00	00	02	12	00	00	00	00	00	05	05	00	10	10		
	Total	15	03	37	118	28	01	01	05	03	54	100	56			42.1	26.9
	Calendar	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0		355.0		
	Holiday	2.0	0.0	0.0	2.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	10.0		18.0		
	Sunday	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0		53.0		
Workable	22.5	23.7	23.3	11.2	23.2	24.9	25.9	26.5	25.7	18.6	16.0	10.4		251.9	21.0		
Earthfill (Core)	0 - 2	00	00	00	00	00	00	00	00	00	00	00	00	00			
	2 - 5	04	01	09	13	11	03	03	02	03	09	15	10	05			
	5 - 10	1.0	0.4	1.1	3.5	2.0	0.2	0.1	0.8	0.3	2.3	3.3	1.9	1.0			
	10 - 30	1.4	0.2	3.9	10.4	2.0	0.0	0.0	0.2	0.2	3.9	9.6	5.7	1.5			
	30 - 50	0.2	0.0	0.6	3.8	1.0	0.0	0.0	0.0	0.0	2.2	2.8	1.6	2.0			
	More 50	0.0	0.0	0.4	2.4	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	2.0			
	Total	3.0	0.7	6.9	21.4	6.1	0.5	0.4	1.2	0.8	10.3	18.2	10.2		79.7	23.8	
	Calendar	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0		365.0		
	Holiday	2.0	0.0	0.0	2.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	10.0		18.0		
	Sunday	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0		53.0		
Workable	21.0	23.3	20.1	1.6	19.9	24.5	25.6	25.8	25.2	13.7	7.8	5.8		214.3	17.9		
Filter	0 - 2	00	00	00	00	00	00	00	00	00	00	00	00	00			
	2 - 5	04	01	09	13	11	03	03	02	03	09	15	10	05			
	5 - 10	05	02	06	18	10	01	01	04	02	12	17	10	05			
	10 - 30	09	01	26	69	13	00	00	01	01	26	64	38	10			
	30 - 50	02	00	05	29	08	00	00	00	00	17	21	12	15			
	More 50	00	00	03	18	00	00	00	00	00	08	08	00	15			
	Total	2.0	0.4	4.9	14.7	4.2	0.4	0.4	0.7	0.6	7.2	12.5	7.0		55	25.8	
	Calendar	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0		365.0		
	Holiday	2.0	0.0	0.0	2.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	10.0		18.0		
	Sunday	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0		53.0		
Workable	22.0	23.6	22.1	8.3	21.8	24.6	25.6	26.3	25.4	16.8	13.5	9.0		239.0	19.9		
Rockfill (Inner shell)	0 - 2	00	00	00	00	00	00	00	00	00	00	00	00	00			
	2 - 5	00	00	00	00	00	00	00	00	00	00	00	00	00			
	5 - 10	05	02	06	18	10	01	01	04	02	12	17	10	05			
	10 - 30	09	01	26	69	13	00	00	01	01	26	64	38	10			
	30 - 50	02	00	05	29	08	00	00	00	00	17	21	12	15			
	More 50	00	00	03	18	00	00	00	00	00	08	08	00	15			
	Total	1.6	0.3	4.0	13.4	3.1	0.1	0.1	0.5	0.3	6.3	11.0	6.0		46.7	26.5	
	Calendar	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0		365.0		
	Holiday	2.0	0.0	0.0	2.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	10.0		18.0		
	Sunday	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0		53.0		
Workable	22.4	23.7	23.0	9.6	22.9	24.9	25.9	26.5	25.7	17.7	15.0	10.0		247.3	20.6		
Rockfill (Outer shell)	0 - 2	00	00	00	00	00	00	00	00	00	00	00	00	00			
	2 - 5	00	00	00	00	00	00	00	00	00	00	00	00	00			
	5 - 10	00	00	00	00	00	00	00	00	00	00	00	00	00			
	10 - 30	09	01	26	69	13	00	00	01	01	26	64	38	10			
	30 - 50	02	00	05	29	08	00	00	00	00	17	21	12	15			
	More 50	00	00	03	18	00	00	00	00	00	08	08	00	15			
	Total	1.1	0.1	3.4	11.6	2.1	0.0	0.0	0.1	0.1	5.1	9.3	5.0		37.9	27.3	
	Calendar	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0		365.0		
	Holiday	2.0	0.0	0.0	2.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	10.0		18.0		
	Sunday	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0		53.0		
Workable	22.9	23.9	23.6	11.4	23.9	25.0	26.0	26.9	25.9	18.9	16.7	11.0		256.1	21.3		
Concrete Grout	0 - 2	00	00	00	00	00	00	00	00	00	00	00	00	00			
	2 - 5	00	00	00	00	00	00	00	00	00	00	00	00	00			
	5 - 10	00	00	00	00	00	00	00	00	00	00	00	00	00			
	10 - 30	09	01	26	69	13	00	00	01	01	26	64	38	10			
	30 - 50	01	00	03	19	05	00	00	00	00	11	14	08	10			
	More 50	00	00	02	12	00	00	00	00	00	05	05	00	10			
	Total	1.0	0.1	3.1	10.0	1.8	0.0	0.0	0.1	0.1	4.2	8.3	4.6		33.3	27.6	
	Calendar	31.0	28.0	31.0	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	31.0		365.0		
	Holiday	2.0	0.0	0.0	2.0	1.0	1.0	0.0	0.0	0.0	2.0	0.0	10.0		18.0		
	Sunday	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	4.0	5.0		53.0		
Workable	23.0	23.9	21.9	13.0	24.2	25.0	26.0	26.9	25.9	19.8	17.7	11.4		260.7	21.7		

Table 8.2 Major Construction Equipment

Equipment	Spec.	Total Required Number	
		Low Grand Falls Scheme	Mutonga Scheme
Bulldozer with ripper	32 ton	11	8
Bulldozer	32 ton	4	3
Bulldozer	21 ton	3	3
Bulldozer	11 ton	8	5
Wheel loader	5 m3	15	9
Tractor shovel	2.2 m3	6	6
Tractor shovel	1.2 m3	2	2
Backhoe	0.6 m3	2	2
Backhoe	0.2 m3	2	2
Dump truck	32 ton	35	35
Dump truck	11 ton	25	15
Crawler drill	10 m3/min	14	13
Crawler drill	15 m3/min	11	7
Air compressor	13.5 m3/min	14	13
Air compressor	17 m3/min	11	7
Vibrating roller	15 ton	2	2
Vibrating roller	10 ton	2	1
Vibrating roller	4 ton	2	1
Tire roller	20 ton	2	1
Tamping roller	20 ton	2	1
Crushing plant	600ton/h	1	-
Crushing plant	250 ton/h	-	1
Screen/washing plant	100 ton/h	2	1
Concrete plant	3 m3 x 3	2	-
Concrete plant	1.5 m3 x 2	-	2
Agitator truck	4.5 m3	8	8
Concrete pump car	100 m3/hr	2	2
Truck crane	30 ton	2	2
Crawler crane	30 ton/hr	2	2
Motor grader	3.7 m	4	2
Water sprinkler	10 klit	4	2
Boring machine	5.5 kW	7	4
Boring machine	11 kW	11	5
Grout pump	7.5 kW	11	6
Grout pump	11 kW	16	8
Grout mixer	200 lit x 2	27	14
Drill jumbo, truck mount type	6 drills	4	4
Muck loader, side type	1.4 m3	4	4
Air compressor	20 m3/min	4	4
Vent fan	300 m3/min	6	6
Vent fan	100 m3/min	6	6
Shotcrete spray gun	5 - 10 m3/hr	2	2
Full circular sliding form	10.5 m dia, 9 m L	2	-
Full circular sliding form	11 m dia, 9 m L	-	2
Diesel generator	300 kVA	3	2
Diesel generator	500 kVA	6	4
Tower crane, fixed type	13.5 ton x 75m	1	-
Dump truck	20 ton	12	-
Low pressure bulldozer	15 ton	3	-
Vibration roller	7 ton	5	-
Joint cutting machine	0.6m3 backhoe	2	-
Wheel loader	1.2 m3	2	-
Concrete vibrating machine	4 nos. 150 mm	1	-
Tower crane, self propelled type	9.5 ton x 75m	-	2
Transfer car	3 m3	-	2
Concrete vibrating machine	3 nos. 150 mm	-	4
Concrete bucket	3 m3	-	4

Tanble 8.3 Labor Cost (Labor Wage)

Description	Unit	Foreign Currency (US\$)	Local Currency (K.Shs.)
Foreman,foreign	M.D.	250	-
Tecnician,foreign	M.D.	167	-
Foreman,tunnel	M.D.	-	800
Foreman A	M.D.	-	600
Foreman B	M.D.	-	500
Mechanic	M.D.	-	400
Electrician	M.D.	-	400
Operator,heavy	M.D.	-	400
Operator,light	M.D.	-	300
Assistant operator	M.D.	-	300
Plant operator	M.D.	-	400
Driver,dump truck	M.D.	-	400
Driver,ordinary	M.D.	-	300
Rigger	M.D.	-	300
Carpentor	M.D.	-	300
Formworker	M.D.	-	300
Concrete worker	M.D.	-	300
Driller	M.D.	-	300
Tunnel worker	M.D.	-	300
Pipe fitter	M.D.	-	300
Brick worker	M.D.	-	300
Mason	M.D.	-	300
Plunber	M.D.	-	300
Painter	M.D.	-	300
Welder	M.D.	-	300
Plasterer	M.D.	-	300
Powderman	M.D.	-	400
Reinforcing worker	M.D.	-	300
Boring worker	M.D.	-	400
Grout worker	M.D.	-	400
Pavement worker	M.D.	-	300
Skilled worker	M.D.	-	400
Semi skilled worker	M.D.	-	300
Common labor	M.D.	-	200

Table 8.4 Construction Material Cost

Description	Unit	Foreign Currency (US\$)	Local Currency (KShs.)
Gasoline	litre	0.55	11.04
Light oil	litre	0.44	8.85
Lubricant	litre	0.96	19.50
Grease	kg	2.80	56.70
Portland cement(Ordinary,Nairobi)	ton	82.38	4,395.40
Portland cement(Pozzolana,Mombasa)	ton	70.60	5,252.75
Bitumen 80/100	kg	0.35	7.06
Bitumen MC30	litre	0.43	8.81
Emulsion,KJ70	litre	0.30	6.00
Reinforcement,round	ton	551.85	11,175.00
Reinforcement,deformed	ton	560.74	11,355.00
Annealed iron wire	kg	0.87	17.70
Nail	kg	0.90	18.30
Dynamite	kg	4.20	50.40
ANFO	kg	0.67	8.00
Detonator,delay,open	No	2.43	29.20
Detonator,relay,tunnel	No	3.65	43.80
Timber,square	m3	12.96	7,000.00
Timber,plank	m3	14.81	8,000.00
Timber,log	m3	11.11	6,000.00
Plywood	m3	75.93	41,000.00
H-shape steel	ton	393.75	2,126.25
Channel steel	ton	481.25	2,598.75
Steel plate	ton	437.50	2,362.50
Angle steel	ton	481.25	2,598.75
Bit,75mm	No	426.13	2,301.08
Rod,3m	No	428.75	2,315.25
Shank	No	323.75	1,748.25
Sleeve	No	86.63	467.78
Bit,65mm	No	355.25	1,918.35
Bit,36mm	No	60.38	326.03
Taper rod,1.5m	No	71.40	385.56
Insert bit,36mm,1.7m	No	114.63	618.98
Air entrain agent	kg	2.10	11.34
Water reduced agent	kg	2.80	15.12
Metal form,300*1500	No	22.75	122.85
Metal form,150*1500	No	17.06	92.14
Metal form,100*1500	No	16.19	87.41
Metal bit,56mm	No	32.90	177.66
Diamond bit	carat	96.25	519.75
Boring rod,40mm,1.5m	No	101.50	548.10
Waterstop,200mm,6mm	m	10.94	59.06
Waterstop,300mm,9mm	m	21.35	115.29
Joint filler,20mm	m2	14.70	79.38
PVC pipe,75mm	m	5.16	27.88
Rock bolt,22mm,2m	no.	9.54	51.50
Wire mesh	m2	2.76	14.88

Table 8.5 Equipment Cost

Equipment	Unit	Foreign Currency (US\$)	Local Currency (KShs.)
Bulldozer with ripper,32t	Hr	61.67	731
Bulldozer,32t	Hr	53.74	613
Bulldozer,21t	Hr	37.59	429
Bulldozer,11t	Hr	17.08	195
Wheel loader,5m3	Hr	84.80	967
Tractor shovel,2.2m3	Hr	29.82	340
Tractor shovel,1.2m3	Hr	16.54	181
backhoe,0.6m3	Hr	24.80	275
Backhoe,0.2m3	Hr	24.08	275
Dump truck,32t	Hr	58.03	634
Dump truck,11t	Hr	14.35	157
Dump truck,11t	Hr	14.35	157
Crawler drill,10m3/min	Hr	16.72	164
Crawler drill,15m3/min	Hr	20.95	206
Air compressor,13.5m3/min	Day	109.53	1,044
Air compressor,17m3/min	Day	111.19	1,060
Vibrating roller,15t	Hr	51.14	546
Vibrating roller,10t	Hr	32.63	348
Vibrating roller,4t	Hr	11.40	122
Tire roller,20t	Hr	13.72	131
Tanmping roller,20t	Hr	81.88	874
Concrete plant,3m3 x 3	Hr	182.33	1,737
Concrete plant,1.5m3 x 2	Hr	143.30	1,409
Agitator truck,4.5m3	Hr	18.36	201
Concrete pump car,100m3/min	Hr	48.65	532
Truck crane,30t	Hr	47.54	453
Motor grader,3.7m	Hr	22.04	241
Water sprinkler,10m3	Hr	13.22	144
Boring machine,5.5kW	Day	39.82	379
Boring machine,11kW	Day	74.33	708
Grout pump,7.5kW	Day	31.20	307
Grout pump,11kW	Day	38.81	382
Grout mixer,200 lit x 2	Day	16.23	160
Drifter for jumbo	Day	66.68	330
Truck,8t for jumbo	Hr	10.08	110
Muck loader,side,1.4m3	Hr	26.48	289
Air compressor,20m3/min	Hr	9.69	86
Vent fan,300m3/min	Hr	28.15	230
Vent fan,100m3/min	Hr	2.16	18
Shotcrete spray gun,5-10m3/hr	Hr	41.47	408
Diesel generator,300kVA	Day	90.05	768
Tower crane.fixed,13.5t x 75m	Hr	423.20	3,289
Dump truck,20t	Hr	37.67	412
Low pressure bulldozer,15t	Hr	22.68	259
Vibration roller,7t	Hr	32.63	348
Joint cutting machine,0.4m3 backhoe	Hr	52.54	501
Wheel loader,1.2m3	Hr	26.85	293
Concrete vibrating machine,4nos,150m	Hr	34.51	398
Tower crane.self propell,9.5t x 75m	Hr	421.48	3,104
Transfer car,3m3	Hr	26.93	239
Concrete vibrating machine,3nos,150m	Hr	27.11	312

Table 8.6 Summary Construction Cost for Both Schemes

Description	Foreign Currency (1000 US\$)	Local Currency (1000 KShs)	Total (1000 KShs)	Total (1000 US\$)
1. Low Grand Falls Scheme				
Direct construction cost	228,738.46	4,248,173	16,600,050	307,408.33
Land acquisition and compensation	0.00	407,220	407,220	7,541.11
Administration expenses	0.00	83,000	83,000	1,537.04
Engineering services	29,624.00	282,300	1,881,996	34,851.78
Physical contingency	21,708.79	463,959	1,636,234	30,300.62
Price escalation	62,848.74	0	3,393,832	62,848.74
Total (Low Grand Falls Scheme)	342,919.99	5,484,652	24,002,331	444,487.62
2. Mutonga Scheme				
Direct construction cost	119,374.48	1,970,450	8,416,672	155,864.29
Land acquisition and compensation	0.00	89,402	89,402	1,655.59
Administration expenses	0.00	42,083	42,083	779.31
Engineering services	10,312.00	98,264	655,112	12,131.70
Physical contingency	10,177.80	199,836	749,437	13,878.47
Price escalation	50,575.55	0	2,731,080	50,575.55
Total (Mutonga Scheme)	190,439.83	2,400,035	12,683,786	234,884.92
Grand Total	533,359.82	7,884,687	36,686,117	679,372.54

Remarks: Price escalation is expressed in US\$.
FC escalation rate is applied for both currencies.

Table 8.7 Summary Construction Cost for Low Grand Falls Scheme

Description	Foreign Currency (1000 US\$)	Local Currency (1000 kShs)	Total (1000 KShs)	Total (1000 US\$)
1. Civil work	146,189.25	3,485,976	11,380,196	210,744.36
2. Metal work	26,384.84	259,866	1,684,647	31,197.17
3. Generating equipment	43,213.23	244,036	2,577,550	47,732.42
4. Transmission line and substation equipment	12,951.14	258,295	957,657	17,734.38
Total(1 to 4)	228,738.46	4,248,173	16,600,050	307,408.33
5. Land aquisition and compensation	0.00	407,220	407,220	7,541.11
6. Administration expenses	0.00	83,000	83,000	1,537.04
7. Engineering services	29,624.00	282,300	1,881,996	34,851.78
Total(1 to 7)	258,362.46	5,020,693	18,972,266	351,338.26
8. Physical contingency	21,708.79	463,959	1,636,234	30,300.62
Total(1 to 8)	280,071.25	5,484,652	20,608,500	381,638.88
9. Price escalation	62,848.74	0	3,393,832	62,848.74
Grand total	342,919.99	5,484,652	24,002,331	444,487.62

Remarks: Price escalation is expressed in US\$.
FC escalation rate is applied for both currencies.

Table 8.8 Summary Construction Cost for Mutonga Scheme

Description	Foreign Currency (1000 US\$)	Local Currency (1000 kShs)	Total (1000 KShs.)	Total (1000 US\$)
1. Civil work	63,557.53	1,566,767	4,998,874	92,571.73
2. Metal work	18,050.16	156,141	1,130,850	20,941.66
3. Generating equipment	30,538.08	174,230	1,823,286	33,764.56
4. Transmission line and substation equipment	7,228.71	73,312	463,662	8,586.34
Total(1 to 4)	119,374.48	1,970,450	8,416,672	155,864.29
5. Land aquisition and compensation	0.00	89,402	89,402	1,655.59
6. Administration expenses	0.00	42,083	42,083	779.31
7. Engineering services	10,312.00	98,264	655,112	12,131.70
Total(1 to 7)	129,686.48	2,200,199	9,203,269	170,430.91
8. Physical contingency	10,177.50	199,836	749,437	13,878.47
Total(1 to 8)	139,864.28	2,400,035	9,952,706	184,309.37
9. Price escalation	50,575.55	0	2,731,080	50,575.55
Grand total	190,439.83	2,400,035	12,683,786	234,884.92

Remarks : Price escalation is expressed in US\$.
FC escalation rate is applied for both currencies.

Table 8.9 Construction Cost for Low Grand Falls Scheme

Description	Foreign Currency (1000 US\$)	Local Currency (1000 KShs)	Total (1000 KShs)	Total (1000 US\$)
1. Civil work				
1.1 Preparatory works	6,961.39	165,999	541,914	10,035.45
1.2 Diversion tunnel	8,234.32	170,388	615,041	11,389.65
1.3 Cofferdam	2,175.96	34,389	151,591	2,812.79
1.4 Main dam	111,933.69	2,677,835	8,722,254	161,523.23
1.5 Flip bucket	774.89	10,615	52,459	971.46
1.6 Intake	168.23	7,029	16,113	298.40
1.7 Power station	3,278.82	103,944	281,000	5,203.71
1.8 Tailrace and outlet channel	3,217.48	94,416	268,160	4,965.92
1.9 Switchyard	458.69	11,067	35,836	663.63
1.10 Access road and base camp	8,985.78	210,294	695,526	12,880.11
Total(1)	146,189.25	3,485,976	11,350,196	210,744.36
2 Metal work				
Diversion tunnel closing gate	1,820.70	17,350	115,668	2,142.00
Sand flush gate	7,776.00	46,656	466,560	8,640.00
Spillway radial gate,hoist,stoplogs	9,253.06	88,176	587,841	10,895.95
Intake gate and intake trashracks	2,662.20	25,369	169,128	3,132.00
Penstock	4,235.63	76,242	304,966	5,647.52
Powerhouse tailrace gate,hoist	637.25	6,073	40,485	749.71
Total(2)	26,384.84	259,866	1,684,647	31,197.17
3. Generating equipment				
Turbines	14,533.74	82,075	866,897	16,053.65
Generators	12,338.91	69,681	735,982	13,629.30
Transformers	3,821.85	21,583	227,963	4,221.54
Indoor switchgear	7,817.58	44,149	466,298	8,635.15
Ancillary equipment	1,671.66	9,440	99,710	1,846.47
Miscellaneous materials	2,518.11	14,220	150,193	2,781.44
Transmission line protective relays	270.36	1,527	16,126	298.64
PLC communication	241.02	1,361	14,376	266.22
Total(3)	43,213.23	244,036	2,577,550	47,732.42
4. Transmission line and substation equipment				
Transmission Line	4,184.87	208,789	434,772	8,051.33
Low Grand Falls outdoor switchgear	4,247.37	23,986	253,344	4,691.56
Extension of Kiambere substation	4,518.90	25,520	269,541	4,991.49
Total(4)	12,951.14	258,295	957,657	17,734.38
Total(1 to 4)	228,738.46	4,248,173	16,600,050	307,408.33
5. Land aquisition and compensation	0.00	407,220	407,220	7,541.11
6. Administration expenses	0.00	83,000	83,000	1,537.04
7. Engineering services				
7.1 Detailed design	11,333.00	108,000	719,982	13,333.00
7.2 Construction supervision	18,291.00	174,300	1,162,014	21,518.78
Total(7)	29,624.00	282,300	1,881,996	34,851.78
Total(1 to 7)	258,362.46	5,020,693	18,972,266	351,338.26
8. Physical contingency	21,708.79	463,959	1,636,234	30,300.62
Total(1 to 8)	280,071.25	5,484,652	20,608,500	381,638.88
10 Price escalation	62,848.74	0	3,393,832	62,848.74
Total (Low Grand Falls Scheme)	342,919.99	5,484,652	24,002,331	444,487.62

Remarks: Price escalation is expressed in US\$.
FC escalation rate is applied for both currencies.

Table 8.10 Construction Cost for Mutonga Scheme

Description	Foreign Currency (1000 US\$)	Local Currency (1000 KShs)	Total (1000 KShs)	Total (1000 US\$)
1. Civil work				
1.1 Preparatory works	5,777.96	142,433	454,443	8,415.61
1.2 Diversion tunnel	7,456.39	150,073	552,718	10,235.52
1.3 Cofferdam	1,918.55	31,129	134,731	2,495.01
1.4 Main dam	36,654.22	913,703	2,893,031	53,574.65
1.5 Stilling Basin	5,399.92	150,701	442,297	8,190.68
1.6 Intake	277.15	10,112	25,078	464.41
1.7 Power station	2,825.21	91,402	243,963	4,517.84
1.8 Tailrace and outlet channel	1,555.76	32,826	116,837	2,163.65
1.9 Switchyard	498.52	13,437	40,357	747.35
1.10 Access road and base camp	1,193.85	30,951	95,419	1,767.02
Total(1)	63,557.53	1,566,767	4,998,874	92,571.73
2. Metal work				
Diversion tunnel closing gate	1,170.45	11,154	74,358	1,377.01
Sand flush gate	6,450.00	38,880	388,800	7,200.00
Spillway radial gate hoist stoplogs	8,193.15	78,075	520,505	9,638.98
Intake gate and intake trashracks	918.00	8,748	58,320	1,050.00
Penstock	826.88	14,884	59,536	1,102.51
Powerhouse tailrace gate hoist	461.68	4,400	29,331	543.16
Total(2)	18,050.16	156,141	1,130,850	20,941.66
3. Generating equipment				
Turbines	9,160.38	52,215	546,876	10,127.32
Generators	7,526.07	43,061	449,469	8,323.50
Transformers	2,382.12	13,576	142,212	2,633.56
Indoor switchgear	7,818.54	44,567	466,784	8,644.15
Ancillary equipment	1,125.18	6,414	67,174	1,243.96
Miscellaneous materials	1,743.66	9,939	104,097	1,927.72
Transmission line protective relays	540.81	3,083	32,287	597.90
PLC communication	241.02	1,373	14,358	266.45
Total(3)	30,538.08	174,230	1,823,286	33,764.56
4. Transmission line and substation equipment				
Transmission line	793.80	36,632	79,497	1,472.17
Mutonga outdoor switchgear	6,434.91	36,650	354,165	7,114.17
Total(4)	7,228.71	73,312	463,662	8,586.34
Total(1 to 4)	119,374.48	1,970,450	8,416,672	155,864.29
5. Land acquisition and compensation	0.00	89,402	89,402	1,655.59
6. Administration expenses	0.00	42,083	42,083	779.31
7. Engineering services				
7.1 Detailed design	0.00	0	0	0.00
7.1 Construction supervision	10,312.00	98,264	655,112	12,131.70
Total(7)	10,312.00	98,264	655,112	12,131.70
Total(1 to 7)	129,656.48	2,200,199	9,203,269	170,430.91
8. Physical contingency	10,177.80	199,836	749,437	13,878.47
Total(1 to 8)	139,864.28	2,400,035	9,952,706	184,309.37
9. Price escalation	50,575.55	0	2,731,080	50,575.55
Total (Mutonga Scheme)	190,439.83	2,400,035	12,683,786	234,584.92

Remarks: Price escalation is expressed in US\$.
FC escalation rate is applied for both currencies.