3.2 THE RESULTS OF PRELIMINARY PIPE NETWORK ANALYSIS (YEAR 2008)

3.2.1 The Results of Preliminary Primary Pipe Network Analysis for Zone 1 (2008)

<<ZONE-1(2008)>>

Node Data

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NO	Node	Type	Q (l/sec)	EL (m)	GL (m)	EH (m)	Comments
1	1AD1	0	47.190	23.01	0.00	23.01	
2	1BC3	0	47.190	23.03	0.00	23.03	
3	1BC5	0	47.190	23.43	0.00	23.43	
4	1BC4	0	47.190	23.61	0.00	23.61	
5	1BD1	0	47.190	24.12	0.00	24.12	
6	1BD6	0	47.190	23.43	0.00	23.43	
7	1CD1	0	47.190	23.43	0.50	22.93	
8	1CD4	0	47.190	23.43	0.50	22.93	
9	1CD6	0	140.400	24.08	0.30	23.78	
10	1BD2	0	47.190	24.05	0.30	23.75	
11	1BD5	0	47.190	22.92	0.30	22.62	
12	1CD5	0	140.400	24.73	0.10	24.63	
13	1CD9	0	140.400	23.47	1.20	22.27	
14	1CD7	0	180.310	23.34	1.20	22.14	
15	1CD2X	0	0.000	23.29	1.30	21.99	
16	1CD2	0	140.400	23.28	0.00	23.28	
17	1BD3	0	47.190	24.11	0.00	24.11	
18	1BD4	0	47.190	24.06	0.30	23.76	
19	1CD8	0	47.190	23.42	0.50	22.92	
20	1CD4	0	39.910	24.44	1.20	23.24	
21	1DD1	0	39.910	27.82	1.30	26.52	
22	1DD6	0	93.340	26.33	1.10	25.23	
23	1DD5	0	140.400	25.78	0.90	24.88	
24	1DD7	0	93.340	26.82	1.30	25.52	
25	1DE1	0	93.340	27.06	1.80	25.26	
26	1DE5	0	93.340	26.33	1.80	24.53	
27	1DE3	0	93.340	24.99	2.60	22.39	
28	1DE2	0	178.360	21.39	0.70	20.69	
29	1CE7	0	85.020	22.01	1.00	21.01	
30	1CE9	0	85.020	20.52	1.10	19.42	
31	1CE2	0	85.020	22.35	0.30	22.05	
32	1BE1	0	79.690	20.46	0.10	20.36	
33	1BE3	0	79.690	19.58	0.10	19.48	
34	1BE5	0	79.690	19.44	1.00	18.44	
35	1BE2	0	79.690	19.71	1.00	18.71	
36	1BE6	0	79.690	19.69	1.90	17.79	
37	1CF1	0	87.620	19.68	1.00	18.68	
38	1CE4	0	69.680	19.69	0.20	19.49	
39	1CE3	0	85.020	22.34	1.50	20.84	
40	1CE4	0	164.710	19.83	1.50	18.33	
41	1CE5	0	85.020	23.18	1.10	22.08	
42	1CE8	0	85.020	23.31	1.00	22.31	
43	1DE6	0	93.340	24.99	2.60	22.39	
44	1DE4	0	69.680	23.57	3.00	20.57	
45	1DF1	0	69.680	21.91	2.00	19.91	
46	1EF1	0	93.340	28.60	4.80	23.80	
47	1CF2	0	79.690	19.91	2.00	17.91	
48	1DF3	0	87.620	20.59	2.00	18.59	
49	1DF2	0	69.680	20.13	2.00	18.13	
50	1DDC	0	225.420	24.85	0.99	23.95	
51	1DDB	0	93.340	26.36	1.10	25.26	
52	1DDA	0	39.910	27.71	1.30	26.41	
53	1ED5	0	76.830	41.75	8.50	33.25	
54	1FD2	0	76.830	46.21	8.00	38.21	
55	1DD9	0	39.910	35.72	5.10	30.62	
56	1ED3	0	76.830	35.72	6.20	29.52	
57	1ED1	0	76.830	36.22	7.00	29.22	
58	1EE4	0	76.830	28.96	4.70	24.26	
59	1EE5	0	39.910	28.97	4.70	24.27	
60	1EE3	0	46.020	28.70	1.40	27.30	

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NO	Node	Type	Q (l/sec)	WL (m)	GL (m)	EH (m)	Comments
61	1EEB	0	46.020	28.60	4.80	23.80	
62	1EE2	0	93.340	27.64	1.50	26.14	
63	1EE1	0	93.340	27.89	1.50	26.39	
64	1EEA	0	46.020	28.60	4.80	23.80	
65	1EE8	0	46.020	28.90	3.00	25.90	
66	1EE7	0	46.020	28.59	1.60	26.99	
67	1EEG	0	39.910	28.47	7.60	20.87	
68	1EEK	0	39.910	28.39	7.60	20.79	
69	1EEJ	0	39.910	28.38	5.00	23.38	
70	PEJ2	1	-4,611.231	50.00	1.00	49.00	
71	1FE2	0	46.020	36.58	3.70	32.88	
72	1FE3	0	79.430	36.10	8.10	28.00	
73	1FF1	0	46.020	34.18	11.60	22.58	
74	1FF2	0	46.020	32.53	8.50	24.03	
75	1EF3	0	46.020	32.41	6.00	26.41	
76	1FF3	0	46.020	32.01	8.00	24.01	
77	1FF9	0	46.020	32.09	8.50	23.59	
78	1FFC	0	33.410	34.74	8.30	26.44	
79	1FF5	0	72.020	34.52	8.30	26.22	
80	1FF8	0	51.610	34.92	8.30	26.62	
81	1FF7	0	85.020	35.76	12.80	22.96	
82	1FFA	0	51.610	37.42	12.30	25.12	
83	1GG2	0	51.610	37.51	16.00	21.51	
84	1GFF	0	0.000	39.31	20.50	18.81	
85	1GFC	0	0.000	39.18	20.50	18.68	
86	1GF9	0	51.610	38.40	16.00	22.40	
87	1FF8	0	51.610	38.45	16.30	22.15	
88	1GF8	0	51.610	38.66	12.50	26.16	
89	1GF6	0	51.610	38.34	12.50	25.84	
90	1GFE	0	51.610	39.19	18.00	21.19	
91	1GG1	0	51.610	39.18	17.00	22.18	
92	1GF4	0	51.610	39.58	17.00	22.58	
93	1GFA	0	0.000	39.40	20.50	18.90	
94	1GFB	0	0.000	39.41	20.50	18.91	
95	1GE5	0	33.410	40.01	14.30	25.71	
96	1GF1	0	33.410	38.04	16.00	22.04	
97	1FE6	0	33.410	37.73	14.00	23.73	
98	1FE1	0	33.410	40.81	9.80	31.01	
99	1FE9	0	39.910	47.95	5.00	42.95	
100	1FE4	0	33.410	39.78	5.80	33.98	
101	1FE7	0	33.410	39.69	6.80	32.89	
102	1GE8	0	33.410	39.73	14.30	25.43	
103	1FE8	0	33.410	42.29	8.50	33.79	
104	1GE9	0	55.250	41.39	11.50	29.89	
105	1FE5	0	38.610	42.65	8.50	34.15	
106	1FDF	0	39.910	45.98	8.00	37.98	
107	1FDE	0	39.910	48.18	5.00	43.18	
108	1FD6	0	76.830	46.25	8.00	38.25	
109	1FD1	0	76.830	45.58	8.50	37.08	
110	1GD1	0	39.910	45.49	14.00	31.49	
111	1FDH	0	39.910	45.94	10.00	35.94	
112	1FDG	0	39.910	46.17	8.00	38.17	
113	1FDA	0	39.910	28.74	7.00	21.74	
114	1FD3	0	39.910	28.17	8.50	19.67	
115	1FD1	0	39.910	32.65	10.00	22.65	
116	1FD5	0	39.910	33.82	12.00	21.82	
117	1GDC	0	78.520	43.34	12.40	30.94	
118	1GDD	0	38.610	38.62	15.00	23.62	
119	1EE6	0	39.910	27.63	7.60	20.03	
120	1EEM	0	39.910	28.06	7.60	20.46	

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NO	Node	Type	Q (l/sec)	WL (m)	GL (m)	EH (m)	Comments
121	1EEH	0	39.910	28.44	7.60	20.84	
122	1EEF	0	39.910	28.14	9.00	19.14	
123	DC-R6	0	-780.000	21.38	0.00	21.38	
124	1GFD	0	0.000	39.02	18.00	21.02	
125	1GEA	0	51.610	39.73	14.30	25.43	
126	X001	0	0.000	22.76	0.30	22.46	
127	X002	0	0.000	23.84	0.30	23.54	
128	X003	0	0.000	21.40	1.00	20.40	
129	1DDD	0	39.910	36.50	5.80	30.70	
130	X004	0	0.000	27.32	1.30	26.02	
131	X009	0	0.000	28.38	5.00	23.38	
132	X010	0	0.000	41.79	9.00	32.79	
133	X007	0	0.000	28.63	4.80	23.83	
134	X011	0	0.000	35.39	9.30	26.09	
135	X006	0	0.000	28.83	1.50	27.33	
136	X008	0	0.000	29.06	4.70	24.36	
137	X015	0	0.000	23.31	0.80	22.51	
138	X022	0	0.000	38.59	15.50	23.09	
139	1EC1	0	150.670	44.77	10.50	34.27	
140	1EF2	0	46.020	28.59	4.30	24.29	
141	PEJ11	0	-2,405.000	30.37	5.40	24.97	
142	PEJ12	0	-195.000	41.39	5.00	36.39	
143	X023	0	0.000	44.09	13.95	30.14	
144	1EC2	0	76.830	36.14	6.50	29.64	

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Branch Data

Pipe-page : 1

NO	Node(U)	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
1	1BC3	1AD1	0	300	2230	110	2.589	0.037	0.01	0.02	0.00	
2	1BC5	1BC3	0	400	650	110	49.779	0.396	0.60	0.40	0.00	
3	1BC4	1BC5	0	600	730	110	91.218	0.323	0.26	0.18	0.00	
4	1BD1	1BC4	0	600	920	110	138.408	0.490	0.55	0.51	0.00	
5	1BD1	1BD6	0	400	1020	110	52.940	0.421	0.67	0.69	0.00	
6	1BD6	1BC5	0	400	790	110	5.750	0.046	0.01	0.00	0.00	
7	1BD1	1CD1	0	600	1160	110	143.661	0.508	0.59	0.69	0.00	
8	1CD1	1CDA	0	400	230	110	9.176	0.073	0.03	0.00	0.00	
9	1CD6	1BD2	0	400	1030	110	10.333	0.082	0.03	0.03	0.00	
10	1BD2	1AD1	0	400	2110	110	44.601	0.355	0.49	1.04	0.00	
11	1BD2	1BD5	0	250	510	110	29.146	0.594	2.20	1.13	0.00	
12	1CD6	1BD2	0	1350	1040	110	252.709	0.177	0.03	0.03	0.00	
13	1CD5	1CD6	0	1200	1430	110	773.588	0.684	0.46	0.65	0.00	
14	1CD5	1CD9	0	400	1420	110	61.526	0.490	0.89	1.26	0.00	
15	1CD9	1CD7	0	600	90	110	233.415	0.826	1.46	0.13	0.00	
16	1CD7	1CD2X	0	600	510	110	53.105	0.188	0.09	0.05	0.00	
17	1CD2X	1CD2	0	600	170	110	53.105	0.188	0.09	0.01	0.00	
18	1BD1	1BD3	0	250	190	110	5.019	0.102	0.09	0.01	0.00	
19	1BD3	1BD4	0	350	920	110	8.942	0.093	0.05	0.05	0.00	
20	1BD4	1BD2	0	1350	380	110	270.546	0.189	0.04	0.01	0.00	
21	1BD3	1CD8	0	350	1280	110	32.874	0.342	0.53	0.69	0.00	
22	1CDA	1CD8	0	350	270	110	6.253	0.065	0.02	0.01	0.00	
23	1CD9	1CD8	0	350	1250	110	8.063	0.084	0.04	0.05	0.00	
24	1CD4	1CD9	0	350	490	110	66.628	0.693	1.98	0.97	0.00	
25	1DD1	1CD4	0	350	1530	110	70.788	0.736	2.21	3.38	0.00	
26	1DD1	1DD6	0	300	2170	90	20.485	0.290	0.68	1.49	0.00	
27	1DD6	1DD5	0	1200	580	110	1153.397	1.020	0.96	0.55	0.00	
28	1DD5	1CD5	0	1200	1390	110	1012.997	0.896	0.75	1.05	0.00	
29	1DD7	1DD6	0	1350	710	110	1307.258	0.913	0.68	0.49	0.00	
30	1DE1	1DD7	0	1350	340	110	1336.771	0.931	0.71	0.24	0.00	
31	1DE1	1DE5	0	600	230	90	290.905	1.029	3.17	0.73	0.00	
32	1DE5	1DE3	0	600	860	90	197.565	0.699	1.55	1.34	0.00	
33	1DE3	1DE2	0	350	880	90	80.882	0.841	4.10	3.60	0.00	
34	1CE7	1DE2	0	350	230	90	64.701	0.672	2.71	0.62	0.00	
35	1CE7	1CE9	0	350	1060	90	45.429	0.472	1.41	1.49	0.00	
36	1CE2	1CE9	0	350	1680	90	39.591	0.411	1.09	1.83	0.00	
37	1BD2	1BD5	0	700	570	110	412.651	1.072	1.97	1.13	0.00	
38	1BD5	1BE1	0	300	1750	110	36.989	0.523	1.41	2.46	0.00	
39	1BD5	1BE3	0	700	1630	110	357.618	0.929	1.51	2.46	0.00	
40	1BE1	1BE3	0	400	380	110	103.144	0.821	2.31	0.88	0.00	
41	1BE3	1BE5	0	400	910	110	23.454	0.187	0.15	0.14	0.00	
42	1BE2	1BE5	0	400	350	110	56.236	0.448	0.75	0.27	0.00	
43	1BE1	1BE2	0	400	950	110	57.742	0.459	0.79	0.75	0.00	
44	1CE2	1BE1	0	400	1310	110	80.036	0.637	1.45	1.89	0.00	
45	1BE6	1CF1	0	600	590	110	8.607	0.030	0.00	0.01	0.00	
46	1CEA	1CF1	0	400	260	110	11.802	0.094	0.01	0.01	0.00	
47	1CE3	1CEA	0	400	1770	110	81.482	0.648	1.50	2.65	0.00	
48	1CE2	1CE3	0	600	560	110	24.108	0.085	0.02	0.01	0.00	
49	1CE5	1CE3	0	600	1430	110	142.394	0.504	0.58	0.84	0.00	
50	1CE8	1CE5	0	800	760	110	159.279	0.317	0.18	0.13	0.00	
51	1CE8	1CE7	0	350	90	110	195.151	2.028	14.42	1.30	0.00	
52	1DE6	1CE8	0	800	1450	110	439.449	0.874	1.16	1.68	0.00	
53	1DE3	1DE6	0	800	360	110	55.979	0.111	0.03	0.00	0.00	
54	1DE3	1DE4	0	400	1120	90	61.147	0.487	1.27	1.42	0.00	
55	1DE4	1DF1	0	400	830	90	77.846	0.619	1.99	1.66	0.00	
56	1EF1	1DE4	0	600	1570	110	357.774	1.265	3.21	5.03	0.00	
57	1CD5	1CE5	0	400	1450	110	68.135	0.542	1.07	1.55	0.00	
58	1CF2	1CF1	0	600	1580	110	67.210	0.238	0.15	0.23	0.00	
59	1DF3	1CF2	0	600	1100	110	146.900	0.520	0.62	0.68	0.00	
60	1DF3	1DF2	0	300	230	110	45.041	0.637	2.03	0.46	0.00	

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NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
61	1DE2		1DF2	0	300	1900	110	24.639	0.349	0.66	1.26	0.00	
62	1DDC		1DE2	0	300	1090	110	57.416	0.812	3.18	3.46	0.00	
63	1DD6		1DDC	0	600	590	110	313.489	1.109	2.51	1.48	0.00	
64	1DDC		1CD5	0	500	1430	110	30.653	0.156	0.08	0.12	0.00	
65	1DD8		1DD6	0	600	220	110	66.161	0.234	0.14	0.03	0.00	
66	1DDA		1DD8	0	600	1870	110	159.501	0.564	0.72	1.35	0.00	
67	1FD2		1ED5	0	800	1340	110	778.404	1.549	3.33	4.46	0.00	
68	1DD9		1DD1	0	500	1250	110	319.529	1.627	6.32	7.90	0.00	
69	1DD9		1DD1	0	500	1400	110	300.543	1.531	5.64	7.90	0.00	
70	1ED3		1DD9	0	600	550	110	11.435	0.040	0.01	0.00	0.00	
71	1ED3		1DD7	0	300	1590	90	63.828	0.903	5.60	8.90	0.00	
72	1ED4		1ED3	0	600	750	110	152.093	0.538	0.66	0.50	0.00	
73	1ED4		1EE4	0	300	1640	110	68.676	0.972	4.43	7.26	0.00	
74	1EE5		1EE4	0	900	110	110	122.881	0.193	0.06	0.01	0.00	
75	1EF1		1EEB	0	450	110	110	2.418	0.015	0.00	0.00	0.00	
76	1EF1		1EE2	0	450	1900	90	50.554	0.318	0.51	0.96	0.00	
77	1EE1		1EE2	0	600	300	90	139.467	0.493	0.81	0.25	0.00	
78	1EE1		1DE1	0	600	1230	110	153.988	0.545	0.67	0.83	0.00	
79	1EE4		1EE1	0	1500	1080	110	2120.140	1.200	0.99	1.07	0.00	
80	1EEA		1DE6	0	800	2690	110	476.810	0.949	1.34	3.61	0.00	
81	1EEB		1EEA	0	900	250	110	21.333	0.034	0.00	0.00	0.00	
82	1EE8		1EEA	0	900	360	110	501.497	0.788	0.83	0.30	0.00	
83	1EE8		1EE7	0	900	840	110	322.492	0.507	0.37	0.31	0.00	
84	1EE7		1EEG	0	1000	760	110	276.472	0.352	0.17	0.12	0.00	
85	1DE1		1DD6	0	600	930	110	166.318	0.588	0.78	0.73	0.00	
86	1FE2		1EE8	0	600	1880	110	870.009	1.731	4.09	7.68	0.00	
87	1FE2		1FE3	0	800	260	110	571.356	1.137	1.88	0.48	0.00	
88	1FF1		1FF2	0	400	950	110	88.178	0.702	1.73	1.65	0.00	
89	1FF2		1EF3	0	500	680	110	46.020	0.234	0.18	0.12	0.00	
90	1FF9		1FF3	0	600	690	90	46.020	0.163	0.10	0.08	0.00	
91	1FF2		1FF9	0	400	170	110	110.290	0.878	2.62	0.44	0.00	
92	1FF9		1EF1	0	800	2340	110	504.085	1.003	1.49	3.49	0.00	
93	1FFC		1FF5	0	600	190	110	204.707	0.724	1.14	0.22	0.00	
94	1FF5		1FF1	0	600	680	110	132.687	0.469	0.51	0.34	0.00	
95	1FF8		1FFC	0	400	170	110	67.466	0.537	1.05	0.18	0.00	
96	1FF7		1FF8	0	400	680	110	73.702	0.587	1.24	0.84	0.00	
97	1FFA		1FF7	0	400	930	110	89.462	0.712	1.78	1.66	0.00	
98	1GG2		1FFA	0	400	880	110	18.950	0.151	0.10	0.09	0.00	
99	1GFF		1GFC	0	300	180	110	26.326	0.372	0.75	0.13	0.00	
100	1GFC		1GF9	0	300	1030	110	26.326	0.372	0.75	0.78	0.00	
101	1GF9		1FF7	0	300	1920	110	36.506	0.516	1.37	2.64	0.00	
102	1FF8		1FFA	0	400	880	110	71.404	0.568	1.17	1.03	0.00	
103	1FFB		1GF9	0	400	240	110	26.537	0.211	0.19	0.05	0.00	
104	1GF8		1GF9	0	400	800	110	35.252	0.281	0.32	0.26	0.00	
105	1GF8		1GF6	0	400	620	110	45.446	0.362	0.51	0.32	0.00	
106	1GF6		1GG2	0	600	1860	110	123.732	0.438	0.45	0.83	0.00	
107	1GFF		1GFE	0	400	440	110	32.645	0.260	0.28	0.12	0.00	
108	1GFE		1GG1	0	1000	960	110	51.610	0.056	0.01	0.01	0.00	
109	1GF4		1FF8	0	600	1770	110	149.551	0.529	0.64	1.13	0.00	
110	1GF4		1GFA	0	400	630	110	33.764	0.269	0.29	0.18	0.00	
111	1GFA		1GFF	0	400	280	110	33.764	0.269	0.29	0.09	0.00	
112	1GFF		1GFE	0	1000	520	110	332.779	0.424	0.23	0.12	0.00	
113	1GFB		1GFF	0	1000	350	110	357.986	0.456	0.27	0.10	0.00	
114	1GF4		1GFB	0	1000	650	110	357.986	0.456	0.27	0.17	0.00	
115	1GE5		1GF4	0	400	1030	110	40.840	0.325	0.42	0.43	0.00	
116	1GE5		1GF4	0	600	910	110	124.768	0.441	0.46	0.43	0.00	
117	1GF1		1FE6	0	600	530	110	142.983	0.506	0.59	0.31	0.00	
118	1FE6		1FE3	0	500	1870	110	109.573	0.558	0.87	1.63	0.00	
119	1FE1		1FE2	0	900	680	110	1487.385	2.338	6.21	4.23	0.00	
120	PEJ2		1FE9	0	1000	380	110	1818.200	2.315	5.39	2.05	0.00	

<<ZONE-1(2008)>>

Pipe-page : 3

NO	Node(U)	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
121	PEJ12	1FE4	0	600	1060	90	195.000	0.690	1.51	1.61	0.00	
122	1FE4	1FE7	0	300	250	110	17.911	0.253	0.37	0.09	0.00	
123	1FE1	1FE7	0	300	1560	110	25.682	0.363	0.72	1.12	0.00	
124	1FE7	1GF1	0	800	2210	110	317.064	0.690	0.75	1.65	0.00	
125	1GF1	1FFA	0	800	1570	110	246.325	0.490	0.40	0.62	0.00	
126	1FE8	1GE8	0	300	2050	110	34.626	0.490	1.25	2.56	0.00	
127	1GE9	1GE5	0	1000	1310	110	752.369	0.958	1.05	1.38	0.00	
128	1FE5	1GE9	0	1000	1050	110	807.619	1.028	1.20	1.26	0.00	
129	1FDF	1FE5	0	1000	2200	110	914.265	1.164	1.51	3.33	0.00	
130	1FD2	1FDF	0	1000	140	110	954.175	1.215	1.64	0.23	0.00	
131	1FDE	1FD2	0	1000	490	110	1554.198	1.979	4.03	1.97	0.00	
132	PEJ2	1FDE	0	1000	430	110	1591.108	2.030	4.23	1.82	0.00	
133	PEJ2	1FD6	0	900	1040	110	1108.797	1.743	3.61	3.75	0.00	
134	1FD6	1FD1	0	800	440	110	508.214	1.011	1.51	0.67	0.00	
135	1FDH	1GD1	0	800	1900	110	188.721	0.375	0.24	0.45	0.00	
136	1FDG	1FDH	0	800	650	110	228.631	0.455	0.34	0.23	0.00	
137	1FD6	1FDG	0	800	170	110	268.541	0.534	0.46	0.08	0.00	
138	1FDA	1FD3	0	350	750	110	39.910	0.415	0.77	0.57	0.00	
139	1FD5	1FD4	0	300	720	110	39.910	0.565	1.62	1.17	0.00	
140	1GDC	1FD5	0	250	670	110	79.820	1.626	14.20	9.52	0.00	
141	PEJ2	1GDC	0	400	2550	90	90.126	0.717	2.61	6.66	0.00	
142	1FE4	1GDD	0	400	2140	90	38.610	0.307	0.54	1.16	0.00	
143	1EE5	1EE4	0	900	110	110	122.881	0.193	0.06	0.01	0.00	
144	1EE2	1EE6	0	300	670	90	2.898	0.041	0.02	0.01	0.00	
145	1EEM	1EE6	0	300	210	90	37.012	0.524	2.04	0.43	0.00	
146	1EEH	1EEM	0	300	80	110	71.349	1.009	4.75	0.38	0.00	
147	1EEF	1EEM	0	300	1350	90	5.573	0.079	0.06	0.08	0.00	
148	1EEG	1EEH	0	1000	220	110	236.562	0.301	0.12	0.03	0.00	
149	1EEH	1EEK	0	1000	1390	110	125.303	0.160	0.04	0.05	0.00	
150	DC-R6	1BD1	0	1600	2250	110	780.000	0.388	0.11	0.26	0.00	
151	1BE2	1BE6	0	600	90	110	88.297	0.312	0.24	0.02	0.00	
152	1FD1	1ED4	0	500	1690	110	297.599	1.516	5.54	9.36	0.00	
153	1GFD	1GF8	0	400	310	110	71.214	0.567	1.17	0.36	0.00	
154	1GFE	1GFD	0	400	130	110	76.251	0.607	1.32	0.17	0.00	
155	1GE5	1GEA	0	300	110	110	50.394	0.713	2.50	0.28	0.00	
156	1GE8	1GEA	0	300	110	110	1.216	0.017	0.00	0.00	0.00	
157	1EE2	1DE3	0	450	1670	90	93.783	0.590	1.58	2.65	0.00	
158	X001	1CE2	0	600	150	110	325.879	1.153	2.70	0.41	0.00	
159	1CD6	X001	0	600	490	110	325.879	1.153	2.70	1.32	0.00	
160	X002	1CDA	0	400	850	110	44.267	0.352	0.48	0.41	0.00	
161	1CD6	X002	0	400	490	110	44.267	0.352	0.48	0.24	0.00	
162	1CE2	X003	0	400	460	110	97.124	0.773	2.07	0.95	0.00	
163	X003	1CE4	0	400	760	110	97.124	0.773	2.07	1.57	0.00	
164	1ED5	1DDD	0	800	1910	110	701.574	1.396	2.75	5.25	0.00	
165	1EE1	X004	0	1500	830	110	1733.315	0.981	0.69	0.57	0.00	
166	X004	1DE1	0	1500	380	110	1733.315	0.981	0.69	0.26	0.00	
167	1EEK	X009	0	1000	380	110	39.910	0.051	0.00	0.01	0.00	
168	X009	1EEJ	0	1000	260	110	39.910	0.051	0.00	0.00	0.00	
169	X010	1FE1	0	1000	190	110	1778.289	2.264	5.18	0.98	0.00	
170	1FE9	X010	0	1000	1190	110	1778.289	2.264	5.18	6.16	0.00	
171	1EE3	X007	0	900	960	90	110.955	0.174	0.07	0.07	0.00	
172	X007	1EE8	0	900	330	90	110.955	0.174	0.07	0.03	0.00	
173	1FE3	X011	0	800	340	110	601.499	1.197	2.07	0.71	0.00	
174	X011	1FF1	0	800	590	110	601.499	1.197	2.07	1.21	0.00	
175	1EE5	X006	0	900	980	90	156.975	0.247	0.14	0.14	0.00	
176	X006	1EE3	0	900	940	90	156.975	0.247	0.14	0.13	0.00	
177	X008	1EE4	0	1500	120	110	1882.532	1.065	0.80	0.10	0.00	
178	X015	1CD2	0	600	160	110	87.295	0.309	0.24	0.03	0.00	
179	1CD1	X015	0	600	510	110	87.295	0.309	0.24	0.12	0.00	
180	1GE5	X022	0	400	1090	110	75.654	0.602	1.30	1.42	0.00	

<<ZONE-1(2008)>>

Pipe-pege : 4

NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
181	X022		1GF1	0	400	420	110	75.654	0.602	1.30	0.55	0.00	
182	1FD1		1EC1	0	600	1570	110	133.785	0.473	0.52	0.81	0.00	
183	1EEB		1EF2	0	800	570	90	46.020	0.092	0.03	0.01	0.00	
184	PEJ13		1FDA	0	350	590	110	79.820	0.830	2.76	1.63	0.00	
185	PEJ11		1EE5	0	900	1470	90	442.648	0.696	0.96	1.40	0.00	
186	PEJ11		X008	0	1500	1650	110	1882.531	1.065	0.80	1.31	0.00	
187	1DF1		1DF3	0	600	650	110	279.561	0.989	2.03	1.32	0.00	
188	X023		1GDC	0	400	480	90	68.214	0.543	1.56	0.75	0.00	
189	1GD1		X023	0	300	320	110	68.214	0.965	4.37	1.40	0.00	
190	1GD1		1EC1	0	600	3530	110	80.597	0.285	0.20	0.72	0.00	
191	1EC1		1EC2	0	300	2240	110	63.712	0.901	3.85	8.63	0.00	
192	1DDD		1EC2	0	300	1760	110	13.118	0.186	0.21	0.36	0.00	
193	1DDD		1DD9	0	800	330	110	648.546	1.290	2.37	0.78	0.00	
194	1BD1		1BD3	0	1350	220	110	392.782	0.274	0.07	0.01	0.00	
195	1BD3		1BD4	0	1350	940	110	308.791	0.216	0.05	0.05	0.00	
196	1CD4		1CD9	0	600	570	110	253.724	0.897	1.70	0.97	0.00	
197	1DD1		1CD4	0	600	1560	110	289.474	1.024	2.17	3.38	0.00	
198	1DE4		1DF1	0	600	860	110	271.395	0.960	1.92	1.66	0.00	
199	1FF2		1FF9	0	800	320	110	485.836	0.967	1.39	0.44	0.00	
200	1FF1		1FF2	0	800	800	110	599.988	1.194	2.06	1.65	0.00	
201	1FF8		1FFC	0	600	220	110	170.651	0.604	0.82	0.18	0.00	
202	1FF7		1FF8	0	600	670	110	216.025	0.764	1.26	0.84	0.00	
203	1FFA		1FF7	0	600	1010	110	248.779	0.880	1.64	1.66	0.00	
204	1GG2		1FFA	0	600	940	110	53.171	0.188	0.09	0.09	0.00	
205	1GE5		1GF4	0	1000	1160	110	427.303	0.544	0.37	0.43	0.00	
206	1GFE		1GFD	0	600	180	110	185.953	0.658	0.96	0.17	0.00	
207	1GFD		1GF8	0	600	360	110	190.990	0.675	1.00	0.36	0.00	
208	1GF8		1GF6	0	600	640	110	129.895	0.459	0.49	0.32	0.00	
209	1BE1		1BE2	0	600	965	110	166.481	0.589	0.78	0.75	0.00	
210	1FE1		1FE7	0	700	1650	110	231.812	0.602	0.68	1.12	0.00	
211	1FE5		1FE8	0	300	83	110	68.036	0.963	4.35	0.36	0.00	
212	1EEK		1EEF	0	300	118	110	45.483	0.643	2.06	0.25	0.00	
213	1FE4		1FE7	0	600	277	110	105.069	0.372	0.33	0.09	0.00	
214	1DD1		1DDA	0	600	100	110	199.414	0.705	1.09	0.11	0.00	
215	1FD6		1FD2	0	800	100	110	255.211	0.508	0.42	0.04	0.00	
216	1BE1		1CE4	0	400	595	110	67.586	0.538	1.06	0.63	0.00	

3.2.2 The Results of Preliminary Primary Pipe Network Analysis for Zone 2 and Zone 3 (2008)

<<ZONE-2 3(2008)>>

Node Data

Node-page : 1

NO	Node	Type	Q (l/sec)	EL (m)	GL (m)	EH (m)	Comments
1	3BF1	0	17.940	29.79	0.50	29.29	
2	3BG1	0	17.940	29.92	0.50	29.42	
3	3BG2	0	17.940	29.93	0.50	29.43	
4	3BF2	0	17.940	30.02	0.50	29.52	
5	3BE1	0	23.270	29.76	1.90	27.86	
6	2DF6	0	46.540	32.79	2.00	30.79	
7	2DF5	0	41.340	34.05	4.00	30.05	
8	3CF4	0	41.210	29.73	0.80	28.93	
9	3CFA	0	41.210	29.79	2.00	27.79	
10	3DF3	0	18.070	30.55	2.00	28.55	
11	3DF4	0	18.070	30.57	1.90	28.67	
12	3CF9	0	41.210	30.08	2.00	28.08	
13	3CF2	0	23.270	29.48	0.80	28.68	
14	3CF3	0	41.210	28.96	2.00	26.96	
15	2DFC	0	46.540	33.86	2.50	31.36	
16	2DF7	0	46.540	33.89	3.50	30.39	
17	2EF5	0	41.340	34.08	4.00	30.08	
18	2EFC	0	41.340	34.28	4.50	29.78	
19	2EF6	0	41.340	35.51	6.00	29.51	
20	2EF4	0	41.340	35.50	6.00	29.50	
21	2EG4	0	72.020	35.56	6.00	29.56	
22	2EG5	0	64.610	36.10	6.00	30.10	
23	2EG7	0	38.090	39.39	5.00	34.39	
24	2EG3	0	38.090	35.24	3.50	31.74	
25	2EG2	0	38.090	34.93	3.50	31.43	
26	2EG1	0	38.090	34.42	4.00	30.42	
27	2DG8	0	38.090	34.44	4.00	30.44	
28	2DG6	0	38.090	34.76	4.00	30.76	
29	2DG7	0	42.120	33.64	1.20	32.44	
30	3CGD	0	18.070	33.64	2.10	31.54	
31	3CG5	0	41.330	33.17	2.20	30.97	
32	SNTER	0	0.000	33.17	1.00	32.17	
33	3CHA	0	41.330	29.58	1.00	28.58	
34	3BH4	0	41.330	29.26	1.00	28.26	
35	3BH1	0	41.330	27.84	2.00	25.84	
36	3BHB	0	41.330	26.02	0.50	25.52	
37	3AH1	0	41.330	25.65	0.50	25.15	
38	3AH6	0	41.330	25.57	0.50	25.07	
39	3BG6	0	41.330	25.57	2.00	23.57	
40	3BG7	0	41.330	26.50	0.50	26.00	
41	3BG4	0	41.330	26.64	1.60	25.64	
42	3BG5	0	41.330	26.20	1.50	24.70	
43	3BH7	0	41.330	29.73	2.00	27.73	
44	3BH2	0	41.330	29.04	2.00	27.04	
45	3AH2	0	41.330	28.36	0.50	27.86	
46	3BH3	0	41.330	29.19	2.00	27.19	
47	3BH8	0	41.330	32.61	2.00	30.61	
48	3CG8	0	41.330	32.30	2.60	29.70	
49	3CH4	0	41.330	32.70	1.00	31.70	
50	3CG2	0	41.330	32.73	1.00	31.73	
51	3DG1	0	41.330	33.23	1.50	31.73	
52	2DG2	0	42.120	33.86	1.20	32.66	
53	2DG4	0	42.120	35.33	4.00	31.33	
54	2DH3	0	42.120	38.89	1.50	37.39	
55	3DH5	0	41.330	38.81	3.00	35.81	
56	3CGC	0	0.000	33.90	3.00	30.90	
57	3CG3	0	18.070	32.81	2.00	30.81	
58	3CGB	0	41.330	32.83	1.50	31.33	
59	3CG1	0	18.070	32.87	2.60	30.27	
60	3CGA	0	41.330	33.60	1.00	32.60	

< ZONE-2_3(2008) >

Node-page : 2

NO	Node	Type	Q (l/sec)	ML (m)	CL (m)	EH (m)	Comments
61	3CH9	0	44.330	34.34	1.50	32.84	
62	3CH6	0	44.330	34.69	2.80	31.89	
63	3CH5	0	44.330	35.09	1.50	33.59	
64	3CH8	0	44.330	34.68	1.50	33.18	
65	3CHB	0	44.330	34.03	1.00	33.03	
66	3CG9	0	44.330	33.00	1.00	32.00	
67	3CF7	0	499.980	17.87	1.50	16.37	
68	3BF3	0	17.940	30.13	1.50	28.63	
69	3BG8	0	17.940	30.42	0.50	29.92	
70	3BG3	0	17.940	30.28	0.50	29.78	
71	3CG7	0	44.330	32.30	2.30	30.00	
72	3DF1	0	0.000	32.57	2.50	30.07	
73	3DF2	0	44.330	31.78	2.50	29.28	
74	3CF5	0	0.000	31.36	1.70	29.66	
75	2DFD	0	42.120	32.69	2.50	30.19	
76	2DF4	0	72.020	33.67	3.00	30.67	
77	2DFA	0	41.340	33.78	3.50	30.28	
78	2DFB	0	72.020	33.77	3.50	30.27	
79	2EF8	0	41.340	34.28	4.50	29.78	
80	2EF9	0	41.340	35.42	6.00	29.42	
81	2DH2	0	59.670	39.84	1.50	38.34	
82	2DH5	0	38.090	39.75	1.50	38.25	
83	3DH6	0	14.300	39.47	0.80	38.67	
84	3CH2	0	14.300	36.88	1.00	35.88	
85	3CHC	0	44.330	34.67	1.00	33.67	
86	3CH1	0	44.330	34.25	1.50	32.75	
87	3CH3	0	44.330	33.80	1.00	32.80	
88	3BHA	0	44.330	32.80	2.00	30.80	
89	3CH7	0	14.300	34.13	1.50	32.63	
90	3BH9	0	50.570	33.34	2.00	31.34	
91	3CJ1	0	14.300	36.45	1.00	35.45	
92	3CJ5	0	14.300	36.72	2.00	34.72	
93	3CJ2	0	50.570	37.44	3.00	34.44	
94	3CJ6	0	14.300	37.67	3.00	34.67	
95	3AH5	0	50.570	28.64	1.00	27.64	
96	3AH3	0	50.570	28.40	2.00	26.40	
97	3AH4	0	50.570	28.41	1.00	27.41	
98	3AJ1	0	81.110	28.60	1.30	27.30	
99	3AJ2	0	28.340	30.60	0.60	30.00	
100	3AJ3	0	28.340	32.91	3.00	29.91	
101	3BJ5	0	28.340	33.67	2.80	30.87	
102	3BK1	0	28.340	35.51	2.50	33.01	
103	3AK2	0	28.340	30.88	1.00	29.88	
104	3AK1	0	28.340	30.49	0.50	29.99	
105	3AK3	0	28.340	30.56	0.50	30.06	
106	3CK4	0	28.340	37.68	2.90	34.78	
107	3CK1	0	28.340	37.27	2.70	34.57	
108	3BJ3	0	50.570	35.50	2.00	33.50	
109	3BJ2	0	50.570	30.26	1.00	29.26	
110	3BJ8	0	50.570	34.85	2.00	32.85	
111	3BJ4	0	50.570	33.83	2.00	31.83	
112	3BHC	0	50.570	32.81	2.00	30.81	
113	3BH5	0	50.570	29.40	0.50	28.90	
114	3BH6	0	50.570	28.85	2.00	26.85	
115	3BJ6	0	50.570	29.66	2.00	27.66	
116	3BJ9	0	50.570	36.36	3.00	33.36	
117	3BJ7	0	28.340	36.67	3.00	33.67	
118	3CJ3	0	28.340	37.99	3.00	34.99	
119	3CK2	0	28.340	38.98	3.00	35.98	
120	DC-R1	0	-2,470.000	39.16	2.00	37.16	

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Node-page : 3

NO	Node	Type	Q (1/sec)	WL (m)	CL (m)	EH (m)	Comments
121	2CK3	0	33.540	39.15	3.00	36.15	
122	2DK3	0	33.540	39.91	3.00	36.91	
123	2EK3	0	94.380	45.89	3.50	42.39	
124	2EL1	0	94.380	46.43	3.50	42.93	
125	2FK2	0	94.380	54.79	10.00	44.79	
126	2FK4	0	94.380	53.32	10.00	43.32	
127	2FK3	0	94.380	51.72	10.00	41.72	
128	2EK1	0	94.380	47.71	3.50	44.21	
129	2EK2	0	94.380	47.13	3.50	43.63	
130	2DK5	0	0.000	39.39	3.00	36.39	
131	2DK4	0	33.540	39.08	3.00	36.08	
132	2CJ1	0	33.540	39.09	3.00	36.09	
133	2CJ7	0	59.670	39.50	3.00	36.50	
134	2CJ4	0	0.000	42.06	3.00	39.06	
135	2CJ3	0	0.000	42.52	3.00	39.52	
136	2DJ2	0	59.670	45.52	2.00	43.52	
137	2DJ1	0	59.670	44.16	3.50	40.66	
138	2EJA	0	59.670	48.06	3.50	44.56	
139	2EJ6	0	94.380	48.37	3.50	44.87	
140	2EJ4	0	94.380	49.23	6.00	43.23	
141	2FJ3	0	94.380	51.45	11.00	40.45	
142	2FK1	0	94.380	52.25	11.00	41.25	
143	2EJ1	0	59.670	48.06	3.50	44.56	
144	2EH1	0	59.670	43.46	3.00	40.46	
145	2DH4	0	59.670	42.80	3.00	39.80	
146	2DH6	0	59.670	41.00	2.00	39.00	
147	2EJ3	0	94.380	49.74	4.60	45.14	
148	2EJ2	0	56.940	49.22	4.60	44.62	
149	2EH4	0	56.940	47.56	5.00	42.56	
150	2EH7	0	56.940	47.73	5.40	42.33	
151	2EH5	0	56.940	48.10	5.00	43.10	
152	2EJ7	0	94.380	50.91	4.60	46.31	
153	2EJ8	0	94.380	49.50	4.00	45.50	
154	2EG5	0	83.460	41.44	5.00	36.44	
155	2EH6	0	56.940	43.58	4.50	39.08	
156	2EH3	0	56.940	44.96	6.00	38.96	
157	2EH2	0	59.670	40.20	4.50	35.70	
158	2EH9	0	56.940	37.72	4.00	33.72	
159	2EH8	0	56.940	37.62	6.00	31.62	
160	2DG5	0	38.090	40.21	5.20	35.01	
161	2FH1	0	56.940	51.59	7.00	44.59	
162	2FH4	0	56.940	42.11	10.00	32.11	
163	2FH3	0	56.940	42.43	11.00	31.43	
164	2FG9	0	26.520	36.86	7.00	29.86	
165	2FG2	0	26.520	37.27	6.50	30.77	
166	2FGD	0	26.520	37.69	11.00	26.69	
167	2FG4	0	26.520	37.84	10.00	27.84	
168	2FG8	0	26.520	39.32	16.00	23.32	
169	2FGC	0	26.520	38.75	11.00	27.75	
170	2FGB	0	26.520	36.91	7.00	29.91	
171	2EFD	0	26.520	36.52	6.50	30.02	
172	2FF4	0	26.520	36.50	7.00	29.50	
173	2FG5	0	26.520	41.42	9.00	32.42	
174	2FGA	0	26.520	38.33	7.00	31.33	
175	2EFA	0	67.860	36.48	7.00	29.48	
176	2FG1	0	26.520	37.28	6.50	30.78	
177	2FG3	0	26.520	37.22	6.50	30.72	
178	2FF7	0	26.520	37.12	6.50	30.62	
179	2FG7	0	26.520	40.90	14.20	26.70	
180	2FG6	0	83.460	41.44	16.00	25.44	

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NO	Node	Type	Q (l/sec)	WL (m)	GL (m)	EH (m)	Comments
181	2FH6	0	56.940	44.21	12.50	31.71	
182	2FH2	0	56.940	45.37	13.00	32.37	
183	2FJ5	0	94.380	48.23	12.00	36.23	
184	2FJ2	0	94.380	48.57	9.00	39.57	
185	2FJ1	0	94.380	52.50	7.00	45.50	
186	2FJ4	0	94.380	48.41	11.00	37.41	
187	2FH5	0	56.940	47.70	10.00	37.70	
188	2FH8	0	56.940	53.23	4.00	49.23	
189	2FH9	0	0.000	53.81	4.50	49.31	
190	2FH7	0	56.940	52.80	4.00	48.80	
191	PULOG	1	-4,408.950	55.00	1.00	54.00	
192	3CG1	0	41.330	33.13	1.00	32.13	
193	2FGE	0	0.000	41.91	15.30	26.61	
194	X012	0	0.000	41.42	10.80	30.62	
195	2FGF	0	0.000	40.59	14.20	26.39	
196	2DG3	0	42.120	34.02	1.20	32.82	
197	X021	0	0.000	35.67	6.00	29.67	
198	X020	0	0.000	42.06	4.90	37.16	
199	X019	0	0.000	48.24	3.50	44.74	
200	3BE7	0	0.000	29.76	1.00	28.76	
201	X018	0	0.000	32.70	1.00	31.70	
202	3AJ4	0	28.340	32.42	0.50	31.92	
203	3AL1	0	28.340	30.25	0.50	29.75	
204	3BL1	0	28.340	31.67	2.50	29.17	
205	2BL1	0	33.540	37.86	2.50	35.36	
206	2CK1	0	33.540	37.85	2.50	35.35	
207	2DL1	0	94.380	42.33	3.50	38.83	
208	2DK2	0	94.380	41.81	3.50	38.31	
209	2DK1	0	94.380	41.81	3.50	38.31	
210	2CJ9	0	33.540	39.09	3.00	36.09	
211	2CH1	0	59.670	38.02	1.10	36.92	
212	2CH2	0	59.670	38.02	1.10	36.92	
213	2FK5	0	94.380	51.39	13.00	38.39	
214	2CK2	0	33.540	37.85	3.00	34.85	
215	BRN3	0	-2,860.000	57.59	8.00	49.59	

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Branch Data

Pipe-page : 1

NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
1	3BG1		3BF1	0	600	1760	110	45.367	0.160	0.07	0.13	0.00	
2	3BG2		3BG1	0	600	80	110	63.307	0.224	0.13	0.01	0.00	
3	3BF2		3BG2	0	250	1780	110	3.811	0.078	0.05	0.09	0.00	
4	3BF2		3BE4	0	250	1300	110	7.917	0.161	0.20	0.26	0.00	
5	2DF5		2DF6	0	400	1630	90	46.540	0.370	0.77	1.26	0.00	
6	3BE4		3CF4	0	400	730	110	12.074	0.096	0.01	0.03	0.00	
7	3CFA		3CF4	0	400	1430	110	12.240	0.097	0.01	0.06	0.00	
8	3DF3		3CFA	0	400	1100	110	53.450	0.425	0.69	0.76	0.00	
9	3DF4		3DF3	0	600	170	110	71.520	0.253	0.16	0.02	0.00	
10	3DF4		3CF9	0	600	2020	110	88.936	0.315	0.24	0.49	0.00	
11	3CF9		3CF4	0	500	700	110	81.375	0.414	0.50	0.35	0.00	
12	3CF4		3CF2	0	400	260	110	64.480	0.513	0.97	0.25	0.00	
13	3CF2		3CF3	0	300	300	110	41.210	0.583	1.72	0.52	0.00	
14	2DF7		2DFC	0	600	310	110	46.540	0.165	0.07	0.03	0.00	
15	2EF5		2DF7	0	600	710	110	93.080	0.329	0.27	0.19	0.00	
16	2EFC		2EF5	0	800	370	110	296.698	0.590	0.56	0.20	0.00	
17	2EF6		2EFC	0	800	1700	110	310.450	0.677	0.72	1.23	0.00	
18	2EF6		2EF4	0	500	180	110	14.453	0.074	0.02	0.01	0.00	
19	2EG4		2EF4	0	500	820	110	26.887	0.137	0.06	0.06	0.00	
20	2EG7		2EG6	0	500	1530	110	178.595	0.910	2.15	3.29	0.00	
21	2EG7		2EG3	0	250	1090	110	39.224	0.799	3.82	4.15	0.00	
22	2EG3		2EG2	0	350	150	110	67.905	0.706	2.05	0.31	0.00	
23	2EG2		2EG1	0	350	1130	110	29.815	0.310	0.45	0.51	0.00	
24	2DG8		2EG1	0	250	510	110	3.209	0.065	0.04	0.02	0.00	
25	2DG6		2DG8	0	250	340	110	18.325	0.373	0.93	0.32	0.00	
26	2DG6		2DG7	0	350	900	90	42.548	0.442	1.25	1.12	0.00	
27	2DG7		3CGD	0	350	940	90	0.428	0.004	0.00	0.00	0.00	
28	3CG5		SNTER	0	500	270	110	0.000	0.000	0.00	0.00	0.00	
29	3CG5		3CHA	0	350	1460	90	61.376	0.638	2.46	3.59	0.00	
30	3CHA		3BE4	0	350	1390	90	17.046	0.177	0.23	0.32	0.00	
31	3BH4		3BH1	0	350	1340	90	38.908	0.404	1.06	1.42	0.00	
32	3BH1		3BHB	0	350	400	90	85.754	0.891	4.57	1.82	0.00	
33	3BHB		3AH1	0	350	310	90	41.424	0.431	1.19	0.37	0.00	
34	3AH1		3AH6	0	250	210	110	11.148	0.227	0.37	0.08	0.00	
35	3BG6		3AH6	0	250	1530	110	0.296	0.006	0.00	0.00	0.00	
36	3BG7		3BG6	0	250	720	110	21.852	0.445	1.29	0.93	0.00	
37	3BG2		3BG7	0	250	460	110	56.306	1.147	7.45	3.43	0.00	
38	3BG4		3BG7	0	300	1100	110	9.876	0.140	0.12	0.14	0.00	
39	3BG4		3BG5	0	300	740	110	23.026	0.326	0.59	0.44	0.00	
40	3BG5		3BG6	0	300	1100	110	22.774	0.322	0.57	0.63	0.00	
41	3BH4		3BG5	0	300	1570	110	44.078	0.624	1.95	3.06	0.00	
42	3BH7		3BH4	0	300	130	110	61.526	0.870	3.61	0.47	0.00	
43	3BH7		3BH2	0	600	1110	90	120.651	0.427	0.62	0.69	0.00	
44	3BH2		3AH2	0	400	620	90	56.347	0.448	1.10	0.68	0.00	
45	3AH2		3AH1	0	250	510	110	46.939	0.956	5.32	2.71	0.00	
46	3BH2		3BH1	0	400	650	110	91.176	0.726	1.81	1.20	0.00	
47	3BH3		3BH2	0	600	950	110	71.202	0.252	0.16	0.15	0.00	
48	3BH8		3BH3	0	400	1510	110	101.867	0.811	2.26	3.42	0.00	
49	3BH8		3BH7	0	300	970	110	55.318	0.783	2.97	2.88	0.00	
50	3BH7		3BH4	0	300	200	110	48.745	0.690	2.35	0.47	0.00	
51	3CG8		3BG4	0	300	1030	110	77.232	1.093	5.50	5.66	0.00	
52	3CH4		3CG8	0	600	820	110	128.753	0.455	0.48	0.40	0.00	
53	3DG1		3CG2	0	600	1750	90	79.103	0.280	0.28	0.50	0.00	
54	2DG2		3DG1	0	600	970	90	123.433	0.437	0.65	0.63	0.00	
55	2DH3		2DG4	0	800	1810	110	586.201	1.166	1.97	3.56	0.00	
56	2DH3		3DH5	0	400	590	110	21.641	0.172	0.13	0.08	0.00	
57	3DH5		3CGC	0	400	1530	110	123.128	0.980	3.21	4.91	0.00	
58	3CGC		3CGD	0	350	270	110	45.633	0.474	0.98	0.26	0.00	
59	3CGC		3CG3	0	400	800	110	77.495	0.617	1.35	1.03	0.00	
60	3CG3		3CG3	0	600	750	110	26.694	0.091	0.03	0.02	0.00	

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NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
61	3CG1		3CGB	0	600	210	110	71.024	0.251	0.16	0.01	0.00	
62	3CGA		3CG1	0	900	1490	110	377.053	0.593	0.49	0.73	0.00	
63	3CGA		3CG5	0	500	400	110	122.044	0.622	1.07	0.43	0.00	
64	3CH9		3CGA	0	1000	1290	110	543.427	0.692	0.58	0.74	0.00	
65	3CH6		3CH9	0	1000	520	110	587.757	0.748	0.67	0.35	0.00	
66	3CH5		3CH6	0	1200	430	110	1142.684	1.010	0.94	0.40	0.00	
67	3CH5		3CH8	0	900	320	110	632.970	0.995	1.28	0.41	0.00	
68	3CH8		3CHB	0	900	580	110	588.640	0.925	1.12	0.65	0.00	
69	3CHB		3CG9	0	900	1070	110	544.310	0.856	0.97	1.03	0.00	
70	3CG9		3CF7	0	600	2540	110	499.980	1.768	5.96	15.13	0.00	
71	3BF3		3BF2	0	400	490	110	29.669	0.236	0.23	0.11	0.00	
72	3BF3		3CF9	0	600	1230	110	33.590	0.119	0.04	0.05	0.00	
73	3BG8		3BF3	0	600	1390	110	81.198	0.287	0.21	0.29	0.00	
74	3BG8		3BG3	0	600	210	110	151.682	0.536	0.66	0.14	0.00	
75	3BG3		3BG2	0	600	680	110	133.742	0.473	0.52	0.35	0.00	
76	3CG7		3BG8	0	600	1130	110	250.820	0.887	1.66	1.88	0.00	
77	3CG8		3CG7	0	600	1680	110	7.191	0.025	0.00	0.00	0.00	
78	3CG1		3CG7	0	800	1080	110	287.959	0.573	0.53	0.57	0.00	
79	3CG3		3DF1	0	600	1060	110	86.118	0.305	0.23	0.24	0.00	
80	3DF1		3DF2	0	600	590	110	222.916	0.788	1.34	0.79	0.00	
81	3DF2		3CF5	0	600	470	110	178.586	0.632	0.89	0.42	0.00	
82	3CF5		3DF4	0	600	890	110	178.586	0.632	0.89	0.79	0.00	
83	2DFD		3DF1	0	600	220	110	136.798	0.484	0.54	0.12	0.00	
84	2DF4		2DFD	0	600	1100	110	178.918	0.633	0.89	0.98	0.00	
85	2DG4		2DF4	0	600	1080	90	196.738	0.696	1.54	1.66	0.00	
86	2DG6		2DFA	0	350	1740	90	27.748	0.288	0.57	0.98	0.00	
87	2DF5		2DFA	0	350	480	90	27.699	0.288	0.56	0.27	0.00	
88	2DF8		2DF4	0	600	700	90	54.200	0.192	0.14	0.10	0.00	
89	2EF5		2DF8	0	600	570	90	112.112	0.397	0.54	0.31	0.00	
90	2EF8		2DF5	0	500	480	90	65.413	0.333	0.49	0.23	0.00	
91	2EF9		2EF8	0	550	1550	90	104.342	0.439	0.73	1.14	0.00	
92	2DH2		2DH3	0	800	400	110	649.965	1.293	2.38	0.95	0.00	
93	2DH2		2DH5	0	800	340	110	203.685	0.405	0.28	0.09	0.00	
94	2DH5		3DH6	0	800	280	110	403.430	0.803	0.99	0.28	0.00	
95	3DH6		3CH2	0	600	1650	110	243.313	0.861	1.57	2.59	0.00	
96	3CH2		3CHC	0	600	710	110	352.491	1.247	3.12	2.21	0.00	
97	3CHC		3CH1	0	600	170	110	308.161	1.090	2.43	0.42	0.00	
98	3CH6		3CH1	0	600	660	110	152.352	0.539	0.66	0.44	0.00	
99	3CH1		3CH3	0	600	310	110	234.242	0.828	1.46	0.45	0.00	
100	3CH3		3BHA	0	600	1010	110	189.912	0.672	0.99	1.00	0.00	
101	3CH1		3CH7	0	600	130	110	181.941	0.643	0.92	0.12	0.00	
102	3CH7		3BH9	0	600	1000	110	167.641	0.593	0.79	0.79	0.00	
103	3CJ1		3CH5	0	1350	1080	110	1819.983	1.271	1.25	1.36	0.00	
104	3CJ5		3CJ1	0	1650	580	110	1834.284	0.858	0.48	0.27	0.00	
105	3CJ2		3CJ5	0	1650	1480	110	1848.583	0.865	0.49	0.72	0.00	
106	3CJ6		3CJ2	0	1650	300	110	2365.857	1.106	0.77	0.23	0.00	
107	3AH1		3AH6	0	400	280	110	32.886	0.262	0.28	0.08	0.00	
108	3AH5		3AH2	0	400	890	110	34.923	0.278	0.31	0.28	0.00	
109	3BH3		3AH5	0	400	520	110	67.922	0.541	1.07	0.55	0.00	
110	3AH5		3AH3	0	400	430	110	47.064	0.375	0.54	0.24	0.00	
111	3AH1		3AH3	0	400	780	110	3.506	0.028	0.00	0.01	0.00	
112	3AJ1		3AH1	0	400	890	110	29.008	0.231	0.22	0.19	0.00	
113	3AJ2		3AJ1	0	400	1020	110	94.117	0.749	1.95	2.00	0.00	
114	3AJ3		3AJ2	0	400	600	110	136.044	1.083	3.86	2.31	0.00	
115	3BJ5		3AJ3	0	600	490	110	240.813	0.852	1.54	0.76	0.00	
116	3BK1		3BJ5	0	600	970	110	269.153	0.952	1.89	1.84	0.00	
117	3AJ3		3AK2	0	300	890	110	48.089	0.680	2.29	2.03	0.00	
118	3AK2		3AK1	0	300	880	110	19.749	0.279	0.44	0.39	0.00	
119	3AK3		3AK1	0	300	770	110	8.591	0.122	0.09	0.07	0.00	
120	3CK4		3CK1	0	800	440	110	394.870	0.786	0.95	0.41	0.00	

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NO	Node(U) ->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
121	3CK1	3BK1	0	800	2130	110	366.530	0.729	0.83	1.76	0.00	
122	3BK1	3AK3	0	300	2290	110	46.597	0.659	2.16	4.95	0.00	
123	3BK1	3BJ3	0	800	1300	110	22.410	0.045	0.00	0.01	0.00	
124	3BJ3	3BJ2	0	250	1530	110	36.983	0.753	3.42	5.24	0.00	
125	3AJ2	3BJ2	0	250	620	110	13.587	0.277	0.51	0.31	0.00	
126	3BJ3	3BJ8	0	800	580	110	432.573	0.861	1.12	0.65	0.00	
127	3BJ8	3BJ4	0	800	1140	110	382.003	0.760	0.89	1.02	0.00	
128	3BJ4	3BH9	0	800	1100	110	261.862	0.521	0.44	0.49	0.00	
129	3BH9	3BHC	0	600	150	110	378.932	1.340	3.57	0.53	0.00	
130	3BHC	3BHA	0	600	140	110	55.933	0.198	0.10	0.01	0.00	
131	3BHA	3BH8	0	600	170	110	201.515	0.713	1.11	0.19	0.00	
132	3BHC	3BH5	0	600	1760	110	272.429	0.964	1.94	3.41	0.00	
133	3BH5	3BH3	0	600	310	110	146.221	0.517	0.61	0.21	0.00	
134	3BH5	3BH6	0	400	420	110	75.638	0.602	1.30	0.55	0.00	
135	3BH6	3AH4	0	300	650	110	25.068	0.355	0.69	0.44	0.00	
136	3BH3	3AH5	0	400	570	110	64.634	0.514	0.97	0.55	0.00	
137	3BJ6	3AJ1	0	250	1050	110	19.001	0.387	1.00	1.06	0.00	
138	3BJ4	3BJ6	0	250	1310	110	35.130	0.716	3.11	4.17	0.00	
139	3BJ4	3BJ6	0	250	1390	110	34.441	0.702	3.00	4.17	0.00	
140	3BJ9	3BJ3	0	800	820	110	416.133	0.828	1.01	0.85	0.00	
141	3CJ2	3BJ9	0	800	840	110	466.703	0.928	1.29	1.08	0.00	
142	3BJ7	3BJ3	0	250	1190	110	18.847	0.384	0.98	1.17	0.00	
143	3CJ3	3BJ7	0	250	800	110	24.973	0.509	1.65	1.32	0.00	
144	3CJ3	3BJ7	0	400	820	110	84.920	0.676	1.61	1.32	0.00	
145	3BJ7	3BJ3	0	400	1270	110	62.706	0.499	0.92	1.17	0.00	
146	3CJ3	3CJ6	0	1800	650	110	2297.095	0.903	0.47	0.32	0.00	
147	3CK2	3CJ3	0	1800	2010	110	2337.054	0.918	0.49	0.99	0.00	
148	3CK2	3CK1	0	800	990	110	470.224	0.935	1.31	1.30	0.00	
149	DC-R1	3CK2	0	1800	340	110	2470.000	0.971	0.54	0.18	0.00	
150	2CK3	3CK2	0	800	210	110	365.617	0.727	0.82	0.17	0.00	
151	2DK3	2CK3	0	800	600	110	461.641	0.918	1.27	0.76	0.00	
152	2EL1	2EK3	0	300	2410	110	13.625	0.193	0.22	0.54	0.00	
153	2FK2	2FK4	0	200	500	110	18.967	0.604	2.95	1.47	0.00	
154	2FK4	2FK3	0	250	680	110	30.171	0.615	2.35	1.60	0.00	
155	2FK3	2EK1	0	300	2580	110	39.014	0.552	1.55	4.01	0.00	
156	2EK1	2EK2	0	800	260	110	628.970	1.251	2.24	0.58	0.00	
157	2EK2	2EK3	0	800	830	110	503.946	1.003	1.49	1.24	0.00	
158	2EK2	2DK5	0	250	3200	110	30.644	0.624	2.42	7.74	0.00	
159	2DK5	2DK4	0	250	130	110	30.644	0.624	2.42	0.31	0.00	
160	2CJ1	2DK4	0	250	1210	110	1.686	0.034	0.01	0.01	0.00	
161	2CJ1	3CJ3	0	250	180	110	50.613	1.031	6.11	1.10	0.00	
162	2CJ7	3CJ6	0	300	290	110	83.061	1.175	6.29	1.83	0.00	
163	2CJ4	2CJ7	0	600	840	110	348.428	1.232	3.05	2.56	0.00	
164	2CJ3	2CJ4	0	600	150	110	348.428	1.232	3.05	0.46	0.00	
165	2DJ2	2CJ3	0	300	1230	110	49.825	0.705	2.44	3.00	0.00	
166	2DJ2	2DJ1	0	200	1150	110	11.570	0.368	1.18	1.36	0.00	
167	2EJA	2DJ1	0	250	700	110	48.100	0.980	5.56	3.90	0.00	
168	2EJA	2EK1	0	800	1720	110	171.665	0.342	0.20	0.35	0.00	
169	2EJ6	2EJA	0	800	100	110	754.502	1.501	3.14	0.31	0.00	
170	2EJ4	2EJ6	0	300	940	110	29.159	0.413	0.91	0.86	0.00	
171	2FJ3	2EJ4	0	1200	2620	110	1081.396	0.956	0.85	2.22	0.00	
172	2FK1	2FJ3	0	200	610	110	12.260	0.390	1.32	0.80	0.00	
173	2EJ1	2EH1	0	1000	1790	110	1217.215	1.550	2.57	4.60	0.00	
174	2EH1	2DH4	0	400	380	110	88.734	0.706	1.75	0.66	0.00	
175	2DH4	2DH6	0	250	1800	110	18.993	0.387	1.00	1.80	0.00	
176	2DJ2	2DH6	0	300	1520	110	55.399	0.784	2.97	4.52	0.00	
177	2EJA	2DJ2	0	800	1900	110	475.067	0.945	1.33	2.54	0.00	
178	2EJ4	2EJ6	0	1200	990	110	1090.146	0.964	0.86	0.86	0.00	
179	2EJ3	2EJ4	0	600	1000	110	132.288	0.468	0.51	0.51	0.00	
180	2EJ3	2EJ2	0	500	160	110	222.890	1.135	3.25	0.52	0.00	

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NO	Node(U)	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
181	2EJ2	2EH4	0	500	880	110	165.950	0.845	1.88	1.66	0.00	
182	2EH7	2EH4	0	500	190	110	110.848	0.565	0.89	0.17	0.00	
183	2EH5	2EH7	0	500	190	110	167.788	0.855	1.92	0.37	0.00	
184	2EJ7	2EH5	0	500	790	110	234.380	1.194	3.56	2.81	0.00	
185	2EJ7	2EJ8	0	1000	650	110	1100.843	1.402	2.13	1.41	0.00	
186	2EJ8	2EJ1	0	1000	800	110	1006.463	1.281	1.81	1.44	0.00	
187	2EH4	2EG7	0	500	2580	110	219.858	1.120	3.17	8.17	0.00	
188	2EG5	2EG7	0	250	90	110	102.822	2.095	22.69	2.05	0.00	
189	2EH3	2EH6	0	800	600	110	637.044	1.267	2.30	1.38	0.00	
190	2EH5	2EH3	0	800	850	110	817.822	1.627	3.65	3.14	0.00	
191	2EH3	2EH2	0	300	1050	110	69.567	0.984	4.53	4.76	0.00	
192	2EH2	2EH9	0	300	550	110	69.450	0.983	4.52	2.48	0.00	
193	2EH9	2EH8	0	300	490	110	12.510	0.177	0.19	0.10	0.00	
194	2DG5	2EH8	0	300	1310	110	44.430	0.629	1.98	2.59	0.00	
195	2DG5	2DH5	0	800	1250	110	237.835	0.473	0.37	0.46	0.00	
196	2EH1	2DH2	0	1000	1940	110	1024.609	1.305	1.87	3.62	0.00	
197	2EH1	2DH4	0	300	430	110	38.920	0.551	1.55	0.66	0.00	
198	2DH1	2DH6	0	300	1840	110	30.331	0.429	0.98	1.80	0.00	
199	2DH4	2DH6	0	250	1860	110	18.660	0.380	0.97	1.80	0.00	
200	2FH1	2EH5	0	800	980	110	808.170	1.608	3.57	3.49	0.00	
201	2EH6	2FH4	0	300	1440	110	31.137	0.441	1.02	1.47	0.00	
202	2FH3	2FH4	0	300	450	110	25.803	0.365	0.72	0.32	0.00	
203	2EG7	2EG3	0	300	990	110	66.770	0.945	4.20	4.15	0.00	
204	3CH6	3CH4	0	600	620	110	358.244	1.267	3.21	1.99	0.00	
205	2FG9	2EF6	0	800	1420	110	396.243	0.788	0.95	1.35	0.00	
206	2FG2	2FG9	0	800	450	110	384.669	0.765	0.90	0.41	0.00	
207	2FGD	2FG2	0	800	430	110	402.055	0.800	0.98	0.42	0.00	
208	2FG4	2FGD	0	800	140	110	428.575	0.853	1.10	0.15	0.00	
209	2FG8	2FG4	0	800	600	110	660.997	1.315	2.46	1.48	0.00	
210	2FGC	2FGB	0	600	1470	90	175.893	0.622	1.25	1.84	0.00	
211	2FGB	2EFD	0	600	430	90	149.373	0.528	0.92	0.39	0.00	
212	2EFD	2FF4	0	600	390	90	26.520	0.094	0.04	0.02	0.00	
213	2DG4	2DG8	0	250	430	110	28.010	0.571	2.05	0.89	0.00	
214	2EG6	2DG4	0	300	2880	110	15.078	0.213	0.27	0.77	0.00	
215	2EG5	2FG5	0	800	1250	110	42.330	0.084	0.02	0.02	0.00	
216	2FG5	2FGA	0	300	780	110	64.614	0.914	3.95	3.09	0.00	
217	2FGA	2FG9	0	300	990	110	38.094	0.539	1.49	1.47	0.00	
218	2EFA	2EF9	0	550	790	90	145.682	0.613	1.35	1.06	0.00	
219	2FG1	2EFA	0	600	1350	90	117.209	0.415	0.59	0.80	0.00	
220	2FG4	2FG1	0	600	310	90	205.902	0.728	1.67	0.56	0.00	
221	2FG1	2FG3	0	400	260	110	27.595	0.220	0.20	0.06	0.00	
222	2FG2	2FG3	0	400	260	110	25.445	0.202	0.17	0.05	0.00	
223	2FG3	2FF7	0	400	570	110	26.520	0.211	0.19	0.10	0.00	
224	2FG6	2FG7	0	800	120	110	916.451	1.823	4.50	0.54	0.00	
225	2FH2	2FH6	0	1000	540	110	1105.654	1.408	2.15	1.16	0.00	
226	2FK2	2FK1	0	200	1830	110	12.620	0.402	1.39	2.54	0.00	
227	2FK2	2FK1	0	800	510	110	721.478	1.435	2.89	1.47	0.00	
228	2FJ2	2FJ5	0	300	100	110	59.763	0.845	3.42	0.34	0.00	
229	2FJ1	2FJ2	0	1000	1100	110	1456.419	1.854	3.58	3.93	0.00	
230	2FJ1	2EJ7	0	1350	1200	110	1879.161	1.313	1.33	1.59	0.00	
231	2EJ7	2EJ3	0	600	240	110	449.558	1.590	4.89	1.17	0.00	
232	2FJ3	2FJ4	0	200	1130	110	18.054	0.575	2.69	3.04	0.00	
233	2FJ4	2FJ5	0	200	740	110	4.927	0.157	0.24	0.18	0.00	
234	2FK3	2EK1	0	800	2610	110	512.671	1.020	1.54	4.01	0.00	
235	2FK4	2FK3	0	800	740	110	615.891	1.225	2.16	1.60	0.00	
236	2FJ2	2FH5	0	1000	300	110	1302.277	1.658	2.91	0.87	0.00	
237	2FH5	2FH2	0	1000	870	110	1245.337	1.586	2.68	2.33	0.00	
238	2FH2	2FH3	0	300	470	110	82.743	1.171	6.25	2.94	0.00	
239	2FH8	2FJ1	0	1500	300	110	3129.960	1.911	2.42	0.73	0.00	
240	2FH9	2FH8	0	1500	230	110	3486.900	1.973	2.50	0.58	0.00	

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NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
241	2FH9		2FH7	0	800	220	110	922.050	1.834	4.55	1.01	0.00	
242	2FH7		2FH1	0	800	300	110	865.110	1.721	4.05	1.21	0.00	
243	PULOG		2FH9	0	1500	310	110	4108.950	2.495	3.85	1.19	0.00	
244	2EH1		2EH2	0	300	960	110	59.553	0.843	3.40	3.26	0.00	
245	2EH3		2EH1	0	400	2120	110	54.271	0.432	0.71	1.50	0.00	
246	3CH4		3BH7	0	600	1570	90	219.934	0.778	1.89	2.97	0.00	
247	3CG9		3CG4	0	350	890	90	27.991	0.291	0.58	0.51	0.00	
248	3CG5		3CG4	0	350	210	90	16.339	0.170	0.21	0.04	0.00	
249	2EG5		2DG5	0	800	1900	110	320.351	0.637	0.61	1.23	0.00	
250	2FK1		2FJ3	0	1200	680	110	1292.513	1.143	1.18	0.80	0.00	
251	2FGE		2FG6	0	1000	240	110	1048.714	1.335	1.95	0.47	0.00	
252	2FH6		2FGE	0	1000	1180	110	1048.714	1.335	1.95	2.30	0.00	
253	2FG8		X012	0	800	910	110	48.803	0.097	0.02	0.02	0.00	
254	X012		2FG5	0	800	300	110	48.803	0.097	0.02	0.00	0.00	
255	2FGF		2FG8	0	800	600	110	608.445	1.210	2.11	1.27	0.00	
256	2FG7		2FGF	0	800	150	110	608.445	1.210	2.11	0.31	0.00	
257	2DG3		2DG2	0	600	140	90	165.553	0.586	1.12	0.16	0.00	
258	2DG4		2DG3	0	600	770	90	207.673	0.734	1.70	1.31	0.00	
259	X021		2EG4	0	500	160	110	98.907	0.504	0.72	0.11	0.00	
260	2EG6		X021	0	500	590	110	98.907	0.504	0.72	0.43	0.00	
261	X020		2EG5	0	800	360	110	548.966	1.092	1.74	0.62	0.00	
262	2EH6		X020	0	800	870	110	548.966	1.092	1.74	1.52	0.00	
263	2EJ6		X019	0	800	230	110	270.422	0.538	0.47	0.13	0.00	
264	X019		2EJ1	0	800	380	110	270.422	0.538	0.47	0.18	0.00	
265	3BF1		3BE7	0	600	1070	110	27.427	0.097	0.03	0.03	0.00	
266	X018		3CH4	0	600	130	90	34.773	0.123	0.06	0.00	0.00	
267	3CG2		X018	0	600	480	90	34.773	0.123	0.06	0.03	0.00	
268	3AJ3		3AJ4	0	300	570	110	28.340	0.401	0.86	0.49	0.00	
269	3AK3		3AL1	0	300	2630	110	9.666	0.137	0.12	0.31	0.00	
270	3BL1		3AL1	0	300	3560	110	18.674	0.264	0.40	1.42	0.00	
271	2BL1		2CK1	0	300	1450	110	1.291	0.018	0.00	0.01	0.00	
272	2DL1		2BL1	0	300	3550	110	34.831	0.493	1.26	4.47	0.00	
273	2EL1		2DL1	0	600	2520	110	247.773	0.876	1.62	4.10	0.00	
274	2DL1		2DK2	0	600	1260	110	118.562	0.419	0.42	0.52	0.00	
275	2DK1		2DK2	0	600	1150	110	9.493	0.034	0.00	0.00	0.00	
276	2DK2		2CK1	0	300	3310	110	33.675	0.476	1.18	3.96	0.00	
277	2DK1		2DK3	0	800	1320	110	495.181	0.985	1.41	1.90	0.00	
278	2EK3		2DK1	0	800	1990	110	599.054	1.192	2.05	4.08	0.00	
279	2CJ9		3CJ3	0	250	200	110	47.662	0.971	5.47	1.10	0.00	
280	2CJ9		2DK4	0	250	1200	110	1.210	0.025	0.01	0.01	0.00	
281	2DH6		2CH1	0	250	1870	110	24.490	0.499	1.60	2.98	0.00	
282	2CH1		3CH2	0	250	200	110	48.684	0.992	5.69	1.14	0.00	
283	2DH6		2CH2	0	300	1900	110	39.223	0.555	1.57	2.98	0.00	
284	2CH2		3CH2	0	300	220	110	74.794	1.058	5.18	1.14	0.00	
285	2FK5		2EL1	0	800	3020	110	531.642	1.058	1.64	4.96	0.00	
286	2CK1		2CK2	0	300	1130	110	1.426	0.020	0.00	0.00	0.00	
287	2CK3		2CK2	0	300	1200	110	32.114	0.454	1.08	1.30	0.00	
288	3CK4		3BL1	0	300	2740	110	47.014	0.665	2.20	6.01	0.00	
289	2CK3		2CJ9	0	600	1900	110	30.370	0.107	0.03	0.06	0.00	
290	2CJ1		2CJ9	0	600	70	110	52.041	0.184	0.09	0.00	0.00	
291	2DH2		2CH2	0	500	2030	110	111.289	0.567	0.90	1.82	0.00	
292	2CH2		2CH1	0	500	80	110	16.048	0.082	0.02	0.00	0.00	
293	2CJ7		2CH1	0	500	4110	110	67.816	0.345	0.36	1.48	0.00	
294	2CJ7		2CJ1	0	600	730	110	137.881	0.488	0.55	0.41	0.00	
295	3BE7		3BE4	0	600	80	110	27.427	0.097	0.03	0.00	0.00	
296	2FG8		2FGC	0	800	510	110	202.413	0.716	1.12	0.57	0.00	
297	2FK2		2FK5	0	800	1530	110	626.022	1.245	2.22	3.40	0.00	
298	3DH6		3DH5	0	400	150	110	145.817	1.160	4.39	0.66	0.00	
299	2DJ2		2CJ3	0	600	1310	110	298.603	1.056	2.29	3.00	0.00	
300	2EL1		2EK3	0	800	2520	110	175.861	0.350	0.21	0.54	0.00	

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NO	Node(U) ->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
301	2FK2	2FK1	0	1200	1890	110	1386.533	1.226	1.34	2.54	0.00	
302	2EF5	2DF5	0	500	132	110	50.166	0.255	0.21	0.03	0.00	
303	2EFC	2EFB	0	550	77	110	2.411	0.010	0.00	0.00	0.00	
304	2DFA	2DF8	0	350	103	110	14.107	0.147	0.11	0.01	0.00	
305	2DG4	2DG6	0	350	87	110	126.711	1.317	6.49	0.57	0.00	
306	2DG8	2EG1	0	300	564	110	5.056	0.072	0.04	0.02	0.00	
307	2FG1	2FG2	0	600	172	110	34.578	0.122	0.04	0.01	0.00	
308	2FG7	2FG8	0	600	769	110	281.485	0.996	2.06	1.58	0.00	
309	2EFD	2EFA	0	600	127	110	96.333	0.341	0.28	0.04	0.00	
310	2FJ4	2FJ5	0	400	780	110	29.691	0.236	0.23	0.18	0.00	
311	2FJ3	2FJ4	0	400	1149	110	110.943	0.883	2.65	3.04	0.00	
312	BRN3	2FK2	0	1800	3934	110	2860.000	1.124	0.71	2.80	0.00	

Date : 1996-09-27 Time : 14:06:49

Program : PNV.BAS
File Name : f:¥jakarta¥p_2005¥17¥47_md1.dat
Title : ZONE-4_7(2005)

Nos of Nodes : 73
Nos of Pipes : 105

Band width : 63
Length of Jacobian matrix : 1,150

No	Max.Err.of Q (l/sec)	Node	Max.dH or dQ (mm or l/sec)	Node
1	5.20E+01	4FC1	-5.16E+01	DC-R1
2	3.83E+01	DC-R6	3.83E+01	DC-R6
3	5.89E+03	DC-R4	5.89E+03	DC-R1
4	2.17E+03	DC-R4	2.17E+03	DC-R1
5	9.30E+02	4FC1	-9.33E+02	4AA1
6	4.22E+02	4FC1	-4.78E+02	4AA1
7	1.93E+02	4FC1	-2.31E+02	4AA1
8	8.86E+01	4FC1	-1.08E+02	4AA1
9	4.06E+01	4FC1	-5.03E+01	4AA1
10	1.87E+01	4FC1	-2.32E+01	4AA1
11	8.58E+00	4FC1	-1.07E+01	4AA1
12	3.94E+00	4FC1	-4.91E+00	4AA1
13	1.81E+00	4FC1	-2.26E+00	4AA1
14	8.32E-01	4FC1	-1.04E+00	4AA1
15	3.82E-01	4FC1	-4.77E-01	4AA1
16	1.76E-01	4FC1	-2.19E-01	4AA1
17	8.07E-02	4FC1	-1.01E-01	4AA1
18	3.71E-02	4FC1	-4.63E-02	4AA1
19	1.70E-02	4FC1	-2.13E-02	4AA1
20	7.82E-03	4FC1	-9.77E-03	4AA1
21	3.60E-03	4FC1	-4.49E-03	4AA1
22	1.65E-03	4FC1	-2.06E-03	4AA1
23	7.59E-04	4FC1	-9.47E-04	4AA1
	3.49E-01	4FC1		

Time of iteration : 3(sec)

3.2.3 The Results of Preliminary Primary Pipe Network Analysis for Zone 4 and Zone 7 (2008)

<20NE-4_7(2008)>

Node Data

Node-page : 1

NO	Node	Type	Q (l/sec)	WL (m)	GL (m)	EH (m)	Comments
1	4BX1	0	101.920	42.54	2.00	40.54	
2	4CX1	0	101.920	43.06	7.00	36.06	
3	4CA1	0	207.090	43.44	7.00	36.44	
4	4DX1	0	101.920	44.39	13.00	31.39	
5	4EA5	0	105.170	44.84	15.00	29.84	
6	7EX1	0	41.990	44.32	18.00	26.32	
7	7EA2	0	41.990	43.65	15.00	28.65	
8	7EX2	0	41.990	43.96	18.00	25.96	
9	7EA3	0	41.990	43.98	22.00	21.98	
10	7FX3	0	41.990	43.86	23.00	20.86	
11	7FX2	0	41.990	43.84	23.00	20.84	
12	7EX3	0	41.990	44.06	22.00	22.06	
13	7FX1	0	41.990	43.83	23.00	20.83	
14	7FA1	0	135.330	43.90	23.00	20.90	
15	7FA2	0	93.340	43.75	25.00	18.75	
16	7GA1	0	93.340	43.73	25.00	18.73	
17	7GA2	0	93.340	43.74	23.00	20.74	
18	4DD8	0	79.950	44.21	1.30	42.91	
19	4DC2	0	57.850	45.46	4.00	41.46	
20	4CD3	0	79.950	44.04	1.20	42.84	
21	4DD1	0	0.000	44.42	5.10	39.32	
22	4EC8	0	57.850	48.40	10.90	37.50	
23	4FC4	0	82.420	48.54	10.80	37.74	
24	4CC5	0	24.570	48.61	12.00	36.61	
25	4EA1	0	65.390	48.05	7.00	41.05	
26	4FA1	0	65.390	47.64	10.00	37.64	
27	4FB1	0	65.390	49.55	10.00	39.55	
28	4EB2	0	65.390	51.57	8.00	43.57	
29	4EB3	0	65.390	50.76	7.00	43.76	
30	4EB1	0	57.850	49.82	6.00	43.82	
31	4DB2	0	57.850	48.73	5.00	43.73	
32	4DB1	0	105.170	48.09	3.00	45.09	
33	4DA1	0	105.170	46.53	3.00	43.53	
34	4BA1	0	105.170	44.01	1.00	43.01	
35	4CA2	0	105.170	44.09	2.10	41.99	
36	4BB1	0	204.490	43.36	0.50	42.86	
37	4BB2	0	204.490	43.48	1.00	42.48	
38	4BC2	0	204.490	45.74	1.00	44.74	
39	4CC2	0	105.170	49.93	1.00	48.93	
40	4CC1	0	185.120	47.85	4.00	43.85	
41	4GC4	0	24.570	48.98	18.00	30.98	
42	DC-R6	1	-1,314.656	50.00	0.00	50.00	
43	4CC4	0	105.170	45.48	4.00	41.48	
44	4CB1	0	105.170	47.81	1.00	46.81	
45	4DC1	0	57.850	47.97	2.00	45.97	
46	4EC2	0	57.850	51.43	10.00	41.43	
47	4EC3	0	57.850	52.77	10.00	42.77	
48	4EC1	0	57.850	47.93	4.00	43.93	
49	4EC6	0	57.850	46.28	7.00	39.28	
50	4EC7	0	79.950	45.60	6.00	39.60	
51	4ED1	0	79.950	45.33	6.00	39.33	
52	4EC5	0	57.850	48.41	11.00	37.41	
53	4EC4	0	57.850	52.91	10.00	42.91	
54	4FC1	0	57.850	53.36	10.00	43.36	
55	DC-R4	1	-4,676.001	54.00	2.00	52.00	
56	4FC3	0	57.850	49.99	14.00	35.99	
57	4FC2	0	57.850	49.54	11.00	38.54	
58	4CC3	0	57.850	45.79	4.00	41.79	
59	4FA2	0	65.390	41.47	23.00	21.47	
60	4EA3	0	65.390	41.39	15.50	28.89	

<<20NE-4_7(2008)>>

Node-page : 2

NO	Node	Type	Q (l/sec)	IL (m)	CL (m)	EH (m)	Comments
61	4DA2	0	207.090	44.79	3.00	41.79	
62	4BA3	0	207.090	43.12	1.00	42.12	
63	4BA2	0	207.090	43.12	3.00	40.12	
64	4AA1	0	101.920	42.54	0.50	42.04	
65	4EA2	0	170.560	47.67	6.60	41.07	
66	4CD1	0	79.950	44.02	1.51	42.51	
67	4EA4	0	65.390	47.04	4.80	42.24	
68	7EA1	0	41.990	43.54	14.00	29.54	
69	7EA4	0	41.990	44.25	15.50	28.75	
70	4EA5	0	0.000	45.64	15.00	30.64	
71	7EA5	0	93.340	45.15	15.00	30.15	
72	7FA3	0	93.340	43.75	22.00	21.75	
73	7GA3	0	0.000	43.97	25.00	18.97	

<<ZONE-1_7(2008)>>

Branch Data

Pipe-page : 1

NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
1	4AA1		4BX1	0	600	2350	110	0.791	0.003	0.00	0.00	0.00	
2	4CX1		4BX1	0	600	1660	110	101.123	0.358	0.31	0.52	0.00	
3	4CA1		4CX1	0	500	1260	110	62.061	0.316	0.30	0.38	0.00	
4	4CA1		4BA2	0	900	2010	110	205.715	0.323	0.16	0.32	0.00	
5	4CA2		4CA1	0	600	1510	110	121.197	0.429	0.43	0.65	0.00	
6	4DA2		4CA1	0	800	1740	110	353.672	0.704	0.77	1.35	0.00	
7	4DX1		4CX1	0	600	2330	110	140.985	0.499	0.57	1.33	0.00	
8	4DA2		4DX1	0	700	1290	110	150.949	0.392	0.31	0.40	0.00	
9	4EA6		4DX1	0	600	1740	110	91.956	0.325	0.26	0.45	0.00	
10	4EA1		4EA6	0	800	2740	110	360.502	0.717	0.80	2.20	0.00	
11	4EA6		7EX1	0	600	690	110	163.376	0.578	0.75	0.52	0.00	
12	7EX1		7EA2	0	300	640	110	31.694	0.448	1.06	0.67	0.00	
13	7EA2		7EA1	0	300	1270	110	7.960	0.113	0.08	0.11	0.00	
14	7EX2		7EA2	0	300	830	110	18.256	0.258	0.38	0.31	0.00	
15	7EA3		7EX2	0	600	820	110	19.742	0.070	0.02	0.02	0.00	
16	7EA1		7EA3	0	600	800	110	107.837	0.381	0.35	0.27	0.00	
17	7EA3		7FX3	0	600	1600	110	46.105	0.163	0.07	0.12	0.00	
18	7FX3		7FX2	0	800	420	110	76.782	0.153	0.05	0.02	0.00	
19	7EX2		7FX2	0	300	1800	110	7.198	0.102	0.07	0.12	0.00	
20	7EX3		7EX2	0	600	1270	110	47.702	0.169	0.08	0.10	0.00	
21	7EX1		7EX3	0	600	1060	110	89.692	0.317	0.25	0.26	0.00	
22	7FX2		7FX1	0	800	440	110	41.990	0.084	0.02	0.01	0.00	
23	7EA5		7FA1	0	800	1680	110	316.683	0.690	0.75	1.25	0.00	
24	7FA1		7FX3	0	800	960	110	72.667	0.145	0.04	0.04	0.00	
25	7FA1		7FA2	0	800	1070	110	138.686	0.276	0.14	0.15	0.00	
26	7FA2		7FA3	0	300	750	110	2.426	0.034	0.01	0.00	0.00	
27	7FA2		7GA1	0	800	1670	110	42.920	0.085	0.02	0.02	0.00	
28	7GA2		7GA1	0	800	610	110	50.420	0.100	0.02	0.01	0.00	
29	7FA3		7GA2	0	500	1460	110	6.273	0.032	0.00	0.01	0.00	
30	7GA3		7GA2	0	800	1750	110	137.487	0.274	0.13	0.23	0.00	
31	4DC2		4DD8	0	400	2050	110	50.081	0.399	0.61	1.25	0.00	
32	4DD1		4DD8	0	800	1200	110	155.222	0.309	0.17	0.21	0.00	
33	4FC4		4EC8	0	500	720	110	48.023	0.245	0.19	0.14	0.00	
34	4GC5		4FC4	0	500	1370	110	23.935	0.122	0.05	0.07	0.00	
35	4EA1		4FA1	0	600	3030	110	64.780	0.229	0.14	0.41	0.00	
36	4FB1		4FA1	0	600	1690	110	203.486	0.720	1.13	1.91	0.00	
37	4EB2		4FB1	0	700	2190	110	274.162	0.712	0.92	2.02	0.00	
38	4EB2		4EB3	0	1800	970	110	3117.588	1.225	0.84	0.81	0.00	
39	4EB3		4EB1	0	1350	1410	110	1295.034	0.905	0.67	0.94	0.00	
40	4EB1		4DB2	0	1350	1750	110	1249.056	0.873	0.62	1.09	0.00	
41	4DB2		4DB1	0	1200	1230	110	829.786	0.734	0.52	0.64	0.00	
42	4DB1		4DA1	0	900	2090	110	473.370	0.744	0.75	1.56	0.00	
43	4CA2		4BA1	0	600	1870	110	35.626	0.126	0.04	0.08	0.00	
44	4BB2		4BB1	0	600	1840	110	42.776	0.151	0.06	0.12	0.00	
45	4BC2		4BB2	0	600	2210	110	192.897	0.682	1.02	2.26	0.00	
46	4CC2		4BC2	0	700	2280	110	397.387	1.033	1.84	4.19	0.00	
47	4CC2		4CC1	0	600	1880	110	201.341	0.712	1.11	2.08	0.00	
48	DC-R6		4CC2	0	1800	430	110	1314.656	0.517	0.17	0.07	0.00	
49	4CC2		4CC4	0	300	270	110	139.718	1.977	16.46	4.45	0.00	
50	4CC2		4CB1	0	500	2500	110	107.695	0.548	0.85	2.12	0.00	
51	4CB1		4BB2	0	300	1510	110	54.369	0.769	2.87	4.33	0.00	
52	4CB1		4BA1	0	800	2230	110	542.434	1.079	1.71	3.80	0.00	
53	4BA1		4BB1	0	600	880	110	161.714	0.572	0.74	0.65	0.00	
54	4DA1		4CA2	0	600	1350	110	261.993	0.927	1.80	2.44	0.00	
55	4DB1		4CB1	0	1000	2310	110	230.933	0.294	0.12	0.28	0.00	
56	4DB1		4CC1	0	400	2110	110	20.314	0.162	0.11	0.24	0.00	
57	4DC1		4CC1	0	800	990	110	129.246	0.257	0.12	0.12	0.00	
58	4EB1		4DC1	0	600	1640	110	203.688	0.720	1.13	1.85	0.00	
59	4EC2		4EB1	0	600	1280	110	215.560	0.762	1.26	1.61	0.00	
60	4EB3		4EA1	0	1350	2310	110	1757.164	1.228	1.17	2.71	0.00	

<< ZONE-4_7(2008)>>

Pipe-page : 2

NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
61	4EC3		4EB2	0	500	1220	110	116.668	0.594	0.98	1.20	0.00	
62	4EC3		4EC2	0	900	1360	110	519.668	0.884	0.99	1.34	0.00	
63	4CC2		4CB1	0	800	2600	110	363.345	0.723	0.81	2.12	0.00	
64	4DC1		4EC1	0	600	3250	110	16.592	0.059	0.01	0.04	0.00	
65	4EC1		4EC6	0	500	460	110	235.000	1.197	3.58	1.65	0.00	
66	4EC6		4EC7	0	600	270	110	315.122	1.115	2.54	0.68	0.00	
67	4EC7		4ED1	0	600	180	110	235.172	0.832	1.48	0.27	0.00	
68	4ED1		4DD4	0	600	1340	110	155.222	0.549	0.68	0.91	0.00	
69	4EC5		4EC6	0	500	1590	110	137.972	0.703	1.34	2.13	0.00	
70	4EC4		4EC5	0	500	1610	110	205.649	1.047	2.80	4.50	0.00	
71	4EC4		4EC3	0	1000	120	110	809.351	1.031	1.21	0.14	0.00	
72	4FC1		4EC4	0	1200	480	110	1143.632	1.011	0.94	0.45	0.00	
73	DC-R4		4FC1	0	1800	360	110	4676.004	1.838	1.77	0.64	0.00	
74	4FC1		4FC3	0	600	1550	110	289.998	1.026	2.17	3.37	0.00	
75	4FC3		4FC2	0	500	400	110	125.640	0.640	1.12	0.45	0.00	
76	4FB1		4FC2	0	500	450	110	5.285	0.027	0.00	0.01	0.00	
77	4FC2		4GC4	0	500	1370	110	73.075	0.372	0.41	0.56	0.00	
78	4FC3		4FC4	0	500	1760	110	106.503	0.542	0.83	1.45	0.00	
79	4EC5		4EC8	0	500	850	110	9.827	0.050	0.01	0.01	0.00	
80	4EC2		4EC1	0	600	1760	110	276.258	0.977	1.99	3.50	0.00	
81	4CC1		4CC3	0	400	370	110	165.781	1.319	5.57	2.06	0.00	
82	4CC3		4DC2	0	400	130	110	107.931	0.859	2.52	0.33	0.00	
83	4DD8		4CD3	0	800	1540	110	125.352	0.249	0.11	0.17	0.00	
84	4FA1		4FA2	0	600	2820	110	202.877	0.718	1.12	3.17	0.00	
85	4DA1		4DA2	0	1000	1830	110	711.711	0.906	0.95	1.74	0.00	
86	4BA1		4BA3	0	800	1460	110	311.176	0.619	0.61	0.89	0.00	
87	4BA3		4BA2	0	800	1430	110	1.375	0.003	0.00	0.00	0.00	
88	4BA3		4AA1	0	600	1810	110	102.711	0.363	0.32	0.58	0.00	
89	4EA1		4EA2	0	1200	440	110	1089.784	0.964	0.86	0.38	0.00	
90	4EA2		4EA3	0	600	2000	110	249.247	0.882	1.64	3.28	0.00	
91	4CC4		4CD1	0	300	1180	110	34.548	0.489	1.24	1.46	0.00	
92	4CD3		4CD1	0	800	1280	110	45.402	0.090	0.02	0.02	0.00	
93	4GC4		4GC5	0	500	1920	110	48.505	0.247	0.19	0.37	0.00	
94	4EA4		4DA1	0	1200	1760	110	605.501	0.535	0.29	0.51	0.00	
95	4EA2		4EA4	0	1200	1810	110	669.977	0.592	0.35	0.63	0.00	
96	7EA4		7EA1	0	300	590	110	31.030	0.481	1.21	0.71	0.00	
97	4EA3		7EA4	0	600	140	110	183.857	0.650	0.94	0.14	0.00	
98	4DB2		4EA4	0	800	2100	110	361.420	0.719	0.80	1.69	0.00	
99	4EA1		4EA5	0	800	1440	110	537.210	1.069	1.68	2.41	0.00	
100	4EA5		7EA5	0	800	290	110	537.210	1.069	1.68	0.49	0.00	
101	7EA5		7FA3	0	500	2010	110	97.187	0.495	0.70	1.40	0.00	
102	4FA2		7GA3	0	600	910	110	137.487	0.486	0.55	0.50	0.00	
103	4EC3		4EB2	0	1600	1260	110	3340.471	1.313	0.95	1.20	0.00	
104	4EC4		4EC3	0	1800	160	110	3255.301	1.279	0.90	0.14	0.00	
105	4FC1		4EC4	0	1800	520	110	3184.524	1.251	0.87	0.45	0.00	

3.2.4 The Results of Preliminary Primary Pipe Network Analysis for Zone 5 (2008)

<<ZONE-5(2008)>>

Node Data

Node-page : 1

NO	Node	Type	Q (l/sec)	WL (m)	GL (m)	EH (m)	Comments
1	5HG1	0	74.490	53.43	18.00	35.43	
2	5HF5	0	74.490	55.25	21.00	34.25	
3	5GF2	0	55.250	55.26	20.50	34.76	
4	5GD2	0	98.410	57.89	12.00	45.89	
5	5GDE	0	32.500	58.04	14.00	44.04	
6	5GD8	0	32.500	57.99	15.00	42.99	
7	5GD3	0	32.500	58.05	16.00	42.05	
8	5HD1	0	32.500	58.23	24.00	34.23	
9	5GE4	0	55.250	55.37	14.00	41.37	
10	5GE6	0	55.250	55.49	14.00	41.49	
11	5HE2	0	129.740	55.59	24.00	31.59	
12	5HE3	0	129.740	56.43	22.00	34.43	
13	5HF2	0	74.490	55.29	25.00	30.29	
14	5HF4	0	0.000	55.26	21.00	34.26	
15	5HF3	0	31.720	55.33	25.00	30.33	
16	5JF1	0	31.720	56.35	30.00	26.35	
17	5JE2	0	31.720	56.85	28.00	28.85	
18	5HE7	0	74.490	56.43	22.00	34.43	
19	5HE4	0	55.250	58.33	22.00	36.33	
20	5HE5	0	55.250	58.83	22.00	36.83	
21	5HD4	0	32.500	60.10	24.00	36.10	
22	5HD2	0	32.500	61.49	24.00	37.49	
23	5HC2	0	98.410	63.80	21.00	42.80	
24	5HD5	0	32.500	58.56	24.00	34.56	
25	5HD7	0	32.500	57.35	24.00	33.35	
26	5HD6	0	32.500	58.38	24.00	34.38	
27	5HD8	0	32.500	57.97	24.00	33.97	
28	5GD7	0	32.500	58.27	21.00	37.27	
29	5GD6	0	32.500	58.39	22.00	36.39	
30	5GD4	0	32.500	58.71	22.10	36.61	
31	5GD5	0	32.500	58.55	22.00	36.55	
32	5GDA	0	32.500	58.38	17.50	40.88	
33	5GD9	0	32.500	58.09	17.70	40.39	
34	5GE1	0	32.500	56.64	12.00	44.64	
35	5GE3	0	55.250	56.08	14.00	42.08	
36	5HE1	0	55.250	55.80	24.00	31.80	
37	5GE2	0	32.500	57.19	18.00	39.19	
38	5JE3	0	31.720	57.30	32.00	25.30	
39	5KE2	0	31.720	57.79	35.00	22.79	
40	5HE8	0	31.720	58.29	29.00	29.29	
41	5KE1	0	0.000	58.44	25.00	33.44	
42	5JE1	0	31.720	58.39	28.00	30.39	
43	5JE4	0	31.720	58.28	26.20	32.08	
44	5HE6	0	0.000	58.75	22.00	36.75	
45	5JD1	0	72.150	59.12	26.00	33.12	
46	5JD2	0	72.150	59.66	26.00	33.66	
47	5KD1	0	72.150	65.20	28.00	37.20	
48	5KD2	0	103.870	58.95	23.50	35.45	
49	CLDAK	0	0.000	58.95	23.00	35.95	
50	5KD4	0	0.000	65.31	31.50	33.81	
51	5JC2	0	72.150	68.44	32.00	36.44	
52	DC-R5	1	-3,866.850	71.00	26.00	45.00	
53	5JC1	0	63.830	65.89	27.00	38.89	
54	5HD3	0	32.500	60.90	24.00	36.90	
55	5GC2	0	98.410	61.91	18.00	43.91	
56	5GC1	0	98.410	62.03	18.00	44.03	
57	5GB1	0	63.830	62.98	20.00	42.98	
58	5HC1	0	63.830	63.91	23.00	40.91	
59	5GC3	0	98.410	59.98	18.00	41.98	
60	5KF1	0	39.260	57.75	51.00	6.75	

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Node-page : 2

NO	Node	Type	Q (l/sec)	WL (m)	GL (m)	EH (m)	Comments
61	5GB2	0	63.830	62.82	21.00	41.82	
62	5FA1	0	36.400	62.69	11.30	51.39	
63	5GB3	0	36.400	62.73	14.50	48.23	
64	5KC1	0	72.150	66.47	31.80	34.67	
65	5KE5	0	31.720	57.75	39.80	17.95	
66	5HB1	0	63.830	63.74	22.00	41.74	
67	5JC3	0	162.240	65.84	30.00	35.84	
68	5KE6	0	31.720	57.68	50.00	7.68	
69	5KE4	0	31.720	58.88	37.25	21.63	
70	5Z01	0	0.000	66.24	33.98	32.26	
71	5Z02	0	0.000	64.99	30.28	34.71	
72	5Z03	0	0.000	64.47	27.47	37.00	
73	5Z04	0	0.000	58.52	24.75	33.77	
74	5Z05	0	0.000	59.08	26.12	32.96	
75	5KE3	0	70.980	59.36	48.00	11.36	
76	5KD3	0	72.150	62.05	54.00	8.05	
77	5LF1	0	70.980	58.23	55.00	3.23	
78	5KG1	0	39.260	57.07	49.00	8.07	
79	5KC2	0	81.770	63.41	55.00	8.41	
80	5KE7	0	70.980	58.79	50.00	8.79	

<<ZONE-5(2008)>>

Branch Data

Pipe-page : 1

NO	Node(E)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
1	5HF5		5HG1	0	400	1450	110	74.490	0.593	1.27	1.82	0.00	
2	5GF2		5HF5	0	800	1150	110	32.019	0.064	0.01	0.01	0.00	
3	5GDE		5GD2	0	500	1630	110	32.492	0.165	0.09	0.15	0.00	
4	5GD3		5GDB	0	400	250	90	26.223	0.209	0.27	0.06	0.00	
5	5GD3		5GDE	0	800	350	110	64.992	0.129	0.03	0.01	0.00	
6	5HD1		5GDB	0	400	2480	90	15.131	0.120	0.10	0.24	0.00	
7	5GE6		5GE4	0	600	210	110	142.519	0.504	0.58	0.12	0.00	
8	5HE2		5GE6	0	600	1220	110	47.745	0.169	0.08	0.10	0.00	
9	5HE3		5HE2	0	600	960	110	177.485	0.628	0.88	0.84	0.00	
10	5HE3		5HF2	0	500	1670	110	95.972	0.489	0.68	1.14	0.00	
11	5HF2		5HF4	0	800	260	110	116.961	0.233	0.10	0.03	0.00	
12	5HF4		5HF5	0	800	150	110	116.961	0.233	0.10	0.01	0.00	
13	5HF3		5HF2	0	600	170	110	95.480	0.338	0.28	0.04	0.00	
14	5JF1		5HF3	0	600	2140	110	127.200	0.450	0.47	1.02	0.00	
15	5JE2		5JF1	0	400	2180	110	29.593	0.235	0.23	0.50	0.00	
16	5JE2		5HE7	0	600	2090	110	80.058	0.283	0.20	0.42	0.00	
17	5HE7		5HE3	0	600	180	110	5.568	0.020	0.00	0.00	0.00	
18	5HE4		5HE3	0	800	1980	110	397.629	0.791	0.96	1.90	0.00	
19	5HE5		5HE4	0	800	350	110	495.552	0.986	1.44	0.50	0.00	
20	5HD4		5HE5	0	900	1200	110	569.145	0.895	1.05	1.27	0.00	
21	5HD2		5HD4	0	900	1200	110	601.645	0.946	1.16	1.39	0.00	
22	5HC2		5HD2	0	1000	1600	110	891.715	1.135	1.44	2.31	0.00	
23	5HD5		5HD1	0	400	210	90	69.544	0.553	1.62	0.33	0.00	
24	5HD2		5HD5	0	350	1000	90	67.434	0.701	2.93	2.93	0.00	
25	5HD5		5HD7	0	300	1100	110	32.500	0.460	1.11	1.21	0.00	
26	5HD5		5HD6	0	400	350	110	46.393	0.369	0.53	0.18	0.00	
27	5HD6		5HD8	0	300	1230	90	13.893	0.197	0.33	0.41	0.00	
28	5GD7		5HD8	0	300	520	90	18.607	0.263	0.57	0.30	0.00	
29	5GD6		5GD7	0	300	150	110	27.861	0.394	0.83	0.12	0.00	
30	5GD4		5GD6	0	500	420	110	100.472	0.512	0.74	0.32	0.00	
31	5GD1		5GD8	0	800	210	110	341.260	0.679	0.72	0.16	0.00	
32	5GD8		5GD7	0	300	330	90	23.246	0.329	0.86	0.28	0.00	
33	5GD8		5GD3	0	400	820	90	41.042	0.327	0.61	0.50	0.00	
34	5GDA		5GD3	0	500	630	110	82.673	0.421	0.52	0.33	0.00	
35	5GD4		5GDA	0	500	310	110	115.173	0.587	0.96	0.33	0.00	
36	5GD8		5GD9	0	350	440	110	47.513	0.494	1.06	0.46	0.00	
37	5GD9		5GDB	0	350	810	110	15.013	0.156	0.13	0.10	0.00	
38	5GDB		5GE1	0	300	2150	110	23.866	0.338	0.63	1.35	0.00	
39	5GE1		5GE3	0	600	440	110	217.851	0.770	1.28	0.56	0.00	
40	5GE3		5GE6	0	600	910	110	150.023	0.531	0.64	0.59	0.00	
41	5GE3		5HE1	0	300	1460	110	12.577	0.178	0.19	0.28	0.00	
42	5HE4		5HE1	0	300	1380	110	42.673	0.604	1.83	2.53	0.00	
43	5GE2		5GE1	0	300	590	110	29.525	0.418	0.93	0.55	0.00	
44	5GD6		5GE2	0	350	1560	110	40.111	0.417	0.77	1.20	0.00	
45	5HD1		5GE2	0	300	1940	110	21.913	0.310	0.53	1.04	0.00	
46	5GD8		5GE1	0	600	1800	110	196.959	0.697	1.06	1.91	0.00	
47	5JE3		5JE2	0	600	790	110	141.371	0.500	0.58	0.45	0.00	
48	5KE2		5JE3	0	400	960	110	45.384	0.361	0.51	0.49	0.00	
49	5KE2		5JE3	0	600	1020	110	127.708	0.452	0.48	0.49	0.00	
50	5HE8		5KE2	0	400	530	110	63.780	0.508	0.95	0.50	0.00	
51	5KE1		5HE8	0	400	100	110	80.462	0.640	1.46	0.15	0.00	
52	5KE1		5JE1	0	400	1430	110	10.936	0.087	0.01	0.05	0.00	
53	5JE1		5JE4	0	300	480	110	13.376	0.189	0.21	0.11	0.00	
54	5HE6		5JE4	0	300	1210	110	18.344	0.260	0.38	0.47	0.00	
55	5HE5		5HE6	0	300	220	110	18.344	0.260	0.38	0.08	0.00	
56	5Z05		5JE1	0	400	2307	110	34.161	0.272	0.30	0.69	0.00	
57	5JD2		5JD1	0	350	310	110	62.178	0.646	1.74	0.54	0.00	
58	5KD1		5JD2	0	400	1470	110	134.328	1.069	3.77	5.54	0.00	
59	5KD1		5Z03	0	400	162	110	148.713	1.183	4.55	0.73	0.00	
60	5KD2		CLOAK	0	400	190	110	0.000	0.000	0.00	0.00	0.00	

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Pipe-page : 2

NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
61	5KD2		5Z04	0	400	857	110	44.843	0.357	0.50	0.43	0.00	
62	5KD4		5KD1	0	800	110	110	394.331	0.784	0.95	0.11	0.00	
63	DC-R5		5JC2	0	1200	660	110	2457.672	2.173	3.88	2.56	0.00	
64	5JC2		5HC2	0	1100	3020	110	1185.561	1.248	1.54	4.64	0.00	
65	5JC1		5HC2	0	800	2050	110	410.749	0.817	1.02	2.09	0.00	
66	5JC2		5JC1	0	1200	2110	110	1309.307	1.158	1.21	2.55	0.00	
67	5HD2		5HD3	0	350	160	90	76.633	0.797	3.71	0.59	0.00	
68	5HD3		5JD1	0	350	1330	90	44.133	0.459	1.31	1.78	0.00	
69	5HC2		5GC2	0	1000	2680	110	606.185	0.772	0.71	1.89	0.00	
70	5GC2		5GD4	0	800	1610	110	589.405	1.173	1.99	3.20	0.00	
71	5GC1		5GC2	0	500	1420	110	31.847	0.162	0.09	0.12	0.00	
72	5GB1		5GC1	0	800	1290	110	344.368	0.685	0.74	0.95	0.00	
73	5HC1		5GB1	0	1000	1590	110	544.828	0.694	0.58	0.93	0.00	
74	5JC1		5HC1	0	1000	2320	110	672.488	0.856	0.86	1.98	0.00	
75	5GC3		5GD2	0	400	2070	110	65.918	0.525	1.01	2.09	0.00	
76	5GC1		5GC3	0	500	1110	110	164.328	0.837	1.85	2.05	0.00	
77	5KF1		5KG1	0	400	1760	110	39.260	0.312	0.39	0.68	0.00	
78	5LF1		5KF1	0	800	1640	110	208.423	0.415	0.29	0.48	0.00	
79	5KF1		5JF1	0	600	2880	110	129.327	0.457	0.49	1.40	0.00	
80	5GB1		5GB2	0	600	1240	110	63.830	0.226	0.13	0.16	0.00	
81	5GE4		5GF2	0	800	1940	110	87.269	0.174	0.06	0.11	0.00	
82	5GB1		5GB3	0	600	1520	110	72.800	0.257	0.17	0.25	0.00	
83	5GB3		5FA1	0	600	890	110	36.400	0.129	0.05	0.04	0.00	
84	5KC1		5KD4	0	800	1230	110	394.331	0.784	0.95	1.16	0.00	
85	5JC2		5KC1	0	1000	680	110	1299.832	1.655	2.90	1.97	0.00	
86	5KF1		5KE5	0	600	1580	110	0.576	0.002	0.00	0.00	0.00	
87	5KE2		5KE5	0	600	680	110	38.983	0.138	0.05	0.04	0.00	
88	5HC1		5H81	0	600	1220	110	63.830	0.226	0.13	0.17	0.00	
89	5KE5		5KE6	0	300	930	110	7.840	0.111	0.08	0.07	0.00	
90	5KE7		5KE6	0	300	1780	110	23.880	0.338	0.63	1.11	0.00	
91	5Z02		5KD3	0	300	1879	110	39.139	0.554	1.56	2.94	0.00	
92	5KE3		5KE4	0	800	1000	110	273.327	0.544	0.48	0.48	0.00	
93	5KE4		5KE1	0	800	1160	110	241.607	0.481	0.38	0.44	0.00	
94	5JC1		5JC3	0	1000	900	110	162.240	0.207	0.06	0.05	0.00	
95	5Z01		5KC2	0	1000	2221	110	833.351	1.061	1.27	2.83	0.00	
96	5GC1		5GC2	0	600	1510	110	49.783	0.176	0.08	0.12	0.00	
97	5HD2		5HD5	0	400	1050	110	113.503	0.903	2.76	2.93	0.00	
98	DC-R5		5JC2	0	1000	760	110	1409.178	1.794	3.37	2.56	0.00	
99	5KE1		5HE8	0	600	140	110	195.052	0.690	1.04	0.15	0.00	
100	5HE8		5KE2	0	600	560	110	180.014	0.637	0.90	0.50	0.00	
101	5KC1		5Z01	0	1000	183	110	833.351	1.061	1.27	0.23	0.00	
102	5KD1		5Z02	0	300	136	110	39.139	0.554	1.56	0.21	0.00	
103	5Z03		5KD2	0	400	1212	110	148.713	1.183	4.55	5.52	0.00	
104	5Z04		5KE1	0	400	173	110	44.843	0.357	0.50	0.08	0.00	
105	5JD1		5Z05	0	400	146	110	34.161	0.272	0.30	0.04	0.00	
106	5KD3		5KE3	0	1000	2780	110	718.570	0.915	0.97	2.69	0.00	
107	5KE3		5KE7	0	1000	1960	110	374.263	0.477	0.29	0.57	0.00	
108	5KC2		5KD3	0	1000	1290	110	751.581	0.957	1.05	1.36	0.00	
109	5KE7		5LF1	0	800	1130	110	279.403	0.556	0.50	0.56	0.00	

3.2.5 The Results of Preliminary Primary Pipe Network Analysis for Zone 6 (2008)

(ZONE-6(2008))

Node Data

Node-page : 1

NO	Node	Type	Q (l/sec)	WL (m)	GL (m)	PH (m)	Comments
1	6FK1	0	42.250	59.58	13.00	46.58	
2	6GG8	0	0.000	57.68	17.00	40.68	
3	6GGC	0	48.620	57.18	17.00	40.18	
4	6GG3	0	48.620	56.79	18.00	38.79	
5	6GGJ	0	42.250	56.69	20.00	36.69	
6	6HG3	0	42.250	56.33	20.00	36.33	
7	6HG4	0	42.250	56.25	20.00	36.25	
8	6HG8	0	42.250	56.16	24.00	32.16	
9	6HG6	0	42.250	56.11	23.00	33.11	
10	6HG7	0	36.270	55.87	22.00	33.87	
11	6HH2	0	36.270	55.05	21.50	33.55	
12	6HH6	0	36.270	54.93	20.00	34.93	
13	6HH5	0	36.270	55.43	20.00	35.43	
14	6HH4	0	36.270	56.64	24.00	32.64	
15	6GH3	0	48.620	57.15	19.00	38.15	
16	6GG9	0	48.620	57.05	16.00	41.05	
17	6GGE	0	48.620	56.96	16.50	40.46	
18	6GGF	0	48.620	56.76	22.00	34.76	
19	6GGB	0	48.620	56.75	21.00	35.75	
20	6GGM	0	0.000	56.75	20.00	36.75	
21	6GGN	0	0.000	56.86	18.00	38.86	
22	6GGH	0	0.000	57.18	18.00	39.18	
23	6GG4	0	0.000	57.55	16.30	41.25	
24	6GG2	0	48.620	57.62	17.00	40.62	
25	6GG6	0	48.620	57.68	16.50	41.18	
26	6GGA	0	48.620	57.72	16.50	41.22	
27	6GGC	0	48.620	57.86	16.00	41.86	
28	6GG7	0	48.620	57.58	14.50	43.08	
29	6GH2	0	48.620	56.68	18.00	38.68	
30	6GH1	0	42.250	57.01	10.00	47.01	
31	6GJ3	0	42.250	57.02	15.00	42.02	
32	6GJ1	0	42.250	59.51	8.00	51.51	
33	6GK2	0	42.250	60.83	9.00	51.83	
34	6GK3	0	42.250	59.80	10.00	49.80	
35	6GK1	0	42.250	59.58	13.00	46.58	
36	6GGD	0	48.620	57.35	14.80	42.55	
37	6GH6	0	42.250	58.02	14.00	44.02	
38	6HH3	0	42.250	58.53	20.00	38.53	
39	6HJ1	0	42.250	58.93	11.00	47.93	
40	6HG1	0	42.250	56.26	20.00	36.26	
41	6HG2	0	42.250	56.22	20.00	36.22	
42	6HG5	0	42.250	55.80	24.00	31.80	
43	6HGA	0	42.250	55.76	21.00	34.76	
44	6HGC	0	42.250	56.06	23.00	33.06	
45	6JG1	0	0.000	55.77	32.00	23.77	
46	6JG2	0	52.650	55.58	39.00	16.58	
47	PSR80	0	0.000	75.28	44.00	31.28	
48	6JG1	0	42.250	55.58	39.00	16.58	
49	6JG6	0	0.000	55.72	32.00	23.72	
50	6JG5	0	42.250	55.75	32.00	23.75	
51	6HG9	0	42.250	55.74	23.00	32.74	
52	6GK4	0	42.250	59.80	12.00	47.80	
53	6GK5	0	42.250	60.26	10.00	50.26	
54	6HK2	0	42.250	60.89	17.00	43.89	
55	6HK1	0	42.250	61.77	15.00	46.77	
56	BUARN	1	-2,792.400	62.00	8.00	54.00	
57	6HJ2	0	42.250	60.39	12.00	48.39	
58	6HJ3	0	78.520	59.59	11.00	48.59	
59	6GJ2	0	42.250	59.87	10.00	49.87	
60	6FK2	0	42.250	59.48	10.00	49.48	

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Node-page : 2

NO	Node	Type	Q (l/sec)	WL (m)	GL (m)	EH (m)	Comments
61	6FJ2	0	42.250	59.12	11.00	48.12	
62	6GH4	0	42.250	58.13	13.00	45.13	
63	6GH5	0	42.250	57.15	12.00	45.15	
64	6GG5	0	0.000	57.61	16.30	41.31	
65	6FJ1	0	42.250	59.45	11.00	48.45	
66	6FK3	0	42.250	59.63	10.90	48.73	
67	6FK4	0	42.250	60.24	9.90	50.34	
68	6FJ3	0	42.250	58.92	12.10	46.82	
69	6FG1	0	48.620	58.26	14.20	44.06	
70	6HJ8	0	36.270	57.57	21.50	36.07	
71	6HH7	0	36.270	54.83	24.00	30.83	
72	6JH2	0	48.100	78.51	47.00	31.51	
73	6JJ1	0	48.100	78.54	48.50	30.04	
74	6JH1	0	78.520	56.30	43.00	13.30	
75	6HGD	0	36.270	56.35	22.00	34.35	
76	6KH3	0	11.830	78.52	47.60	30.92	
77	6JH3	0	11.830	78.52	47.80	30.72	
78	6KJ2	0	11.830	78.66	48.00	30.66	
79	6KG2	0	63.050	74.60	49.00	25.60	
80	6KG1	0	115.700	75.28	48.50	26.78	
81	6LG3	0	44.850	78.53	48.50	30.03	
82	6LH1	0	52.650	79.73	48.00	31.73	
83	6KH1	0	100.750	76.36	48.00	28.36	
84	6KH2	0	11.830	78.54	48.00	30.54	
85	6KJ1	0	11.830	78.80	49.00	29.80	
86	6LH2	0	11.830	79.78	58.00	21.78	
87	CIPYN	1	-962.260	80.00	58.00	22.00	
88	6LJ1	0	11.830	79.39	58.00	21.39	
89	6LH5	0	11.830	79.06	48.00	31.06	
90	6KJ3	0	11.830	78.85	48.00	30.85	
91	6KG3	0	115.700	75.28	48.00	27.28	
92	6LH4	0	11.830	79.05	48.00	31.05	
93	6MJ1	0	11.830	79.94	58.00	21.94	
94	6LG5	0	115.700	76.57	48.50	28.07	
95	6LG4	0	115.700	75.64	48.50	27.14	
96	6NJ2	0	11.830	79.94	62.00	17.94	

<<ZONE-6(2008)>>

Branch Data

Pipe-page : 1

NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
1	6GGG		6GG3	0	600	820	90	103.624	0.366	0.47	0.39	0.00	
2	6GG3		6GGJ	0	600	740	90	55.001	0.195	0.15	0.10	0.00	
3	6GGJ		6HG3	0	800	580	110	313.177	0.623	0.62	0.36	0.00	
4	6HG3		6HG4	0	800	170	110	270.927	0.539	0.47	0.08	0.00	
5	6HG4		6HG8	0	800	690	110	132.356	0.263	0.13	0.09	0.00	
6	6HG8		6HG6	0	800	740	110	90.106	0.179	0.06	0.05	0.00	
7	6HG7		6HH2	0	400	1000	110	58.714	0.467	0.82	0.82	0.00	
8	6HH2		6HH6	0	400	880	110	22.444	0.179	0.14	0.12	0.00	
9	6HH5		6HH6	0	400	810	110	50.096	0.399	0.61	0.50	0.00	
10	6HH4		6HH5	0	400	730	110	86.366	0.687	1.67	1.21	0.00	
11	6GH3		6HH4	0	500	890	110	85.800	0.442	0.57	0.51	0.00	
12	6GH3		6GG9	0	1100	230	110	570.442	0.600	0.40	0.10	0.00	
13	6GG9		6GGE	0	1100	340	110	462.799	0.487	0.27	0.09	0.00	
14	6GGE		6GGF	0	1000	580	110	414.179	0.527	0.35	0.20	0.00	
15	6GGF		6GGJ	0	1000	390	110	300.423	0.383	0.19	0.07	0.00	
16	6GGF		6GGB	0	1000	490	110	65.137	0.083	0.01	0.01	0.00	
17	6GG3		6GGM	0	600	280	110	16.517	0.058	0.01	0.00	0.00	
18	6GGN		6GGM	0	600	300	90	91.816	0.325	0.38	0.11	0.00	
19	6GGH		6GGN	0	600	840	90	91.816	0.325	0.38	0.32	0.00	
20	6GGH		6GGG	0	600	80	110	24.878	0.088	0.02	0.00	0.00	
21	6GG4		6GGH	0	600	640	90	116.694	0.413	0.58	0.37	0.00	
22	6GG2		6GG4	0	600	110	90	116.694	0.413	0.58	0.07	0.00	
23	6GG8		6GG2	0	600	80	110	165.314	0.585	0.77	0.06	0.00	
24	6GGA		6GG8	0	600	550	110	48.620	0.172	0.08	0.04	0.00	
25	6GGC		6GGA	0	1000	450	110	389.920	0.496	0.31	0.14	0.00	
26	6GG7		6GH2	0	300	680	110	35.862	0.507	1.33	0.90	0.00	
27	6GH1		6GH2	0	300	1860	110	12.758	0.180	0.20	0.36	0.00	
28	6GH1		6GJ3	0	300	1180	110	3.972	0.056	0.02	0.02	0.00	
29	6GJ1		6GJ3	0	300	1660	110	38.278	0.542	1.50	2.49	0.00	
30	6GK2		6GJ1	0	300	1470	110	28.981	0.410	0.90	1.32	0.00	
31	6GK2		6GK3	0	400	1140	110	61.952	0.493	0.90	1.03	0.00	
32	6GK3		6GK1	0	300	500	110	19.702	0.279	0.44	0.22	0.00	
33	6GG7		6GGD	0	900	570	110	337.512	0.531	0.40	0.23	0.00	
34	6GGD		6GG9	0	900	1000	110	288.892	0.454	0.30	0.30	0.00	
35	6GH6		6GH3	0	1100	1490	110	705.862	0.743	0.59	0.87	0.00	
36	6HH3		6GH6	0	1100	770	110	748.112	0.787	0.66	0.51	0.00	
37	6HJ1		6HH3	0	1100	550	110	790.362	0.832	0.73	0.40	0.00	
38	6GGM		6HG1	0	600	970	90	108.333	0.383	0.51	0.49	0.00	
39	6HG1		6HG2	0	600	190	90	66.083	0.234	0.20	0.04	0.00	
40	6HG4		6HG2	0	600	100	110	96.320	0.341	0.28	0.03	0.00	
41	6HG2		6HG5	0	600	680	90	120.153	0.425	0.62	0.42	0.00	
42	6HG6		6HGC	0	800	240	110	185.997	0.370	0.24	0.05	0.00	
43	6HGC		6JG4	0	800	1940	110	143.747	0.286	0.15	0.29	0.00	
44	6JG4		6JG2	0	600	1640	90	49.122	0.174	0.12	0.19	0.00	
45	6JG1		6JG2	0	600	100	110	3.528	0.012	0.00	0.00	0.00	
46	6JG6		6JG1	0	600	1380	90	45.778	0.162	0.10	0.14	0.00	
47	6JG5		6JG6	0	600	250	90	45.778	0.162	0.10	0.03	0.00	
48	6JG4		6JG5	0	600	90	110	91.625	0.335	0.27	0.02	0.00	
49	6JG5		6HG9	0	600	2070	90	6.597	0.023	0.00	0.01	0.00	
50	6HG5		6HG9	0	600	840	90	35.653	0.126	0.07	0.06	0.00	
51	6GK1		6FK1	0	400	1070	110	0.181	0.001	0.00	0.00	0.00	
52	6GK4		6GK1	0	400	1530	110	22.729	0.181	0.14	0.22	0.00	
53	6GK5		6GK4	0	400	470	110	64.979	0.517	0.98	0.46	0.00	
54	6HK2		6GK5	0	500	750	110	107.229	0.546	0.84	0.63	0.00	
55	6HK1		6HK2	0	600	1580	110	149.479	0.529	0.64	0.88	0.00	
56	BUARN		6HK1	0	1200	300	110	1030.797	0.911	0.78	0.23	0.00	
57	BUARN		6FK1	0	1500	330	110	1761.603	0.997	0.71	0.23	0.00	
58	6HK1		6HJ2	0	1200	1310	110	1197.535	1.059	1.02	1.38	0.00	
59	6HJ2		6HJ3	0	1200	1000	110	1053.294	0.931	0.81	0.80	0.00	
60	6HJ3		6HJ1	0	1200	940	110	974.774	0.862	0.70	0.66	0.00	

<<ZONE-6(2008)>>

Pipe-page : 2

NO	Node(U)	->	Node(D)	Type	Dia (mm)	Len (m)	C	Q (l/sec)	V (m/sec)	i (‰)	dH (m)	f.dH (m)	Comments
61	6HJ2		6GJ2	0	500	680	110	101.991	0.519	0.76	0.52	0.00	
62	6GJ2		6GJ1	0	500	1290	110	59.741	0.304	0.28	0.36	0.00	
63	6GJ1		6FK2	0	400	1090	110	8.197	0.065	0.02	0.03	0.00	
64	6HK1		6GK2	0	1500	2030	110	1403.136	0.791	0.46	0.94	0.00	
65	6GH4		6GH1	0	300	1060	110	31.174	0.441	1.03	1.09	0.00	
66	6GH5		6GH1	0	400	530	110	27.806	0.221	0.20	0.11	0.00	
67	6HJ1		6GH5	0	400	1570	110	70.056	0.557	1.13	1.78	0.00	
68	6HG5		6HGA	0	500	280	110	42.250	0.215	0.15	0.04	0.00	
69	6GG8		6GG5	0	600	100	90	127.366	0.450	0.69	0.07	0.00	
70	6GG5		6GGG	0	600	630	90	127.366	0.450	0.69	0.43	0.00	
71	6FJ1		6FJ2	0	250	1150	110	9.665	0.197	0.29	0.33	0.00	
72	6FK3		6FK2	0	400	490	110	31.053	0.271	0.30	0.15	0.00	
73	6GK2		6FK4	0	1500	1510	110	1269.949	0.719	0.39	0.59	0.00	
74	6FJ3		6GH4	0	400	640	110	73.424	0.584	1.23	0.79	0.00	
75	6FJ2		6FJ3	0	250	740	110	9.281	0.189	0.27	0.20	0.00	
76	6FK3		6FJ1	0	250	600	110	10.052	0.205	0.31	0.18	0.00	
77	6FK4		6FK3	0	1500	1810	110	1185.630	0.671	0.34	0.61	0.00	
78	6FG1		6GG7	0	900	1130	110	421.991	0.663	0.60	0.68	0.00	
79	6HJ1		6HJ8	0	400	1140	110	72.106	0.574	1.19	1.36	0.00	
80	6HJ8		6HH4	0	400	2830	110	35.836	0.285	0.33	0.93	0.00	
81	6HH6		6HH7	0	500	910	110	36.270	0.185	0.11	0.10	0.00	
82	PSRBO		6KG1	0	600	1050	110	0.000	0.000	0.00	0.00	0.00	
83	6HGD		6HG6	0	700	890	110	138.141	0.359	0.26	0.24	0.00	
84	6HGD		6HG7	0	400	240	110	94.984	0.756	1.99	0.48	0.00	
85	6GG9		6HGD	0	1000	2800	110	317.915	0.443	0.25	0.70	0.00	
86	6HGD		6JH1	0	1000	2960	110	78.520	0.100	0.02	0.05	0.00	
87	6FG1		6GGC	0	1000	1040	110	438.540	0.558	0.39	0.40	0.00	
88	6FJ3		6FG1	0	1500	3160	110	909.151	0.514	0.21	0.66	0.00	
89	6GGA		6GG8	0	1000	220	110	292.680	0.373	0.18	0.01	0.00	
90	6FK4		6FK1	0	400	1510	110	42.069	0.335	0.44	0.66	0.00	
91	6KH3		6JH2	0	600	1050	110	17.111	0.061	0.01	0.01	0.00	
92	6KH2		6KH3	0	600	1160	110	19.912	0.070	0.02	0.02	0.00	
93	6JH3		6JH2	0	800	1080	110	30.989	0.062	0.01	0.01	0.00	
94	6JJ1		6JH3	0	800	1020	110	42.819	0.085	0.02	0.02	0.00	
95	6KJ3		6KJ2	0	800	2110	110	111.778	0.222	0.09	0.19	0.00	
96	6KJ2		6JJ1	0	800	1980	110	90.919	0.181	0.06	0.12	0.00	
97	6KJ2		6KH3	0	300	1320	110	9.029	0.128	0.10	0.14	0.00	
98	6FJ2		6FJ3	0	1500	770	110	1015.547	0.575	0.25	0.20	0.00	
99	6FJ1		6FJ2	0	1500	1197	110	1057.412	0.598	0.27	0.33	0.00	
100	6FK3		6FJ1	0	1500	625	110	1099.276	0.622	0.30	0.18	0.00	
101	6KG1		6KG2	0	400	730	110	63.050	0.502	0.93	0.68	0.00	
102	6LH1		6LG1	0	900	2360	110	385.448	0.606	0.51	1.20	0.00	
103	6KH1		6KG1	0	700	2400	110	185.252	0.481	0.45	1.08	0.00	
104	6LH2		6LH1	0	1500	900	110	438.038	0.248	0.05	0.05	0.00	
105	6KH2		6KH1	0	600	1030	110	286.002	1.012	2.12	2.18	0.00	
106	6LJ1		6LH5	0	300	1430	110	13.896	0.197	0.23	0.33	0.00	
107	6KJ3		6KH2	0	600	1960	110	70.679	0.250	0.16	0.31	0.00	
108	6KJ3		6KJ1	0	400	1200	110	11.830	0.094	0.01	0.05	0.00	
109	6KG1		6KG3	0	600	480	110	6.502	0.023	0.00	0.00	0.00	
110	6LH4		6KH2	0	800	1280	110	247.066	0.492	0.40	0.51	0.00	
111	6LH2		6LH4	0	800	1710	110	256.829	0.511	0.43	0.73	0.00	
112	6MJ1		6LH2	0	1600	1710	110	706.757	0.352	0.10	0.16	0.00	
113	C1PYN		6MJ1	0	1800	580	110	962.260	0.378	0.09	0.06	0.00	
114	6LG1		6LG5	0	600	670	110	340.593	1.205	2.93	1.96	0.00	
115	6LG4		6KG3	0	600	1010	110	109.198	0.386	0.36	0.36	0.00	
116	6LG5		6LG4	0	600	630	110	224.898	0.795	1.36	0.93	0.00	
117	6LJ1		6KJ3	0	800	1880	110	206.117	0.410	0.28	0.51	0.00	
118	6MJ1		6LJ1	0	800	1570	110	231.843	0.461	0.35	0.55	0.00	
119	6MJ1		6NJ2	0	800	1460	110	11.830	0.024	0.00	0.00	0.00	
120	6LH5		6LH1	0	300	1360	110	2.066	0.029	0.01	0.01	0.00	

3.3 Proposed Primary Pipe Length in East and West Concessional Areas

(m)

Dia	Part One Program			Part Two Program			TOTAL		
	EAST	WEST	TOTAL	EAST	WEST	TOTAL	EAST	WEST	TOTAL
mm									
300	28,924	8,211	37,135	58,684	29,561	88,245	87,608	37,772	125,380
350	190	0	190	0	0	0	190	0	190
400	20,097	6,927	27,024	6,232	1,888	8,120	26,329	8,815	35,144
500	9,019	6,173	15,192	593	3,817	4,410	9,612	9,990	19,602
600	14,807	55,170	69,977	6,628	20,152	26,780	21,435	75,322	96,757
700	890	9,610	10,500	2,400	0	2,400	3,290	9,610	12,900
800	23,868	30,932	54,800	9,092	20,278	29,370	32,960	51,210	84,170
900	2,680	5,000	7,680	1,170	1,190	2,360	3,850	6,190	10,040
1000	5,752	13,468	19,220	3,918	8,116	12,034	9,670	21,584	31,254
1200	6,180	10,750	16,930	0	0	0	6,180	10,750	16,930
1350	0	9,100	9,100	0	0	0	0	9,100	9,100
1500	11,432	4,060	15,492	900	0	900	12,332	4,060	16,392
1650	0	2,250	2,250	1,710	0	1,710	1,710	2,250	3,960
1800	3,934	3,700	7,634	580	0	580	4,514	3,700	8,214
Total	127,774	165,350	293,124	91,906	85,003	176,909	219,680	250,353	470,033

ANNEX-46

OPERATION/MAINTENANCE AND MONITORING SYSTEM

CONTENTS OF ANNEX-46

(Treatment Plant)

Daily Inspection Report (Power Substation)

Date: Time: Weather:
Reporter: Approved by:

Name of Panel	Meter Reading	
MCP-SUB	Incoming	kV
	No.1 System	kV
		A
	No.2 System	kV
		A
3kV Bus Tie		V
		A
3kV Incoming No.1		MW
		A
		kV
		%
3kV Incoming No.2		MW
		A
		kV
		%
3kV Transmission Feeder	No.1	A
	No.2	A
3kV Distribution Feeder	No.1	A
	No.2	A
3kV Capacitor Feeder	No.1	A
	No.2	A
HVS-SC1-Control		A
HVS-SC2-Control		A
HVS-SC-SUB3		A
HVS-SC-SUB4		A
110V 150A Charger		V
		A
110V 150A Rectifier		V
		A
LC-SUB-Swith Board	No.1	kW
		V
		A
	No.2	V
		A
Note		

(Treatment Plant)

Daily Inspection Report (Transmission Pump Station)

Date: Time: Weather:
Reporter: Approved by:

Name of Panel	Meter Reading	
HVS-TR1 Incoming		A
		V
HVS-TR2 Incoming		A
		V
HVS-TR3 Tie	No.1	V
		Vo
	No.2	V
		Vo
HCP-TR1		A
HCP-TR2		A
HCP-TR3		A
HCP-TR4		A
HCP-TR5		A
LVS-TR	Income A	A
		V
	Income B	A
		V
Note		

(Treatment Plant)

Daily Inspection Report (Distribution Pump Station)

Date: Time: Weather:
Reporter: Approved by:

Name of Panel	Meter Reading	
3.3kV Switch Board	No.1	kV
	No.2	kV
3kV Incoming	No.1	A
		kV
	No.2	A
		kV
3kV 1600kVA Transformer	No.1 Feeder	A
	No.2 Feeder	A
P-PD1 (620kW)		A
P-PD2 (620kW)		A
P-PD3 (320kW)		A
P-PD4 (620kW)		A
P-PD5 (620kW)		A
P-PD6 (320kW)		A
Note		

(Treatment Plant)

Daily inspection Report (Load Center)

Date: Time: Weather:
Reporter: Approved by:

Name of Panel	Meter Reading	
LC-RW	Panel 2	V
	Panel 3	V
LC-CF 1	Panel 1	V
		kWH
	Panel 3	V
		kWH
LC-CF 2	Panel 1	V
		kWH
	Panel 3	V
		kWH
LC-OB 1	Panel 2	V
		A
		kWH
	Panel 3	V
		A
		kWH
LC-OB 2	Panel 2	V
		A
		kWH
	Panel 3	V
		A
		kWH
LC-CH 1	Panel 1	V
		A
		kWH
	Panel 3	V
		A
		kWH
LC-CH 2	Panel 1	V
		A
		kWH
	Panel 3	V
		A
		kWH
LC-WW 1	Panel 2	V
	Panel 3	V
LC-WW 2	Panel 2	V
	Panel 3	V
Note:		

(Distribution Center)

Daily Inspection Report (Power Substation)

Date: Time: Weather:
Reporter: Approved by:

Name of Panel	Meter Reading	
MCP	Incoming	kV
	No.1	kV
		A
	No.2	kV
		A
HVS-DC1-A (Incoming)		V
		%
		kW
		A
HVS-DC1-B		V
		%
		kW
		A
HVS-DC2 (Tie VCB)	No.1	V
		Vo
	No.2	V
		Vo
DIST PUMP STATION -1		A
DIST PUMP STATION -2		A
POWER TRANSFORMER (200KVA-1)		A
POWER TRANSFORMER (200KVA-2)		A
CAPACITOR (100KVA)		A
CAPACITOR (150KVA)		A
LC-MAIN-DC1		V
		A
LC-MAIN-DC2		V
		A
BC-DC2 (INVERTER)		V
		A
		Hz
Note:		

(Distribution Center)

Daily Inspection Report (Electric Room)

Date: Time: Weather:
Reporter: Approved by:

Name of Panel	Meter Reading	
Auxiliary Panel	P-DP1	C
	P-DP2	C
	P-DP3	C
	P-DP4	C
	P-DP5	C
HPC-DP1		A
HPC-DP2		V
		A
HPC-DP3		A
HPC-DP4		V
		A
HPC-DP5		A
MCP-DC	20kV Incoming	kV
	HHVS-DC2	A
	HHVS-DC3	A
	HVS-DC-1A	kV
		A
		%
	HVS-DC-1B	kV
		A
		%
	3kV-SC1	A
	3kV-SC2	A
	3kV-T2-1	A
	3kV-T2-2	A
	3kV PUMP FEEDER1	kA
	3kV PUMP FEEDER2	kA
	LC-MAIN-DC1	V
		A
	LC-MAIN-DC2	V
		A
	P-DP 1	A
	P-DP 2	A
	P-DP 3	A
	P-DP 4	A
	P-DP 5	A
Note:		

ANNEX-47

PRELIMINARY COST ESTIMATES

CONTENTS OF ANNEX-47

1. INVESTMENT COST IN EASTERN AND WESTERN AREA

DESCRIPTION	EAST			WEST			TOTAL		
	Foreign Yen	Local Rp	Total Eq. Yen	Foreign Yen	Local Rp	Total Eq. Yen	Foreign Yen	Local Rp	Total Eq. Yen
2nd Stage									
2nd Phase, Part One	28,545	543,403	54,420	26,423	443,340	47,532	54,967	986,743	101,952
Buaran III	6,726	115,479	12,226	0	0	0	6,726	115,479	12,226
DC - R1 II	390	16,434	1,173	0	0	0	390	16,434	1,173
DC - R6 I	0	0	0	409	37,869	2,212	409	37,869	2,212
TM R1 - R6	4,300	19,100	5,210	2,903	12,893	3,517	7,203	31,993	8,727
PRIMARY MAIN	9,912	70,191	13,256	14,727	100,905	19,531	24,639	171,096	32,787
SERVICE MAIN	2,924	135,596	9,380	4,412	204,680	14,159	7,336	340,276	23,539
ENGINEERING SERVICE	1,698	10,703	2,206	1,570	10,689	2,078	3,268	21,392	4,284
LAND COST	0	126,500	6,024	0	36,000	1,714	0	162,500	7,738
PHYSICAL CONT.	2,595	49,400	4,945	2,402	40,304	4,321	4,996	89,704	9,266
2nd Phase, Part Two	27,595	629,338	57,567	20,144	371,636	37,842	47,740	1,000,973	95,409
Cipayung T. P.	4,709	86,753	8,839	0	0	0	4,709	86,753	8,839
DC - R4 II	0	0	0	741	36,596	2,484	741	36,596	2,484
DC - R5 II	0	0	0	312	27,127	1,604	312	27,127	1,604
RAW WATER TRANSMIT	7,608	54,332	10,195	0	0	0	7,608	54,332	10,195
TM CIPAYUNG - R5, R4	4,992	16,172	5,764	8,086	30,666	9,546	13,078	46,838	15,310
PRIMARY MAIN	4,036	38,610	5,876	4,714	41,490	6,690	8,750	80,100	12,566
SERVICE MAIN	2,101	97,458	6,742	3,262	151,354	10,470	5,363	248,812	17,212
ENGINEERING SERVICE	1,640	8,800	2,059	1,198	8,618	1,608	2,838	17,418	3,667
LAND COST	0	270,000	12,857	0	42,000	2,000	0	312,000	14,857
PHYSICAL CONT.	2,509	57,213	5,235	1,831	33,785	3,440	4,341	90,997	8,675
TOTAL	56,140	1,172,741	111,987	46,567	814,976	85,374	102,707	1,987,716	197,361
3rd Stage									
1st Phase, Part One	3,411	131,680	9,683	27,473	639,581	57,934	30,885	771,260	67,617
Cisadane II	0	0	0	4,687	105,451	9,709	4,687	105,451	9,709
DC - R1 III	0	14,886	709	0	0	0	0	14,886	709
DC - R3 I	0	0	0	156	16,799	956	156	16,799	956
DC - R4 III	0	0	0	195	17,601	1,033	195	17,601	1,033
TM CISADANE - R5,R6,R3	0	0	0	9,532	40,148	11,445	9,532	40,148	11,445
PRIMARY MAIN	956	11,421	1,500	5,482	39,699	7,374	6,438	51,120	8,874
SERVICE MAIN	1,941	89,915	6,223	3,288	152,571	10,554	5,229	242,486	16,777
ENGINEERING SERVICE	204	3,487	371	1,635	11,168	2,167	1,839	14,655	2,538
LAND COST	0	0	0	0	198,000	9,429	0	198,000	9,429
PHYSICAL CONT.	310	11,971	880	2,498	58,144	5,267	2,809	70,114	6,147
1st Phase, Part Two	19,531	373,468	37,317	21,127	380,816	39,262	40,659	754,281	76,579
CIPAYUNG II	8,032	180,747	16,639	0	0	0	8,032	180,747	16,639
DC - R3 II	0	0	0	253	17,186	1,071	253	17,186	1,071
DC - R4 IV	0	0	0	234	17,756	1,079	234	17,756	1,079
DC - R6 I	0	0	0	156	619	186	156	619	186
TM CIPAYUNG - R3,R5,R4	4,992	16,172	5,762	6,729	24,332	7,888	11,721	40,504	13,650
PRIMARY MAIN	956	11,419	1,500	5,482	39,700	7,374	6,438	51,119	8,874
SERVICE MAIN	2,615	121,289	8,390	5,096	236,520	16,359	7,711	357,809	24,749
ENGINEERING SERVICE	1,160	9,889	1,633	1,256	10,083	1,737	2,416	19,972	3,370
LAND COST	0	0	0	0	0	0	0	0	0
PHYSICAL CONT.	1,776	33,952	3,393	1,921	34,620	3,568	3,698	68,569	6,961
2nd Phase	2,880	79,163	6,649	20,434	434,125	41,107	23,314	513,291	47,756
Cisadane III	0	0	0	4,687	105,451	9,709	4,687	105,451	9,709
DC - R3 II, R4 IV, R6 I	0	0	0	448	1,781	533	448	1,781	533
TM R4 - R5	0	0	0	134	1,128	187	134	1,128	187
PRIMARY MAIN	1,274	15,229	2,000	7,309	52,932	9,829	8,583	68,161	11,829
SERVICE MAIN	1,175	54,642	3,777	4,784	221,873	15,350	5,959	276,515	19,127
ENGINEERING SERVICE	170	2,096	268	1,215	11,495	1,763	1,385	13,591	2,031
LAND COST	0	0	0	0		0	0	0	0
PHYSICAL CONT.	261	7,196	604	1,857	39,465	3,736	2,118	46,664	4,340
GRAND TOTAL	81,962	1,757,052	165,636	115,601	2,269,498	223,677	197,565	4,026,548	389,313

2. CONSTRUCTION COST OF WATER TREATMENT PLANTS

(million)

Description	Buaran III WTP		Cipayung WTP	
	Yen	Rp	Yen	Rp
CIVIL WORKS				
Intake / Receiving Well		5,946		1,784
Mixing, Flocculation & Sedimentation Basins		17,837		17,837
Filters		18,769		18,769
Waste Basins		7,345		7,345
Clear Water Reservoirs		25,705		11,187
Operation Building				1,299
Pump Well & Station Building		8,060		4,030
Chemical Buildings		4,547		4,547
Others		9,676		9,676
MECHANICAL WORKS				
Treatment Facilities	1,589	3,981	1,589	3,981
Chemical Feed System	768	2,163	768	2,163
Transmission/Distribution Pumps	103	480	52	240
Others	635	1,035	635	1,035
ELECTRICAL WORKS				
Power Substation	176	492	176	492
Treatment Facilities	599	1,194	599	1,194
Chemical Feed System	293	588	293	588
Transmission/Distribution Pumps	82	443	41	222
Others	289	364	289	364
PIPE AND VALVES				
Pipe and Valves	267		267	
SUB-TOTAL	4,801	108,625	4,709	86,753
SCADA SYSTEM				
RTU & Central Unit	1,925	6,854		
GROUND TOTAL	6,726	115,479	4,709	86,753

3. CONSTRUCTION COST OF DISTRIBUTION CENTERS

(million)

Name of DC	Capacity		Civil	Facilities		Total Coat		Remarks
	1000m3	m3/sec	Rp	Yen	Rp	Yen	Rp	
Part 1 Program								
DC-R1	20.7	2.0	14,886	390	1,548	390	16,434	East
DC-R6	50.4	2.1	36,244	409	1,625	409	37,869	West
Part 2 Program								
DC-R4	46.8	3.8	33,655	741	2,941	741	36,596	West
DC-R5	36.0	1.6	25,889	312	1,238	312	27,127	West

Note :
Following unit costs are applied for cost estimation.
Civil Rp 719,123 / m3
Facilities Yen 194,897 + Rp 773,855 / (l/sec)

4. CONSTRUCTION COST OF PUMP STATIONS FOR RAW WATER TRANSMISSION

(million)

Name of DC	Capacity		Civil	Facilities		Total Coat		Remarks
	1000m3	m3/sec	Rp	Yen	Rp	Yen	Rp	
Part 2 Program								
Intake	15.8	5.0	11,362	974	3,869	974	15,231	East
Booster	18.9	5.0	13,592	974	3,869	974	17,461	East

5. UNIT COST OF PIPE INSTALLATION WORKS

1) Transmission and Primary Main

(million / km)

Dia (mm)	Procure Yen	Civil Rp
300	19	314
350	24	349
400	29	383
500	41	446
600	54	506
700	67	564
800	83	618
900	98	671
1,000	116	721
1,100	134	770
1,200	154	818
1,350	182	888
1,500	215	955
1,600	236	998
1,800	283	1,082
2,000	332	1,165
2,200	384	1,244

2) Service Main

(million / km)

Dia (mm)	Procurement Yen	Procurement Rp	Civil Rp	TOTAL Yen	TOTAL Rp.
INFIL/EXTENSION					
50	0.305	8.559	59.621	0.305	68.180
75	0.537	14.198	79.981	0.537	94.179
100	0.945	20.332	100.341	0.945	120.673
150	4.500	33.728	141.061	4.500	174.789
200	9.055	48.300	181.781	9.055	230.081
250	12.000	63.815	222.501	12.000	286.316
EXTENSION					
50	0.305	8.559	32.014	0.305	40.573
75	0.537	14.198	39.594	0.537	53.792
100	0.945	20.332	48.969	0.945	69.301
150	4.500	33.728	74.902	4.500	108.630
200	9.055	48.300	114.570	9.055	162.870
250	12.000	63.815	175.245	12.000	239.060

Note :

Service main pipe is locally available while some fittings and accessories such as valves are calculated as foreign portion.

3) Flow Meter and Pressure Gauge

Cost of Flow meters and Pressure gauges is added to the cost of Distribution Primary Main.

	million Yen East	million Yen West
Part 1	112.8	112.8
Part 2	112.8	112.8

6. LAND ACQUISITION COST

(million Rp)

	Unit Cost	Area (ha)	land acquisition cost EAST	WEST
Part 1 Program (2002)				
Buaran III TP	8,000	15	120,000	
DC-R6	6,000	6		36,000
Part 2 Program (2006)				
Cipayung TP	6,000	45	270,000	
DC-R4	6,000	7		42,000
After Priority Project (2009)				
Cipayung TP	6,000	30		180,000
DC-R4	6,000	3		18,000

Note :

Area of Treatment Plant is proposed considering the area of existing Buaran TP.

Area of Distribution Center is proposed considering the area of existing DC-R1.

7. PRICE INDEX AND ESCALATION RATE

Year	Foreign Portion (Yen)		Local Portion (Rp.)	
	Price Index	Escalation Rate	Price Index	Escalation Rate
1987				
1988	0.74%	1.176	4.44%	1.885
1989	2.21%	1.168	5.56%	1.805
1990	3.09%	1.142	11.26%	1.710
1991	3.30%	1.108	10.38%	1.537
1992	1.65%	1.073	5.46%	1.392
1993	1.33%	1.055	10.28%	1.320
1994	2.05%	1.041	10.56%	1.197
1995	2.05%	1.021	8.28%	1.083
1996		1.000		1.000

ANNEX-61

INITIAL ENVIRONMENTAL EXAMINATION

CONTENTS OF ANNEX-61

INITIAL ENVIRONMENTAL EXAMINATION FOR ENVIRONMENTAL IMPACT ASSESSMENT, JAKARTA WATER SUPPLY DEVELOPMENT PROJECT

The Initial Environmental Examination was conducted by the Indonesian Consultants as sub-contracting works of the JICA Study Team and was conducted conforming to the Indonesian laws and regulations concerning the environmental impact assessment.

DEPARTEMEN PEKERJAAN UMUM
DIREKTORAT JENDERAL CIPTA KARYA
DIREKTORAT AIR BERSIH

INITIAL ENVIRONMENTAL EXAMINATION

FOR

ENVIRONMENTAL IMPACT ASSESMENT

JAKARTA WATER SUPPLY DEVELOPMENT PROJECT

SEPTEMBER 1996

JICA STUDY TEAM

1. INTRODUCTION

1.1 BACKGROUND

The Master Plan and Feasibility Study for Jakarta Water Supply Development Project conducted by JICA(1983-1985) concluded that the service area of PDAM DKI Jakarta should be expanded to meet not only domestic but also industrial and commercial water demand. However, water supply conditions in Jakarta have not been satisfactorily improved because of (a) the delay in the implementation of planned projects such as construction of new treatment plants and raw water transmission mains, (b) the delay of upgrading distribution mains, (c) the rapidly increase of water demand and change of living standards and (d) rapid industrialization around Jakarta.

Because of the above reasons, the Indonesian Government in 1995 decided to request the Government of Japan to revise that plan and to include expansion of study area, to cover fringe area of DKI Jakarta such as Bogor, Tangerang and Bekasi. To meet future water demand for that area, the JICA team has proposed : (a) an expansion of water treatment plant (WTP) Buaran of about 5,000 l/s, (b) to built a WTP in Cipayung which has a capacity about 5,000 l/s, (c) to expand and to built some distribution centers both in south and north Jakarta.

Those plans are expected to bring either positive or negative environmental impacts, hence since the environmental impact assessment (EIA) should be executed to describe the environmental consequences of proposed implementation. Based on Government Regulation 51/1993, an EIA is mandatory to be carried out by the responsible body that is Cipta Karya.

1.2 REGULATIONS

Regulations to be considered as references of this study are as follows:

1. Local Government Function Law No.5/1994
2. Road Law No.13/1980
3. Environmental Law No.4/1982
4. Biological Water Resources and Ecosystem Law No.5/1990
5. Housing and Settlement Law No.24/1992

6. Spatial Planning Law No.24/1992
7. Government Regulation No.6/1980 on Local Institution Coordination
8. Local Government Regulation No.20/1990 on Water Pollution Control
9. Government Regulation No.51/1993 on Environmental Impact Assessment
10. Presidential Decree No.55/1993 on Land for the Development of Public Interest
11. Ministry of Environmental Decree No.02/MENKLH /6/1988 on Environmental Ambient
12. Ministry of environmental Decree No.11/MENLH/3/1994 on Activities that require Environmental Impact Assessment Study
13. Ministry of Environmental Decree No.Kep/MENLTH/3/1994 on Guidance for Environmental Impact Assessment Study
14. Ministry of Environmental Decree No.Kep-056/1994 on Major Impact Guidelines
15. Other Local Government Regulations

1.3 THE RELATIONSHIP BETWEEN PROPOSED PLAN AND MAJOR ENVIRONMENTAL CONSEQUENCES

Major plans including construction of WPT, upgrading of distribution centers and development of distribution network requires extensive land acquisition and construction may have a significant effect on the quality of the human environment include those : (1) that are likely to have a adverse impact on cultural, scenic resources of national, provincial or local significance, (2) that divide or disrupt an established community, or cause increased congestion; are inconsistent with plans or goals that have been adopted by the community, (3) that are likely to be highly controversial relocation housing resources. :

1.3.1 Planning and Design Phase

1. Impact on land use especially in Cipayung WTP in anticipation of development.
2. Acquisition and condemnation of property for project, with subsequent resettlement of families and business especially for Cipayung WTP development and some distribution centers both in south and north Jakarta.

1.3.2 Construction Phase

1. Soil erosion and disturbance of natural drainage.
2. Morphological change that cause erosion from activities below:
   - Excavating and burying at the Cipayung
     WTP at the slope over 15%, without hardening the soil
   - Drainage with slope over 15% without hardening the soil.
3. The possible impact on air from heavy equipments loading and unloading materials in the project area.
4. Secondary impact from the WTP that cause of informal activities in response to the project needs.

1.3.3 Operation Phase

1. Contiguous land use and those who located nearby WTP especially Cipayung will have more access into this area.
2. Traffic congestion from and into WTP, noise and air pollution, aesthetic, and dust during the installation of distribution pipe.
3. Significantly detrimental impact on water quality ambient of West Tarum Canal and Sunter River if sludge produced from WTPs is discharged into the river without specific treatment.
4. Economic effects, influencing private development around WTP mainly in Cipayung and also multiplier effect to the local people.
5. Increasing economic activities surrounding project area to fulfill the daily need of workers.
6. Increasing pollution at the bottom of the river if sludge form WTP disposed into the river (Sunter River at Cipayung WTP, and West Tarum Canal at Buaran WTP).

2 PURPOSE AND BENEFIT OF THE STUDY

2.1 PURPOSE

1. To identify components form all activities in both WTPs, distribution centers and distribution networks that have significant impacts into the environment.
2. To describe the environmental setting in which the proposed action is to take place.
3. To predict and assess the impacts associated with proposed action and prediction of anticipated change.
4. To predict and evaluate major impacts from the transmission and distribution pipes installation and determination of the magnitude of scale of the particular change from the proposed action.
5. To consider the decision among alternatives for solving a particular problem associated with the expansion of WTP Buaran, WTP Cipayung, development of distribution centers and distribution networks and application of an importance or significance factor to change.

This study is written in accordance with the government regulation 51/1993 that is a EIA terms of reference for the study of expansion of WTP Buaran, WTP Cipayung, distribution centers and networks of Jakarta. This terms of reference is expected to be a guidance for the responsible body (the owner of the project) how to conduct the EIA study and what should be done in order this study accepted as a legal document by the government.

2.2 BENEFIT OF THE STUDY

The impact statement of the environmental impact analysis study is expected to be :

1. Input for the regional development planning process.
2. To assess the decision making process in locating Cipayung WTP and other distribution centers.
3. A general consideration for the detail engineering phase of Buaran WTP, Cipayung WTP, distribution centers, transmission and distribution networks.
4. A guidance for the environmental monitoring and management plan.

3 THE EIA STUDY

The study of EIA for the development of water supply system in DKI Jakarta mainly related with the expansion Buaran WTP, construction of WTP Cipayung, expansion and development of distribution centers and expansion of transmission and distribution networks for fringe area Bogor, Tangerang and Bekasi (BOTABEK), are formed by all component associated with impacts.

3.1 PLAN OF ACTIVITIES TO BE STUDIED

The expansion of Buaran WTP and Cipayung WTP respectively 5,000 l/s and 5,000 l/s, development of distribution centers in Pulogadung and Cilandak, some distribution centers both in south and north Jakarta, and development of distribution and transmission networks are expected to be part of Jakarta Water Supply Comprehensive Plan 2019.

The existing supply area is 316 km^2 and it is expected to reach into 435 km^2, 505 km^2, 715 km^2, 837 km^2, and 871 km^2, respectively by the year 2000, 2005, 2010, 2015 and 2019. The status of this project still in the feasibility study with preliminary design is being done by the JICA Team.

3.1.1 Pre Construction Phase

Several activities to be studied in this phase will covers :

1. Survey and investigation for considering the impact on land use through speculation in construction of Cipayung WTP and other distribution centers.
2. Acquisition and condemnation of property for project, with subsequent resettlement of families and business. At least 8ha for Buaran and 20ha for Cipayung WTP are needed. Unsatisfied by local people is expected if the land acquisition were less than market price.

3.1.2 Construction Phase

During the construction Phase there would be possibilities some potential impacts during this phase of project development :

1. Preparation

a. Mobilization and transportation material and equipment to the project location. Potential impact needs to be studied such as :
   - Noise and traffic congestion from heavy machine, trucks, tractors coming in and out especially in the distribution networks.
   - Air pollution including dust, dirt and burning of debris.

b. Labor Mobilization

   This project consumed labors from local and outside. The socioeconomic impact study is needed.

c. Construction and Operation of Base Camp

   Base camp generally used for storage of material, construction equipment and logging for workers. Potential impact needs to be studies are :
   - Decreased in the quality of air and noise pollution to the vicinity area.
   - Socio economic impact on the society surrounding base camp.

2. Operational

   a. Preparation of Land, including land clearing in the traditional Jakasampurna Village of Cipayung WTP location. The potential impact expected are :
      - decreased in noise and air pollution
      - disturbance roads and public utilities
      - disturbance in flora and fauna habitat

   b. Excavating and burying soil / land will cause impact on
      - decreased in air quality and noise,
      - crossing and instability of cliff along the Sunter riverbanks

3.1.3 Operational phase

1. WTP Operation

   WTP operation will produce sludge from settled suspended solid of water source in the process of sedimentation and filtration.

3.2 ENVIRONMENTAL COMPONENT TO BE STUDIED

3.2.1 Physical and Chemical Components

Physical and chemical components will cover climate, air quality and noise (mainly in Cipayung WTP), water quality from West Tarum Canal, land use and spatial planning, physiograph, hydrology and public utilities nearby area.

1. Climate
   Climate components to be studied are type of climate, humidity, rain fall and wind.
2. Quality of Air and Noise
   The measurement of air and noise will be conducted in Cipayung WTP and Buaran WTP, to cover CO, Nox, Sox, HC, Pb and dust.
3. Water Quality
   Water quality to be analyzed are all physical, chemical and biological parameters especially turbidity.
4. Physiography
   Physiography component included in morphology, geological structure, type of soil, and also geological stability.
5. Hydrology
   Study for hydrological component covers physical, characteristic of the river (debt, sedimentation and erosion)
6. Soil and Space
7. Analysis of land use and regional planning along the transmission and distribution areas :

3.2.2 Biologycal Component

Major impacts from many actions sometimes occur on floral and faunal spaces that are components of the biological environment within and adjacent to project areas. Fortunately, based on data available on the project area indicated that the biological impact is considered minor and not necessarily studied in detail. However, as needed by a standard operating procedure in an environmental impact assessment study a brief discussion on biologycal impact will be shown.

3.2.3 Social-Economy and Cultural Components

Many major impacts associated with certain proposed actions are evidenced by changes in socioeconomic factors in the project area and surrounding region. Socio economic changes may be beneficial or detrimental. The socio economic environment will be studies are as follows :

(a) general characteristics and trends in population for the city area and population characteristic,

(b) socio economic history of the region, income levels and trends for study area and employment patterns.

Land use patterns and controls for study area, housing characteristic including types of housing and occupancy levels area also will be studied. Health and social services including manpower, law enforcement, fire protection and other utilities, religious patterns, areas of unique significance such as cemetery if it is available will be studied also.

3.2.4 Public Utility

Inventarisation and data analysis of quantity and location of public utilities in the study area such as high voltage electricity, phone network and irrigation.

3.3 DELINEATION OF STUDY AREA

The delineation of study area is divided base on ecological, social, and administrative lines that are expected can be delineated separately.

1. Project Area

   Project area covers all region of project plan both for Buaran WTP and Cipayung WTP about 8 and 20 hectares respectively and also along the distribution networks.

2. Ecological Area

   Ecological line covers about ± 500 meter nearby area that significantly associated with sludge disposal.

3. Social Area

   Social area is area around WTPs that has strong interaction with people surrounding that depend on that project.

4. Administrative Area

   Administration are is difficult to be delineated precisely.

3.4 THE RELATIONSHIPS WITH OTHER ACTIVITIES

The relationship between project activities and other activities are as follows:

- traffic to and from WTPs especially Cipayung WTP
- traffic along the distribution networks activities
- nonforman activities such as vendors, non permanent house scatter nearby WTP area
- transportation system in the distribution and transmission networks

Other activities around Buaran WTP and Cipayung WTP create other impacts on traffic to and from project are traffic along the distribution and transmission network, agriculture activities along the local road to Cipayung.

4 METHODOLOGY

Several purposes are served by impact analysis methods. One is to ensure that all environmental factors that need to be considered are included in the analysis. Impact analysis would provide a means for evaluation of alternative on a common basis. Another important purpose of methods of impact analysis is the evaluation of mitigation measures.

This study consider three analytical functions associated with environmental impact assessment : identification, prediction, and evaluation. Methods for identification of environmental impacts can assist in specifying the range of impact that may occur, including their spatial dimensions and time period. Generally, identification methods answer questions concerning the components of the project and what elements of the environment may be concerning the components of the project and what elements of the environment may be affected by these components. Some EIA study in water supply projects in Indonesia identified two types of identification methods, namely checklists and matrices / networks.

Identification include : identification of environmental modification that may be significant, forecasting of the quantity and / or spatial dimensions of change in environment identified, and estimation of the probability that the impact will occur.

Evaluation include determination of the incidence of costs and benefits to user groups and population affected by the project, and specification and comparison of the trade off between various alternatives.

4.1 DATA COLLECTION METHOD

4.1.1 Primary Data

Primary data on socioeconomic and sociocultural will be conducted in the project area by observing on the spot. For physical, chemical and biological components, the data will be collected from some spots and will be analyzed in the laboratory. The amount of those components are as follows :

Air quality and noise	:	5 point sources
Flora and fauna	:	1 plot
Water quality	:	10 samples
Ground water (wells)	:	5 samples

4.1.2 Secondary data

Secondary data on physical, chemical and biological components area expected come from the past reports and other informations from : Directorat Jeneral Human Settlement (Cipta Karya), Jakarta Water Supply Enterprise (PDAM), JICA Reports, Local Government Reports including Local Planning Body (Bappeda) and others.

4.2 DATA ANALYSIS

Data will be analyzed with methods guided by the government regulations and in accordance with ambient standards from the Department of Public Works. Data will be presented in the form of tables, graphs , figures, and maps.

4.3 IDENTIFICATION AND PREDICTION OF MAJOR IMPACT

4.3.1 Method of Impact Identification

Impact identification will be conducted by the use of matrixed that show the interaction among components in accordance with EIA Matrix from the Department of Public Works.

4.3.2 Method of Impact Prediction

Impact prediction will be conducted in order to know the quantitative impact by the use of mathematical formula from some references and based on researches or other expert opinions / suggestions. However, method of impact prediction in this study will be focused on Cost Benefit Analysis Method.

4.4 IMPACT EVALUATION METHOD

The evaluation of major impact which carried out holistically and based on causative is expected to understand major impacts and followed by deciding the handling priority based on Government Regulation No.51/1993 on EIA and the Head of Bapedal Decree No.056/1994 on Major Impact Guidelines.

The major impact form an activity is depended on :

1. The quantity of human being impacted
2. The area influenced
3. The longer of impact
4. The impact intensity
5. The amount of other environmental component exposed
6. The cumulative of impact
7. The reversibility or non reversibility of impacts

From those guidelines then the government will be able to control and monitor the impact and how to mitigate the impact itself. The alternative to be elected is depend on the feasibility on the application in the field.

5 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

5.1 ENVIRONMENTAL MANAGEMENT PLAN

Environmental management plan consist of five basic point specified by the government regulation PP51/1993 :

1. Goal and benefit of environmental management.
2. Sources and various major impact need to be managed.
3. Reasons for the use of management system from the technological, economical and institutional aspect.
4. Method and equipment to be used and time schedule for the environmental management plan.
5. Application of environmental management include of whose responsible for the management, inspection, control mechanism and financial.

5.2 ENVIRONMENTAL MONITORING PLAN

Environmental monitoring plan include five basic point as guided by the government regulation 51/93 as follows :

1. Goal and benefit of environmental monitoring plan.
2. Sources and various major impact need to be managed.
3. Reasons for the use of monitoring system from the technological, economical and institutional aspect.
4. Method and equipment to be used and time schedule for the environmental monitoring plan.
5. Application of environmental monitoring include of whose responsible for the management, inspection, control mechanism and financial..

6 STUDY IMPLEMENTATION

6.1 STUDY

To accomplish an environmental assessment study a various expertise is required as can be seen below :

NO	POSITION	MM	EXPERTISE CRITERIA
1	Environmental Engineer (Water Supply Engineer)	6	Experience in water supply engineering and design at least 8 years and 3 years in EIA study and has an EIA advance certificate.
2	Geology or Geotech (Civil Engineer)	1	Experience in hydrogeology at least 4 years and has a basic EIA certificate.
3	Hydrologist	2	Experience in hydrology at least 4 years and has a basic EIA certificate.
4	Socio-cultural expert	3	Experience in his or her field at least 4 years and has a basic EIA certificate.
5	Socioeconomist	3	Experience in his or her field at least 4 years and has a basic EIA certificate.
6	Public Health Engineer or Junior Sanitary Engineer	3	Experience in his or her field at least 4 years and has a basic EIA certificate.

Those experts will be assisted by the operators, secretary, drafters and surveyors.

6.2 TIME SCHEDULE

The environmental assessment study will be accomplish for six months period of time since work agreement letter is signed.

7 REPORTING SYSTEM

7.1 TYPE OF REPORTS TO BE SUBMITTED

Various reports supposedly to be submitted by the consultant are :

7.1.1 Inception Report

This report consist of literature study, work plan and detail plan for the next study, and preparation for the surveillance program.

7.1.2 Interim Report

This report consist of work progress which is divided into monthly report and also work plan for the month ahead.

7.1.3 Draft Final Report

This report consist of draft final report, environmental management plan report, environmental monitoring plan and summary.

The draft final report will be submitted 5 months after work agreement was signed.

7.1.4 Final Report

This report consist of EIA Main Report, environmental management plan , environmental monitoring plan and executive summary report, and will be submitted promptly 6 months after work agreement was signed.

7.2 NUMBER OF REPORT TO BE SUBMITTED

The report to be submitted are as follows :

1. Inception Report : 10 copies
2. Interim Report : 10 copies
3. Draft final Report *)
   - Main AMDAL Report : 60 copies
   - RKL Report : 60 copies
   - RPL Report : 60 copies

- Executive Summary : 60 copies

*) To be submitted to the Central Commission of AMDAL 15, 15 dan 20 eks respectively.

4. Final Report *)

- Main Report AMSAL (EIA) : 25 copies
- RKL Report : 25 copies
- RPL Report : 25 copies
- Executive Summary : 25 copies

*) To be submitted to the Central Commission of EIA Ministry of Public Works, Jakarta 15 copies respectively.

TIME SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT / ANDAL
ENVIRONMENTAL MANAGEMENT PLAN / RKL AND ENVIRONMENTAL
MONITORING PLAN / RPL

DESCRIPTION OF ACTIVITIES	MONTH OF					
	1	2	3	4	5	6
1. SURVEY PREPARATION						
2. SURVEY FOR INITIAL ENVIRONMENTAL EXAMINATION						
3. CONCEPTING FOR IEE						
4. PRESENTATION FOR IEE						
5. REPARATION FOR IEE						
6. SITE SURVEY FOR ENVIRONMENTAL IMPACT ASSESSMENT						
7. CONCEPTING FOR EIA						
8. PRESENTATION FOR EIA / ANDAL, RKL AND RPL						
9. REPARATION FOR EIA / ANDAL, RKL AND RPL						

DIREKTORAT JENDERAL CIPTA KARYA
DEPARTEMAN PEKERJAAN UMUM
JALAN RADEN PATAH, KEBAYORAN BARU
JAKARTA SELATAN

DRAFT

KERANGKA ACUAN
STUDI ANALISIS DAMPAK LINGKUNGAN
PROYEK PENGEMBANGAN AIR BERSIH JAKARTA

JICA STUDY TEAM
JAKARTA 1996

DAFTAR ISI

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BAB I

PENDAHULUAN

1.1. LATAR BELAKANG

Studi Master Plan and Feasibility Study for Jakarta Water Suply Development Project yang dilaksanakan oleh JICA (1983 - 1985) menyimpulkan bahwa pelayanana PDAM DKI Jakarta harus diperluas tidak saja untuk memenuhi kebutuhan domestik akan tetapi juga diharapkan dapat mencukupi kebutuhan industri dan komersial. Namun demikian beberapa masalah seperti : (a) keterlambatan pembangunan instalasi pengolahan air, (b) keterlambatan penyelesaian saluran air baku utama dan (c) peningkatan kebutuhan air bersih oleh karena cepatnya urbanisasi dan peningkatan standar kebutuhan mengakibatkan harapan studi tersebut tidak dapat dipenuhi.

Oleh karena studi yang dikemukakan di atas sudah dirasakan tidak dapat lagi mengakomodasi kebutuhan saat ini maka dilakukan review oleh tim JICA (1995 - 1996). Hasil studi yang belakangan ini sebagaimana disepakati termasuk perluasan daerah pelayanan " Fringe Area" DKI Jakarta seperti Bogor, Tangerang dan Bekasi secara bertahap. Untuk memenuhi kebutuhan daerah perluasan maka direncanakan : (1) perluasan instalasi pengolahan air (IPA) Buaran sebesar 3.000 L yang dikenal dengan proyek IPA Buaran III, (2) pembangunan proyek IPA Cipayung sebesar 15.000 L/dtk, (3) perluasan pusat distribusi di beberapa wilayah, (4) pembangunan pusat distribusi di utara dan selatan Jakarta dan (5) pemasangan pipa transmisi yang terintegrasi untuk seluruh areal pelayanan.

Sudah barang tentu pada tahap pembangunan dan operasional ke dua IPA tersebut akan memberikan dampak baik positif maupun negatif pada lingkungan sekitarnya. Oleh karenanya perlu dilakukan studi AMDAL yang didahului dengan penulisan Kerangka Acuan ini.

1.2. PERATURAN PERUNDANG-UNDANGAN YANG BERLAKU

Peraturan perundang-undangan yang berlaku dan terkait dengan studi ini diantaranya sebagai berikut :

1. Undang-undang No. 5 Tahun 1994 tentang Pokok-pokok Pemerintahan di Daerah.
2. Undang-undang No. 13 Tahun 1980 tentang Jalan
3. Undang-undang No. 4 Tahun 1982 tentang Ketentuan-ketentuan Pokok Pengelolaan Lingkungan Hidup.
4. Undang-undang No. 5 Tahun 1990 tentang Konservasi Sumberdaya Air Hayati dan Ekosistemnya.
5. Undang-undang No. 4 Tahun 1992 tentang Perumahan dan Permukiman.
6. Undang-undang No. 24 Tahun 1992 tentang Penataan Ruang.
7. Peraturan Pemerintah Nomor 6 Tahun 1988 tentang Koordinasi Kegiatan Instansi Vertikal di Daerah.
8. Peraturan Pemerintah Nomor 20 Tahun 1990 tentang Pengendalian Pencemaran Air
9. Peraturan Pemerintah Nomor 51 Tahun 1993 tentang Analisis Mengenai dampak Lingkungan
10. Keputusan Presiden RI Nomor 55 Tahun 1993 tentang Pengadaan Tanah bagi Pelaksanaan Pembangunan untuk Kepentingan Umum.
11. Keputusan Menteri Negara Kependudukan dan Lingkungan Hidup No. Kep. 02/MENKLH/6/1988 tentang Pedoman Penetapan Baku Mutu Lingkungan.
12. Keputusan Menteri Negara lingkungan Hidup No. Kep 11/MENLH/3/1994 tentang Jenis Usaha atau Kegiatan Yang Wajib Dilengkapi dengan Analisis Mengenai Dampak Lingkungan
13. Keputusan Menteri Negara Lingkungan Hidup No. Kep/MENLH/3/1994 tentang Pedoman Umum Penyusunan Analisis Mengenai Dampak Lingkungan.
14. Keputusan Kepala Badan Pengendalian Dampak Lingkunagn No. KEP-056 Tahun 1994 tentang Pedoman Mengenai Ukuran Dampak Penting.
15. Peraturan Daerah Lainnya yang terkait

1.3. KAITAN RENCANA KEGIATAN DENGAN DAMPAK PENTING YANG TIMBUL.

Berdasarkan hasil identifikasi dampak penting hypotesis dari permasalahan yang ada dalam kaitannya dengan kondisi lingkungan, diperkirakan terdapat beberapa isu utama yang terkait erat dengan rencana Pengembangan Instalasi Pengolahan Air (IPA) di Buaran dan Cipayung, PDAM, DKI Jakarta sebagai berikut :

1.3.1. Tahap Pra Konstruksi

1. Kemungkinan timbulnya keresahan masyarakat pada saat pembebasan lahan dan pemindahan penduduk khususnya untuk pembangunan IPA Cipayung.

2. Perubahan pemilikan lahan dan pola peruntukan lahan di sekitar IPA khususnya di Cipayung.

1.3.2. Tahap Konstruksi

1. Kemungkinan timbulnya genangan air di beberapa lokasi permukiman dan ladang di sekitar lokasi kegiatan, yang disebabkan oleh meningkatnya kuantitas air larian (run off).

2. Perubahan morfologi lahan yang menimbulkan erosi, karena kegiatan-kegiatan:

   - Penggalian dan penimbunan khususnya di IPA Cipayung pada kelerengan diatas 15%, tanpa pengerasan dan tanaman penutup.

   - Saluran Drainase dengan kelerengan diatas 15 % tanpa pengerasan dan penutup.

3. Menurunnya kualitas udara karena meningkatnya emisi gas CO, Sox, NOx, HC, Pb dan debu yang diakibatkan oleh keluar dan masuknya kendaraan besar yang mengangkut material proyek. Di samping itu juga akan terjadi peningkatan kebisingan dan gangguan debu di sepanjang jalan lokal yang menuju IPA khususnya IPA Cipayung.

4. Terjadinya kerusakan prasarana jalan, gangguan lalu lintas, dan gangguan aliran sungai pada pelaksanaan konstruksi IPA dan pusat-pusat distribusi serta pada saat pemasangan pipa transmisi.

5. Dampak sekunder dari keberadaan instalasi air minum yaitu berkembangnya kegiatan-kegiatan non formal di sekitar lokasi proyek untuk melayani kebutuhan temporer proyek.

1.3.3. Tahap Pasca Konstruksi

1. Perubahan tata guna lahan khususnya di lokasi instalasi pengolahan air minum Cipayung. Keberadaan instalasi tersebut akan memberikan akses yang lebih besar dari dan menuju proyek.

2. Terjadinya gangguan lalu lintas, estetika, kebisingan dan debu selama pemasangan pipa distribusi.

3. Menurunnya kualitas udara serta meningkatnya kebisingan, karena meningkatnya lalu lintas kendaraan menuju lokasi IPA, walaupun kemungkinan ini tidak signifikan.

4. Meningkatnya pencemaran di wilayah hilir badan air apabila sludge atau lumpur hasil pengolahan dibuang kembali ke badan air (S. Sunter untuk IPA Cipayung dan Saluran Tarum Barat untuk IPA Buaran).

5. Meningkatnya kegiatan ekonomi masyarakat di sekitar IPA untuk memenuhi kebutuhan sehari-hari pegawai IPA.

6. Meningkatnya pencemaran di wilayah hilir badan air apabila sludge atau lumpur hasil pengolahan dibuang kembali ke badan air (S. Sunter untuk IPA Cipayung dan Saluran Tarum Barat untuk IPA Buaran).

BAB II
TUJUAN DAN KEGUNAAN STUDI

2.1. TUJUAN STUDI

1. Mengidentifikasi komponen-komponen kegiatan pembangunan IPA Buaran dan Cipayung berpotensi menimbulkan dampak penting terhadap lingkungan.

2. Mengidentifikasi rona lingkungan awal di wilayah studi, terutama komponen lingkungan yang diperkirakan akan terkena dampak kegiatan.

3. Memprakirakan dan mengevaluasi dampak penting terhadap lingkungan akibat kegiatan pembangunan IPA Buaran dan Cipayung.

4. Memprakirakan dan emngevaluasi dampak penting yang diakibatkan oleh pemasangan pipa transmisi serta pipa distribusi.

5. Merumuskan saran tindak dalam pengelolaan dan pemantauan lingkungan dalam rangka penanganan dampak penting yang timbul akibat rencana pembangunan IPA Buaran dan Cipayung, pusat-pusat distribusi air, pemasangan pipa transmisi serta pipa distribusi.

Agar tujuan studi tersebut dapat terarah, maka disusunlah Kerangka Acuan Studi Analisis Dampak Lingkungan Pengembangan Palayanan Air Minum DKI Jakarta khususnya pembangunan IPA Buaran dan Cipayung, pembangunan dan perluasan pusat-pusat distribusi air, serta pemasangan pipa transmisi dan distribusi. Kerangka Acuan ini dimaksudkan untuk memberikan arahan dan kejelasan pada pihak-pihak yang berkepentingan dalam pelaksanaan studi tentang ruang lingkup pekerjaan yang harus dilaksanakan.

2.2. KEGUNAAN STUDI

Hasil Studi Analisis Dampak Lingkungan ini diharapkan dapat digunakan untuk :

1. Bahan masukan bagi proses perencanaan pembangunan daerah.

2. Membantu pengambilan keputusan dalam rangka pemilihan alternatif lokasi IPA yang paling layak dari segi lingkungan.

3. Bahan pertimbangan dalam tahap perencanaan rinci (detail engineering design) pembangunan IPA Buaran dan Cipayung, pusat-pusat distribusi dan jaringan pipa transmisi serta distribusi.

4. Pedoman dalam kegiatan pengelolaan dan pemantauan lingkungan terhadap dampak penting yang timbul.

BAB III

RUANG LINGKUP STUDI

Ruang lingkup Studi Analisis Dampak Lingkungan untuk pengembangan pelayanan air minum DKI Jakarta khususnya dikaitkan dengan rencana perluasan IPA Buaran, pembangunan IPA Cipayung, perluasan dan pembangunan pusat-pusat distribusi air, perluasan jaringan transmisi serta distribusi air minum untuk DKI Jakarta dan fringe area di Bogor, Tangerang dan Bekasi ditentukan oleh komponen kegiatan yang dapat menimbulkan dampak penting antara lain sebagai berikut :

3.1. RENCANA KEGIATAN YANG DITELAAH

Pembangunan perluasan IPA Buaran dan pembangunan IPA Cipayung masing-masing sebesar 3000 l/dtk dan 15.000 l/dtk, perluasan pusat distribusi air di Pulogadung dan Cilandak, pembuatan beberapa pusat-pusat distribusi air baik di Jakarta Utara dan Selatan, pemasangan jaringan pipa transmisi untuk seluruh wilayah DKI Jakarta serta pemasangan pipa distribusi merupakan sebagian dari rencana perluasan areal pelayanan PDA DKI Jakarta secara bertahap sampai dengan tahun 2019, yang diharapkan mencapai jangkauan sebagian "fringe area" Jakarta.

Areal pelayanan yang ada saat ini baru mencapai 316 km2 dan akan ditingkatkan menjadi berturut-turut 435 km2, 505 km2, 715 km2, 837 km2 dan 871 km2, masing-masing untuk tahun 2000, 2005, 2010, 2015 dan 2019.

Status proyek saat ini masih dalam tahap studi kelayakan yang sudah selesai Tahun 1996 oleh konsultan JICA, pada saat ini pula sedang dilakukan Review Feasibility Studi, menjelang dimulainya perencanaan rinci (detail design).

Peta lokasi kegiatan dapat dilihat pada lampiran gambar 1 dan 2.

3.1.1. Tahap Pra Konstruksi.

Kegiatan yang perlu ditelaah pada tahap pra konstruksi meliputi :

1. Penelitian dan survey untuk penentuan areal tambahan IPA Buaran III dan areal IPA Cipayung diperkirakan akan membebaskan sebagian lahan milik, umumnya atau menimbulkan spekulan/calo tanah yang ingin menguasai lahan sekitar IPA tersebut.

2. Pembebasan lahan dan pemindahan penduduk yang terkena pembebasan. Untuk keperluan proyek, diperkirakan akan dibebaskan lahan seluas paling sedikit 5 Ha untuk IPA Buaran dan paling tidak seluas 15 Ha untuk East Treatment Plant. Dampak potensial yang diperkirakan timbul adalah ketidakpuasan atas ganti rugi lahan, dan perubahan mata pencaharian penduduk yang dipindahkan.

3.1.2. Tahap Konstruksi.

Kegiatan pada tahap ini dapat dibedakan menjadi dua, yaitu persiapan dan pelaksanaan konstruksi.

1. Persiapan.

   a. Kegiatan Pengangkutan/Mobilisasi Material dan Peralatan.
      Mencakup kegiatan pengangkutan/mobilisasi material dan peralatan dari luar ke lokasi kegiatan/proyek, maupun pengangkutan di dalam lokasi kegiatan/proyek.

      Dampak potensial yang perlu ditelaah antara lain :
      - Penurunan kualitas udara (debu dll.) dan kebisingan.
      - Kerusakan prasarana jalan dan gangguan lalu lintas.

b. Mobilisasi Tenaga Kerja.

Pelaksanaan proyek ini dipekirakan akan memerlukan banyak tenaga kerja, baik yang didatangkan dari luar daerah dan dari daerah setempat. Hal ini perlu ditelaah terutama terhadap dampak sosial-ekonomi pada masyarakat, khususnya untuk IPA Cipayung (East Treatment Plant) yang saat ini relatif masih tradiosional

c. Pembuatan dan Pengoperasian Base Camp.

Pada umumnya base camp dipergunakan untuk penyimpanan material, peralatan konstruksi dan tempat tinggal pekerja/buruh proyek.

Dampak potensial yang perlu ditelaah dari kegiatan ini antara lain :

- Penurunan kualitas lingkungan (air, udara) akibat limbah yang ditimbulkan dan gangguan kebisingan.
- Dampak sosial-ekonomi terhadap masyarakat di sekitar lokasi base camp.

2. Pelaksanaan.

a. Penyiapan dan Pembersihan Lahan.

Kegiatan ini meliputi pembersihan tanaman dan bangunan (land clearing) yang ada di dalam areal desa Jakasempurna yang relatif masih tradisional.
Dampak potensial yang perlu ditelaah meliputi :

- Penurunan kualitas air, kualitas udara (debu) dan kebisingan.
- Gangguan terhadap komponen biologi (keanekaragaman flora dan habitat fauna) yang menurut pengamatan sekitar tidak terlalu besar.
- Gangguan/terpotongnya prasarana jalan dan prasarana/fasilitas umum lainnya akibat pembuatan IPA, pembangunan pusat-pusat distribusi air, pemasangan jaringan pipa transmisi dan distribusi.

b. Penggalian dan Penimbunan Tanah.

Kegiatan ini meliputi pekerjaan penggalian, penimbunan, perataan dan

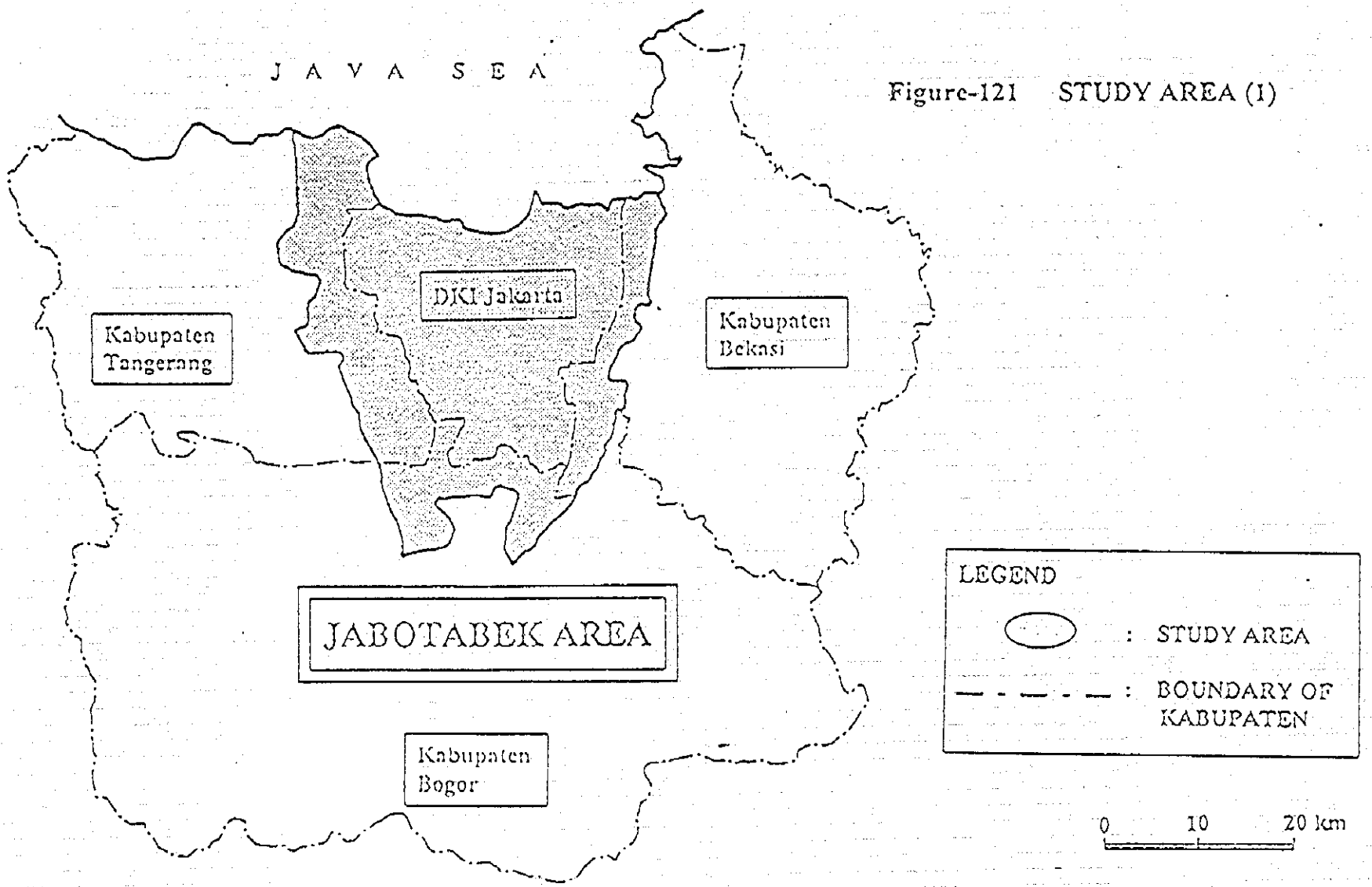


Figure-121 STUDY AREA (1)

Figure 1.1 PROPOSED WATER SUPPLY SYSTEM IN 2005

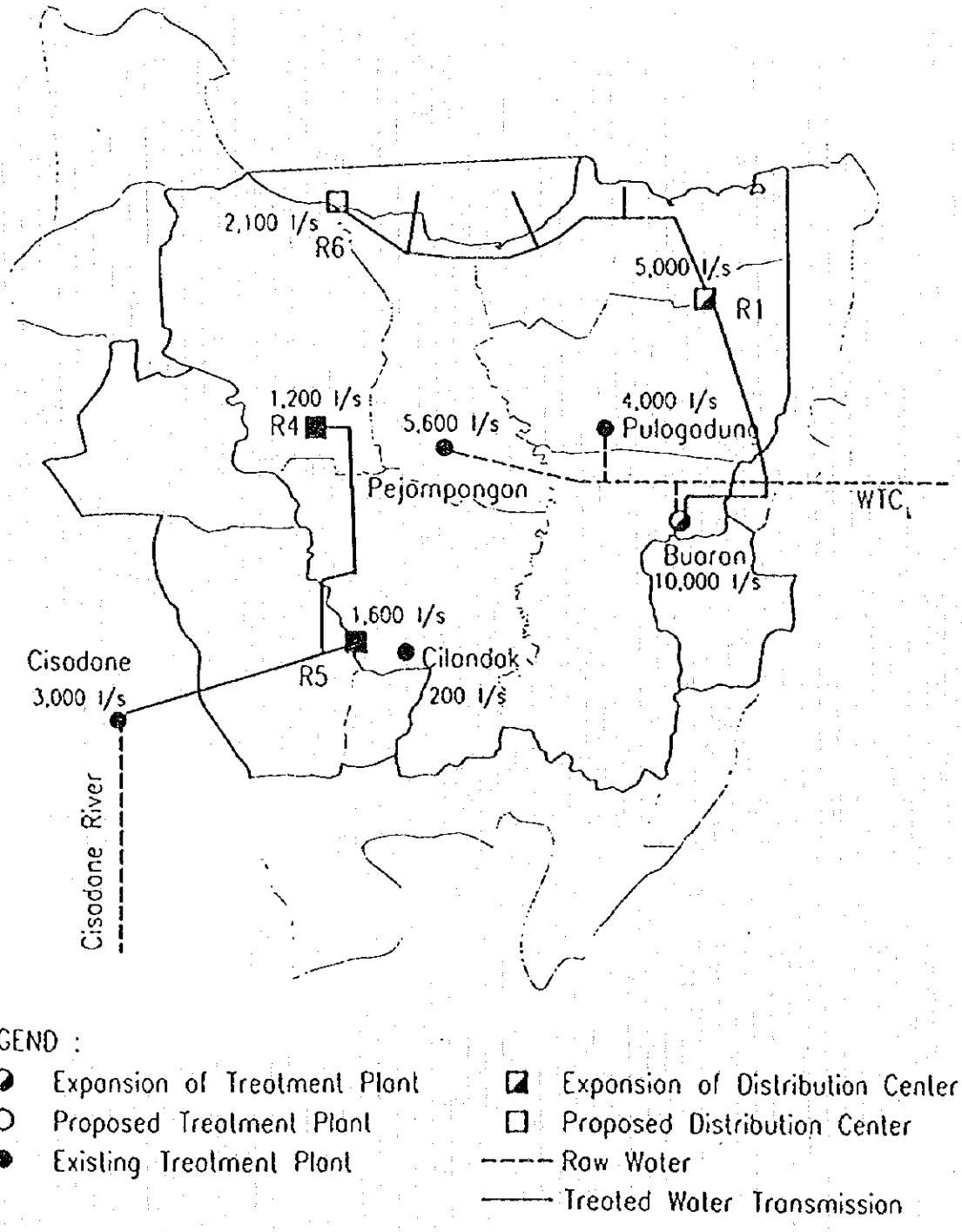
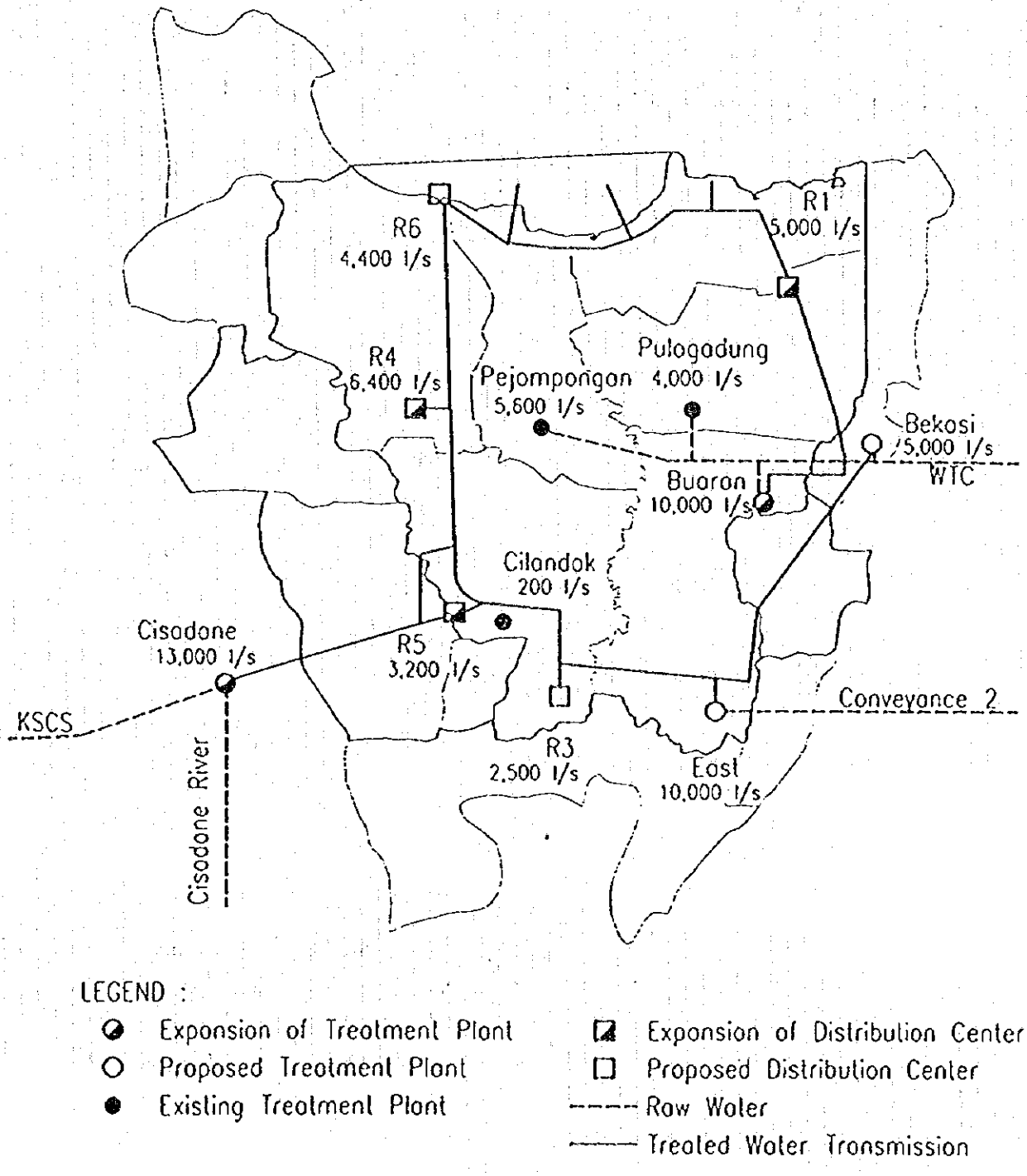


Figure 3.2 FUTURE WATER SUPPLY SYSTEM IN 2019

ALTERNATIVE R1 : BUARAN + BEKASI



pemadatan tanah untuk badan jalan menuju lokasi proyek, dan sarana pelengkap lainnya.

Dampak potensial yang perlu ditelaah antara lain :

- Penurunan kualitas udara, air dan kebisingan. Gangguan aliran permukaan.
- Erosi tanah dan kestabilan lereng, khususnya di Bantaran S. Sunter.

3.1.3. Tahap Pasca Konstruksi atau Operasional.

1. Pengoperasian IPA

Pada saat instalasi mulai dioperasikan maka beberapa dampak potensial yang perlu dikaji pada tahap ini diantaranya adalah :

- Produksi lumpur atau sludge yang pada saat terbidity tinggi (misalnya 5.000 JTU) maka akan dihasilkan lumpur sebanyak ± (15.000 X 5.000 X 86.400) mg/hari, atau sekitar 6.000 ton lumpur setiap hari (apabila operasi berlangsung 24 jam/hari).
- pemasangan jaringan pipa transmisi serta pipa distribusi akan menimbulkan
- **Peningkatan penggunaan jalan menuju IPA khususnya IPA Cipayung**

3.2.1. KOMPONEN LINGKUNGAN YANG DITELAAH.

Komponen lingkungan yang ditelaah meliputi:

3.2.1. Komponen Fisik Kimia.

1. Iklim.

Komponen iklim yang ditelaah meliputi tipe iklim, suhu dan kelembaban udara, curah hujan serta jumlah hari hujan, dan keadaan angin.

2. Kualitas Udara dan Kebisingan.

Pengukuran kualitas udara dan kebisingan dilakukan langsung di IPA Buaran yang relatif sudah terbangun dan IPA Cipayung yang relatif masih

belum terbangun untuk mengetahui kondisi sebelum kegiatan dilakukan. Telaahan mencakup kondisi kualitas udara dan kebisingan di wilayah studi mencakup tingkat kadar zat pencemar yang dapat ditimbulkan oleh kendaraan berat yang keluar dan masuk membawa material dan berbagai peralatan lainnya (CO, NOx, SOx, HC, Pb, Debu, serta tingkat kebisingan).

3. Kualitas Air.

   Perlu dilakukan pengukuran kualitas air di sumber Saluran Tarum Barat (WTC) yang akan dipergunakan sebagai sumber air baku khususnya pemeriksaan terhadap paramater turbiditi atau kekeruhan. Namun demikian, untuk melihat gambaran yag menyeluruh maka perlu dilakukan telaahan kualitas air secara lengkap yang meliputi kualitas fisik, kimia dan mikrobiologi dengan acuan baku mutu yang berlaku.

4. Fisiografi.

   Komponen fisiografi yang ditelaah meliputi kondisi morphologi (topografi bentuk lahan), struktur geologi dan jenis tanah. Selain itu juga ditelaah stabilitas geologis dan stabilitas tanah serta parameter/indikatornya (longsor tanah, gempa, sesar, dsb).

5. Hidrologi.

   Telaahan terhadap komponen hidrologi meliputi karakteristik fisik sungai (debit, kadar sedimentasi, tingkat erosi, dll), kondisi drainase yang ada, lokasi banjir, kuantitas dan tingkat pemanfaatan air tanah.

6. Ruang, Tanah dan Lahan.

   Telaahan mencakup inventarisasi dan analisis tata guna lahan saat ini dan rencana pengembangan wilayah di sepanjang daerah yang dilalui pipa/distribusi transmisi dan IPA seperti adanya daerah pemukiman, tegalan, perdagangan, industri dan sebagainya.

Hasil analisis tersebut diharapkan dapat digunakan untuk memprediksi perubahan penggunaan tanah akibat aktivitas tersebut, sehingga lingkungan di sekitar IPA dapat terbina dengan baik.

7. Prasarana Jalan dan Lalu Lintas.

   Telaahan meliputi inventarisasi kondisi jalan dan lalu lintas khususnya di wilayah studi yang menuju IPA Cipayung serta seluruh jaringan jalan yang dilewati jaringan pipa transmisi dan distribusi. Telaahan dititikberatkan pada gangguan kerusakan jalan dan gangguan lalu lintas pada saat konstruksi, penggalian dan penanaman pipa serta kondisi lalu lintas setelah IPA dioperasikan.

3.2.2. Komponen Biologi .

Walaupun di dalam studi Amdal selalu disyaratkan adanya komponen biologi yang harus dilakukan penelaahan berupa inventarisasi dan analisis flora dan fauna yang ada di sepanjang tapak proyek. Pengamatan terhadap flora lebih diutamakan pada jenis flora langka/dilindungi undang-undang. Namun pemeriksaan secara sekilar baik di IPA Buaran maupun rencana IPA Cipayung tidak terlihat adanya jenis flora dan fauna yang dilinndungi.

Hasil analisis akan dilakukan untuk satu plot diharapkan dapat mengetahui ada tidaknya flora dan fauna langka, dan dapat menentukan metoda pelaksanaan pembangunan IPA yang tidak mengganggu kehidupan flora dan fauna di sekitar proyek. Diharapkan juga adanya saran jenis tanaman yang cocok untuk penghijauan kembali di sekitar IPA.

3.2.3. Komponen Sosial-Ekonomi dan Sosial-Budaya.

1. Kependudukan.

   Komponen kependudukan yang ditelaah diantaranya jumlah dan kepadatan penduduk, komposisi penduduk, tingkat pendidikan, ketenagakerjaan serta karakteristik kependudukan lainnya.

2. Sosial-Ekonomi.

Komponen sosial-ekonomi yang ditelaah diantaranya adalah kegiatan perekonomian masyarakat, jenis mata pencaharian dan pendapatan penduduk di wilayah studi. Selain itu ditelaah juga tingkat pendapatan daerah setempat, dan keberadaan prasarana ekonomi seperti pusat perdagangan, pertokoan, pasar, dll.

Telaahan komponen sosial-ekonomi hendaknya dititikberatkan pada kemungkinan kesempatan kerja dan peluang berusaha bagi penduduk yang terkena proyek dan penduduk di sekitarnya, ganti rugi atau kompensasi terhadap lahan yang dibebaskan, dampak sosial-ekkonomi pada penduduk yang tinggal di sekitar jalan yang dilewati pipa transmisi dan distribusi, serta peningkatan pendapatan daerah/masyarakat setelah adanya bangunan IPA.

3. Sosial-Budaya.

Telaahan komponen sosial budaya masyarakat meliputi adat istiadat masyarakat yang terdapat di wilayah studi, perilaku/pola kehidu masyarakat, persepsi masyarakat terhadap proyek, sarana sosial peninggalan sejarah/cagar budaya.

4. Kesehatan Masyarakat.

Telaahan kesehatan masyarakat diantaranya mengenai kondisi sanitasi lingkungan masyarakat, keberadaan fasilitas kesehatan, pola penyakit, serta pengaruh rencana kegiatan terhadap kesehatan masyarakat sekitarnya.

3.2.4. Sarana dan Prasarana Umum.

Mencakup inventarisasi dan analisis data mengenai jumlah dan lokasi sarana dan prasarana umum yang terdapat di wilayah studi, terutama yang terkena proyek, seperti jaringan listrik/jaringan listrik tegangan tinggi, jaringan telepon, saluran irigasi dan drainase, dan sebagainya.

3.3. BATAS WILAYAH STUDI.

Penentuan batas wilayah studi bertitik tolak pada batas tapak kegiatan/proyek, kemudian diperluas pada batas ekologi, batas sosial dan batas administratif yang diperkirakan akan terkena dampak kegiatan.

1. **Batas Proyek/Tapak Proyek.**

   Batas proyek meliputi kawasan sepanjang rencana Proyek Pembangunan IPA Buaran dan Cipayung sekitar masing-masing ± 5 Ha dan 15 Ha serta sepanjang jaringan transmisi dan distribusi.

2. **Batas Ekologi.**

   Batas ekologi ditetapkan berdasarkan perkiraan luas wilayah persebaran dampak dalam radius ± 500 meter sekeliling IPA dan badan air yang nantinya akan dipakai sebagai pembuangan lumpur.

3. **Batas Sosial.**

   Batas sosial ditentukan berdasarkan ruang di sekitar rencana kegiatan yang menjadi tempat berlangsungnya berbagai interaksi sosial antar kelompok masyarakat yang memiliki norma dan nilai tertentu yang sudah mapan, sesuai dengan proses dinamika sosial suatu kelompok masyarakat, yang akan diperkirakan akan mengalami perubahan mendasar akibat rencana kegiatan tersebut. Adapun batas sosial tersebut ditentukan pada lokasi permukiman penduduk disekitar kedua IPA tersebut.

4. **Batas Administratif.**

   Batas administratif dampak sulit untuk ditetapkan akan tetapi pada saat studi AMDAL akan dilakukan deliniasi batas pengaruh secara fungsional.

3.4. KETERKAITAN DENGAN KEGIATAN LAIN.

Adanya kegiatan-kegiatan lain di sekitar rencana IPA Buaran dan Cipayung setidaknya akan menimbulkan dampak timbal-balik terhadapakedua IPA tersebut.

Adapun kegiatan terkait yang harus ditelaah diantaranya adalah:

- Kondisi lalu lintas pada ruas jalan jalan lokal yang menuju lokasi IPA khususnya jalan yang menuju IPA Cipayung
- Kegiatan lalu lintas yang dilalui oleh jaringan transmisi serta distribusi
- Kegiatan permukiman pada daerah sekitar IPA Cipayung yang relatif masih tradisional.
- Kegiatan lalu lintas yang dilalui oleh jaringan transmisi serta distribusi
- Kegiatan pertanian, perkebunan yang ada di sekitar jalan lokal yang menuju IPA Cipayung

BAB IV

METODOLOGI

4.1. METODA PENGUMPULAN DATA.

4.1.1. Data Primer.

Data primer sosial-ekonomi dan sosial-budaya diambil dengan cara wawancara langsung dengan masyarakat yang berada dalam wilayah studi, dan dari hasil observasi lapangan. Jumlah responden yang akan diambil untuk mendapatkan data sosial ekonomi dan sosial budaya diperhitungkan sebanyak dari jumlah 5% penduduk yang dipindahkan.

Data primer komponen fisik kimia dan biologi diambil dari pengamatan langsung di lapangan, serta dengan melakukan pengukuran dan pengambilan contoh untuk dianalisa di laboratorium. Metoda pengambilan sampel dan peralatan yang dipakai, serta metoda analisis di laboratorium disesuaikan dengan komponen/parameter lingkungan yang diambil, dan mengacu pada ketentuan dan persyaratan teknis yang baku.

Jumlah data primer yang perlu diambil minimal sebanyak :

Kualitas udara dan kebisingan	:	5 titik sampel.
Kondisi flora dan fauna	:	1 titik plot.
Kualitas air permukaan	:	10 sampel.
Kualitas air tanah	:	5 titik sampel.

Lokasi pengambilan sampel dapat dilihat pada lampiran 4.

4.1.2. Data Sekunder.

Data sekunder untuk komponen fisik kimia, biologi, sosial-ekonomi dan sosial-budaya dapat diperoleh dari laporan penelitian/studi yang terdahulu, maupun dari data/informasi yang berasal dari instansi/dinas yang terkait, seperti: Direktorat Bina Teknik Ditjen Cipta Karya Departemen PU, Studi Perluasan Pelayanan Aair Minum DKI yang dilaksanakan JICA, Pemda Tk. I DKI Jaya, Bappeda Tk I DKI Jaya, BPN, Pemda,Bappeda Tk II Kodya Jakarta Timur, PDAM DKI Jakarta.

4.2. METODA ANALISIS DAN PENYAJIAN DATA.

Hasil pengambilan contoh data primer dianalisis dengan menggunakan metoda analisis yang sesuai dengan jenis data dan persyaratan teknis yang baku. Hasil analisis data primer tersebut dan hasil pengumpulan data sekunder dapat disajikan dalam bentuk tabel, grafik, gambar ataupun peta.

4.3. METODA IDENTIFIKASI DAN PREDIKSI DAMPAK PENTING.

4.3.1. Metoda Identifikasi Dampak.

Identifikasi dampak dapat dilakukan dengan menggunakan matriks interaksi yang menggambarkan hubungan antara komponen lingkungan dan komponen kegiatan, dengan mengacu pada Matriks AMDAL PU Bidang Air Bersih.

4.3.2. Metoda Prediksi Dampak.

Prediksi dampak yang dilakukan untuk mendapatkan gambaran kuantitatif tentang besarnya danipak yang akan terjadi dapat dilakukan dengan menggunakan metoda formal berupa formula matematik untuk masing-masing jenis dampak, atau dengan metoda informal dengan menggunakan analogi, hasil penelitian dan pendapat ahli/pakar dibidangnya.

Berbagai metode akan dipakai, namun akan difokuskan pada modifikasi metode Cost and Benefit Analysis.

4.4. METODA EVALUASI DAMPAK.

Evaluasi dampak penting yang dilakukan secara holistik dan kausatif untuk mengetahui tingkat/skala penting dampak yang akan terjadi guna menentukan prioritas penanganannya, dilakukan dengan mengacu pada PP Nomor 51 Tahun 1993, tentang ANDAL dan Keputusan Kepala Bapedal Nomor: Kep-056 Tahun 1994, tentang Pedoman Mengenai Ukuran Dampak Penting.

Dampak penting suatu usaha/kegiatan ditentukan oleh faktor-faktor:

1. Jumlah manusia yang terkena dampak;
2. Luas wilayah persebaran dampak;
3. Lamanya dampak berlangsung;
4. Intensitas dampak;
5. Banyaknya komponen lingkungan lain yang terkena dampak;
6. Sifat kumulatif dampak;
7. Berbalik atau tidak berbaliknya dampak.

Dari hasil evaluasi lingkungan ini disarankan beberapa cara penanggulangan dan dampak penting yang terjadi untuk mencegah, mengurangi, memperbaiki atau mengendalikan setiap dampak penting yang terjadi. Alternatif metoda/cara yang dipilih hendaknya mempertimbangkan segi kelayakan dalam Pelaksanaannya.

BAB V
PERUMUSAN RKL DAN RPL

Rencana Pengelolaan Lingkungan (RKL) dan Rencana Pemantauan Lingkungan (RPL) disusun dengan memperhatikan pendekatan teknologi, ekonomi dan kelembagaan.

5.1. PENDEKATAN DAN PERUMUSAN RKL.

Rencana Pengelolaan Lingkungan (RKL) harus diuraikan secara rinci, dan berisikan ketentuan tentang:

1. Tujuan dan manfaat pengelolaan lingkungan.
2. Sumber dan jenis dampak penting yang harus dikelola.
3. Pendekatan dan alasan pemilihan sistem pengelolaan, dengan memakai pendekatan teknologi, ekonomi dan kelembagaan.
4. Rencana pengelolaan lingkungan, yang meliputi metoda/peralatan, lokasi dan waktu pengelolaan.
5. Pelaksanaan pengelolaan lingkungan, yang meliputi instansi pelaksana, pengawas, mekanisme pelaksanaan, dan sumber dana/pembiayaan.

5.2. PENDEKATAN DAN PERUMUSAN RPL.

Rencana Pemantauan Lingkungan (RPL) juga harus diuraikan secara rinci, dan berisi kan ketentuan tentang:

1. Tujuan dan manfaat pemantauan lingkungan.
2. Sumber dan jenis dampak penting yang harus dipantau.
3. Pendekatan dan alasan pemilihan sistem pemantauan yang dilakukan.
4. Rencana pemantauan lingkungan, yang meliputi metoda/peralatan, lokasi danwaktu/periode pemantauan.
5. Pelaksanaan pemantauan lingkungan, yang meliputi instansi pelaksana, pengawas, mekanisme pelaksanaan, dan sumber dana/pembiayaan.

BAB VI
PELAKSANAAN STUDI

6.1. PENYUSUNAN STUDI

Untuk menyelesaikan studi ANDAL Pembangunan IPA Buaran dan Cipayung sesuai dengan tujuan, ruang lingkup dan metodologi seperti yang telah dikemukakan, diperlukan tim studi yang lerdiri dari tenaga ahli dari berbagai disiplin ilmu, sebagai berikut:

NO	JABATAN	MM	KRITERIA TENAGA AHLI
1	Ahli Teknik Lingkungan	6	Pengalaman dibidangnya selama 8 tahUn dan pengalaman Studi AMDAL 3 Tahun, serta mempunyai sertifikat AMDAL B (Penyusun)
2	Anggota Tim/Ahli Geoteknik/Geologi	1	Pengalaman dibidangnya selama 4 tahun dan lebih diutamakan yang mempunyai sertifikat AMDAL A (Dasar)
3	Anggota Tim/Hidrologi	2	Pengalaman dibidangnya selama 4 tahun dan lebih diutamakan yang mempunyai sertifikat AMDAL A (Dasar)
4	Anggota Tim/Ahli Sosial Budaya	3	Pengalaman dibidangnya selama 4 tahun dan lebih diutamakan yang mempunyai sertifikat AMDAL A (Dasar)
5	Anggota Tim/Ahli Sosial Ekonomi	3	Pengalaman dibidangnya selama 4 tahun dan lebih diutamakan yang mempunyai sertifikat AMDAL A (Dasar)
6	Anggota Tim/Ahli Kesehatan Masyarakat	3	Pengalaman dibidangnya selama 4 tahun dan lebih diutamakan yang mempunyai sertifikat AMDAL A (Dasar)

Dalam pelaksanaannya tenaga ahli ini akan dibantui oleh asisten tenaga ahli dan staf pendukung, seperti suveryor, juru gambar, operator komputer dan juru ketik.

6.2. JADWAL PELAKSANAAN STUDI

Keseluruhan pelaksanaan studi AMDAL Proyek Pembangunan IPA Buaran dan Cipayung in diharapkan dapat selesai tepat waktu selama 6 (enam) bulan sejak ditandatanganinya surat perjanjian kontrak, diharapkan sudah dapat dimulai awal Juli 1996 dengan rincian sebagai berikut :

TABEL JADWAL PELAKSANAAN PENYUSUNAN ANDAL, RKL DAN RPL

URAIAN KEGIATAN	BULAN KE					
	1	2	3	4	5	6
1. Persiapan Survei						
2. Survei KA						
3. Penyusunan Draft KA						
4. Presentasi KA						
5. Perbaikan dan Final Laporan KA						
6. Survei Lapangan						
7. Penyusunan Draft Laporan ANDAL, RKL dan RPL						
8. Presentasi ANDAL, RKL dan RPL						
9. Perbaikan/penyusunan Final ANDAL, RKL dan RPL						

6.3. PEMBIAYAAN

Sumber pembiyaaan untuk pelaksanaan studi Analisis Dampak Lingkungan ini berasal dari JICA-Direktorat Jenderal Cipta Karya anggaran 1996/1997.

BAB VII
SISTEM PELAPORAN

7.1. JENIS LAPORAN.

Jenis-jenis laporan yang harus dibuat oleh konsultan pelaksana studi ini adalah sebagai berikut:

7.1.1. Laporan Pendahuluan.

Laporan ini berisi tentang kajian hasil studi kepustakaan, rencana kerja secara rinci, rencana program kerja dalam melaksanakan studi, serta kerangka laporan akhir.

Laporan ini sudah harus disampaikan ke pemrakarsa, selambat-lambatnya 30 hari sejak ditandatanganinya surat perjanjian kerja.

7.1.2. Laporan Kemajuan.

Berisi laporan kemajuan pekerjaan yang dilakukan pada setiap bulannya dan hambatan yang dialami dalam proses pelaksanaannya, serta rencana kerja untuk bulan berikutnya.

Laporan ini dibuat setiap bulan selama 3 bulan dan harus sudah diterima pemrakarsa pada akhir bulan ke-2 hingga akhir bulan ke-4 sejak ditanda-tanganinya surat perjanjian kerja.

7.1.3. Konsep Laporan Akhir.

Terdiri dari konsep Laporan Utama Studi AMDAL, Laporan RKL, Laporan RPL dan Ringkasan Eksekutif.

Laporan ini harus sudah disampaikan ke pemrakarsa selambat-lambatnya pada akhir bulan ke-5 sejak ditandatanganinya surat perjanjian kerja. Selanjutnya laporan ini diserahkan kepada Komisi Pusat Departemen PU. Jakarta

7.1.4. Laporan Akhir.

Terdiri dari Laporan Utama AMDAL, RKL, RPL, dan Ringkasan Eksekutif, yang merupakan hasil perbaikan konsep laporan, akhir yang telah mendapat koreksi dari Komisi Pusat Departemen PU dan Tim Teknis serta sudah harus diserahkan pada akhir bulan ke-6.

7.2. JUMLAH LAPORAN.

Jumlah laporan yang harus dibuat dan diserahkan sebagai berikut:

1. Laporan Pendahuluan	:	10 eksemplar
2. Laporan Kemajuan	:	10 eksemplar
3. Konsep Laporan Akhir *):		
- Laporan Utama AMDAL	:	60 eksemplar
- Laporan RKL	:	60 eksemplar
- Laporan RPL	:	60 eksemplar
- Ringkasan Eksekutif	:	60 eksemplar

*) Disampaikan secara bertahap ke Komisi Pusat, masing- masing 15, 15 dan 20 set eksemplar.

4. Laporan Akhir *) :		
- Laporan Utama AMDAL	:	25 eksemplar
- Laporan RKL	:	25 eksemplar
- Laporan RPL	:	25 eksemplar
- Ringkasan Eksekutif	:	25 eksemplar

*) Disampaikan ke Komisi Pusat AMDAL Departemen PU, Jakarta masing-masing sebanyak 15 eksemplar.

BAB VIII

DATA DAN INFORMASI YANG TERSEDIA

Data dan informasi yang tersedia berupa laporan interim Proyek Pengembangan Air Bersih Jakarta yang disusun oleh JICA STUDY TEAM.