APPENDIX B WATER QUALITY, QUANTITY AND POLLUTION LOAD BASED ON WATER SAMPLING

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LIST OF TABLES

- We conducted the water quality analysis in July (dry season) and December (wet season), in order to grasp the current pollutant load, design flow and pollutant load.

1. Dry Season (July,1997)

1) Domestic Wastewater:	3 points
2) Influent and Effluent of Lagoon:	3 points
3) Industrial Wastewater:	2 points
4) Receiving Water Bodies:	2 points
5) Sludge:	10 points

2. Wet Season (December,1997)

1) Domestic Wastewater:	3 points	
2) Influent and Effluent of Lagoon:	3 points	
3) Sludge:	9 points	
4) Receiving Water Bodies (Inland Area):	12 points	
5) Receiving Water Bodies (Sea):	21 points	*1,*2

However, due to El Nino phenomenon, no rainfall precipitated until December. Therefore, the sample taken in December did not represent wet season's ones but dry season's one.

*1; Most of results obtained from water analysis of receiving water bodies (sea) are not considered correct values due to salinity of sea water.

*2; COD is analized by Standard Methods – 5220 of AWWA, however, COD-Mn is used $KMnO_4$ instead of $K_2Cr_2O_7$. COD is commonly applied to evaluate organic content in sea water in Japan.

A. Water Quality/Quantity Survey in July, 1997

Table B.1 Domestic Wastewater

Boroko

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	2.5	27	28	6.30	170	150	402	0.4	25	8.0	23	
8:00	3.4	28	28	6.30	190	210	272	0.4	26	7.6	25	
10:00	2.4	28	28	6.40	130	190	292	0.4	24	5.5	27	
12:00	2.7	28	28	7.20	86	140	260	0.6	19	5.2	19	
14:00	2.8	29	28	7.40	46	120	136	0.6	12	6.1	17	
16:00	2.5	28	28	6.40	36	73	160	0.6	15	2.1	16	
18:00	2.2	27	28	6.50	94	120	240	0.5	21	2.9	21	
20:00	-	-	-	-	-	-	-	-	-	-	-	
Average	2.64	27.9	28.0	6.64	107	143	252	0.50	20.29	5.34	21.14	

Gerehu

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	8.2	27	28	6.40	110	190	340	0.5	41	5.0	32	2.4E+07
8:00	3.2	29	28	6.50	170	230	444	0.4	58	6.1	40	2.4E+07
10:00	3.9	29	28	6.60	82	140	200	0.6	25	4.1	26	2.4E+07
12:00	3.9	29	28	6.50	53	100	168	0.5	18	0.21	21	2.4E+07
14:00	3.5	29	28	6.50	54	100	172	0.5	23	0.25	25	2.4E+07
16:00	4.4	28	28	6.90	45	110	164	0.5	60	2.6	34	2.4E+07
18:00	5.1	28	28	7.60	51	110	196	0.4	36	3.5	31	2.4E+07
20:00	7.8	27	25	6.40	51	97	144	0.4	15	5.5	26	2.4E+07
Average	5.00	28.25	27.63	6.68	77	135	229	0.48	34.50	3.41	29.38	2.4E+07

Morata

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	7.3	28	26	7.10	49	130	312	0.5	91	7.4	48	4.6E+09
8:00	5.1	28	27	6.50	57	110	208	0.5	38	3.1	21	1.1E+10
10:00	-	28	28	6.30	33	61	148	0.4	15	0.24	15	-
12:00	4.4	29	29	6.40	22	58	124	0.4	16	0.22	20	4.3E+08
14:00	-	29	29	6.40	28	49	124	0.5	17	0.16	17	-
16:00	4.4	29	28	7.40	26	38	68	0.5	8.8	1.5	15	-
18:00	4.8	28	28	7.30	26	48	72	0.4	7.8	2.2	13	-
20:00	-	28	27	7.30	40	140	140	0.4	14	4.2	17	2.1E+08
Average	5.20	28.38	27.75	6.84	35	79	150	0.45	25.95	2.38	20.75	4.1E+09

Table B.2 Influent and Effluent of Lagoons

Waigani Lagoon

Influent

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	-	26	27	7.10	170	350	436	0.2	62	9.9	40	4.6E+08
9:00	460.4	28	27	6.60	150	150	372	0.4	61	12.2	46	-
12:00	295.2	28	31	6.40	130	110	344	0.5	31	8.9	41	-
15:00	334.2	28	28	6.40	100	200	280	0.4	29	5.8	37	-
18:00	393.2	28	28	6.40	140	160	224	0.4	24	4.8	44	2.9E+08
Average	370.8	27.60	28.20	6.58	138	194	331	0.38	41.40	8.32	41.60	3.8E+08

Effluent

14:00	0.00	29.00	31.00	6.20	13	59	132	0.50	7.30	4.20	37.00	2.4E+09

Gerehu Lagoon

Influent

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	42.3	25	27	6.60	140	200	276	0.6	34	4.6	31	1.6E+09
9:00	38.6	29	27	7.20	110	160	328	0.7	30	4.8	31	1.1E+11
12:00	47.0	31	27	6.20	110	150	292	0.6	26	3.1	29	-
15:00	18.4	25	26	6.30	120	120	212	0.6	27	4.0	28	-
18:00	20.5	25	27	6.40	84	140	188	0.7	32	4.2	34	2.9E+09
Average	33.36	27.00	26.80	6.54	113	154	259	0.64	29.80	4.14	30.60	3.8E+10
Effluent												
14:00	0.00	24.00	30.00	6.50	80	52	196	1.20	31.00	7.30	36.00	9.0E+08

Morata Lagoon

Influent

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	30.5	28	28	6.60	160	390	389	0.1	61	6.9	45	2.4E+07
9:00	19.0	29	28	6.70	140	360	674	0.4	47	7.4	38	2.4E+07
12:00	24.0	29	28	6.60	110	270	311	0.3	48	5.5	36	2.4E+07
15:00	18.4	30	28	6.60	140	290	376	0.2	41	5.6	40	2.4E+07
18:00	20.5	29	29	6.70	130	210	289	0.3	45	4.2	38	2.4E+07
Average	22.48	29.00	28.20	6.64	136	304	408	0.26	48.40	5.92	39.40	2.4E+07
Effluent												
14:00	0.00	29.00	31.00	7.40	21	48	93	11.00	41.00	4.90	41.00	2.4E+07

Table B.3 Industrial Wastewater

Factory	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl
	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Pacific Engineering	1.81	33	29	6.40	1700	14,000	20,800	0.30	56.00	10.20	250
SP Brewery	6.65	34	29	4.00	190	3,100	3,120	0.50	43.00	10.80	76

Table B.4 Receiving Water Bodies

Location	Time	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl
	hrs	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
(Inland Area)											
Waigani Swamp	12:00	28	26	7.80	81	12	124	14.00	6.40	0.18	46.00
(Costal Area)											
Joyce Bay	12:00	30	28	8.20	110	41	2,180	8.30	5.20	0.11	25,000
Joyce Bay	12:00	30	28	7.20	170	7.5	1,500	5.60	1.00	0.31	21,000
Average		30	28	7.70	140	24	1,840	6.95	3.10	0.21	23,000

Table B.5 Sludge

Location	Ni	Pb	T-N	T-P	Cd	Hg	Zn	Al	Cu	Water	SS	VSS
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L	mg/L
(Lagoon)												
Waigani - 1	0.280	0.64	190.0	34.5	0.004	0.027	11.20	23.00	1.20	99.60	2,500	740
Waigani - 2	0.088	0.34	150.0	16.7	0.011	0.002	1.88	8.00	0.07	99.80	3,200	750
Gerehu - 1	2.600	6.10	1,600.0	11.7	0.210	0.020	68.70	2,490.00	12.00	95.40	35,000	15,100
Gerehu - 2	1.100	1.80	1,100.0	32.5	0.059	0.008	16.40	310.00	3.30	98.60	9,600	4,750
Morata - 1	0.960	3.20	1,100.0	< 0.005	0.150	0.042	24.60	220.00	11.00	93.20	35,000	19,700
Morata - 2	2.600	22.00	920.0	< 0.005	0.470	0.340	135.00	2,210.00	39.00	93.50	38,000	22,600
Average	1.271	5.68	843.3	15.9	0.151	0.073	42.96	876.83	11.10	96.68	20,550	10,607
(Septic Tank)												
Badili - 1	1.100	2.10	370.0	13.2	0.083	0.031	96.00	150.00	7.00	98.80	9,000	2,480
Badili - 2	0.008	0.02	22.0	3.90	0.001	0.001	0.28	1.50	0.02	99.97	36	< 1
Koki - 1	0.003	0.02	5.2	0.71	0.001	0.002	0.19	0.25	0.01	99.99	16	< 1
Koki - 2	0.002	0.01	4.6	0.49	0.001	0.002	0.07	0.21	0.01	99.99	7	< 1
Average	0.278	0.54	100.5	4.58	0.022	0.009	24.14	37.99	1.76	99.69	2,265	620

B. Water Quality/Quantity Survey in December, 1997

Table B.6 Domestic Wastewater

Boroko

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	-	-	-	-	-	-	-	-	-	-	-	
8:00	1.5	29	30	6.50	78	22	165	0.9	49	8.9	-	
10:00	2.0	31	30	6.60	74	51	204	1.6	36	9.9	-	
12:00	1.4	31	30	6.60	48	52	84	1.5	40	1.8	-	
14:00	1.8	30	30	6.60	43	6	132	1.5	28	2.5	-	
15:00	-	-	-	6.60	20	6	82	-	23	2.0	-	
16:00	2.7	30	30	6.40	46	30	72	1.2	24	2.7	-	
18:00	2.7	30	30	6.60	77	40	128	0.8	42	3.1	-	
20:00	2.5	30	30	6.60	120	77	180	0.8	38	2.6	-	
Average	2.09	30.1	30.0	6.56	63	35	131	1.19	35.0	4.19	-	

Gerehu

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	0.4	30	30	8.30	1100	730	3450	1.5	460	34.3	-	
8:00	0.2	30	31	8.40	640	490	3040	1.1	480	27.5	-	
10:00	0.4	33	31	8.30	500	390	2400	1.7	260	15.7	-	
12:00	0.6	33	33	7.90	230	88	1280	1.1	120	9.30	-	
14:00	0.9	35	33	8.10	250	150	880	1.3	94	7.70	-	
16:00	1.0	33	32	7.90	81	72	232	1.2	50	8.2	-	
18:00	0.9	32	32	7.70	93	90	236	2.2	58	7.6	-	
20:00	0.5	30	29	7.60	140	130	130	1.3	67	8.4	-	
Average	0.61	32.0	31.4	8.03	379	268	1456	1.43	199	14.84	-	

Morata

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	11.7	29	26	6.40	72	18	141	0.5	27	1.5	-	
8:00	10.7	33	30	6.50	44	18	89	0.5	17	1.8	-	
10:00	8.0	34	30	6.50	42	13	101	0.4	18	2.30	-	
12:00	11.8	36	31	6.40	46	13	105	0.4	14	1.20	-	
14:00	12.0	37	30	6.50	29	10	56	0.5	12	1.00	-	
16:00	11.3	34	30	6.60	25	11	52	0.5	12.0	1.1	-	
18:00	12.4	32	30	5.32	-	-	-	0.8	-	-	-	
20:00	-	-	-	-	-	-	-	-	-	-	-	
Average	11.13	33.6	29.6	6.32	43.0	13.8	90.7	0.51	16.67	1.48	-	

Table B.7 Influent and Effluent of Lagoons

Waigani Lagoon

Influent

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	-	29	26	6.60	110	85	296	1.2	47	3.9	-	
9:00	278.5	31	30	6.50	140	76	320	0.9	50	3.9	-	
12:00	282.1	32	31	6.60	110	90	264	0.7	42	5.1	-	
15:00	202.2	32	31	6.50	83	64	181	2.8	30	3.0	-	
18:00	184.8	30	30	6.50	91	72	246	0.5	32	3.2	-	
Average	236.9	30.8	29.6	6.54	107	77	261	1.22	40.2	3.82	-	

Effluent

14:00	294.0	34.0	33.0	7.20	46	46	109	13.8	30.0	3.30	-	

Gerehu Lagoon

Influent

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	40.8	29	29	7.00	310	220	640	0.8	140	7.4	-	
9:00	25.1	29	30	7.10	170	92	332	0.8	78	6.1	-	
12:00	30.7	33	32	6.60	100	83	232	1.1	40	2.9	-	
15:00	39.9	38	32	6.70	110	96	180	0.5	48	4.0	-	
18:00	34.7	29	30	6.80	100	53	212	0.6	41	2.9	-	
Average	34.24	31.6	30.6	6.84	158	109	319	0.76	69.4	4.66	-	

Effluent

14:00	0.00	35.0	35.0	7.00	30	20	132	11.5	50.0	2.80	-	

Morata Lagoon

Influent

Time	Q	Temperature		pH	SS	BOD	COD	DO	T-N	T-P	Cl	Faecal C.
hrs	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPU/100 mL
6:00	25.3	30	29	7.00	180	110	412	1.3	66	4.6	-	
9:00	29.4	34	32	6.60	250	180	524	0.3	65	4.3	-	
12:00	31.2	35	32	6.60	140	120	288	0.3	38	3.2	-	
15:00	29.8	33	31	6.40	250	150	452	0.7	49	5.0	-	
18:00	27.9	34	30	6.60	150	90	196	0.6	40	3.5	-	
Average	28.7	33.2	30.8	6.64	194	130	374	0.64	51.6	4.12	-	

Effluent

14:00	0.0	34.0	35.0	6.80	28	49	64	11.0	41.0	3.90	-	

Table B.8 Sludge

Location	Ni	Pb	Cd	Al	Zn	Hg	Cu	Water	VSS
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	%	mg/L
(Lagoon)									
Waigani - 1	0.007	0.03	0.0022	0.380	0.67	0.0008	0.27	99.93	83
Waigani - 2	0.012	0.02	0.0008	2.200	0.48	0.0011	0.13	99.98	88
Gerehu - 1	0.032	0.20	0.0047	6.000	3.86	0.0024	0.54	99.80	700
Gerehu - 2	0.004	0.01	0.0004	0.120	0.05	0.0007	0.05	99.97	< 1
Morata - 1	0.010	0.15	0.0030	1.500	1.09	0.0009	0.33	99.90	310
Average	0.013	0.082	0.0022	2.040	1.231	0.00118	0.264	99.92	236.2
(Septic Tank)									
Badili - 1	0.027	0.07	0.0021	4.400	3.75	0.0055	0.51	99.70	810
Badili - 2	0.006	0.02	0.0003	0.100	0.24	0.0015	0.03	99.97	2
Koki - 1	0.005	0.00	< 0.0001	0.050	0.04	< 0.0002	0.01	99.94	14
Koki - 2	0.004	0.00	0.0002	0.070	0.03	< 0.0002	0.02	99.99	2
Average	0.011	0.02	0.0007	1.155	1.01	0.0018	0.14	99.90	207

Table B.9 Receiving Water Bodies - Inland Area

Location	Q	Temperature		pH	SS	BOD	COD	S-COD	DO	T-N	T-P	Cl
	L/s	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
(Influent to Swamp)												
Jackson Creek - 1	0.0	29	29	6.90	240.0	8.3	125	59	1.50	4.8	0.64	170
Jackson Creek - 2	0.0	35	29	7.40	27.0	10.0	57	56	1.10	5.6	0.43	170
Average	0.0	32.0	29.0	7.15	133.5	9.2	91.0	57.5	1.30	2.80	0.54	170.0
(Swamp)												
Waigani No.1 - 1	-	31	30	7.80	64.0	17.0	81	68	3.40	4.8	1.7	150
Waigani No.1 - 2	-	32	30	8.60	59.0	11.0	81	66	9.10	4.5	1.9	100
Waigani No.2 - 1	-	31	30	7.40	63.0	3.3	68	79	4.40	4.5	2.2	83
Waigani No.2 - 2	-	32	30	8.60	54.0	11.0	79	70	7.80	4.5	2.1	82
Waigani No.3 - 1	-	31	29	7.90	54.0	2.6	82	46	4.30	4.0	1.6	77
Waigani No.3 - 2	-	32	30	8.70	56.0	11.0	88	66	7.80	5.0	1.7	77
Average	-	31.5	29.8	8.2	58.3	9.3	79.8	65.8	6.13	4.55	1.87	94.8
(Effluent from Swamp)												
Zooland Creek - 1	158.0	39	31	6.99	< 1	1.2	28	72	2.50	8.3	6.00	71
Zooland Creek - 2	157.0	32	30	7.00	16.0	73.0	78	72	1.40	3.3	1.90	180
Average	157.5	35.5	30.5	7.00	8.0	37.1	53.0	72.0	1.95	5.80	3.95	125.5
(Laloki River)												
Laloki River - 1	6167	32	28	7.20	47.0	1.1	58	69	4.10	1.6	0.18	5.2
Laloki River - 2	4144	34	32	7.60	8.0	9.6	49	52	3.60	5.3	0.31	6.2
Average	5156	33.0	30.0	7.40	27.5	5.4	53.5	60.5	3.85	3.45	0.25	5.7

Table B.10 Receiving Water Bodies - Sea

Location	Temperature		pH	SS	COD	DO	T-N	T-P	EC	Cl
	Air	Water		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
(Point No.01 - 1)										
0.5 m depth	30	29	6.32	74.0	1,210	4.50	5.6	0.08		20,000
2.0 m depth	30	29	6.34			4.80				
5.0 m depth	30	28	6.34			4.60				
10.0 m depth	30	28	6.34	76.0	1,530	4.60	8.5	0.03		21,000
2.0 m above seabed	30	27	6.34	60.0	1,300	5.40	2.7	0.04		23,000
(Point No.01 - 2)										
0.5 m depth	32	29	8.10	400	1,210	6.30	1.9	0.02		9,500
2.0 m depth	32	29				6.40				
5.0 m depth	32	28				6.30				
10.0 m depth	32	28	8.00	270	1,530	4.70	1.3	0.01		11,000
2.0 m above seabed	32	27	8.10	250	1,300	6.10	1.8	0.07		11,000
(Point No.02 - 1)										
0.5 m depth	30	28.4	6.46	66.0	1,470	5.10	2.9	< 0.005		19,000
2.0 m depth	30	28.2	6.57			5.50				
5.0 m depth	30	28.0	6.38			5.10				
10.0 m depth	30	27.7								
2.0 m above seabed	30	27.0	6.37	66.0	1,390	4.80	1.5	< 0.005		22,000
(Point No.02 - 2)										
0.5 m depth	30	29	8.00	280	60	7.10	1.6	0.03		6,600
2.0 m depth	30	29				7.30				
5.0 m depth	30	28				7.20				
10.0 m depth	30	28	8.00	300	84	7.20	1.8	0.02		9,000
2.0 m above seabed	30	27	8.10	280	1,530	7.30	1.9	0.02		11,000
(Point No.001 - 1)										
0.5 m depth	30	29.6	6.34	66.0	1,160	5.00	2.2	< 0.005		20,000
2.0 m depth	30	29.0	6.38			4.90				
5.0 m depth	30	28.2	6.38			4.80				
10.0 m depth	30	28.2	6.33	66.0	1,180	4.70	1.4	< 0.005		21,000
2.0 m above seabed	30	27.8	6.36	66.0	918	4.90	3.0	< 0.005		24,000
(Point No.001 - 2)										
0.5 m depth	31	29	8.10	770	1,460	6.40	2.2	< 0.005		10,000
2.0 m depth	31	29				7.60				
5.0 m depth	31	29				6.80				
10.0 m depth	31	29	8.10	280	1,180	6.40	1.9	0.04		8,800
2.0 m above seabed	31	28	8.00	360	1,180	7.20	6.9	0.01		11,000

Table B.11 Receiving Water Bodies - Sea

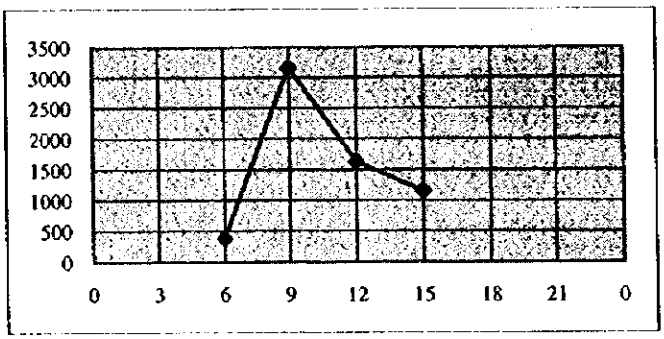
Location	Temperature		pH	DO	EC	Temperature		pH	DO	EC
	Air	Water		mg/L	mg/L	Air	Water		mg/L	mg/L
No.1	30	23	6.15	4.8		32	29	6.76	6.7	
No.2	32	30	6.23	5.3		32	29	6.77	6.3	
No.3	32	30	6.54	5.8		32	29	6.70	7.7	
No.4	30	30	6.31	4.8		32	29	6.72	7.8	
No.5	32	29	6.25	4.7		32	29	6.75	6.4	
No.6	32	29	6.22	5.4		31	29	6.65	7.7	
No.7	30	30	6.31	5.0		32	29	6.78	6.5	
No.8	32	30	6.40	5.1		34	29	6.69	7.0	
No.9	32	29	6.44	4.7		34	27	6.70	6.1	
No.10	32	29	6.44	5.2		32	29	6.35	7.0	
No.11	32	29	6.46	4.8		32	28	6.64	7.6	
No.12	34	28	6.47	3.7		30	28	6.71	7.2	
No.13	30	29	6.48	4.8		30	29	6.66	7.6	
No.14	29	29	6.56	5.0		30	29	6.61	7.5	
No.15	29	28	6.66	5.0		32	29	6.72	7.7	

Table B.12 Flow Measurement at Lagoons (May, 1997)

Waigani

Time	m^3/hr	l/sec	l/cap/hr
6:00	383.04	106.40	2.784
9:00	3159.72	877.70	22.964
12:00	1630.44	452.90	11.850
15:00	1158.84	321.90	8.422
18:00			

Q_{L1} = 6332.04 m^3



population 137,592

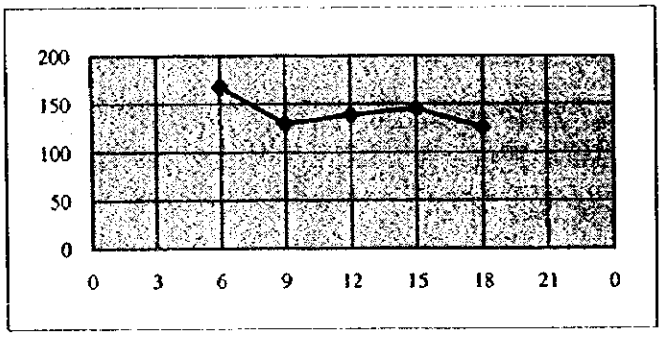
Estimated Flow: Q_{L1} / 4 / 0.04438 = 35,669 m^3/day

Estimated Per Capita Flow: 259 l/cap/day

Gerehu

Time	m^3/hr	l/sec	l/cap/hr
6:00	167.83	46.62	7.941
9:00	129.60	36.00	6.132
12:00	138.71	38.53	6.563
15:00	145.15	40.32	6.868
18:00	125.71	34.92	5.948

Q_{L2} = 707.00 m^3



population 21,135

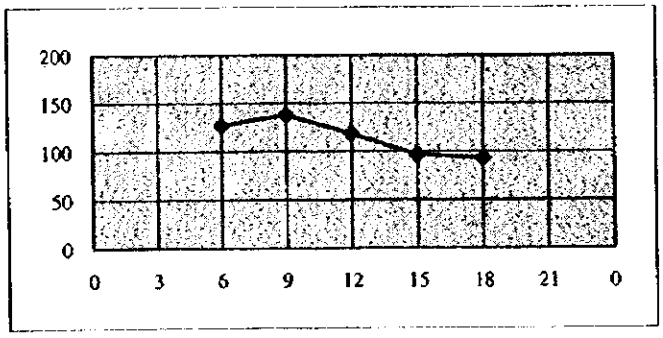
Estimated Flow: Q_{L2} / 5 / 0.04438 = 3,186 m^3/day

Estimated Per Capita Flow: 151 l/cap/day

Morata

Time	m^3/hr	l/sec	l/cap/hr
6:00	127.22	35.34	14.218
9:00	137.92	38.31	15.413
12:00	118.44	32.90	13.236
15:00	96.73	26.87	10.810
18:00	93.20	25.89	10.416

Q_{L3} = 573.52 m^3



population 8,948

Estimated Flow: Q_{L3} / 5 / 0.04438 = 2,585 m^3/day

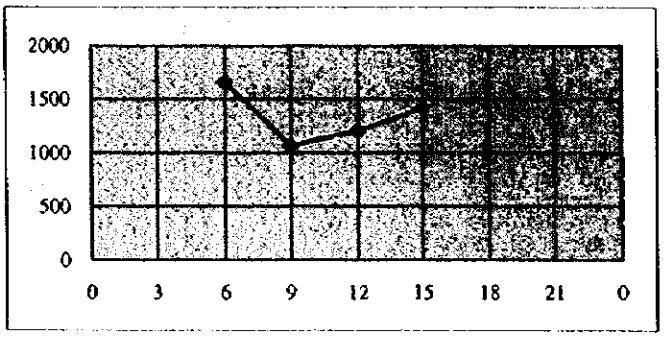
Estimated Per Capita Flow: 289 l/cap/day

Table B.13 Flow Measurement at Lagoons (August, 1997)

Waigani

Time	m^3/hr	l/sec	l/cap/hr
6:00	-	-	-
9:00	1657.44	460.40	12.046
12:00	1062.72	295.20	7.724
15:00	1203.12	334.20	8.744
18:00	1415.52	393.20	10.288

Q_{L1} = 5338.80 m^3



population 137,592

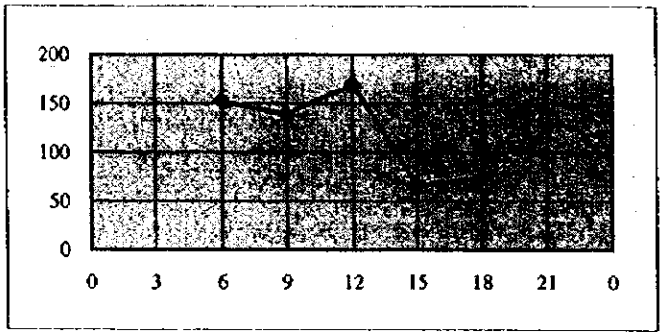
Estimated Flow Q_{L1} / 4 / 0.04438 = 30,074 m^3/day

Estimated Per Capita Flow 219 l/cap/day

Gerehu

Time	m^3/hr	l/sec	l/cap/hr
6:00	152.28	42.30	7.205
9:00	138.96	38.60	6.575
12:00	169.20	47.00	8.006
15:00	66.24	18.40	3.134
18:00	73.80	20.50	3.492

Q_{L2} = 600.48 m^3



population 21,135

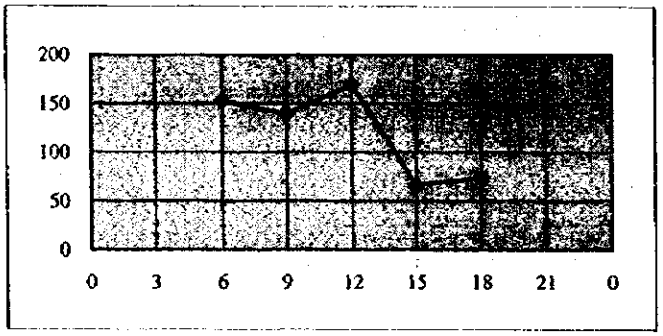
Estimated Flow Q_{L2} / 5 / 0.04438 = 2,706 m^3/day

Estimated Per Capita Flow 128 l/cap/day

Morata

Time	m^3/hr	l/sec	l/cap/hr
6:00	152.28	42.30	17.018
9:00	138.96	38.60	15.530
12:00	169.20	47.00	18.909
15:00	66.24	18.40	7.403
18:00	73.80	20.50	8.248

Q_{L3} = 600.48 m^3



population 8,948

Estimated Flow Q_{L3} / 5 / 0.04438 = 2,706 m^3/day

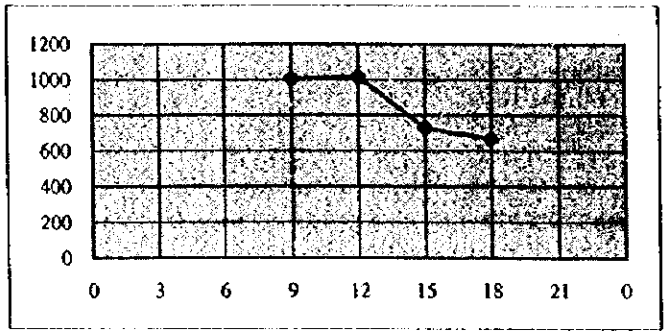
Estimated Per Capita Flow 302 l/cap/day

Table B.14 Flow Measurement at Lagoons (December, 1997)

Waigani

Time	m^3/hr	l/sec	l/cap/hr
6:00		-	
9:00	1002.60	278.50	7.287
12:00	1015.56	282.10	7.381
15:00	727.92	202.20	5.290
18:00	665.28	184.80	4.835

Q_{L1} = 3411.36 m^3

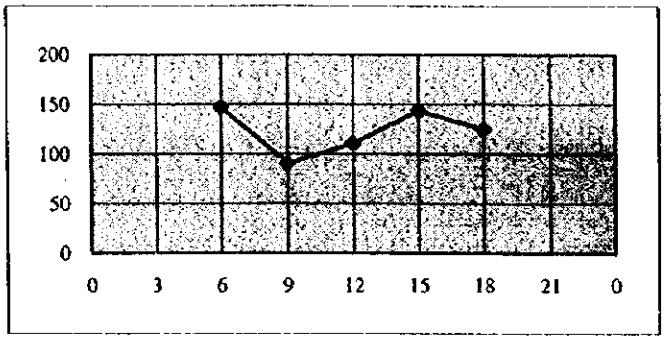


population	Estimated Flow	Q_{L1} / 4 / 0.04438 =	19,217 m^3/day
137,592	Estimated Per Capita Flow		140 l/cap/day

Gerehu

Time	m^3/hr	l/sec	l/cap/hr
6:00	146.88	40.80	6.950
9:00	90.36	25.10	4.275
12:00	110.52	30.70	5.229
15:00	143.64	39.90	6.796
18:00	124.92	34.70	5.911

Q_{L2} = 616.32 m^3

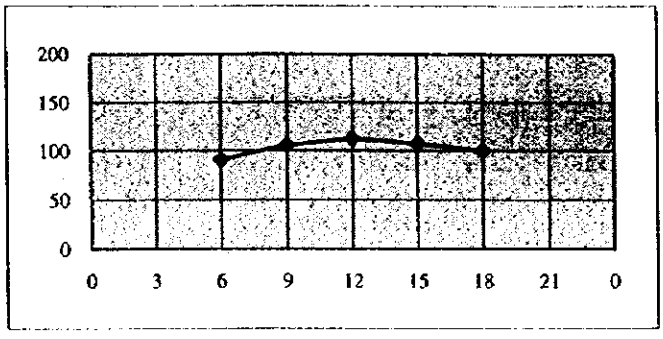


population	Estimated Flow	Q_{L2} / 5 / 0.04438 =	2,777 m^3/day
21,135	Estimated Per Capita Flow		131 l/cap/day

Morata

Time	m^3/hr	l/sec	l/cap/hr
6:00	91.08	25.30	10.179
9:00	105.84	29.40	11.828
12:00	112.32	31.20	12.553
15:00	107.64	29.90	12.030
18:00	100.44	27.90	11.225

Q_{L3} = 517.32 m^3

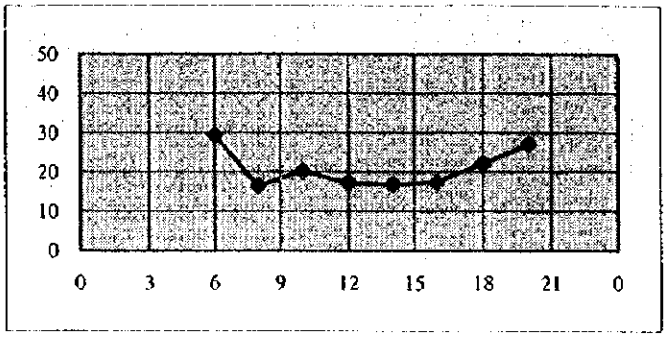


population	Estimated Flow	Q_{L3} / 5 / 0.04438 =	2,331 m^3/day
8,948	Estimated Per Capita Flow		261 l/cap/day

Table B.15 Flow Measurement at Residential Areas (May,1997)

1. Boroko (High Cost House)

Time	m^3/hr	l/sec	l/cap/day
6:00	29.38	8.16	28.465116
8:00	16.31	4.53	15.802326
10:00	20.16	5.60	19.534884
12:00	17.14	4.76	16.604651
14:00	16.88	4.69	16.360465
16:00	17.42	4.84	16.883721
18:00	22.21	6.17	21.523256
20:00	27.14	7.54	26.302326
Q_{D1} =	166.64	m^3	



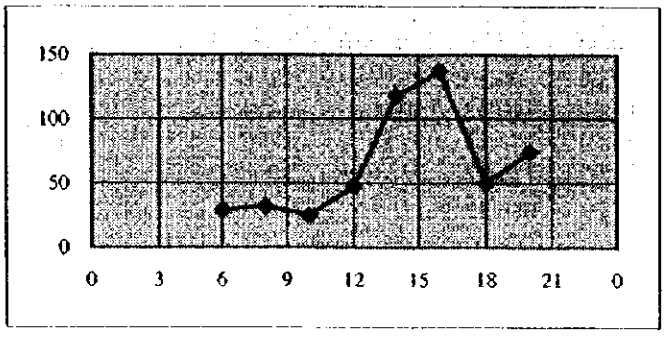
population 1,032

Estimated Flow Q_{D1} / 8 / 0.04448 = 468 m^3/day

Estimated Per Capita Flow 454 l/cap/day

2. Gerehu (Mid. Cost House)

Time	m^3/hr	l/sec	l/cap/day
6:00	28.76	7.99	15.73523
8:00	32.00	8.89	17.507659
10:00	25.27	7.02	13.824945
12:00	47.38	13.16	25.916849
14:00	117.72	32.70	64.398249
16:00	136.94	38.04	74.914661
18:00	49.97	13.88	27.334792
20:00	74.30	20.64	40.647702
Q_{D2} =	512.35	m^3	



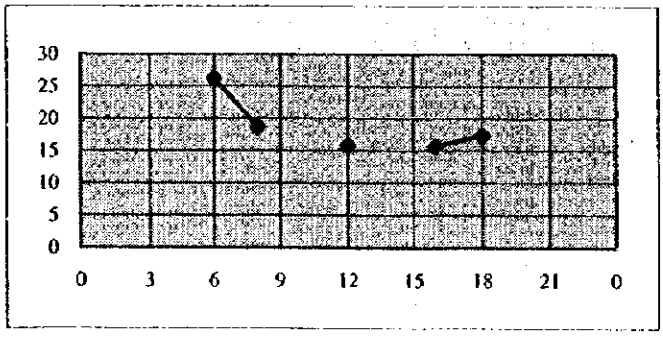
population 1,828

Estimated Flow Q_{D2} / 8 / 0.04448 = 1440 m^3/day

Estimated Per Capita Flow 788 l/cap/day

3. Morata (Low Cost House)

Time	m^3/hr	l/sec	l/cap/day
6:00	26.24	7.29	14.39605
8:00	18.61	5.17	10.209545
10:00		-	
12:00	15.70	4.36	8.6099835
14:00		-	
16:00	15.73	4.37	8.6297312
18:00	17.39	4.83	9.538124
20:00		-	
Q_{D3} =	93.67	m^3	



population 1,823

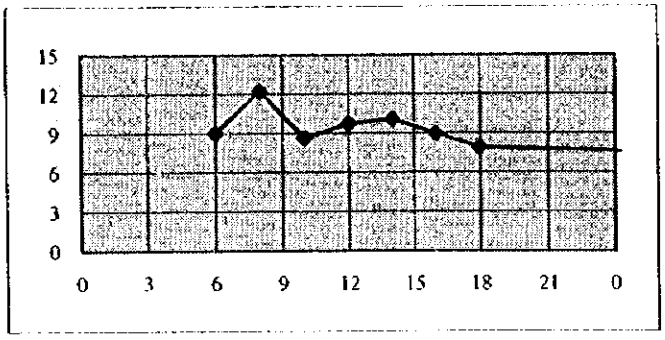
Estimated Flow Q_{D3} / 5 / 0.04448 = 421 m^3/day

Estimated Per Capita Flow 231 l/cap/day

Table B.16 Flow Measurement at Residential Areas (August, 1997)

1. Boroko (High Cost House)

Time	m^3/hr	l/sec	l/cap/day
6:00	9.00	2.50	8.7209302
8:00	12.24	3.40	11.860465
10:00	8.64	2.40	8.372093
12:00	9.72	2.70	9.4186047
14:00	10.08	2.80	9.7674419
16:00	9.00	2.50	8.7209302
18:00	7.92	2.20	7.6744186
20:00	-	-	-
Q_{D1} =	66.60	m^3	



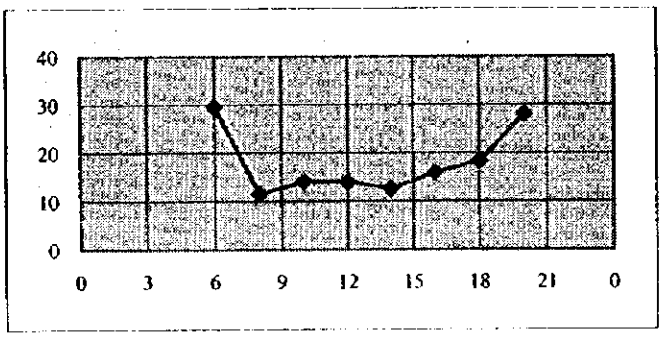
population 1,032

Estimated Flow: Q_{D1} / 7 / 0.04448 = 214 m^3/day

Estimated Per Capita Flow: 207 l/cap/day

2. Gerehu (Mid. Cost House)

Time	m^3/hr	l/sec	l/cap/day
6:00	29.52	8.20	16.148796
8:00	11.52	3.20	6.3019694
10:00	14.04	3.90	7.6805252
12:00	14.04	3.90	7.6805252
14:00	12.60	3.50	6.892779
16:00	15.84	4.40	8.6652079
18:00	18.36	5.10	10.043764
20:00	28.08	7.80	15.36105
Q_{D2} =	144.00	m^3	



population 1,828

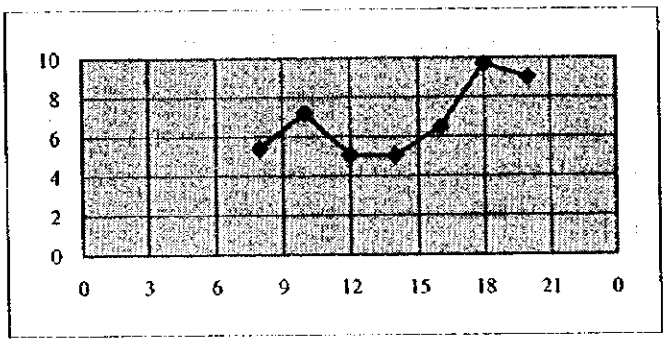
Estimated Flow: Q_{D2} / 8 / 0.04448 = 405 m^3/day

Estimated Per Capita Flow: 221 l/cap/day

Table B.17 Flow Measurement at Residential Areas (December,1997)

1. Boroko (High Cost House)

Time	m^3/hr	l/sec	l/cap/day
6:00		-	
8:00	5.40	1.50	5.2325581
10:00	7.20	2.00	6.9767442
12:00	5.04	1.40	4.8837209
14:00	5.04	1.40	4.8837209
16:00	6.48	1.80	6.2790698
18:00	9.72	2.70	9.4186047
20:00	9.00	2.50	8.7209302
Q_{D1} =	47.88	m^3	



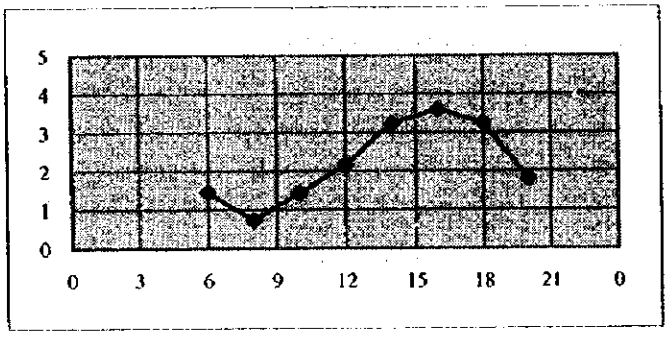
population 1,032

Estimated Flow — Q_{D1} / 7 / 0.04448 = 154 m^3/day

Estimated Per Capita Flow — 149 l/cap/day

2. Gerehu (Mid. Cost House)

Time	m^3/hr	l/sec	l/cap/day
6:00	1.44	0.40	0.7877462
8:00	0.72	0.20	0.3938731
10:00	1.44	0.40	0.7877462
12:00	2.16	0.60	1.1816193
14:00	3.24	0.90	1.7724289
16:00	3.60	1.00	1.9693654
18:00	3.24	0.90	1.7724289
20:00	1.80	0.50	0.9846827
Q_{D2} =	17.64	m^3	



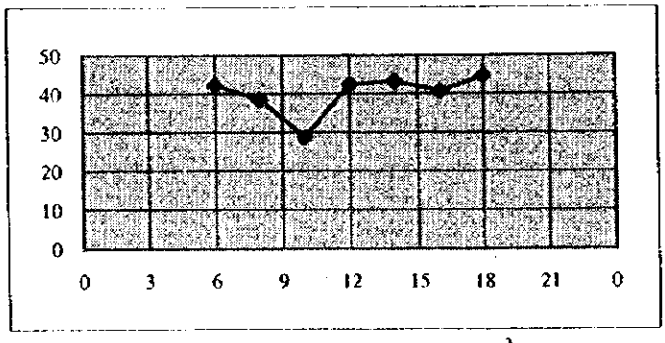
population 1,828

Estimated Flow — Q_{D2} / 8 / 0.04448 = 50 m^3/day

Estimated Per Capita Flow — 27 l/cap/day

3. Morata (Low Cost House)

Time	m^3/hr	l/sec	l/cap/day
6:00	42.12	11.70	23.104772
8:00	38.52	10.70	21.130005
10:00	28.80	8.00	15.798135
12:00	42.48	11.80	23.302249
14:00	43.20	12.00	23.697202
16:00	40.68	11.30	22.314866
18:00	44.64	12.40	24.487109
20:00		-	
Q_{D3} =	280.44	m^3	



population 1,823

Estimated Flow — Q_{D3} / 7 / 0.04448 = 901 m^3/day

Estimated Per Capita Flow — 494 l/cap/day

APPENDIX C BASIS OF SEWERAGE DESIGN

APPENDIX C BASIS OF SEWERAGE DISIGN

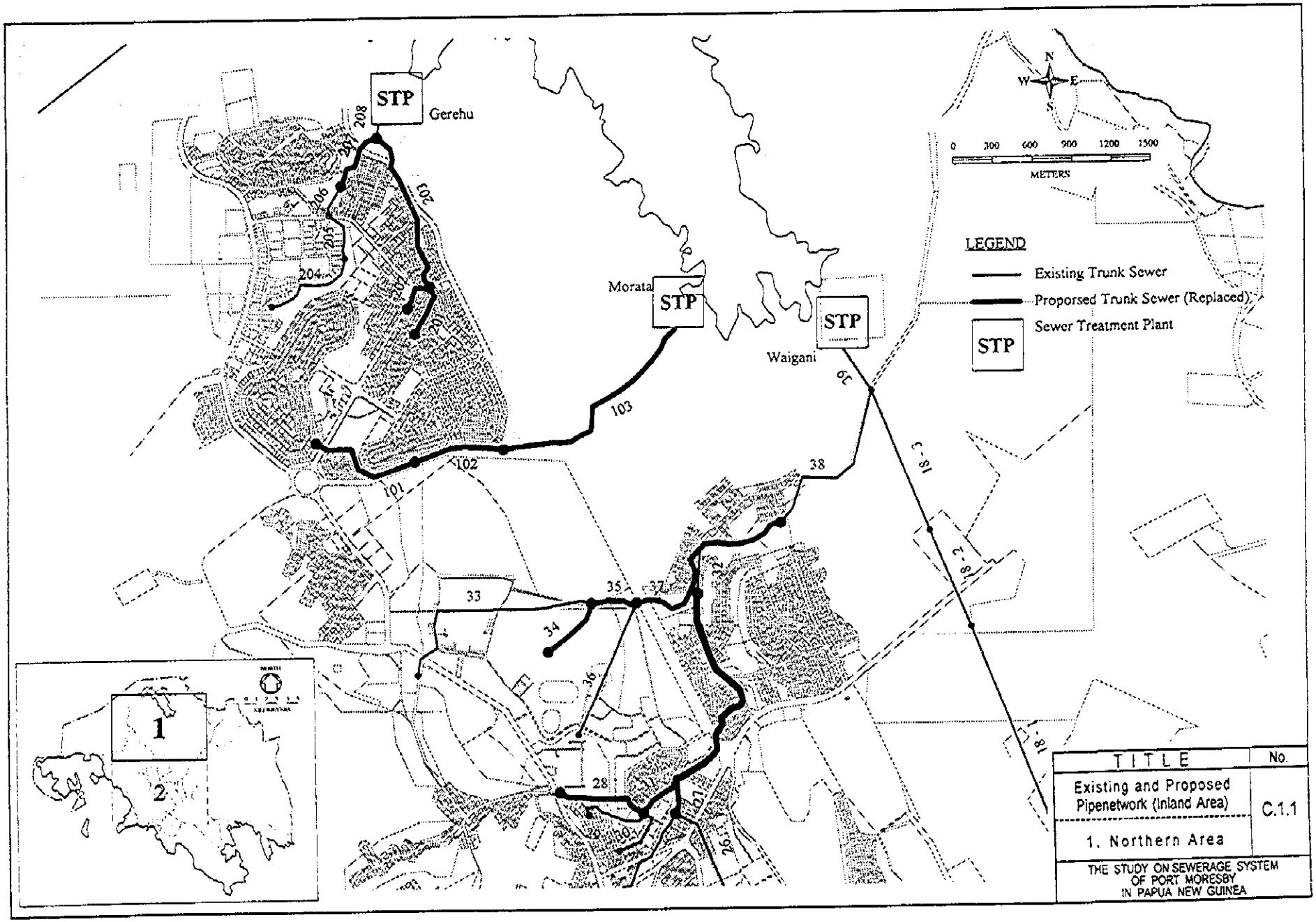
page

LIST OF TABLES

LIST OF FIGURES

C.1.1 Hydraulic analysis of sewer pipes in Inland Area (2015)

Analysis of existing trunk sewer pipeline in inland area for the year 2015 is shown in the following figures and tables. As a result, more than 30 % new trunk sewer pipes are to be installed to supplement the insufficient trunk sewer pipes.


STP
Gerehu
Morata
STP
STP
Waigani
STP
LEGEND
Existing Trunk Sewer
Proposed Trunk Sewer (Replaced)
Sewer Treatment Plant
0 300 600 900 1200 1500
METERS
N
W
E
S
208
207
206
205
204
203
202
201
103
102
101
39
38
18-3
18-2
18-1
33
34
35
37
36
32
28
29
30
27
26
1
2
TITLE
No.
Existing and Proposed Pipenetwork (Inland Area)
C.1.1
1. Northern Area
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA

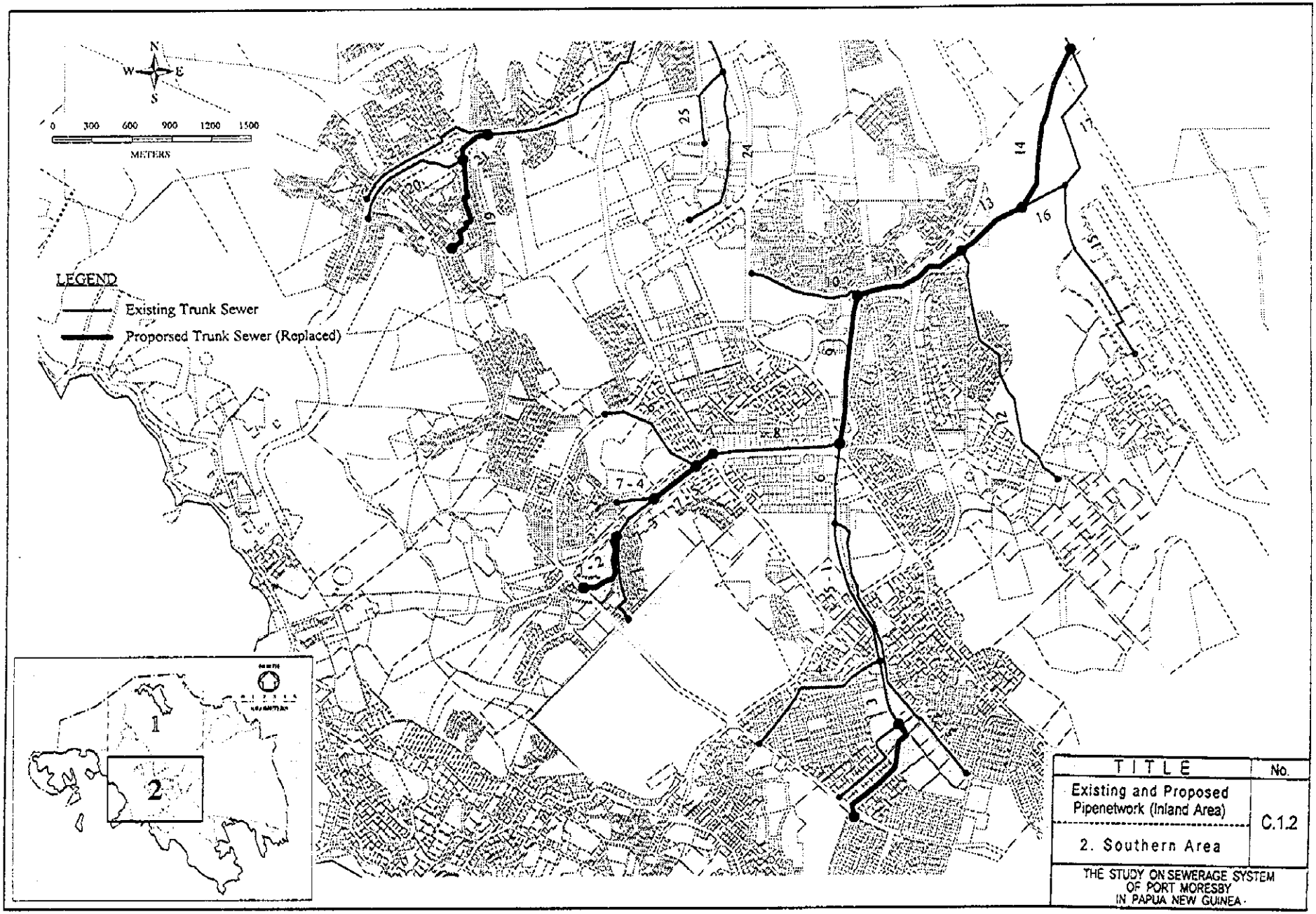

N
W
E
S
0 300 600 900 1200 1500
METERS
LEGEND
Existing Trunk Sewer
Proporsed Trunk Sewer (Replaced)
1
2
TITLE
No.
Existing and Proposed Pipenetwork (Inland Area)
2. Southern Area
C.1.2
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA

Table C.1.1 Analysis of Existing Trunk Sewer Pipe
Waigani, Morata, Gerehu (2015)

SEWER LINE		MANHOLE INVERT		EXISTING PIPE SPECIFICATION				ESTIMATED FLOW			COMENT	
From No	To No	Upstream I.L	Downstream I.L	Length (m)	Gradient (°/₀₀)	Diameter (mm)	Q_1=Capacity (l/s)	Contributing (E.P)	Peaking Factor	Q_2=M.H.F (l/s)	Q_1/Q_2 (%)	Judge
WAIGANI												
1	3	53.11	45.79	925	7.91	225	40	4,699	2.00	49	82	NG
				925	9.4	225	44				170	NEW
2	3	54.62	45.79	825	10.70	225	46	2,710	2.00	28	164	OK
3	5	45.79	43.98	525	3.45	375	103	7,488	1.80	70	147	OK
4	5-1	55.00	43.98	1,338	8.24	450	259	22,563	1.50	176	147	OK
5-1	6	43.98	37.56	1,150	5.58	525	321	31,051	1.50	243	132	OK
5-2	6	51.08	37.56	2,325	5.82	300	74	5,309	1.80	50	148	OK
6	9	37.56	36.17	562	2.47	600	305	40,598	1.50	317	96	NG
7-1	7-3	67.29	59.55	687	11.27	225	48	4,260	2.00	44	107	OK
7-2	7-3	65.94	59.55	612	10.44	225	46	7,797	1.80	73	63	NG
				612	9.4	225	44				122	NEW
7-3	7-5	59.55	53.11	487	13.22	300	111	12,610	1.60	105	106	OK
7-4	7-5	54.88	53.11	437	4.05	225	29	3,055	2.00	32	90	NG
7-5	7-7	53.11	48.86	375	11.33	300	103	17,623	1.60	147	70	NG
				375	9.4	225	44				100	NEW
7-6	7-7	59.87	48.86	950	11.59	225	48	4,416	2.00	46	105	OK
7-7	8	48.86	47.11	125	14.00	300	114	22,039	1.50	172	66	NG
				125	6.4	300	77				111	NEW
8	9	47.11	36.17	962	11.37	375	187	25,131	1.50	196	95	NG

SEWER LINE		MANHOLE INVERT		EXISTING PIPE SPECIFICATION				ESTIMATED FLOW			COMENT	
From No	To No	Upstream I.L	Downstream I.L	Length (m)	Gradient (‰)	Diameter (mm)	Q_1=Capacity (l/s)	Contributing (E.P)	Peaking Factor	Q_2=M.H.F (l/s)	Q_1/Q_2 (%)	Judge
9	11	36.17	32.08	1,175	3.48	600	362	70,356	1.50	550	66	NG
				1,175	3.2	500	213				105	NEW
10	11	39.21	32.08	875	8.15	300	87	9,122	1.80	86	102	OK
11	13	32.08	27.50	875	5.23	600	444	82,446	1.50	644	69	NG
				875	3.2	500	213				102	NEW
12	13	50.00	27.50	2,049	10.98	375	184	19,637	1.60	164	112	OK
13	14	27.50	27.00	487	1.03	600	197	103,110	1.50	806	24	NG
				487	1.4	900	677				108	NEW
14	18-1	27.00	22.81	1,287	3.26	750	635	103,201	1.50	806	79	NG
				1,287	3.2	500	213				105	NEW
15	17	41.96	26.88	1,575	9.57	300	95	91	2.00	1	9977	OK
16	17	27.00	26.88	437	0.27	300	16	91	2.00	1	1690	OK
17	18-1	26.88	22.81	1,162	3.50	600	363	818	2.00	9	4263	OK
18-1	18-2				20.00	900	2559	104,019	1.50	813	315	OK
18-2	18-3				11.00	1050	2863	104,019	1.50	813	352	OK
18-3	39				6.00	1200	3018	104,110	1.50	813	371	OK
19	21	67.61	54.35	1,037	12.79	225	51	8,266	1.80	77	65	NG
				1,037	9.4	225	44				122	NEW
20	21	70.19	54.35	1,042	15.20	225	55	2,610	2.00	27	204	OK
21	23	54.35	51.29	338	9.05	225	43	12,779	1.60	106	40	NG
				338	6.4	300	77				113	NEW
22	23	69.50	51.29	1,262	14.43	225	54	6,313	1.80	59	91	NG
23	27	51.29	29.00	1,950	11.43	375	187	23,610	1.50	184	102	OK
24	26	38.09	32.84	1,275	4.12	375	112	2,699	2.00	28	400	OK
25	26	36.10	32.84	550	5.93	225	35	1,053	2.00	11	315	OK
26	27	32.84	29.00	812	4.73	375	121	4,710	2.00	49	246	OK

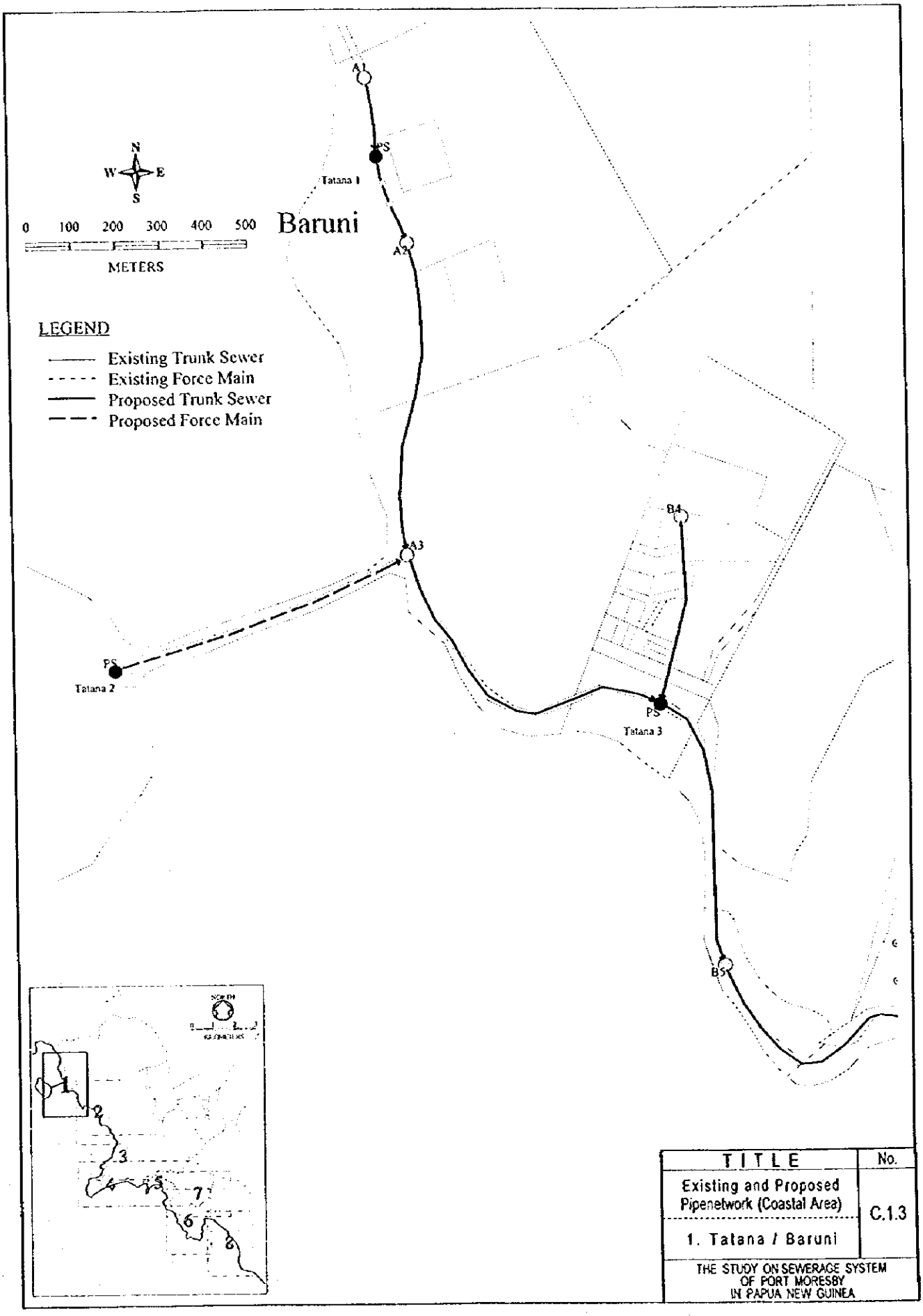
SEWER LINE		MANHOLE INVERT		EXISTING PIPE SPECIFICATION				ESTIMATED FLOW			COMENT	
From No	To No	Upstream I.L	Downstream I.L	Length (m)	Gradient (‰)	Diameter (mm)	Q_1=Capacity (l/s)	Contributing (E.P)	Peaking Factor	Q_2=M.H.F (l/s)	Q_1/Q_2 (%)	Judge
27	32	29.00	19.23	2,212	4.42	450	189	38,037	1.50	297	64	NG
				2,212	4.4	400	138				110	NEW
					36.00	600	1164					
28	31	26.88	22.73	700	5.93	225	35	4,635	2.00	48	72	NG
				700	9.4	225	44				162	NEW
29	31	26.21	22.73	587	5.93	225	35	2,167	2.00	23	153	OK
30	31	24.58	22.73	312	5.93	225	35	2,253	2.00	23	147	OK
31	32	22.73	19.23	2,320	1.51	300	38	14,588	1.60	122	31	NG
				2,320	5.2	350	105				117	NEW
32	38	19.23	12.31	1,225	5.65	525	323	17,825	1.60	149	217	OK
					23.00	675	1274					
33	35	43.00	24.26	1,737	10.79	300	100	10,182	1.60	85	118	OK
34	35	26.82	24.26	512	5.00	225	32	3,584	2.00	37	85	NG
				512	9.4	225	44				202	NEW
35	37	24.26	21.24	412	7.33	300	83	13,766	1.60	115	72	NG
				412	9.4	225	44				110	NEW
36	37	38.59	21.24	1,062	16.34	225	57	2,944	2.00	31	187	OK
37	38	21.24	12.31	1,762	5.07	375	125	18,868	1.60	157	79	NG
				1,762	9.4	225	44				107	NEW
38	39	12.31	8.03	1,225	3.49	600	363	25,566	1.50	200	182	OK
					4.20	750	721					
39	STP				5.40	1350	3920	186,556	1.50	1,457	269	OK
					3.49	600	363					
					4.20	750	721					
MORATA												
101	102	31.51	25.75	912	6.32	225	36	22,434	1.50	175	20	NG
				912	3.7	450	173				119	NEW
102	103	25.75	19.14	712	9.28	225	43	30,039	1.50	235	18	NG
				712	3.2	500	213				109	NEW

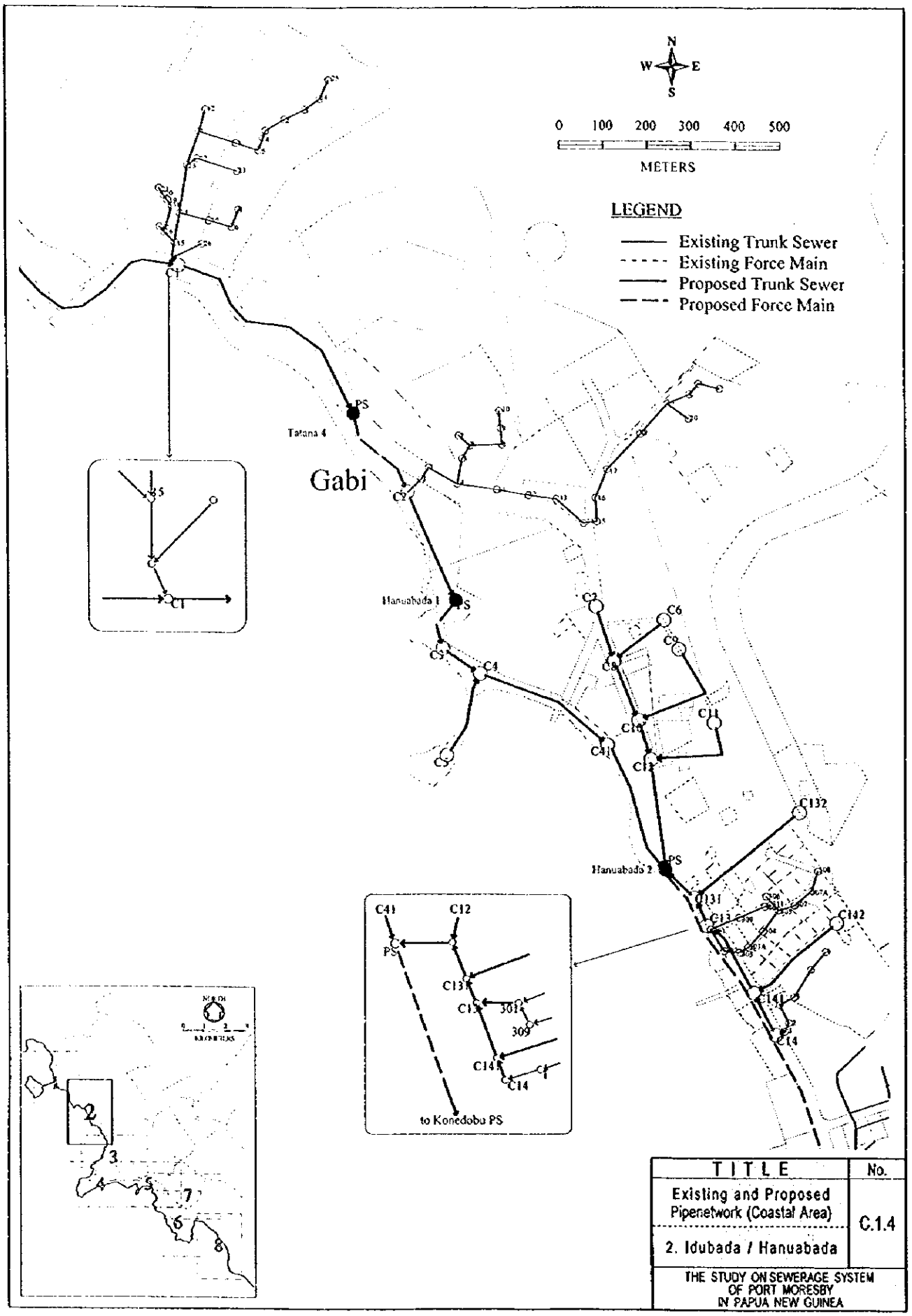
SEWER LINE		MANHOLE INVERT		EXISTING PIPE SPECIFICATION				ESTIMATED FLOW			COMENT	
From No	To No	Upstream I.L	Downstream I.L	Length (m)	Gradient (‰)	Diameter (mm)	Q_1=Capacity (l/s)	Contributing (E.P)	Peaking Factor	Q_2=M.H.F (l/s)	Q_1/Q_2 (%)	Judge
103	STP	19.14	14.88	1,712	2.49	450	142	35,559	1.50	278	51	NG
				1,712	4.4	400	138				101	NEW
GEREHU												
201	203	22.65	19.97	462	5.80	225	34	10,513	1.60	88	39	NG
				462	6.4	300	77				127	NEW
202	203	21.53	19.97	312	5.00	225	32	4,995	2.00	52	61	NG
				312	9.4	225	44				145	NEW
203	208	19.97	12.74	1,362	5.31	375	128	31,647	1.50	247	52	NG
				1,362	4.4	400	138				107	NEW
204	205	22.20	18.79	750	4.55	150	10	640	2.00	7	154	OK
205	206	18.79	16.95	450	4.09	225	29	1,839	2.00	19	150	OK
206	207	16.95	15.37	325	4.86	225	31	2,424	2.00	25	124	OK
207	208	15.37	12.74	487	5.40	225	33	9,904	1.80	93	36	NG
				487	6.4	300	77				119	NEW
208	STP	12.74	11.06	300	5.60	525	322	41,551	1.50	325	99	NG

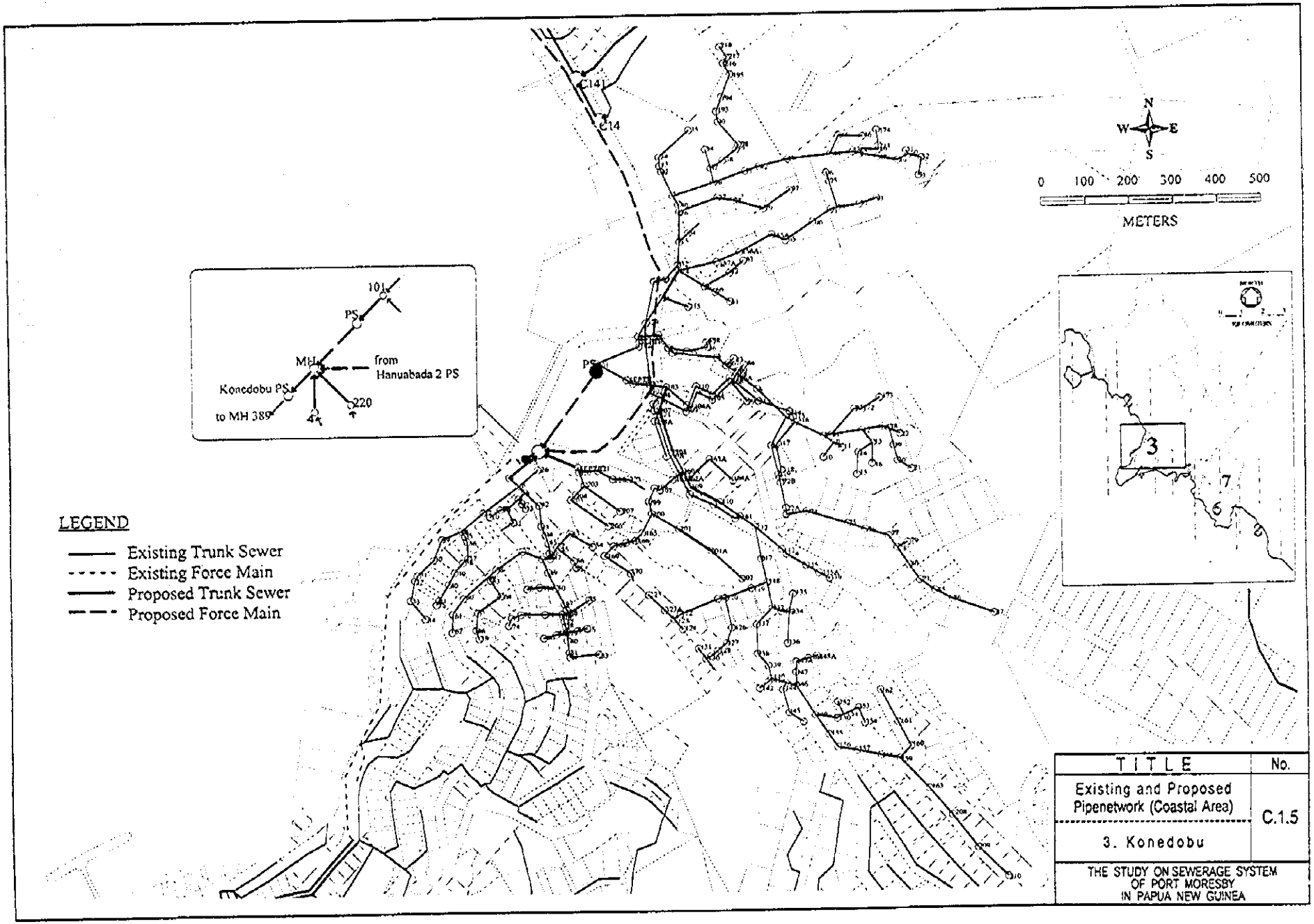
Note; M.H.F-Maximum Hourly Flow

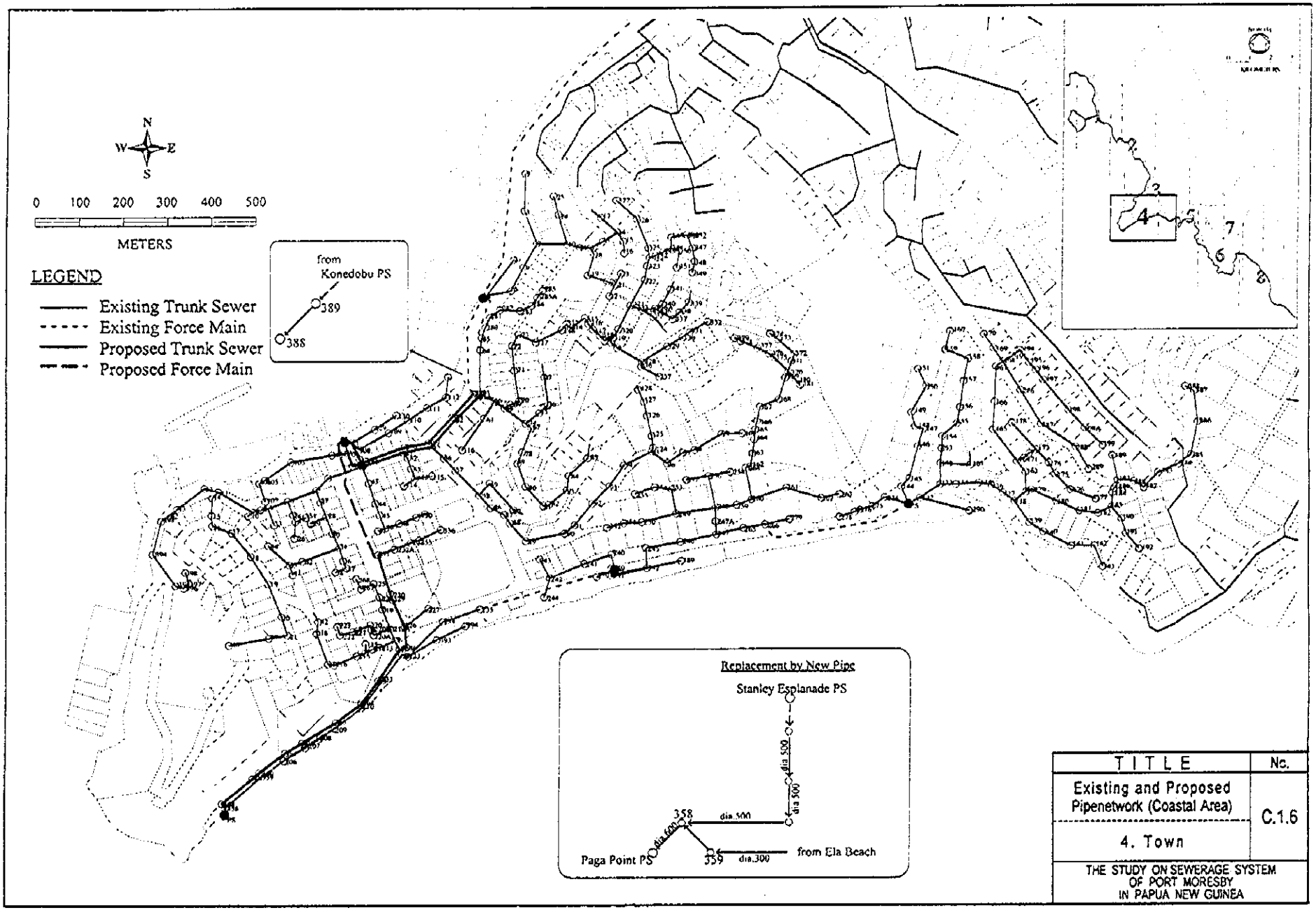
C.1.2 Hydraulic analysis of sewer pipes in Coastal Area (1995, 2005, 2015)

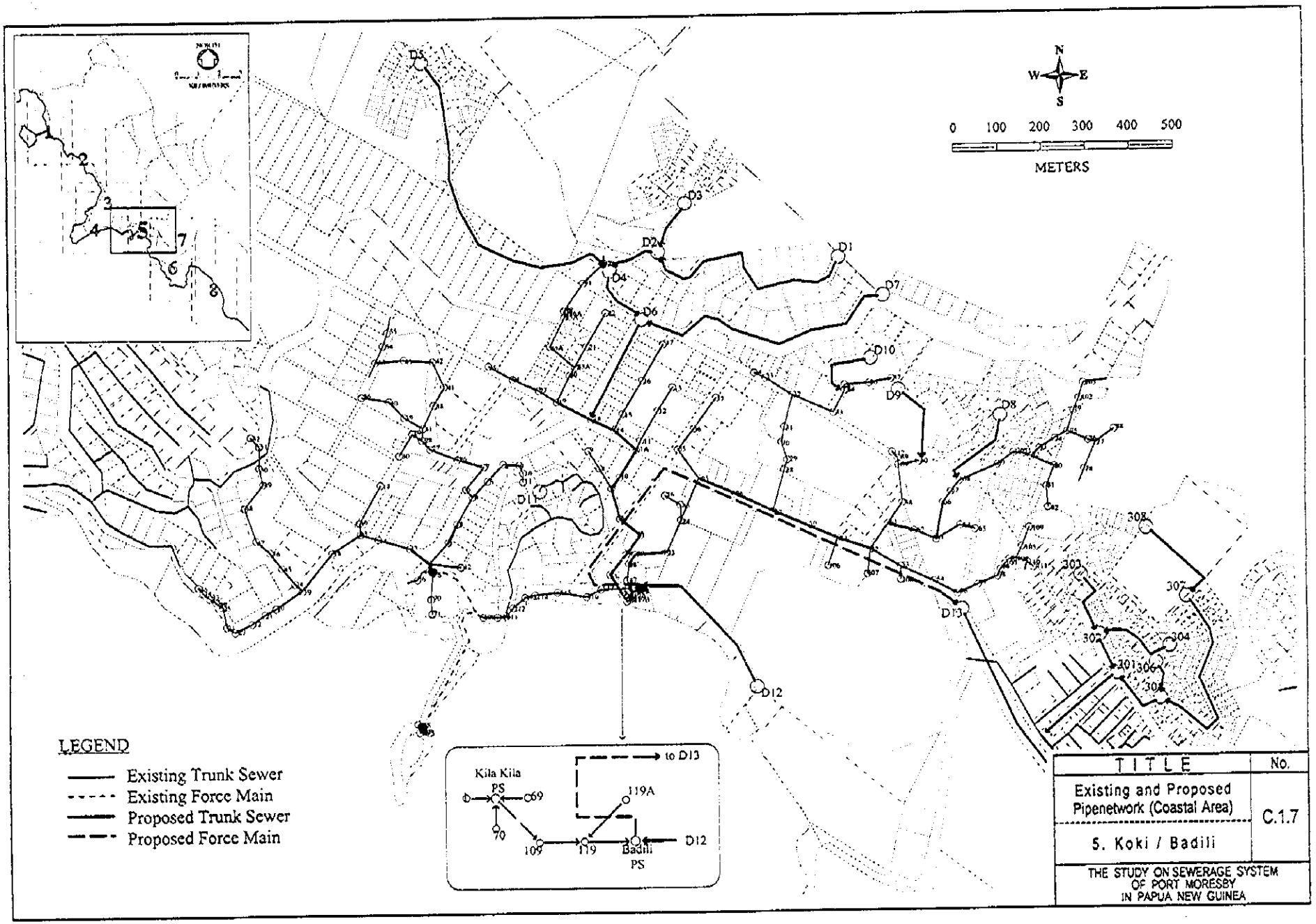
Analysis of existing trunk sewer pipes in coastal area for the years 1995, 2005, 2015 are shown in following figures and tables.

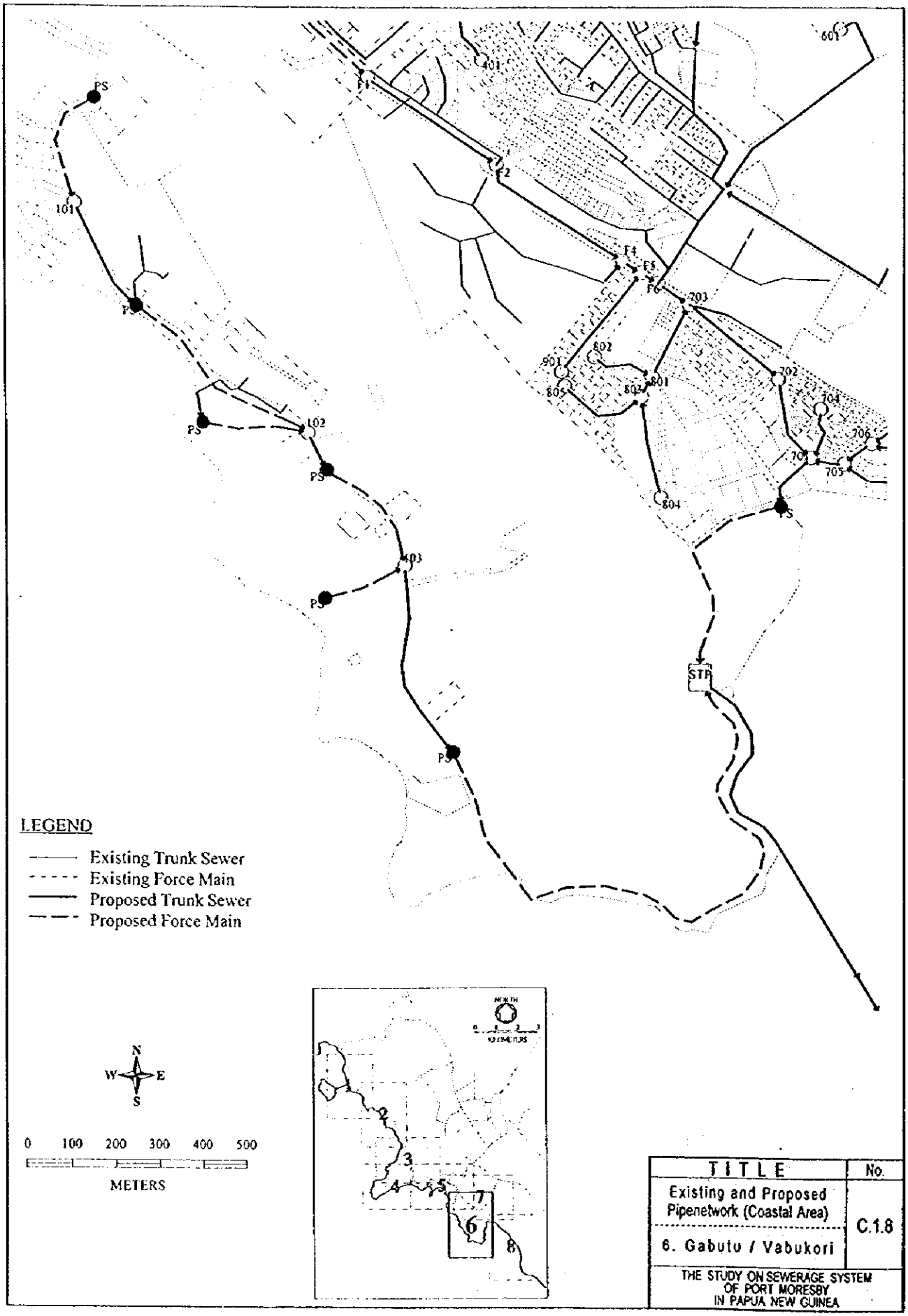

N
W
E
S
0 100 200 300 400 500
METERS
Baruni
LEGEND
Existing Trunk Sewer
Existing Force Main
Proposed Trunk Sewer
Proposed Force Main
A1
PS
Tatana 1
A2
A3
B4
PS
Tatana 2
PS
Tatana 3
B5
TITLE
No.
Existing and Proposed Pipenetwork (Coastal Area)
C.1.3
1. Tatana / Baruni
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA

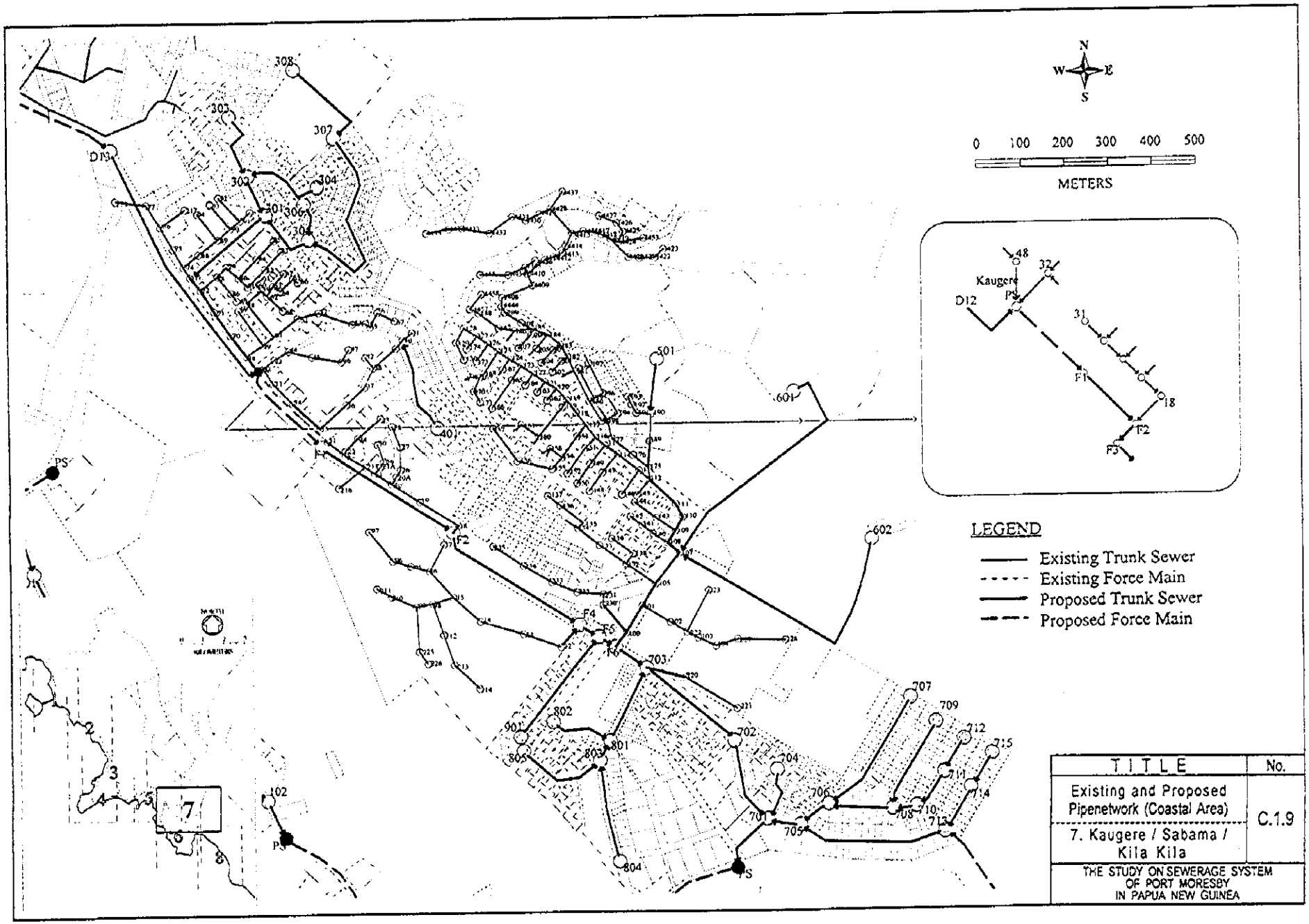

N
W
E
S
0 100 200 300 400 500
METERS
LEGEND
Existing Trunk Sewer
Existing Force Main
Proposed Trunk Sewer
Proposed Force Main
Gabi
Tatana 4
Hanuabada 1
Hanuabada 2
PS
C1
C2
C3
C4
C5
C6
C8
C9
C10
C11
C12
C13
C14
C131
C132
C142
C41
301
309
to Konedobu PS
2
3
4
5
6
7
8
TITLE
Existing and Proposed Pipenetwork (Coastal Area)
2. Idubada / Hanuabada
No.
C.1.4
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA


LEGEND
Existing Trunk Sewer
Existing Force Main
Proposed Trunk Sewer
Proposed Force Main
Konedobu PS
to MH 389
MH
PS
101
220
from
Hanuabada 2 PS
C14
N
W
E
S
0 100 200 300 400 500
METERS
3
7
6
TITLE
Existing and Proposed Pipenetwork (Coastal Area)
3. Konedobu
No.
C.1.5
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA

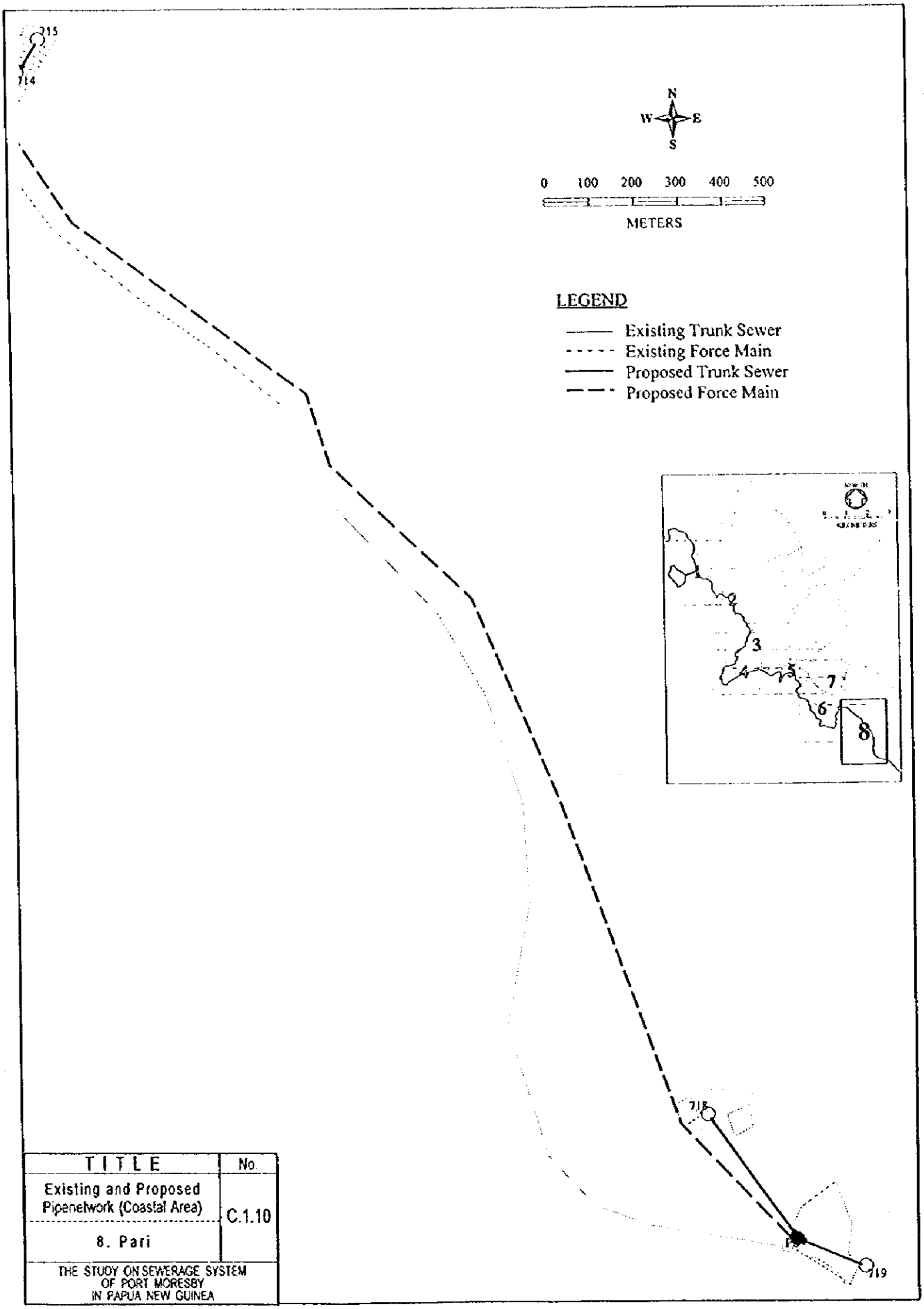

N
W
E
S
0 100 200 300 400 500
METERS
LEGEND
Existing Trunk Sewer
Existing Force Main
Proposed Trunk Sewer
Proposed Force Main
from
Konedobu PS
389
388
Replacement by New Pipe
Stanley Esplanade PS
dia.500
dia.500
358
dia.500
dia.600
Paga Point PS
359
dia.300
from Ela Beach
TITLE
Existing and Proposed
Pipenetwork (Coastal Area)
4. Town
No.
C.1.6
THE STUDY ON SEWERAGE SYSTEM
OF PORT MORESBY
IN PAPUA NEW GUINEA


N
W
E
S
0 100 200 300 400 500
METERS
LEGEND
Existing Trunk Sewer
Existing Force Main
Proposed Trunk Sewer
Proposed Force Main
Kila Kila PS
to D13
119A
D12
Badili PS
109
119
70
69
TITLE
No.
Existing and Proposed Pipenetwork (Coastal Area)
C.1.7
5. Koki / Badili
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA


LEGEND
Existing Trunk Sewer
Existing Force Main
Proposed Trunk Sewer
Proposed Force Main
N
W
E
S
0 100 200 300 400 500
METERS
STP
PS
101
102
103
201
202
203
204
205
206
301
401
601
701
702
703
704
705
801
802
803
804
805
901
F1
F2
F4
F5
F6
1
2
3
4
5
6
7
8
TITLE
Existing and Proposed Pipenetwork (Coastal Area)
6. Gabutu / Vabukori
No.
C.1.8
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA



TITLE	No.
Existing and Proposed Pipenetwork (Coastal Area)	C.1.9
7. Kaugere / Sabama / Kila Kila	
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA	


N
W
E
S
0 100 200 300 400 500
METERS
LEGEND
Existing Trunk Sewer
Existing Force Main
Proposed Trunk Sewer
Proposed Force Main
3
5
7
6
8
715
714
718
719
TITLE
No.
Existing and Proposed Pipenetwork (Coastal Area)
C.1.10
8. Pari
THE STUDY ON SEWERAGE SYSTEM OF PORT MORESBY IN PAPUA NEW GUINEA

Analyses of Existing Sewer Pipelines for the years 1995, 2005, 2015

Table C.1.2 Analyses of Existing Sewer Pipelines for the years 1995, 2005, 2015

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
Ela Beach																			
388	387	93.40	92.22	22	53.6	150	35.3	86	0.9	3937%	OK	106	1.1	3194%	OK	119	1.2	2845%	OK
387	386	92.22	91.04	72	16.4	150	19.5	86	0.9	2176%	OK	106	1.1	1766%	OK	119	1.2	1573%	OK
386	385	91.04	89.30	77	22.6	150	22.9	86	0.9	2556%	OK	106	1.1	2073%	OK	119	1.2	1847%	OK
385	384	89.30	88.50	37	21.6	150	22.4	86	0.9	2500%	OK	106	1.1	2028%	OK	119	1.2	1807%	OK
384	383	88.50	87.22	49	26.1	150	24.6	124	1.3	1906%	OK	159	1.7	1486%	OK	180	1.9	1313%	OK
383	382	87.22	86.30	48	19.2	150	21.1	124	1.3	1632%	OK	159	1.7	1273%	OK	180	1.9	1124%	OK
382	188	86.30	85.34	27	35.6	150	28.7	124	1.3	2223%	OK	159	1.7	1734%	OK	180	1.9	1532%	OK
188	187	85.34	82.31	38	79.7	150	43.0	124	1.3	3329%	OK	159	1.7	2596%	OK	180	1.9	2294%	OK
189	187	91.56	82.31	57	162.3	150	61.4	44	0.5	13386%	OK	51	0.5	11548%	OK	55	0.6	10708%	OK
187	186	82.31	82.15	14	11.4	150	16.3	203	2.1	770%	OK	260	2.7	601%	OK	296	3.1	528%	OK
186	185	82.15	81.44	9	78.9	150	42.8	203	2.1	2023%	OK	260	2.7	1579%	OK	296	3.1	1387%	OK
185	184	81.44	79.22	9	246.7	150	75.6	203	2.1	3577%	OK	260	2.7	2793%	OK	296	3.1	2453%	OK
184	183	79.22	55.55	33	717.3	150	129.0	203	2.1	6100%	OK	260	2.7	4762%	OK	296	3.1	4183%	OK
192	191	66.94	59.43	46	163.3	150	61.5	35	0.4	16878%	OK	50	0.5	11815%	OK	61	0.6	9684%	OK
191	190	59.43	57.37	35	58.9	150	36.9	35	0.4	10134%	OK	50	0.5	7094%	OK	61	0.6	5815%	OK
190	183	57.37	55.55	36	50.6	150	34.2	35	0.4	9392%	OK	50	0.5	6575%	OK	61	0.6	5389%	OK
183	182	55.55	55.43	33	3.6	150	9.2	273	2.8	323%	OK	360	3.8	245%	OK	418	4.4	211%	OK
182	181	55.43	54.53	43	20.9	150	22.0	273	2.8	775%	OK	360	3.8	588%	OK	418	4.4	506%	OK
181	180	54.53	45.82	58	150.2	150	59.0	273	2.8	2075%	OK	360	3.8	1574%	OK	418	4.4	1355%	OK
180	179	45.82	30.27	63	246.8	150	75.7	273	2.8	2661%	OK	360	3.8	2018%	OK	418	4.4	1738%	OK
179	162	30.27	19.32	13	842.3	150	139.8	273	2.8	4915%	OK	360	3.8	3727%	OK	418	4.4	3210%	OK
199	198A	94.17	92.88	59	21.9	150	22.5	50	0.5	4324%	OK	54	0.6	4003%	OK	57	0.6	3793%	OK
198A	198	92.88	91.73	56	20.5	150	21.8	50	0.5	4190%	OK	54	0.6	3880%	OK	57	0.6	3676%	OK
198	197	91.73	82.84	89	99.9	150	48.1	50	0.5	9241%	OK	54	0.6	8557%	OK	57	0.6	8107%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
197	196	82.84	81.75	29	37.6	150	29.5	50	0.5	5669%	OK	54	0.6	5249%	OK	57	0.6	4973%	OK
196	195	81.75	77.64	23	178.7	150	64.4	50	0.5	12361%	OK	54	0.6	11445%	OK	57	0.6	10843%	OK
195	194	77.64	75.60	35	58.3	150	36.8	50	0.5	7059%	OK	54	0.6	6536%	OK	57	0.6	6192%	OK
194	193	75.60	64.37	23	488.3	150	106.4	50	0.5	20432%	OK	54	0.6	18918%	OK	57	0.6	17923%	OK
193	168	64.37	53.04	24	472.1	150	104.6	50	0.5	20091%	OK	54	0.6	18602%	OK	57	0.6	17623%	OK
289	288	85.51	76.40	60	151.9	150	59.3	44	0.5	12949%	OK	51	0.5	11172%	OK	55	0.6	10359%	OK
288	287	76.40	67.14	95	97.5	150	47.5	44	0.5	10374%	OK	51	0.5	8950%	OK	55	0.6	8299%	OK
287	286	67.14	60.23	91	75.9	150	42.0	44	0.5	9156%	OK	51	0.5	7900%	OK	55	0.6	7325%	OK
286	168	60.23	53.04	76	94.6	150	46.8	44	0.5	10220%	OK	51	0.5	8817%	OK	55	0.6	8176%	OK
170	169	57.47	54.13	37	90.3	150	45.8	44	0.5	9983%	OK	51	0.5	8613%	OK	55	0.6	7987%	OK
169	168	54.13	53.04	39	27.9	150	25.5	44	0.5	5555%	OK	51	0.5	4793%	OK	55	0.6	4444%	OK
168	167	53.04	51.47	19	82.6	150	43.8	138	1.4	3045%	OK	156	1.6	2694%	OK	167	1.7	2517%	OK
167	166	51.47	41.19	80	128.5	150	54.6	138	1.4	3798%	OK	156	1.6	3360%	OK	167	1.7	3138%	OK
166	165	41.19	35.47	65	88.0	150	45.2	138	1.4	3143%	OK	156	1.6	2780%	OK	167	1.7	2597%	OK
165	164	35.47	45.27	91	107.7	150	50.0	138	1.4	3477%	OK	156	1.6	3076%	OK	167	1.7	2873%	OK
177	176	73.13	64.55	62	138.4	150	56.7	35	0.4	15539%	OK	50	0.5	10878%	OK	61	0.6	8916%	OK
176	175	64.55	54.00	51	206.9	150	69.3	35	0.4	18999%	OK	50	0.5	13299%	OK	61	0.6	10901%	OK
175	174	54.00	51.15	29	98.3	150	47.7	35	0.4	13095%	OK	50	0.5	9167%	OK	61	0.6	7514%	OK
174	173	51.15	48.33	41	68.8	150	39.9	35	0.4	10955%	OK	50	0.5	7669%	OK	61	0.6	6286%	OK
178	173	56.60	48.33	83	99.6	150	48.1	35	0.4	13186%	OK	50	0.5	9230%	OK	61	0.6	7566%	OK
173	172	48.33	31.06	18	959.4	150	149.2	105	1.1	13639%	OK	150	1.6	9547%	OK	183	1.9	7826%	OK
172	171	31.06	25.43	17	331.2	150	87.6	105	1.1	8013%	OK	150	1.6	5609%	OK	183	1.9	4598%	OK
171	164	25.43	45.27	17	1167.1	150	164.5	105	1.1	15042%	OK	150	1.6	10530%	OK	183	1.9	8631%	OK
164	163	45.27	23.01	32	695.6	150	127.0	278	2.9	4386%	OK	356	3.7	3425%	OK	411	4.3	2967%	OK
163	162	23.01	19.32	45	82.0	150	43.6	278	2.9	1506%	OK	356	3.7	1176%	OK	411	4.3	1019%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
162	138	19.32	16.11	34	94.4	150	46.8	551	5.7	815%	OK	716	7.5	627%	OK	829	8.6	542%	OK
143	142	23.34	21.75	52	30.6	225	78.5	35	0.4	21536%	OK	50	0.5	15075%	OK	61	0.6	12357%	OK
142	141	21.75	12.43	53	175.8	225	188.3	35	0.4	51646%	OK	50	0.5	36152%	OK	61	0.6	29633%	OK
141	140	12.43	14.39	72	27.2	225	74.1	35	0.4	20320%	OK	50	0.5	14224%	OK	61	0.6	11659%	OK
140	139	14.39	16.32	38	50.8	225	101.2	35	0.4	27756%	OK	50	0.5	19429%	OK	61	0.6	15925%	OK
139	138	16.32	16.11	60	3.5	225	26.6	35	0.4	7286%	OK	50	0.5	5100%	OK	61	0.6	4181%	OK
138	137	16.11	3.40	32	397.2	225	283.0	667	6.9	4073%	OK	860	9.0	3159%	OK	990	10.3	2744%	OK
137	136	3.40	8.05	32	145.3	225	171.2	667	6.9	2464%	OK	860	9.0	1911%	OK	990	10.3	1660%	OK
136	135	8.05	5.63	30	80.7	225	127.5	667	6.9	1835%	OK	860	9.0	1424%	OK	990	10.3	1237%	OK
135	134	5.63	2.18	51	67.6	225	116.8	667	6.9	1681%	OK	860	9.0	1304%	OK	990	10.3	1132%	OK
134	133	2.18	0.62	35	44.6	225	94.8	667	6.9	1364%	OK	860	9.0	1058%	OK	990	10.3	919%	OK
160	159	54.34	46.91	43	172.8	150	63.3	54	0.6	11254%	OK	89	0.9	6828%	OK	117	1.2	5194%	OK
159	158	46.91	45.99	56	16.4	150	19.5	134	1.4	1398%	OK	146	1.5	1284%	OK	217	2.3	864%	OK
158	157	45.99	35.89	53	190.6	150	66.5	134	1.4	4763%	OK	146	1.5	4371%	OK	217	2.3	2941%	OK
157	156	35.89	30.17	60	95.3	150	47.0	134	1.4	3369%	OK	146	1.5	3092%	OK	217	2.3	2080%	OK
156	155	30.17	23.02	38	188.2	150	66.1	134	1.4	4733%	OK	146	1.5	4344%	OK	217	2.3	2923%	OK
155	154	23.02	12.99	45	222.9	150	71.9	134	1.4	5151%	OK	146	1.5	4728%	OK	217	2.3	3181%	OK
154	153	12.99	8.12	28	173.9	150	63.5	134	1.4	4550%	OK	146	1.5	4176%	OK	217	2.3	2810%	OK
153	152	8.12	3.17	34	145.6	150	58.1	134	1.4	4163%	OK	146	1.5	3821%	OK	217	2.3	2571%	OK
161	152	17.51	3.17	68	210.9	150	69.9	80	0.8	8392%	OK	92	1.0	7298%	OK	100	1.0	6714%	OK
152	133	3.17	0.62	49	52.0	150	34.7	294	3.1	1134%	OK	330	3.4	1011%	OK	417	4.3	800%	OK
133	132	0.62	0.01	55	11.1	225	47.3	961	10.0	472%	OK	1190	12.4	381%	OK	1407	14.7	323%	OK
290	132	0.48	0.01	115	4.1	150	9.7	53	0.6	1764%	OK	61	0.6	1532%	OK	66	0.7	1416%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
132	PS	0.01	-0.10	29	3.8	225	27.7	1014	10.6	262%	OK	1251	13.0	212%	OK	1473	15.3	180%	OK
151	150	31.95	25.70	44	142.0	150	57.4	58	0.6	9500%	OK	95	1.0	5800%	OK	123	1.3	4480%	OK
150	149	25.70	18.24	69	108.1	150	50.1	58	0.6	8288%	OK	95	1.0	5060%	OK	123	1.3	3908%	OK
149	148	18.24	16.90	34	39.4	150	30.2	58	0.6	5004%	OK	95	1.0	3055%	OK	123	1.3	2360%	OK
148	147	16.90	16.69	19	11.1	150	16.0	58	0.6	2650%	OK	95	1.0	1618%	OK	123	1.3	1250%	OK
147	146	16.69	11.81	42	116.2	150	51.9	58	0.6	8592%	OK	95	1.0	5246%	OK	123	1.3	4052%	OK
146	145	11.81	3.72	75	107.9	150	50.0	58	0.6	8279%	OK	95	1.0	5054%	OK	123	1.3	3904%	OK
145	144	3.72	0.88	27	105.2	150	49.4	58	0.6	8175%	OK	95	1.0	4991%	OK	123	1.3	3855%	OK
144	PS	0.88	-0.10	44	22.3	150	22.7	58	0.6	3762%	OK	95	1.0	2297%	OK	123	1.3	1774%	OK
278	277	9.83	3.05	35	193.7	150	67.0	54	0.6	11916%	OK	89	0.9	7230%	OK	117	1.2	5500%	OK
277	276	3.05	0.72	14	166.4	150	62.1	54	0.6	11045%	OK	89	0.9	6702%	OK	117	1.2	5098%	OK
276	275	0.72	0.51	28	7.5	150	13.2	54	0.6	2345%	OK	89	0.9	1423%	OK	117	1.2	1082%	OK
275	274	0.51	0.29	35	6.3	150	12.1	54	0.6	2147%	OK	89	0.9	1302%	OK	117	1.2	991%	OK
274	PS	0.29		56	5.2	150	11.0	54	0.6	1948%	OK	89	0.9	1182%	OK	117	1.2	899%	OK
PS	266	6.00	0.64	358	15.0	150	18.6	1126	11.7	159%	OK	1435	14.9	125%	OK	1713	17.8	104%	OK
279	266	1.08	0.64	56	7.9	150	13.5	54	0.6	2400%	OK	89	0.9	1456%	OK	117	1.2	1108%	OK
266	265	0.64	0.43	50	4.2	225	29.1	1234	12.9	226%	OK	1613	16.8	173%	OK	1947	20.3	143%	OK
265	247	0.43	0.27	63	2.5	225	22.6	1234	12.9	176%	OK	1613	16.8	135%	OK	1947	20.3	112%	OK
379	378	43.09	42.33	16	47.5	150	33.2	41	0.4	7772%	OK	53	0.6	6012%	OK	58	0.6	5494%	OK
378	377	42.33	41.11	41	29.8	150	26.3	41	0.4	6151%	OK	53	0.6	4758%	OK	58	0.6	4348%	OK
377	376	41.11	39.03	29	71.7	150	40.8	41	0.4	9550%	OK	53	0.6	7388%	OK	58	0.6	6751%	OK
376	375	39.03	37.99	16	65.0	150	38.8	41	0.4	9091%	OK	53	0.6	7033%	OK	58	0.6	6427%	OK
375	370	37.99	36.78	45	26.9	150	25.0	41	0.4	5847%	OK	53	0.6	4523%	OK	58	0.6	4133%	OK
374	373	42.01	40.21	22	81.8	150	43.6	37	0.4	11303%	OK	47	0.5	8898%	OK	54	0.6	7744%	OK
373	372	40.21	38.92	51	25.3	150	24.2	37	0.4	6284%	OK	47	0.5	4947%	OK	54	0.6	4306%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
372	371	38.92	37.79	17	66.5	150	39.3	37	0.4	10187%	OK	47	0.5	8020%	OK	54	0.6	6980%	OK
371	370	37.79	36.78	26	38.8	150	30.0	37	0.4	7788%	OK	47	0.5	6131%	OK	54	0.6	5336%	OK
381	380	38.23	37.21	17	60.0	150	37.3	37	0.4	9679%	OK	47	0.5	7620%	OK	54	0.6	6632%	OK
380	370	37.21	36.78	25	17.2	150	20.0	37	0.4	5182%	OK	47	0.5	4080%	OK	54	0.6	3551%	OK
370	369	36.78	35.55	16	76.9	150	42.2	152	1.6	2667%	OK	194	2.0	2090%	OK	220	2.3	1843%	OK
369	368	35.55	33.89	51	32.5	150	27.5	152	1.6	1735%	OK	194	2.0	1360%	OK	220	2.3	1199%	OK
368	367	33.89	32.44	46	31.5	150	27.0	152	1.6	1708%	OK	194	2.0	1338%	OK	220	2.3	1180%	OK
367	366	32.44	30.01	34	71.5	150	40.7	152	1.6	2571%	OK	194	2.0	2015%	OK	220	2.3	1777%	OK
366	365	30.01	28.99	20	51.0	150	34.4	152	1.6	2172%	OK	194	2.0	1702%	OK	220	2.3	1501%	OK
365	364	28.99	27.66	23	57.8	150	36.6	173	1.8	2032%	OK	215	2.2	1635%	OK	241	2.5	1459%	OK
364	363	27.66	26.75	33	27.6	150	25.3	173	1.8	1403%	OK	215	2.2	1129%	OK	241	2.5	1007%	OK
363	362	26.75	25.01	29	60.0	150	37.3	173	1.8	2070%	OK	215	2.2	1666%	OK	241	2.5	1486%	OK
362	264	25.01	22.71	12	191.7	150	66.7	173	1.8	3700%	OK	215	2.2	2977%	OK	241	2.5	2656%	OK
264	260	22.71	12.28	74	140.9	150	57.2	173	1.8	3173%	OK	215	2.2	2553%	OK	241	2.5	2278%	OK
263	262	33.78	28.75	41	122.7	150	53.3	21	0.2	24385%	OK	21	0.2	24385%	OK	21	0.2	24385%	OK
262	261	28.75	22.21	84	77.9	150	42.5	21	0.2	19426%	OK	21	0.2	19426%	OK	21	0.2	19426%	OK
261	260	22.21	12.28	82	121.1	150	53.0	21	0.2	24227%	OK	21	0.2	24227%	OK	21	0.2	24227%	OK
260	259	12.28	9.62	36	73.9	150	41.4	215	2.2	1848%	OK	257	2.7	1546%	OK	283	2.9	1404%	OK
259	248	9.62	2.92	48	139.6	150	56.9	215	2.2	2541%	OK	257	2.7	2125%	OK	283	2.9	1930%	OK
255	254	20.52	16.04	47	95.3	150	47.0	85	0.9	5310%	OK	85	0.9	5310%	OK	85	0.9	5310%	OK
254	253	16.04	13.46	39	66.2	150	39.2	85	0.9	4424%	OK	85	0.9	4424%	OK	85	0.9	4424%	OK
253	249	13.46	3.63	57	172.5	150	63.2	85	0.9	7143%	OK	85	0.9	7143%	OK	85	0.9	7143%	OK
252	251	10.73	4.86	40	146.8	150	58.3	85	0.9	6589%	OK	85	0.9	6589%	OK	85	0.9	6589%	OK
251	250	4.86	4.45	40	10.3	150	15.4	85	0.9	1741%	OK	85	0.9	1741%	OK	85	0.9	1741%	OK
250	249	4.45	3.63	80	10.3	150	15.4	85	0.9	1741%	OK	85	0.9	1741%	OK	85	0.9	1741%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
249	248	3.63	2.92	90	7.9	150	13.5	255	2.7	509%	OK	255	2.7	509%	OK	255	2.7	509%	OK
258	256	21.27	15.96	50	106.2	150	49.6	21	0.2	22688%	OK	21	0.2	22688%	OK	21	0.2	22688%	OK
257	256	18.26	15.96	50	46.0	150	32.7	21	0.2	14932%	OK	21	0.2	14932%	OK	21	0.2	14932%	OK
256	248	15.96	2.92	76	171.6	150	63.1	63	0.7	9613%	OK	63	0.7	9613%	OK	63	0.7	9613%	OK
248	247A	2.92	1.09	31	59.0	150	37.0	533	5.6	666%	OK	575	6.0	618%	OK	601	6.3	591%	OK
247A	247	1.09	0.27	30	27.3	150	25.2	533	5.6	453%	OK	575	6.0	420%	OK	601	6.3	402%	OK
247	246	0.27	-0.09	84	4.3	225	29.4	1783	18.6	158%	OK	2162	22.5	131%	OK	2496	26.0	113%	OK
246	245	-0.09	-0.44	79	4.4	225	29.9	1783	18.6	161%	OK	2162	22.5	133%	OK	2496	26.0	115%	OK
245	342	-0.44	-0.70	47	5.5	225	33.4	1783	18.6	180%	OK	2162	22.5	148%	OK	2496	26.0	128%	OK
389	342	-0.32	-0.70	80	4.8	150	10.5	16	0.2	6298%	OK	16	0.2	6298%	OK	16	0.2	6298%	OK
342	341	-0.70	-0.88	82	2.2	225	21.0	1815	18.9	111%	OK	2194	22.9	92%	NG	2528	26.3	80%	NG
		-0.70	-0.88	82	2.2	250	27.9	1815	18.9	147%	New	2194	22.9	122%	New	2528	26.3	106%	New
341	PS	-0.88	-0.92	17	2.4	225	21.8	1815	18.9	115%	OK	2194	22.9	95%	NG	2528	26.3	83%	NG
		-0.88	-0.92	17	2.4	250	28.8	1815	18.9	153%	New	2194	22.9	126%	New	2528	26.3	110%	New
244	242	10.76	0.62	42	241.4	150	74.8	16	0.2	44898%	OK	16	0.2	44898%	OK	16	0.2	44898%	OK
243	242	2.80	0.62	50	43.6	150	31.8	16	0.2	19080%	OK	16	0.2	19080%	OK	16	0.2	19080%	OK
242	241	0.62	-0.05	85	7.9	150	13.5	48	0.5	2704%	OK	48	0.5	2704%	OK	48	0.5	2704%	OK
241	240	-0.05	-0.63	64	9.1	150	14.5	48	0.5	2900%	OK	48	0.5	2900%	OK	48	0.5	2900%	OK
240	PS	-0.63	-0.92	35	8.3	225	40.9	48	0.5	8174%	OK	48	0.5	8174%	OK	48	0.5	8174%	OK
270	PS	-0.23	-0.92	43	16.0	150	19.3	16	0.2	11575%	OK	16	0.2	11575%	OK	16	0.2	11575%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
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PS	235	3.00	1.72	319	4.0	300	61.3	1879	19.6	313%	OK	2258	23.5	260%	OK	2592	27.0	227%	OK
235	234	1.72	1.55	90	1.9	300	42.0	1911	19.9	211%	OK	2290	23.9	176%	OK	2624	27.3	154%	OK
234	233	1.55	1.32	112	2.1	300	43.8	1911	19.9	220%	OK	2290	23.9	184%	OK	2624	27.3	160%	OK
394	393	2.33	2.01	72	4.4	150	10.2	32	0.3	3046%	OK	32	0.3	3046%	OK	32	0.3	3046%	OK
393	233	2.01	1.32	75	9.2	150	14.6	32	0.3	4382%	OK	32	0.3	4382%	OK	32	0.3	4382%	OK
233	212	1.32	1.28	14	2.9	300	51.7	1975	20.6	251%	OK	2354	24.5	211%	OK	2688	28.0	185%	OK
212	211	1.28	1.01	74	3.6	300	58.4	1975	20.6	284%	OK	2354	24.5	238%	OK	2688	28.0	209%	OK
211	210	1.01	0.78	79	2.9	300	52.2	1975	20.6	254%	OK	2354	24.5	213%	OK	2688	28.0	186%	OK
210	209	0.78	0.54	75	3.2	300	54.7	2103	21.9	250%	OK	2519	26.2	208%	OK	2853	29.7	184%	OK
209	208	9.54	0.42	39	233.8	300	467.6	2103	21.9	2135%	OK	2519	26.2	1782%	OK	2853	29.7	1573%	OK
208	207	0.42	0.24	41	4.4	300	64.1	2103	21.9	292%	OK	2519	26.2	244%	OK	2853	29.7	216%	OK
207	206	0.24	0.06	58	3.1	300	53.9	2103	21.9	246%	OK	2519	26.2	205%	OK	2853	29.7	181%	OK
206	359	0.06	-0.12	58	3.1	300	53.9	2103	21.9	246%	OK	2519	26.2	205%	OK	2853	29.7	181%	OK
359	358	-0.12	-0.40	111	2.5	300	48.6	2103	21.9	222%	OK	2519	26.2	185%	OK	2853	29.7	163%	OK
Stanley Esplanade(1)																			
100	99	44.88	43.87	47	21.5	150	22.3	37	0.4	5792%	OK	47	0.5	4560%	OK	54	0.6	3969%	OK
99	98	43.87	43.27	71	8.5	150	14.0	37	0.4	3632%	OK	47	0.5	2860%	OK	54	0.6	2489%	OK
98	97	43.27	42.88	27	14.4	150	18.3	37	0.4	4749%	OK	47	0.5	3739%	OK	54	0.6	3254%	OK
97	96	42.88	41.86	43	23.7	150	23.5	37	0.4	6086%	OK	47	0.5	4791%	OK	54	0.6	4170%	OK
96	95	41.86	39.38	44	56.4	150	36.2	37	0.4	9381%	OK	47	0.5	7385%	OK	54	0.6	6428%	OK
128	127	109.57	104.24	30	177.7	150	64.2	37	0.4	16655%	OK	47	0.5	13112%	OK	54	0.6	11412%	OK
127	126	104.24	89.08	33	459.4	150	103.2	37	0.4	26782%	OK	47	0.5	21084%	OK	54	0.6	18351%	OK
126	125	89.08	55.12	48	707.5	150	128.1	37	0.4	33237%	OK	47	0.5	26165%	OK	54	0.6	22773%	OK
125	124	55.12	45.40	27	360.0	150	91.4	37	0.4	23708%	OK	47	0.5	18664%	OK	54	0.6	16245%	OK
124	95	45.40	39.38	9	668.9	150	124.6	37	0.4	32317%	OK	47	0.5	25441%	OK	54	0.6	22143%	OK
95	94	39.38	38.51	71	12.3	150	16.9	111	1.2	1458%	OK	141	1.5	1148%	OK	162	1.7	999%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
94	93	38.51	38.05	58	7.9	150	13.6	111	1.2	1173%	OK	141	1.5	923%	OK	162	1.7	804%	OK
93	92	38.05	34.85	56	57.1	150	36.4	111	1.2	3149%	OK	141	1.5	2479%	OK	162	1.7	2157%	OK
92	91	34.85	34.24	63	9.7	150	15.0	111	1.2	1296%	OK	141	1.5	1020%	OK	162	1.7	888%	OK
91	90	34.24	33.62	30	20.7	150	21.9	111	1.2	1894%	OK	141	1.5	1491%	OK	162	1.7	1297%	OK
90	89	33.62	33.04	90	6.4	150	12.2	111	1.2	1057%	OK	141	1.5	832%	OK	162	1.7	724%	OK
89	88	33.04	32.68	55	6.5	150	12.3	130	1.4	910%	OK	169	1.8	700%	OK	193	2.0	613%	OK
88	87	32.68	32.46	23	9.6	150	14.9	130	1.4	1100%	OK	169	1.8	846%	OK	193	2.0	741%	OK
87	86	32.46	30.28	35	62.3	150	38.0	130	1.4	2807%	OK	169	1.8	2159%	OK	193	2.0	1891%	OK
86	58	30.28	23.35	40	173.3	150	63.4	130	1.4	4681%	OK	169	1.8	3601%	OK	193	2.0	3153%	OK
60	59	42.04	33.44	82	104.9	150	49.3	19	0.2	24920%	OK	28	0.3	16910%	OK	31	0.3	15273%	OK
59	58	33.44	23.35	36	280.3	150	80.6	19	0.2	40738%	OK	28	0.3	27643%	OK	31	0.3	24968%	OK
58	57	23.35	21.03	79	29.4	150	26.1	168	1.8	1491%	OK	225	2.3	1114%	OK	255	2.7	983%	OK
57	56	21.03	13.57	39	191.3	150	66.6	168	1.8	3806%	OK	225	2.3	2842%	OK	255	2.7	2508%	OK
56	55	13.57	7.23	39	162.6	150	61.4	168	1.8	3509%	OK	225	2.3	2620%	OK	255	2.7	2312%	OK
327	326	94.85	94.55	62	4.8	150	10.6	18	0.2	5650%	OK	39	0.4	2608%	OK	49	0.5	2076%	OK
326	325	94.55	93.98	72	7.9	150	13.6	18	0.2	7227%	OK	39	0.4	3336%	OK	49	0.5	2655%	OK
325	324	93.98	93.63	23	15.2	150	18.8	18	0.2	10020%	OK	39	0.4	4624%	OK	49	0.5	3681%	OK
349	348	138.95	134.46	26	172.7	150	63.3	18	0.2	33753%	OK	34	0.4	17869%	OK	47	0.5	12927%	OK
348	347	134.46	128.26	32	193.8	150	67.0	18	0.2	35752%	OK	34	0.4	18928%	OK	47	0.5	13692%	OK
347	346	128.26	123.46	32	150.0	150	59.0	18	0.2	31458%	OK	34	0.4	16654%	OK	47	0.5	12048%	OK
352	346	130.99	123.46	17	442.9	150	101.4	18	0.2	54057%	OK	34	0.4	28619%	OK	47	0.5	20703%	OK
346	345	123.46	112.09	35	324.9	150	86.8	54	0.6	15431%	OK	86	0.9	9690%	OK	112	1.2	7440%	OK
345	344	112.09	108.65	25	137.6	150	56.5	54	0.6	10043%	OK	86	0.9	6306%	OK	112	1.2	4842%	OK
351	350	121.20	112.32	39	227.7	150	72.7	18	0.2	38758%	OK	34	0.4	20519%	OK	47	0.5	14843%	OK
350	344	112.32	108.65	20	183.5	150	65.2	18	0.2	34794%	OK	34	0.4	18420%	OK	47	0.5	13325%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
344	343	108.65	105.60	19	160.5	150	61.0	90	0.9	6509%	OK	154	1.6	3804%	OK	206	2.1	2844%	OK
343	342	105.60	94.47	19	585.8	150	116.6	90	0.9	12433%	OK	154	1.6	7266%	OK	206	2.1	5432%	OK
342	324	94.47	93.63	16	52.5	150	34.9	90	0.9	3722%	OK	154	1.6	2175%	OK	206	2.1	1626%	OK
324	323	93.63	93.57	19	3.2	150	8.6	126	1.3	652%	OK	227	2.4	362%	OK	302	3.1	272%	OK
323	322	93.57	93.29	33	8.5	150	14.0	126	1.3	1069%	OK	227	2.4	593%	OK	302	3.1	446%	OK
322	321	93.29	91.84	69	21.0	150	22.1	126	1.3	1682%	OK	227	2.4	934%	OK	302	3.1	702%	OK
339	338	136.02	127.27	30	291.7	150	82.2	18	0.2	43866%	OK	34	0.4	23223%	OK	47	0.5	16800%	OK
338	337	127.27	125.55	22	78.2	150	42.6	18	0.2	22711%	OK	34	0.4	12023%	OK	47	0.5	8698%	OK
337	336	125.55	111.09	41	352.7	150	90.4	18	0.2	48236%	OK	34	0.4	25537%	OK	47	0.5	18473%	OK
341	340	117.56	113.04	39	115.9	150	51.8	18	0.2	27652%	OK	34	0.4	14639%	OK	47	0.5	10590%	OK
340	336	113.04	111.09	17	114.7	150	51.6	18	0.2	27509%	OK	34	0.4	14564%	OK	47	0.5	10535%	OK
336	336A	111.09	110.23	7	122.9	150	53.4	54	0.6	9490%	OK	102	1.1	5024%	OK	141	1.5	3634%	OK
336A	334	110.23	98.48	28	419.6	150	98.7	54	0.6	17539%	OK	102	1.1	9285%	OK	141	1.5	6717%	OK
335	334	107.62	98.48	27	338.5	150	88.6	17	0.2	50038%	OK	37	0.4	22990%	OK	56	0.6	15190%	OK
334	333	98.48	92.38	17	358.8	150	91.2	71	0.7	12335%	OK	139	1.4	6301%	OK	197	2.1	4446%	OK
333	321	92.38	91.84	14	38.6	150	29.9	71	0.7	4044%	OK	139	1.4	2066%	OK	197	2.1	1458%	OK
321	320	91.84	91.44	61	6.6	150	12.3	215	2.2	551%	OK	384	4.0	308%	OK	517	5.4	229%	OK
320	319	91.44	90.84	23	26.1	150	24.6	215	2.2	1098%	OK	384	4.0	615%	OK	517	5.4	457%	OK
319	ddd	90.84	89.22	10	162.0	150	61.3	215	2.2	2737%	OK	384	4.0	1532%	OK	517	5.4	1138%	OK
332	331	144.97	139.90	46	110.2	150	50.6	18	0.2	26965%	OK	34	0.4	14276%	OK	47	0.5	10327%	OK
331	330	139.90	129.50	21	495.2	150	107.2	18	0.2	57160%	OK	34	0.4	30261%	OK	47	0.5	21891%	OK
330	329	129.50	122.36	41	174.1	150	63.6	18	0.2	33895%	OK	34	0.4	17945%	OK	47	0.5	12981%	OK
329	328	122.36	111.19	67	166.7	150	62.2	18	0.2	33164%	OK	34	0.4	17558%	OK	47	0.5	12701%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
237	236	114.01	113.22	48	16.5	150	19.5	18	0.2	10420%	OK	34	0.4	5517%	OK	47	0.5	3991%	OK
236	328	113.22	111.19	12	169.2	150	62.6	18	0.2	33407%	OK	34	0.4	17686%	OK	47	0.5	12794%	OK
328	aaa	111.19	97.01	64	221.6	150	71.7	54	0.6	12744%	OK	102	1.1	6747%	OK	141	1.5	4881%	OK
aaa	bbb	97.01	92.34	18	259.4	150	77.6	54	0.6	13791%	OK	102	1.1	7301%	OK	141	1.5	5282%	OK
bbb	ccc	92.34	90.87	13	113.1	150	51.2	54	0.6	9104%	OK	102	1.1	4820%	OK	141	1.5	3487%	OK
ccc	ddd	90.87	89.22	12	137.5	150	56.5	54	0.6	10039%	OK	102	1.1	5315%	OK	141	1.5	3845%	OK
ddd	318	89.22	78.24	17	645.9	150	122.4	287	3.0	4094%	OK	504	5.3	2331%	OK	676	7.0	1738%	OK
318	317	78.24	71.05	20	359.5	150	91.3	287	3.0	3054%	OK	607	6.3	1444%	OK	818	8.5	1072%	OK
317	316	71.05	70.42	17	37.1	150	29.3	287	3.0	981%	OK	607	6.3	464%	OK	818	8.5	344%	OK
316	315	70.42	66.80	15	241.3	150	74.8	319	3.3	2252%	OK	640	6.7	1122%	OK	855	8.9	840%	OK
315	314	66.80	66.06	39	19.0	150	21.0	319	3.3	631%	OK	640	6.7	315%	OK	855	8.9	236%	OK
314	313	66.06	61.65	14	315.0	150	85.5	319	3.3	2572%	OK	640	6.7	1282%	OK	855	8.9	960%	OK
313	118	61.65	61.23	17	24.7	150	23.9	319	3.3	720%	OK	640	6.7	359%	OK	855	8.9	269%	OK
118	117	61.23	56.60	64	72.3	150	41.0	319	3.3	1233%	OK	640	6.7	614%	OK	855	8.9	460%	OK
117	73	56.60	48.30	44	188.6	150	66.1	319	3.3	1991%	OK	640	6.7	992%	OK	855	8.9	743%	OK
73	72	48.30	44.90	29	117.2	150	52.1	319	3.3	1569%	OK	640	6.7	782%	OK	855	8.9	586%	OK
72	71	44.90	41.41	57	61.2	150	37.7	319	3.3	1134%	OK	640	6.7	565%	OK	855	8.9	423%	OK
71	70	41.41	40.08	71	18.7	150	20.8	319	3.3	627%	OK	640	6.7	313%	OK	855	8.9	234%	OK
70	69	40.08	30.82	21	441.0	150	101.1	338	3.5	2872%	OK	659	6.9	1473%	OK	874	9.1	1111%	OK
69	68	30.82	26.46	15	290.7	150	82.1	338	3.5	2332%	OK	659	6.9	1196%	OK	874	9.1	902%	OK
85	84	78.40	77.77	59	10.7	150	15.7	37	0.4	4083%	OK	47	0.5	3214%	OK	54	0.6	2798%	OK
84	83	77.77	70.72	34	207.4	150	69.3	37	0.4	17993%	OK	47	0.5	14165%	OK	54	0.6	12329%	OK
83	82	70.72	70.08	54	11.9	150	16.6	37	0.4	4302%	OK	47	0.5	3386%	OK	54	0.6	2947%	OK
82	81	70.08	69.68	12	33.3	150	27.8	37	0.4	7214%	OK	47	0.5	5679%	OK	54	0.6	4943%	OK
81	80	69.68	61.70	62	128.7	150	54.6	66	0.7	7947%	OK	76	0.8	6902%	OK	83	0.9	6319%	OK
80	79	61.70	53.77	56	141.6	150	57.3	66	0.7	8336%	OK	76	0.8	7239%	OK	83	0.9	6629%	OK
79	78	53.77	50.95	28	100.7	150	48.3	66	0.7	7030%	OK	76	0.8	6105%	OK	83	0.9	5590%	OK
78	67	50.95	48.81	58	36.9	150	29.3	66	0.7	4255%	OK	76	0.8	3695%	OK	83	0.9	3384%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
67	74	48.81	44.91	18	216.7	150	70.9	66	0.7	10311%	OK	76	0.8	8954%	OK	83	0.9	8199%	OK
77	76	67.25	62.95	64	67.2	150	39.5	29	0.3	13068%	OK	30	0.3	12632%	OK	30	0.3	12632%	OK
76	75	62.95	52.70	27	379.6	150	93.8	29	0.3	31063%	OK	30	0.3	30027%	OK	30	0.3	30027%	OK
75	74	52.70	44.91	40	194.8	150	67.2	29	0.3	22248%	OK	30	0.3	21507%	OK	30	0.3	21507%	OK
74	68	44.91	26.46	60	307.5	150	84.5	114	1.2	7112%	OK	139	1.4	5833%	OK	149	1.6	5441%	OK
68	66	26.46	20.47	28	213.9	150	70.4	471	4.9	1436%	OK	826	8.6	819%	OK	1054	11.0	642%	OK
116	67	29.65	48.81	89	215.3	150	70.7	19	0.2	35703%	OK	28	0.3	24227%	OK	31	0.3	21882%	OK
67	66	48.81	20.47	45	629.8	150	120.9	19	0.2	61065%	OK	28	0.3	41437%	OK	31	0.3	37427%	OK
66	63	20.47	11.17	37	251.4	150	76.4	509	5.3	1440%	OK	882	9.2	831%	OK	1116	11.6	657%	OK
285	285A	47.26	43.61	21	173.8	150	63.5	35	0.4	17415%	OK	46	0.5	13251%	OK	55	0.6	11082%	OK
285A	284	43.61	38.29	22	241.8	150	74.9	35	0.4	20541%	OK	46	0.5	15629%	OK	55	0.6	13072%	OK
284	283	38.29	34.77	28	125.7	150	54.0	35	0.4	14811%	OK	46	0.5	11269%	OK	55	0.6	9425%	OK
283	282	34.77	26.01	45	194.7	150	67.2	35	0.4	18430%	OK	46	0.5	14023%	OK	55	0.6	11728%	OK
282	281	26.01	18.72	30	243.0	150	75.1	35	0.4	20592%	OK	46	0.5	15668%	OK	55	0.6	13104%	OK
281	280	18.72	15.65	24	127.9	150	54.5	35	0.4	14940%	OK	46	0.5	11367%	OK	55	0.6	9507%	OK
280	65	15.65	13.63	25	80.8	150	43.3	35	0.4	11874%	OK	46	0.5	9034%	OK	55	0.6	7556%	OK
Yacht Club																			
23	21	70.70	68.40	33	69.7	150	40.2	18	0.2	21443%	OK	39	0.4	9897%	OK	49	0.5	7877%	OK
22	21	68.78	68.40	15	25.3	150	24.2	18	0.2	12928%	OK	39	0.4	5967%	OK	49	0.5	4749%	OK
21	20	68.40	68.20	11	18.2	150	20.5	54	0.6	3651%	OK	117	1.2	1685%	OK	147	1.5	1341%	OK
20	19	68.20	44.40	61	390.2	150	95.1	54	0.6	16912%	OK	117	1.2	7805%	OK	147	1.5	6212%	OK
19	18	44.40	42.80	47	34.0	150	28.1	54	0.6	4995%	OK	117	1.2	2306%	OK	147	1.5	1835%	OK
18	12	42.80	37.60	14	371.4	150	92.8	54	0.6	16501%	OK	117	1.2	7616%	OK	147	1.5	6061%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
17	14	69.93	66.44	46	75.9	150	41.9	23	0.2	17509%	OK	23	0.2	17509%	OK	23	0.2	17509%	OK
16	15	69.25	67.60	25	66.0	150	39.1	18	0.2	20867%	OK	39	0.4	9631%	OK	49	0.5	7665%	OK
15	14	67.60	66.44	32	36.2	150	29.0	18	0.2	15465%	OK	39	0.4	7137%	OK	49	0.5	5681%	OK
14	13	66.44	48.97	38	459.7	150	103.3	73	0.8	13580%	OK	95	1.0	10435%	OK	109	1.1	9095%	OK
13	12	48.97	37.60	38	299.2	150	83.3	73	0.8	10955%	OK	95	1.0	8418%	OK	109	1.1	7337%	OK
12	11	37.60	32.73	24	202.9	150	68.6	156	1.6	4222%	OK	242	2.5	2721%	OK	286	3.0	2303%	OK
11	10	32.73	29.14	19	188.9	150	66.2	156	1.6	4074%	OK	242	2.5	2626%	OK	286	3.0	2222%	OK
25	24	43.35	42.43	32	28.8	150	25.8	35	0.4	7083%	OK	46	0.5	5389%	OK	55	0.6	4507%	OK
24	10	42.43	29.14	78	170.4	150	62.9	35	0.4	17243%	OK	46	0.5	13119%	OK	55	0.6	10973%	OK
10	7	29.14	10.44	79	236.7	150	74.1	222	2.3	3204%	OK	331	3.4	2149%	OK	392	4.1	1815%	OK
9	8	16.10	12.40	87	42.5	150	31.4	31	0.3	9726%	OK	43	0.4	7012%	OK	51	0.5	5912%	OK
8	7	12.40	10.44	74	26.5	150	24.8	31	0.3	7675%	OK	43	0.4	5533%	OK	51	0.5	4665%	OK
7	6	10.44	8.42	70	28.9	150	25.9	284	3.0	875%	OK	417	4.3	596%	OK	494	5.1	503%	OK
6	5	8.42	6.44	58	34.1	150	28.1	284	3.0	951%	OK	417	4.3	648%	OK	494	5.1	547%	OK
5	1	6.44	-0.37	18	378.3	150	93.7	284	3.0	3166%	OK	417	4.3	2157%	OK	494	5.1	1820%	OK
2	1	0.49	-0.37	86	10.0	150	15.2	31	0.3	4716%	OK	43	0.4	3400%	OK	51	0.5	2867%	OK
1	PS	-0.37	-1.00	11	57.3	150	36.4	315	3.3	1111%	OK	460	4.8	761%	OK	545	5.7	642%	OK
PS	65	16.50	13.63	98	29.3	150	26.1	315	3.3	794%	OK	460	4.8	544%	OK	545	5.7	459%	OK
Stanley Esplanade(1)																			
65	64	13.63	13.00	28	22.5	150	22.8	824	8.6	266%	OK	1342	14.0	163%	OK	1661	17.3	132%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
64	63	13.00	11.17	101	18.1	150	20.5	824	8.6	239%	OK	1342	14.0	147%	OK	1661	17.3	118%	OK
63	63A	11.17	9.73	9	160.0	150	60.9	1352	14.1	433%	OK	2252	23.5	260%	OK	2808	29.3	208%	OK
63A	62	9.73	8.77	73	13.2	150	17.5	1352	14.1	124%	OK	2252	23.5	74%	NG	2808	29.3	60%	NG
		9.73	8.77	73	13.2	200	37.6	1352	14.1	267%	New	2252	23.5	160%	New	2808	29.3	129%	New
62	55	8.77	7.23	82	18.8	150	20.9	1352	14.1	148%	OK	2252	23.5	89%	NG	2808	29.3	71%	NG
		8.77	7.23	82	18.8	200	44.9	1352	14.1	319%	New	2252	23.5	192%	New	2808	29.3	154%	New
55	51	7.23	5.58	66	25.0	150	24.1	1539	16.0	150%	OK	2505	26.1	92%	NG	3094	32.2	75%	NG
		7.23	5.58	66	25.0	200	51.9	1371	14.3	363%	New	2280	23.8	218%	New	2839	29.6	175%	New
115	113	15.34	14.28	39	27.2	150	25.1	19	0.2	12686%	OK	28	0.3	8608%	OK	31	0.3	7775%	OK
114	113	15.02	14.28	30	24.7	150	23.9	19	0.2	12085%	OK	28	0.3	8201%	OK	31	0.3	7407%	OK
113	53	14.28	12.68	25	64.0	150	38.5	57	0.6	6489%	OK	84	0.9	4403%	OK	93	1.0	3977%	OK
53	52	12.68	5.97	26	258.1	150	77.4	57	0.6	13030%	OK	84	0.9	8842%	OK	93	1.0	7986%	OK
52	51	5.97	5.58	16	24.4	150	23.8	57	0.6	4005%	OK	84	0.9	2717%	OK	93	1.0	2454%	OK
51	3	5.58	3.55	97	20.9	150	22.0	1596	16.6	133%	OK	2589	27.0	82%	NG	3187	33.2	66%	NG
		5.58	3.55	97	20.9	200	47.4	1371	14.3	332%	New	2280	23.8	200%	New	2839	29.6	160%	New
50	49	29.65	28.49	21	55.2	150	35.8	32	0.3	10738%	OK	32	0.3	10738%	OK	32	0.3	10738%	OK
49	48	28.49	16.70	41	287.6	150	81.7	32	0.3	24500%	OK	32	0.3	24500%	OK	32	0.3	24500%	OK
48	46	16.70	9.71	34	205.6	150	69.1	32	0.3	20716%	OK	32	0.3	20716%	OK	32	0.3	20716%	OK
46	45	9.71	9.58	33	3.9	150	9.6	32	0.3	2868%	OK	32	0.3	2868%	OK	32	0.3	2868%	OK
45	44	9.58	7.77	29	62.4	150	38.0	51	0.5	7162%	OK	60	0.6	6088%	OK	63	0.7	5798%	OK
44	43	7.77	4.33	49	70.2	150	40.4	51	0.5	7596%	OK	60	0.6	6456%	OK	63	0.7	6149%	OK
43	3	4.33	3.55	41	19.0	150	21.0	51	0.5	3954%	OK	60	0.6	3361%	OK	63	0.7	3201%	OK
398	397	26.30	24.78	26	58.5	150	36.8	128	1.3	2762%	OK	165	1.7	2142%	OK	165	1.7	2142%	OK
397	396	24.78	23.90	17	51.8	150	34.6	128	1.3	2599%	OK	165	1.7	2016%	OK	165	1.7	2016%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
396	395	23.90	22.09	19	95.3	150	47.0	128	1.3	3525%	OK	165	1.7	2735%	OK	165	1.7	2735%	OK
395	394	22.09	20.22	91	20.5	150	21.8	488	5.1	429%	OK	714	7.4	294%	OK	855	8.9	245%	OK
394	393	20.22	19.57	79	8.2	150	13.8	513	5.3	259%	OK	739	7.7	179%	OK	880	9.2	151%	OK
393	13	19.57	18.60	45	21.6	150	22.4	513	5.3	418%	OK	739	7.7	290%	OK	880	9.2	244%	OK
13	12	18.60	18.00	79	7.6	150	13.3	513	5.3	248%	OK	739	7.7	172%	OK	880	9.2	145%	OK
12	11	18.00	17.68	32	10.0	150	15.2	513	5.3	285%	OK	739	7.7	198%	OK	880	9.2	166%	OK
40	39	79.87	63.82	92	174.5	150	63.6	131	1.4	4662%	OK	165	1.7	3701%	OK	165	1.7	3701%	OK
39	21	63.82	65.96	42	51.0	150	34.4	131	1.4	2519%	OK	165	1.7	2000%	OK	165	1.7	2000%	OK
21	20	65.96	59.70	45	139.1	150	56.8	131	1.4	4163%	OK	165	1.7	3305%	OK	165	1.7	3305%	OK
20	19	59.70	53.84	82	71.5	150	40.7	131	1.4	2983%	OK	165	1.7	2369%	OK	165	1.7	2369%	OK
19	18	53.84	49.79	76	53.3	150	35.2	131	1.4	2576%	OK	165	1.7	2045%	OK	165	1.7	2045%	OK
18	17	49.79	44.19	70	80.0	150	43.1	131	1.4	3157%	OK	165	1.7	2506%	OK	165	1.7	2506%	OK
17	16	44.19	42.28	47	40.6	150	30.7	131	1.4	2250%	OK	165	1.7	1786%	OK	165	1.7	1786%	OK
16	15	42.28	32.55	23	423.0	150	99.1	156	1.6	6096%	OK	190	2.0	5005%	OK	190	2.0	5005%	OK
15	14	32.55	18.90	40	341.3	150	89.0	156	1.6	5475%	OK	190	2.0	4495%	OK	190	2.0	4495%	OK
14	11	18.90	17.68	19	64.2	150	38.6	156	1.6	2375%	OK	190	2.0	1950%	OK	190	2.0	1950%	OK
11	9	17.68	17.07	92	6.6	150	12.4	694	7.2	172%	OK	954	9.9	125%	OK	1095	11.4	109%	OK
10	9	18.02	17.07	14	67.9	150	39.7	25	0.3	15234%	OK	25	0.3	15234%	OK	25	0.3	15234%	OK
9	8	17.07	15.83	19	65.3	150	38.9	744	7.8	502%	OK	1004	10.5	372%	OK	1145	11.9	326%	OK
8	7	15.83	14.34	17	87.6	150	45.1	744	7.8	582%	OK	1004	10.5	431%	OK	1145	11.9	378%	OK
23	7	17.67	14.34	41	81.2	150	43.4	25	0.3	16667%	OK	25	0.3	16667%	OK	25	0.3	16667%	OK
7	6	14.34	7.80	47	139.1	150	56.8	794	8.3	687%	OK	1054	11.0	517%	OK	1195	12.4	456%	OK
26	25	14.89	12.09	39	71.8	150	40.8	15	0.2	26116%	OK	19	0.2	20618%	OK	21	0.2	18654%	OK
351	25	13.70	12.09	25	64.4	150	38.6	15	0.2	24735%	OK	19	0.2	19527%	OK	21	0.2	17668%	OK

Area Covered Paga

Sewer Line		MH IL		Existing Pipe Details and Capacity				Pipe adequacy for 1995				Pipe adequacy for 2005				Pipe adequacy for 2015			
US MH No	DS MH No	US IL	DS IL	Length in m	Gradient (0/00)	Dia in mm	Q1=Capacity (L/s)	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement	Contributing Popn	Q2=P.H.F in L/s	Q1/Q2 (%)	Judgement
25	24	12.09	10.70	16	86.9	150	44.9	45	0.5	9576%	OK	57	0.6	7560%	OK	63	0.7	6840%	OK
24	6	10.70	7.80	34	85.3	150	44.5	45	0.5	9489%	OK	57	0.6	7491%	OK	63	0.7	6778%	OK
6	5	7.80	6.97	69	12.0	150	16.7	854	8.9	188%	OK	1130	11.8	142%	OK	1279	13.3	125%	OK
34	33	29.21	25.38	67	57.2	150	36.4	25	0.3	13982%	OK	25	0.3	13982%	OK	25	0.3	13982%	OK
41	33	28.70	25.38	23	144.3	150	57.9	25	0.3	22219%	OK	25	0.3	22219%	OK	25	0.3	22219%	OK
33	32	25.38	24.48	30	30.0	150	26.4	65	0.7	3896%	OK	69	0.7	3670%	OK	71	0.7	3567%	OK
32	31	24.48	16.68	90	86.7	150	44.8	65	0.7	6622%	OK	69	0.7	6238%	OK	71	0.7	6062%	OK
38	37	24.52	18.48	26	232.3	150	73.4	15	0.2	46978%	OK	19	0.2	37088%	OK	21	0.2	33556%	OK
37	36	18.48	17.86	18	34.4	150	28.3	15	0.2	18089%	OK	19	0.2	14281%	OK	21	0.2	12921%	OK
36	31	17.86	16.68	31	38.1	150	29.7	15	0.2	19016%	OK	19	0.2	15013%	OK	21	0.2	13583%	OK
31	30	16.68	14.64	37	55.1	150	35.8	95	1.0	3614%	OK	107	1.1	3208%	OK	113	1.2	3038%	OK
30	28	14.64	11.93	40	67.8	150	39.6	95	1.0	4006%	OK	107	1.1	3557%	OK	113	1.2	3368%	OK
29	28	13.40	11.93	38	38.7	150	30.0	15	0.2	19170%	OK	19	0.2	15134%		21	0.2	13693%	OK
28	27	11.93	11.90	36	0.8	150	4.4	125	1.3	338%	OK	145	1.5	291%	OK	155	1.6	272%	OK
27	5	11.90	6.97	29	170.0	150	62.8	125	1.3	4822%	OK	145	1.5	4157%	OK	155	1.6	3889%	OK
5	4	6.97	5.47	40	37.5	150	29.5	994	10.4	285%	OK	1294	13.5	219%	OK	1455	15.2	195%	OK
4	3	5.47	3.55	82	23.4	150	23.3	994	10.4	225%	OK	1294	13.5	173%	OK	1455	15.2	154%	OK
3	2	3.55	1.55	18	111.1	150	50.8	2666	27.8	183%	OK	3968	41.3	123%	OK	4730	49.3	103%	OK
2	1	1.55	-0.65	41	53.7	150	35.3	2666	27.8	127%	OK	3968	41.3	85%	NG	4730	49.3	72%	NG
		1.55	-0.65	41	53.7	200	76.0	2666	27.8	274%	New	3968	41.3	184%	New	4730	49.3	154%	New