

# **APPENDIX 1**

## **Selected Rainfall Station Data**

- \* Pasir Mas Pump House**
- \* Tumpat Railway Station**
- \* Teratak Pulai**
- \* Kota Bharu (Sultan Ismail Petra Airport)**

Daily Rain	totals mm Day	Year 1979 site 6021061 RUMAH PAM PASIR MAS at KELANTAN												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1		8	0	6	0	11.5	12	0	0	1	6	54	6	
2		1.5	0	8	0	0	0	0	0	11.5	1	68	5.5	
3		4.5	0	4	0	0	17.5	8	0	1	0	20	9	
4		5	3.5	0	0	0	0	3	5	0	1	0	61.5	
5		7.5	7	0	0	0	0	0	0	0	1	6	40	
6		3	7.5	0	0	0	0	4.5	0	12	2	1	14	
7		0	0	0	0	1.5	4.5	1.5	0	2.5	0	25	0	
8		0	0	0	0	0	0	1	0	5.5	0	0	0	
9		0	0	0	0	0	4	35	0	0	0	19	0	
10		0	0	0	5	0	0	4	0	7	18	10	0	
11		0	0	0	0	0	0	13	0	18	0	0	0	
12		0	1	0	0	0	10	0	0	0	2	20	0	
13		0	0	0	0	3.5	0	0	31.5	0	3	41	1	
14		0	0	0	50.5	3	7.5	0	46	3.5	4	78	0	
15		0	68	0	0	1.5	1	24	1	0	6	215	0	
16		0	26	0	0	0	0	11	4	18.5	0	68	0	
17		0	0	0	2	0	37	0	0	26	0	23	0.5	
18		0	0	0	1.5	0	4	0	60	3.5	6	1	0	
19		3	0	0	83	0	0	0	10	45	0	84	0	
20		2	0	0	45	0	0	26	0	0	13	10.5	0	
21		2	0	0	29	47	0	21	0	20	3	26.5	0	
22		4	0	0	0	0	0	7	7	6	46	61	0	
23		7.5	0	0	140	0	0	1.5	0	5.5	34	23	0	
24		0	0	0	0	0	14	46.5	1	0	8	1	0	
25		0	0	0	0	31	0	1.5	21	0	1	27	0	
26		0	0	0	0	0	2	2.5	0	0	3	16.5	0	
27		0	0	0	0	0	0	0	0	0	0	32.5	0	
28		0	0	0	0	0	0	21.5	1.5	5	0	2.5	0	
29		0	0	0	4	19	0	0	0	0	0	0	0	
30		0	0	12.5	46	0	1	12	0	11	1.5	0	0	
31		0	0	0	17	0	55	0	0	0	0	0	0	
Min		0	0	0	0	0	0	0	0	0	0	0	0	0
Tot		48	113	18	368.5	149	132.5	250.5	200	191.5	224	935	137.5	2767.5
Max		8	68	8	140	47	37	46.5	60	45	55	215	61.5	215
NO>0.0		11	6	3	9	9	12	20	12	17	20	26	8	153

Daily Rain	totals mm Day	Year 2008 site 6021061 RUMAH PAM PASIR MAS at KELANTAN												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	?		0	1	0	0	0	15	0	0	1	0?		
2	38.5		5	0	0	0	0	0	0	0	13.5	0	9.5	
3	10.5	0.5	0	80	10.5	0	8.5	65	0	1	0	0	0	
4	2	0	0	0	7	0	0	12	0	1	0	104		
5	35	0	0	0	0	0	0	0	0	1	3.5	95		
6	8	0	0	0	27	0	1.5	65	30	0	10	25.5		
7	4	0	1	0	51	10.5	8.5	0	2	0	1	1		
8	0	0	3	3	37	7	1.5	0	0	0	2	0		
9	0	0	0	0	11	3	0	0	0	6	5.5	1		
10	0	0	1	4	32.5	8.5	4	65	1.5	0	14	3		
11	0	0	4	0	14	0	0	7	0	11	31.5	0		
12	0	0	0	10.5	0	38	0	18	30	1	6	0		
13	0	0	4	5	0	0	9.5	0	78	0	61	1		
14	0	1	1	0	0	0	0	0	0	1	4	8		
15	0	0	0	0	11	0	0	0	12	0	0	78.5		
16	3	0	0.5	0	1	0	0	10	0	3	0	185		
17	3	0	0	0	6	0	30	0	0	8	2	3		
18	8	0	0	0	1	0	0	0	0	2	35	2		
19	0	0	0	0	30	0	2	0	0	0	205	0		
20	0	0	0	0	0	18.5	7	0	0	10.5	95	1		
21	8	0	0	0	0	0	0	50	0	0	8	0		
22	0	0	0.5	0	0	8.5	10.5	98.5	0	5	21	2		
23	3	0	1	4	0	23	4	18	0	98.5	16.5	0		
24	0	8.5	1	3	10.5	7.5	0	0	0	18	5	110		
25	0	5	69	1	14.5	68	5	0	0	0	39.5	130		
26	0	5	0	0	0	5	8	0	4	0	13	13		
27	0	18.5	5	0	21.5	12.5	1	0	2	0	43	120		
28	0	83.5	0	0	1	0	0	0	59.5	6	65	275.5		
29	0	10	0	0	0	0	0	0	0	0	105	108		
30	0	0	0	0	0	0	0	0	0	245	34			
31	0	0	0	0	0	0	105							
Min		0	0	0	0	0	0	0	0	0	0	0	0	
Tot		123	137	92	110.5	286.5	210	116	408.5	219	187.5	1036.5	1415	4341.5
Max		38.5	83.5	69	80	51	68	30	98.5	78	98.5	245	275.5	275.5
NO>0.0		11	9	13	8	17	12	15	10	9	17	24	23	168

Daily Rain	totals mm Day	Year	1979 site 6121067 STN. KERETAITUMPAT at KELANTAN											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1		26	0	0	0	0	0	0	0	0	0	0	44.5	0
2		0	0	1	0	0	0	0	6	0	2	0	92	0
3		0	0	0	0	0	0	0	21	0	0	0	13	1.5
4		0	0	0	0	0	0	0	12	6	0	0	0	35.5
5		0	0	0	0	0	0	0	5.5	0	0	0	0	30.5
6		0	2	0	0	0	0	7.5	24.5	0	8	0	5.5	3
7		0	0	0	0	0	0	0	0	0	2	0	90	0
8		0	0	0	0	0	0	0	0	0	17.5	0	9.5	0
9		0	0	0	0	0	0	0	10.5	0	6	0	0	0
10		0	0	0	3.5	0	0	0	16.5	0	9	16	14.5	0
11		0	0	0	0	0	0	0	29	0	17.5	0	0	0
12		0	0	0	0	0	0	7.5	0	0	0	0	26.5	0
13		0	0	0	0	0	11	0	0	18.5	0	3	0	0
14		0	0	0	25	0	0	8.5	0	25	16.5	1	54	0
15		0	32.5	0	39	0	0	0	0	0	0	0	106	0
16		0	33	0	0	0	0	0	0	0	0	0	92	0
17		0	0	0	13	0	0	32	0	0	48	0	68.5	0
18		0	0	0	0	0	0	20	0	25	3	0	3.5	0
19		0	0	0	9.5	0	0	0	0	64	16.5	48	152	0
20		0	0	0	32.5	0	0	4.5	29	50	0	35.5	30	0
21		3	0	0	0	25	0	0	4.5	0	0	16	31	0
22		3	0	0	0	1	0	0	40	10	47	28	56	0
23		7	0	0	75	0	0	0	0	6	4	44.5	4	0
24		0	0	0	0	0	11	0	7	0	0	20	24	0
25		0	0	12	0	7	0	0	14.5	96	0	0	16	0
26		0	0	0	0	0	0	10.5	30.5	0	0	19	7.5	0
27		0	0	0	0	0	0	0	0	0	0	0	13	0
28		0	0	0	0	0	0	0	15.5	0	6.5	0	2	0
29		0	0	0	0	24.5	39	0	0	0	0	0	0	0
30		0	0	4.5	30.5	0	0	0	0	0	16	0	4	0
31		0	0	0	0	0	0	33.5	0	0	0	0	0	0
Min		0	0	0	0	0	0	0	0	0	0	0	0	0
Tot		39	67.5	13	202	85.5	115	305	300.5	203.5	280.5	955	74.5	2641
Max		26	33	12	75	30.5	32	40	96	48	48	152	35.5	152
NO>0.0		4	3	2	8	6	8	16	9	14	12	23	5	110

Daily Rain	totals mm Day	Year	2008 site 6121067 STN. KERETAITUMPAT at KELANTAN											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	23	31.5	0	0	0	0	0	0	39	0	5	0	350	
2	65	3	0	0	0	0	0	0	6.5	0	0	0	2	
3	1	2	0	4	21	0	0	0	5	0	10	0	0	
4	0	0	6	5	0	0	0	0	5	0	19.5	0	0	
5	2	0	0.5	0	0	0	0	0	20	0	30	13.5	71	
6	4	0	0	0	71	0	5	13.5	16.5	4	33.5	90		
7	17	0	0.5	0	32	17	40	0	0	0	0.5	2		
8	0	0	8.5	0	23	2	0	29	0	0	0	1	22	
9	2	0	1	0	0	0	0	0	0	0	0	1.5	0	
10	0	0	0	0	0	34	0	0	0	0	0	49.5	0	
11	0	0	2	0	7	8	0	7	0	0	60.5	0	0	
12	0	0	0	0	0	0.5	0	0	25	0	33.5	7		
13	0	0	0.5	0	0	0	3	0	0	0	95	1		
14	0	0	0	0	0	0	0	0	0	0	0	0	20	
15	0	0	0	0	30	0	0	0	0	0	7	80		
16	8.5	0	0	0	0	0	0	3.5	0	57	0	81		
17	13.5	0	0	0	0	0	0	0	0	0	0	1		
18	0	0	0	0	0	0	0	17	0	0	24.5	5		
19	0	0	0	0	47	0	7	0	0	2	200	3		
20	0	0	0	6	0	0	2	3	0	26	81	3		
21	0	0	0	0	0	0	0	0	11.5	2.5	11	1		
22	0	0	4.5	2.5	0	6	0	2	0	40	29	0.5		
23	0	3.5	0	5	10	6	0	0	0	8	39.5	4		
24	0	12	25	30	3	4	0	4	0	8	6	46		
25	0	82	102.5	0	0	14.5	0	0	0	0	131	120		
26	0	0	2	0	0	9	9	0	16.5	0	26	36		
27	0	19	0	0	0	0	0	0	0	0	18	47		
28	0	9	0	0	0	0	0	14	15	0	4	130		
29	0	7	0	0	6	0	0	2	3.5	0	142	31		
30	0	0	0	25	15.5	0	1.5	3	0	253	33			
31	0	0	0	0	0	0	136							
Min		0	0	0	0	0	0	0	0	0	0	0	0	
Tot		136	169	153	52.5	275	116.5	66	172	91	212	1260.5	1322.5	4026
Max		65	82	102.5	30	71	34	40	39	25	57	253	350	350
NO>0.0		9	9	11	6	11	11	6	16	7	12	23	26	147

Daily Rain	totals mm Day	1979 site 6023072 TERATAIPULAI at KELANTAN															
		Year Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
1	0 ?				0 ?		0	0	0	0	0	0	58	0			
2	?			?	?		0	0	9	0	0	0	100 ?				
3	?			?	?		0	64	0	0	0	0	0 ?				
4	?			27 ?	?		0	0	14	0	3	0	0 ?				
5	?			9 ?	?		0	0	15	0	8	0	11 ?				
6	?			0 ?	?		0	0	0	0	0	0	32 ?				
7	?			0 ?	?		0	0	13	0	5	0	15 ?				
8	?			0 ?	?		0	0	0	0	10.5	0	22 ?				
9	?			0 ?	?		0	0	11	0	0	0	0 ?				
10	?			0 ?	?		0	7	15	0	0	0	0 ?				
11	?			0 ?	?		0	0	7	0	0	0	0 ?				
12	?			0 ?	?		0	4	0	0	0	0	0 ?				
13	?			0 ?	?		1	20.5	0	13.5	0	7	22 ?				
14	?			0 ?			24	0	0	0	0	4	41 ?				
15	?			60 ?			0	0	0	0	0	5	105 ?				
16	?			32 ?			0	0	0	0	0	0	80 ?				
17	?			0 ?			0	0	0	0	0	0	25 ?				
18	?			0 ?			0	0	17	0	44	76	60 ?				
19	?			0 ?			32	0	0	0	13.5	8	10	62 ?			
20	?			0 ?			50	0	0	11	0	6	32	45 ?			
21	?			0 ?			42	0	0	13	0	0	14	32 ?			
22	?			0 ?			0	27.5	0	21	0	10	68	35 ?			
23	?			0 ?			17	0	0	0	0	12	46	0 ?			
24	?			0 ?			0	0	18	36	0	0	14	40 ?			
25	?			0 ?			0	3	0	6	0	0	5	11 ?			
26	?			0 ?			0	0	0	0	0	0	0	7 ?			
27	?			0 ?			0	0	0	0	0	0	0	32 ?			
28	?			0 ?			0	0	0	9	0	10	0	9 ?			
29	?			?			0	0	15	0	0	0	0 ?				
30	?			?			0	13	0	0	0	0	0 ?				
31	?			?			0	12.5	0	42 ?		50	0 ?				
Min				0	0		0	0	0	0	0	0	0	0	0		
Tot				0	128		0	165	44.5	145.5	192.5	71	148.5	297	844	0	2036
Max				0	60		0	50	27.5	64	36	44	76	68	105	0	105
NO>0.0				0	4		0	5	4	7	14	3	10	12	21	0	80

Daily Rain	totals mm Day	Year 2008 site 6023072 TERATAIPULAI at KELANTAN												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1		5	3	3	0	0	0	15	0	0	0	0	111	
2		10	21	0	0	0	0	0	0	0	5	0	0	
3		1	5	0	29	45	0	24	20	2	0	0	0	
4		1	0	0	0	22	0	0	8	1	0	0	0	
5		12	0	3	2	0	0	0	0	0	0	7	76	
6		3	0	7	0	17	0	0	41	30	0	8	72	
7		10	0	1	0	33	15	9	0	0	0	25	1	
8		0	0	2	0	3	17	0	24	0	0	2	0	
9		0	0	2	0	14	0	0	0	0	0	3	0	
10		0	0	3	0	43	20	99	0	0	0	43	0	
11		0	0	4	0	8	0	0	0	0	0	41	0	
12		0	0	1	0	0	23	0	0	1	0	35	4	
13		0	0	0	0	0	8	0	0	28	0	59	8	
14		0	1	0	0	0	0	29	0	0	6	1	21	
15		0	0	0	0	0	0	28	0	24	0	0	17	
16		0	0	0	0	0	0	0	5	0	12	0	60	
17		32	0	0	0	0	0	15	0	0	0	5	0	
18		3	0	0	0	16	0	0	2	3	0	47	1	
19		0	0	0	0	23	0	0	0	20	0	135	0	
20		4	0	0	0	0	8	0	0	0	39	90	0	
21		2	0	0	0	0	5	0	10	13	7	9	0	
22		0	0	5	0	0	4	0	0	0	1	13	0	
23		0	1	1	6	3	40	0	21	0	4	36	2	
24		2	9	4	20	0	39	0	0	0	9	5	31	
25		0	19	49	0	13	20	4	3	0	6	115	79	
26		0	0	1	0	0	8	15	0	0	0	25	23	
27		0	8	0	0	0	0	0	0	0	0	52	58	
28		0	77	0	0	55	0	0	2	43	0	15	79	
29		0	2	0	0	0	0	0	4	0	0	110	4	
30		0	0	0	0	0	0	3	0	0	142	23		
31		0	0	0	0	0	13	117						
Min		0	0	0	0	0	0	0	0	0	0	0	0	
Tot		85	146	86	57	295	207	238	143	165	102	1023	787	3334
Max		32	77	49	29	55	40	99	41	43	39	142	117	142
NO>0.0		12	10	14	4	13	12	9	12	10	10	24	19	149

## JABATAN METEOROLOGI MALAYSIA

Station : Kota Bharu

Lat. : 06° 10' N

Long. : 102° 17' E

Ht. above M.S.L. : 4.6 m

### Records of Monthly Rainfall Amount

Unit : mm

Year /Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1979	24.8	95.9	1.4	204.4	24.6	116.5	268.1	197.0	205.2	383.9	1028.2	262.3	2812.3
1980	56.2	5.1	55.6	65.1	135.4	247.0	170.2	160.4	201.7	197.5	478.0	835.6	2607.8
1981	34.7	39.6	10.4	109.1	140.0	56.5	45.0	63.2	337.1	215.1	692.9	1543.2	3286.8
1982	32.0	25.1	31.9	75.7	93.4	55.7	163.9	135.0	70.4	294.7	353.3	541.0	1872.1
1983	54.8	6.0	22.4	0.8	55.5	80.4	329.2	162.2	340.1	110.2	296.2	1042.9	2500.7
1984	53.4	49.7	261.3	38.0	113.9	158.2	108.8	111.8	185.3	146.1	430.7	634.4	2291.6
1985	114.9	108.2	465.4	81.4	91.1	79.5	165.0	346.9	167.6	212.8	377.4	605.3	2815.5
1986	28.7	0.0	14.4	17.3	109.9	121.8	75.6	191.3	205.4	342.3	1614.1	138.5	2859.3
1987	34.2	7.7	42.7	9.3	37.2	126.6	54.1	163.7	189.4	112.9	180.7	658.2	1616.7
1988	54.7	83.9	42.0	171.3	125.9	102.2	137.2	153.6	152.4	267.8	837.2	499.3	2627.5
1989	59.7	25.0	45.2	94.1	87.1	54.9	93.8	207.3	313.9	280.9	235.4	43.2	1540.5
1990	23.4	10.1	187.0	310.0	55.5	119.6	346.3	75.9	265.2	308.8	202.0	138.0	2041.8
1991	185.8	29.5	38.4	38.0	217.8	163.8	54.0	154.8	121.5	105.8	566.6	200.0	1876.0
1992	65.2	22.5	14.1	19.0	102.4	206.9	151.8	76.6	58.0	110.5	636.6	225.4	1689.0
1993	115.7	15.6	198.1	379.4	40.2	53.6	173.7	179.1	219.8	541.3	504.5	513.0	2934.0
1994	30.1	17.7	560.2	66.9	145.2	143.2	159.6	109.3	111.6	507.2	1469.3	266.3	3586.6
1995	79.8	39.9	142.9	26.0	188.4	123.0	96.7	318.9	157.1	189.0	1136.4	381.4	2879.5
1996	59.8	25.9	25.5	61.3	31.4	103.2	161.7	214.9	169.7	332.3	673.9	1116.1	2975.7
1997	6.8	92.2	43.3	87.1	31.5	65.3	86.6	119.1	168.7	140.7	567.0	762.0	2170.3
1998	138.4	12.9	25.7	5.7	149.4	92.4	220.1	110.9	232.0	348.8	333.3	677.2	2346.8
1999	170.9	430.0	36.0	146.0	122.0	148.8	191.0	223.7	101.7	213.8	740.7	1209.9	3734.5
2000	108.1	201.6	374.6	355.2	30.5	59.0	154.1	46.9	226.6	174.2	1270.2	658.5	3659.5
2001	237.7	66.7	441.1	75.5	163.4	28.2	205.0	148.9	127.1	245.0	482.6	335.5	2556.7
2002	63.3	21.8	82.4	79.8	135.0	63.6	82.6	139.8	88.2	167.0	696.6	610.8	2230.9
2003	81.6	47.6	176.2	50.8	66.4	165.4	178.4	125.7	107.6	462.4	486.2	392.8	2341.1
2004	43.0	1.8	1.4	32.4	66.8	76.4	171.2	157.8	225.2	478.4	410.0	264.2	1928.6
2005	35.2	18.0	141.8	23.0	128.4	220.6	126.4	83.2	179.6	345.8	524.6	785.8	2612.4
2006	97.6	105.2	50.6	36.0	282.8	182.2	186.4	139.6	205.2	144.8	510.4	348.0	2288.8
2007	155.8	7.0	115.2	89.0	109.2	51.0	171.0	271.8	293.0	344.0	198.0	262.0	2067.0
2008	97.8	162.6	50.6	102.4	147.8	214.6	107.2	144.0	80.0	83.4	1457.0	918.8	3566.2



Records of Number of Raindays

Year /Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1979	6	4	2	12	9	9	22	14	20	22	24	11	155
1980	6	8	5	7	9	12	20	19	18	16	22	23	165
1981	12	6	4	9	11	4	11	4	19	17	23	17	137
1982	8	4	3	12	8	8	16	10	11	21	22	19	142
1983	12	1	6	1	9	9	21	13	21	17	25	26	161
1984	17	11	13	7	11	16	13	13	15	14	20	20	170
1985	11	13	16	12	14	6	13	20	20	22	25	18	190
1986	12	0	7	5	14	10	7	15	19	26	21	20	156
1987	14	2	8	4	6	15	11	15	17	11	15	25	143
1988	11	12	6	12	12	10	18	17	20	17	23	14	172
1989	14	3	5	6	11	9	10	17	24	16	21	12	148
1990	7	5	8	10	8	9	15	8	18	21	14	13	136
1991	13	2	7	7	13	6	4	14	12	15	19	15	127
1992	9	9	4	3	11	13	12	11	10	12	23	19	136
1993	13	6	13	8	3	9	9	19	21	20	23	22	166
1994	13	8	17	8	16	21	14	16	16	17	27	15	188
1995	19	6	8	5	9	12	13	24	22	23	21	19	181
1996	10	5	8	9	9	12	15	21	17	19	23	24	172
1997	4	11	4	11	4	10	11	14	14	18	23	24	148
1998	16	5	8	5	10	12	14	16	22	18	19	24	169
1999	20	12	8	14	11	12	16	17	16	19	25	24	194
2000	16	10	13	11	9	10	9	8	16	16	25	18	161
2001	17	8	13	10	11	5	10	16	16	23	21	16	166
2002	11	3	5	8	11	14	8	12	16	13	22	26	149
2003	15	8	16	4	10	12	16	15	15	27	25	21	184
2004	10	2	3	5	10	8	15	16	17	23	25	16	150
2005	11	5	7	6	14	16	16	16	10	24	21	25	171
2006	9	10	8	7	16	16	14	12	13	18	25	21	169
2007	17	2	12	12	17	12	17	15	20	17	19	17	177
2008	14	7	10	9	20	12	11	13	14	13	25	24	172

## **APPENDIX 2**

### Selected Discharge Station Data

\* Gulliemard Bridge

Daily Flow	means m3/s	Year	1979 site	5721442 SG.	KELANTAN at	JAM.GULLI Kel.								
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1	417.5	289.8	296.6	214.4	311.4	304.9	203.6	236.2	242.5	323.3	671.6	2048.3		
2	488.9	279.6	268	235.6	379.6	344.8	213.6	223.2	281.3	288.4	1653.4	1454.8		
3	673.8	272.4	314.5	210	352.1	370.7	200	212.6	335.9	267.2	1067.9	1486.5		
4	681.7	271.2	413.7	198.6	327.5	362.7	192.7	204.2	282.5	246.7	1005.3	2108		
5	944.2	266.5	365.6	185.6	335.1	297.2	186.1	197.4	285.3	239.5	931.9	1744.3		
6	952	282.2	300.9	193.7	307.2	250.9	180.8	194	320	234.1	769.4	1442.9		
7	724.9	366.3	263.9	267.5	291.9	284.8	178.4	192.8	313.8	260.3	697.7	1518.4		
8	608.1	686.4	245.1	262.2	360.9	382.3	176.5	200.5	268.1	319.7	647.7	1231.9		
9	518.4	638.9	235.5	231.3	364.2	363.5	174.8	196.7	264.7	300.6	575.3	1043.5		
10	461.7	432.4	231	233.1	353.3	370.5	173.7	187.1	286.5	286.8	608.2	935.2		
11	428.6	338.9	238.6	210.8	336.7	328.7	174.1	180.9	297.1	354.2	710.7	873.6		
12	405.9	303.9	251.1	193.5	314.2	357.2	176.5	177.1	346.5	386	848.5	853		
13	387.7	287.8	246.8	212.7	312.7	380.5	188.5	173.6	382.8	440.3	788.5	813.9		
14	372.1	282.1	262.1	211.2	342.2	388	234	170.8	408	529.7	821.1	813.1		
15	358.6	278.4	269	205.5	438.8	442.3	296.2	182.4	382.2	453	1032.2	821.8		
16	346.8	287.1	241.1	221.2	358.9	514.6	334.2	192.7	314.8	350.5	1817.3	770		
17	336.7	300.9	224.8	231.3	272.6	472.9	331.1	183.2	414	297.6	1789.9	728.8		
18	327.2	297.6	213.1	237.9	247.4	446.3	298.3	183.5	835.8	361.2	1404.1	700.3		
19	319.8	301.4	205.6	223.9	225.4	579.2	259.3	218.7	1221.4	404	1195.5	673.5		
20	312.8	279	203.7	224.6	213.6	560.4	285.5	371.2	820.6	454.8	1026.3	647.8		
21	307.7	256.3	198.1	273.2	207.6	377.4	262	399.4	548.6	460.9	899.1	612.2		
22	312.4	245.9	194.5	279	219.1	313.8	295.2	336.4	409.8	576.7	897.8	576		
23	344.2	241.5	194.7	348	233.8	277.6	444	334.8	476.7	510.3	1000.6	549.8		
24	497.4	237.5	195.4	423.6	236.7	246.4	503.1	276.4	547.6	433.8	1743.4	528.9		
25	579.9	240.4	189.2	415.8	223.1	238.4	518.6	244.7	517.4	512.1	2427.7	510		
26	484.2	472.1	183.8	366.6	226	238.4	546.9	259.1	410.4	470.9	3200.1	495.8		
27	405.9	597.5	181	462.3	226.8	233.5	516.3	245.3	476.1	435.7	7467	484.3		
28	352.3	373.7	177.8	403.9	276.1	222.9	401.3	215.8	407.7	462	9929.3	472.5		
29	328.9	177	370.4	410.4	211.8	308.8	196.6	388.4	427.8	9481.3	458.1			
30	315.3	178.7	322.3	362	205.9	273.8	189.6	370.1	384.5	5109	447			
31	302.7	177.2	337.6	259.4	204.6	342.2	448.5							
Min		302.7	237.5	177	185.6	207.6	205.9	173.7	170.8	242.5	234.1	575.3	447	170.8
Mean		461.2	336	236.7	269	303.4	345.6	283.5	225.2	428.6	381.1	2073.9	912.7	520.1
Max		952	686.4	413.7	462.3	438.8	579.2	546.9	399.4	1221.4	576.7	9929.3	2108	9929.3

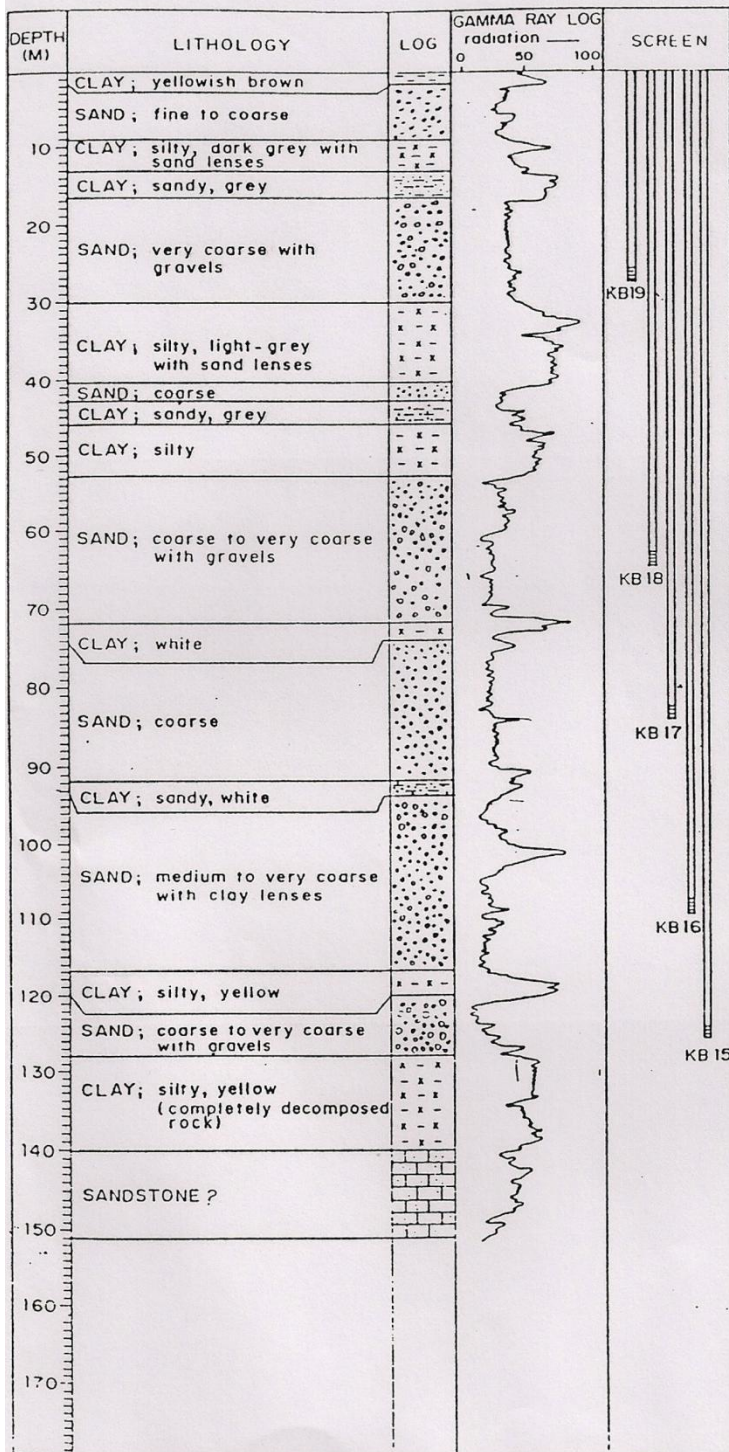
Daily Flow	means m3/s	Year	2008 site	5721442 SG.	KELANTAN at	JAM.GUILLI Kel.								
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1	710.4	244.7	2272.1	395.5	607.1	437.8	772.5	361.7	931.5	676.5	596.5	2289.7		
2	704	259.2	959	407.4	500.5	391.2	689.9	341.3	843.1	687.2	503.3	1489		
3	614.1	294.3	627.3	416.3	663.1	337.7	547.2	342.6	844.6	854.6	551.2	1197.8		
4	627.3	365.5	465.9	414.8	534.6	385.5	689.7	343.1	932.8	943.5	752.2	1052.4		
5	566.6	366.9	389.3	415.4	542.8	375.2	856.5	357.2	1006	890.8	560.4	938.2		
6	578.1	306	369	410.6	621.9	367.9	544.2	440.7	999.9	984.4	485.5	1151.9		
7	578.7	275.1	494.7	395.7	709.6	357.4	439.8	713.8	1052.6	1111	429.5	3146.8		
8	537	234.3	976.1	413.9	667.3	526.5	394.3	520.5	1159.9	1120.1	398.6	2992.7		
9	585.1	216.5	966.2	432.3	675	788.2	506.7	424.1	1028.7	1064.9	733.6	2136.3		
10	585.7	207.4	899.4	401.2	549.1	520.9	511.9	362	977.6	943.6	1022.6	1586.5		
11	513.4	195.6	835	383.2	510.2	518.1	411.6	339.2	913.9	892.2	966.4	1274.2		
12	464.9	183	788	410.9	467.8	790	675.8	328.1	858.9	921.9	1060.4	1157.2		
13	409.1	178	813.8	455.7	399.2	557.2	580	338	827.6	888.7	951.6	1029.9		
14	385.6	176.9	806.8	414.7	341.7	402.4	656.8	446	960.4	1002.9	808.5	1003.5		
15	359.3	181.2	708.9	383.8	320	338.3	979.1	654.9	1090	1001.5	761.5	1183.7		
16	334.7	176.9	653.1	346.2	304.9	324.2	799.6	758.2	916.8	932.2	684.7	1093.4		
17	323.1	173.5	570.6	309.7	294.8	304.2	621.7	734.3	786.3	893.3	619.4	1044.7		
18	491	169.2	493.8	313	284.2	293.5	541.3	836.3	745.6	901.3	561.4	923.7		
19	632.5	158.6	483.6	304.2	278.6	326.7	529.3	893.4	730.5	925.6	555.5	841.6		
20	574.1	157.4	472.6	316.7	325.3	314.5	451.4	857	726.9	713.4	987.7	766.8		
21	474.3	154.4	454.1	310.8	527.1	328.6	465.2	926.1	705.3	476.8	1339.7	721.8		
22	392.3	156	481.5	323.8	366.6	334.1	560.8	1051.2	857.8	468.3	1098.7	691		
23	363.9	155.4	519.6	342.1	372.4	322.8	612.1	993.3	980.7	661.8	1016	659.8		
24	307.9	158.2	513.3	363.6	373.6	299.3	543.5	1018.6	816	1030.5	930.6	639		
25	284	154.1	549.6	372.8	410	303.3	571.1	1013.5	732.5	1047.6	938.5	746.5		
26	273.1	154.7	542.2	407.8	353.5	311.6	952.4	1025.8	697.4	896	1367.5	1332.3		
27	288.7	165.5	595.5	525	453.8	387.3	722.9	988	687.3	712.3	1690.7	1331.5		
28	291.5	475.3	662	570.9	414.7	469.1	692.6	806.9	689	664	1299.5	941.7		
29	361.3	2623.5	585.2	716.1	392.7	363.5	501.4	800.1	698.1	689.2	2513	1100.5		
30	332	476.1	747.5	400.1	637.1	431.6	894.1	690	656.7	4587.6	1473.3			
31	264.8	424.6	421.3	393.3	1003.8	648.9	1288.2							
Min		264.8	154.1	369	304.2	278.6	293.5	393.3	328.1	687.3	398.6	639	154.1	
Mean		458.3	300.6	672.6	414	454.3	413.8	601.5	674.6	862.9	848.4	1025.7	1265.3	667.9
Max		710.4	2623.5	2272.1	747.5	709.6	790	979.1	1051.2	1159.9	1120.1	4587.6	3146.8	4587.6

## **APPENDIX 3**

### Example Borehole Log Data

\* KB1-KB5

\* KB15-KB19



WELL NO: KB 15  
 KB 16  
 KB 17  
 KB 18  
 KB 19

Location: Jalan Merbau

Map Sheet no: 3968

Easting: 472500

Northing: 678300

Elevation: KB 15: 6.57 m

KB 16: 6.58 m

KB 17: 6.60 m

KB 18: 6.55 m

KB 19: 6.47 m

Total depth KB 15: 150.0 m

KB 16: 113.0 m

KB 17: 88.0 m

KB 18: 66.0 m

KB 19: 34.0 m

Screen depth KB 15: 125.0 m - 126.5 m

KB 16: 108.5 m - 110.0 m

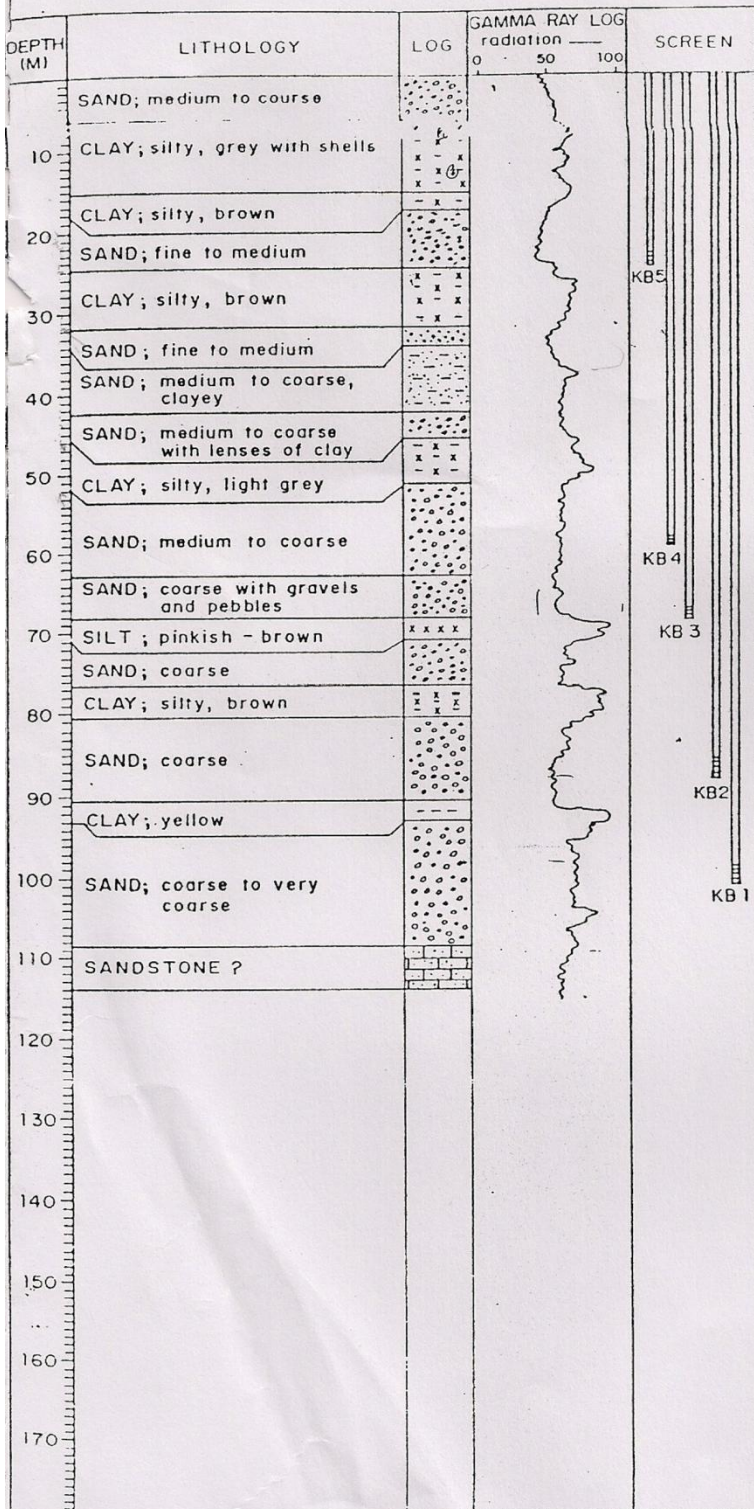
KB 17: 83.5 m - 85.0 m

KB 18: 64.0 m - 65.5 m

KB 19: 27.0 m - 28.5 m

Remarks





WELL NO : KB 1  
 KB 2  
 KB 3  
 KB 4  
 KB 5

Location : Pengkalan Chepa Waterworks.

Map Sheet no : 3968

Easting : 478100

Northing : 681700

Elevation : KB 1 : 5.93 m  
 KB 2 : 5.93 m  
 KB 3 : 5.87 m  
 KB 4 : 5.85 m  
 KB 5 : 5.79 m

Total depth KB 1 : 114.0 m  
 KB 2 : 91.0 m  
 KB 3 : 73.0 m  
 KB 4 : 64.0 m  
 KB 5 : 30.0 m

Screen depth : KB 1 : 98.5 m - 100.0 m  
 KB 2 : 85.5 m - 87.0 m  
 KB 3 : 67.0 m - 68.5 m  
 KB 4 : 58.0 m - 59.5 m  
 KB 5 : 23.0 m - 24.5 m

Remarks :





## **APPENDIX 4**

### Example Aquachem Sample Summary Report

# Sample Summary Report

Sample ID KB 24  
 Sample Date  
 Station Jelawat  
 Location  
 Geology  
 Watertype Na-HCO<sub>3</sub>  
 Temperature (°C) 29.33  
 pH 5.52  
 Conductivity 85.29uS/cm

Sum of Anions 1.34meq/L  
 Sum of Cations 0.94meq/L  
 Balance -17.67%

Total dissolved solids 73.81mg/L  
 Total hardness 18.42mg/l CaCO<sub>3</sub>  
 Alkalinity 20.91mg/l CaCO<sub>3</sub>

Major ion composition	mg/l	mmol/l	meq/l
Na	10.62	0.46	0.46
K	2.22	0.057	0.057
Ca	4.87	0.12	0.24
Mg	1.52	0.06	0.13
Cl	10.21	0.29	0.29
SO <sub>4</sub>	10.09	0.11	0.21
NO <sub>3</sub>	1.98	0.03	0.03
HCO <sub>3</sub>	23.47	0.38	0.38

Ratios	Comparison to Seawater			
	mg/l	mmol/l	mg/l	mmol/l
Ca/Mg	3.20	1.94	0.319	0.194
Ca/SO <sub>4</sub>	0.48	1.16	0.152	0.364
Na/Cl	1.04	1.60	0.556	0.858
Cl/Br			287	648

DESCRIPTION:PROJECT:PROJECT NO:CLIENT:DATE:

# Sample Summary Report

Sample ID KB 3  
 Sample Date  
 Station Pengkalan Chepa Waterworks  
 Location  
 Geology  
 Watertype Ca-Cl  
 Temperature (°C) 31.34  
 pH 6.25  
 Conductivity 656.71uS/cm

Sum of Anions 5.65meq/L  
 Sum of Cations 5.16meq/L  
 Balance -4.58%

Total dissolved solids 324.87mg/L  
 Total hardness 177.45mg/l CaCO3  
 Alkalinity 32.14mg/l CaCO3

Major ion composition	mg/l	mmol/l	meq/l
Na	30.19	1.31	1.31
K	8.33	0.213	0.213
Ca	35.75	0.89	1.78
Mg	21.41	0.88	1.76
Cl	160.30	4.52	4.52
SO4	2.46	0.03	0.05
NO3	2.64	0.04	0.04
HCO3	37.15	0.61	0.61

Ratios	Comparison to Seawater			
	mg/l	mmol/l	mg/l	mmol/l
Ca/Mg	1.67	1.01	0.319	0.194
Ca/SO4	14.53	34.81	0.152	0.364
Na/Cl	0.19	0.29	0.556	0.858
Cl/Br			287	648

DESCRIPTION:PROJECT:PROJECT NO:CLIENT:DATE:

# Sample Summary Report

Sample ID KB13  
 Sample Date  
 Station Tanjung Mas Waterworks  
 Location  
 Geology  
 Watertype Na-Cl  
 Temperature (°C) 30.24  
 pH 5.76  
 Conductivity 1864.43uS/cm

Sum of Anions 13.88meq/L  
 Sum of Cations 13.61meq/L  
 Balance -0.99%

Total dissolved solids 793.99mg/L  
 Total hardness 322.57mg/l CaCO3  
 Alkalinity 12.68mg/l CaCO3

Major ion composition	mg/l	mmol/l	meq/l
Na	154.84	6.74	6.74
K	12.27	0.314	0.314
Ca	57.55	1.44	2.87
Mg	43.43	1.79	3.57
Cl	465.71	13.14	13.14
SO4	2.21	0.02	0.05
NO3	3.20	0.05	0.05
HCO3	13.43	0.22	0.22

Ratios	Comparison to Seawater			
	mg/l	mmol/l	mg/l	mmol/l
Ca/Mg	1.33	0.80	0.319	0.194
Ca/SO4	26.04	62.38	0.152	0.364
Na/Cl	0.33	0.51	0.556	0.858
Cl/Br			287	648

DESCRIPTION:PROJECT:PROJECT NO:CLIENT:DATE: