

APPENDIX 10

SURFACE WATER STORAGE CALCULATIONS

Integra Consulting						Job No	Date
						3036	05.11.18
						Sheet	By
Calculations		Telephone:		0161 237 3400		01	JS
Job Title							
Storm Water Flood Model							
M5-60 = 18		r = 0.335		Return, T = 100		Area (m²) = 5205	
				CC Factor = 0.3		Limit (l/s) = 5	
				Totals		214	304
D (mins)	M5-D (mm)	MT-D (mm)	Rate (mm/hr)	Flow (l/s)	CC Flow (l/s)	Storage (m³)	CC Storage (m³)
10.00	8.88	16.72	100.32	144.12	187.35	83.47	109.41
15.00	10.71	20.75	83.01	119.24	155.02	102.82	135.02
20.00	12.09	23.58	70.75	101.64	132.13	115.97	152.56
25.00	13.20	25.97	62.33	89.54	116.41	126.82	167.11
30.00	14.14	28.00	55.99	80.43	104.56	135.78	179.22
35.00	14.96	29.76	51.01	73.28	95.27	143.40	189.57
40.00	15.68	31.32	46.98	67.50	87.75	149.99	198.59
45.00	16.34	32.73	43.64	62.70	81.51	155.78	206.57
50.00	16.93	34.02	40.82	58.64	76.24	160.93	213.71
55.00	17.49	35.20	38.40	55.16	71.71	165.54	220.15
60.00	18.00	36.29	36.29	52.14	67.78	169.70	226.01
65.00	18.48	37.31	34.44	49.48	64.33	173.48	231.37
70.00	18.93	38.27	32.80	47.12	61.26	176.92	236.29
75.00	19.36	39.17	31.33	45.01	58.52	180.07	240.84
80.00	19.76	40.02	30.01	43.12	56.05	182.96	245.04
85.00	20.15	40.82	28.82	41.40	53.81	185.62	248.95
90.00	20.52	41.59	27.72	39.83	51.78	188.07	252.59
95.00	20.87	42.31	26.72	38.39	49.91	190.34	255.99
100.00	21.21	43.01	25.81	37.07	48.19	192.43	259.16
105.00	21.54	43.67	24.96	35.85	46.61	194.37	262.13
110.00	21.85	44.31	24.17	34.72	45.14	196.17	264.92
115.00	22.15	44.92	23.44	33.67	43.77	197.84	267.54
120.00	22.45	45.51	22.76	32.69	42.50	199.38	270.00
125.00	22.73	46.08	22.12	31.78	41.31	200.82	272.31
130.00	23.01	46.63	21.52	30.92	40.19	202.14	274.49
135.00	23.28	47.16	20.96	30.11	39.14	203.37	276.54
140.00	23.54	47.67	20.43	29.35	38.15	204.51	278.47
145.00	23.79	48.16	19.93	28.63	37.22	205.57	280.29
150.00	24.04	48.64	19.46	27.95	36.33	206.54	282.00
155.00	24.28	49.10	19.01	27.30	35.50	207.44	283.62
160.00	24.51	49.55	18.58	26.69	34.70	208.26	285.14
165.00	24.74	49.99	18.18	26.11	33.95	209.02	286.57
170.00	24.97	50.41	17.79	25.56	33.23	209.71	287.92
175.00	25.19	50.82	17.42	25.03	32.54	210.34	289.19
180.00	25.40	51.22	17.07	24.53	31.89	210.91	290.38
185.00	25.61	51.61	16.74	24.05	31.26	211.43	291.51
190.00	25.82	51.99	16.42	23.59	30.66	211.89	292.56
195.00	26.02	52.36	16.11	23.15	30.09	212.31	293.55
200.00	26.22	52.72	15.82	22.72	29.54	212.67	294.48

205.00	26.42	53.08	15.53	22.32	29.01	212.99	295.34
210.00	26.61	53.42	15.26	21.93	28.50	213.27	296.15
215.00	26.79	53.75	15.00	21.55	28.02	213.50	296.90
220.00	26.98	54.08	14.75	21.19	27.55	213.70	297.60
225.00	27.16	54.40	14.51	20.84	27.09	213.85	298.25
230.00	27.34	54.71	14.27	20.50	26.66	213.97	298.86
235.00	27.52	55.02	14.05	20.18	26.23	214.05	299.41
240.00	27.69	55.32	13.83	19.87	25.83	214.09	299.92
245.00	27.86	55.61	13.62	19.56	25.43	214.11	300.39
250.00	28.03	55.90	13.42	19.27	25.05	214.09	300.81
255.00	28.19	56.18	13.22	18.99	24.69	214.03	301.19
260.00	28.35	56.45	13.03	18.71	24.33	213.95	301.54
265.00	28.52	56.72	12.84	18.45	23.98	213.84	301.85
270.00	28.67	56.98	12.66	18.19	23.65	213.70	302.12
275.00	28.83	57.24	12.49	17.94	23.32	213.54	302.35
280.00	28.98	57.50	12.32	17.70	23.01	213.35	302.55
285.00	29.14	57.74	12.16	17.46	22.70	213.13	302.72
290.00	29.29	57.99	12.00	17.23	22.41	212.89	302.85
295.00	29.43	58.22	11.84	17.01	22.12	212.62	302.96
300.00	29.58	58.46	11.69	16.80	21.84	212.33	303.03
305.00	29.73	58.69	11.55	16.59	21.56	212.02	303.07
310.00	29.87	58.91	11.40	16.38	21.30	211.68	303.09
315.00	30.01	59.14	11.26	16.18	21.04	211.33	303.08
320.00	30.15	59.35	11.13	15.99	20.78	210.95	303.04
325.00	30.29	59.57	11.00	15.80	20.54	210.56	302.97
330.00	30.42	59.78	10.87	15.61	20.30	210.14	302.88
335.00	30.56	59.98	10.74	15.43	20.06	209.70	302.77
340.00	30.69	60.18	10.62	15.26	19.83	209.25	302.63
345.00	30.83	60.38	10.50	15.09	19.61	208.78	302.46
350.00	30.96	60.58	10.38	14.92	19.39	208.29	302.28
355.00	31.09	60.99	10.31	14.81	19.25	208.93	303.55
360.00	31.21	61.21	10.20	14.65	19.05	208.55	303.51
365.00	31.34	61.42	10.10	14.50	18.86	208.15	303.45
370.00	31.47	61.63	9.99	14.36	18.67	207.75	303.37
375.00	31.59	61.84	9.89	14.21	18.48	207.33	303.28
380.00	31.71	62.05	9.80	14.07	18.30	206.90	303.17
385.00	31.83	62.25	9.70	13.94	18.12	206.46	303.05
390.00	31.96	62.46	9.61	13.80	17.94	206.01	302.91
395.00	32.07	62.66	9.52	13.67	17.77	205.55	302.76
400.00	32.19	62.86	9.43	13.54	17.61	205.07	302.60
405.00	32.31	63.05	9.34	13.42	17.45	204.59	302.42
410.00	32.43	63.25	9.26	13.30	17.29	204.10	302.23
415.00	32.54	63.44	9.17	13.18	17.13	203.59	302.02
420.00	32.66	63.63	9.09	13.06	16.98	203.08	301.80
425.00	32.77	63.82	9.01	12.94	16.83	202.56	301.57
430.00	32.88	64.01	8.93	12.83	16.68	202.02	301.33
435.00	32.99	64.19	8.85	12.72	16.54	201.48	301.08
440.00	33.10	64.38	8.78	12.61	16.39	200.93	300.81
445.00	33.21	64.56	8.70	12.50	16.26	200.37	300.54
450.00	33.32	64.74	8.63	12.40	16.12	199.81	300.25

455.00	33.43	64.92	8.56	12.30	15.99	199.23	299.95
460.00	33.54	65.09	8.49	12.20	15.86	198.65	299.64
465.00	33.64	65.27	8.42	12.10	15.73	198.05	299.32
470.00	33.75	65.44	8.35	12.00	15.60	197.45	298.99
475.00	33.85	65.62	8.29	11.91	15.48	196.85	298.65
480.00	33.96	65.79	8.22	11.81	15.36	196.23	298.30
485.00	34.06	65.96	8.16	11.72	15.24	195.61	297.94
490.00	34.16	66.12	8.10	11.63	15.12	194.98	297.57
495.00	34.26	66.29	8.04	11.54	15.01	194.34	297.19
500.00	34.36	66.46	7.97	11.46	14.89	193.70	296.80
505.00	34.46	66.62	7.92	11.37	14.78	193.04	296.41
510.00	34.56	66.78	7.86	11.29	14.67	192.39	296.00
515.00	34.66	66.95	7.80	11.20	14.57	191.72	295.59
520.00	34.76	67.11	7.74	11.12	14.46	191.05	295.16
525.00	34.85	67.26	7.69	11.04	14.36	190.37	294.73
530.00	34.95	67.42	7.63	10.96	14.25	189.69	294.29
535.00	35.05	67.58	7.58	10.89	14.15	189.00	293.84
540.00	35.14	67.73	7.53	10.81	14.06	188.30	293.39
545.00	35.24	67.89	7.47	10.74	13.96	187.60	292.93
550.00	35.33	68.04	7.42	10.66	13.86	186.89	292.45
555.00	35.42	68.19	7.37	10.59	13.77	186.17	291.97
560.00	35.52	68.34	7.32	10.52	13.68	185.45	291.49
565.00	35.61	68.49	7.27	10.45	13.58	184.73	290.99
570.00	35.70	68.64	7.23	10.38	13.49	183.99	290.49
575.00	35.79	68.79	7.18	10.31	13.41	183.26	289.99
580.00	35.88	68.94	7.13	10.24	13.32	182.52	289.47
585.00	35.97	69.08	7.09	10.18	13.23	181.77	288.95
590.00	36.06	69.23	7.04	10.11	13.15	181.01	288.42
595.00	36.15	69.37	7.00	10.05	13.06	180.26	287.88
600.00	36.24	69.51	6.95	9.99	12.98	179.49	287.34
605.00	36.32	69.65	6.91	9.92	12.90	178.72	286.79
610.00	36.41	69.79	6.86	9.86	12.82	177.95	286.24
615.00	36.50	69.93	6.82	9.80	12.74	177.17	285.68
620.00	36.58	70.07	6.78	9.74	12.66	176.39	285.11
625.00	36.67	70.21	6.74	9.68	12.59	175.60	284.53
630.00	36.75	70.35	6.70	9.62	12.51	174.81	283.95
635.00	36.84	70.48	6.66	9.57	12.44	174.01	283.37
640.00	36.92	70.62	6.62	9.51	12.36	173.21	282.78
645.00	37.00	70.75	6.58	9.45	12.29	172.41	282.18
650.00	37.09	70.89	6.54	9.40	12.22	171.60	281.58
655.00	37.17	71.02	6.51	9.35	12.15	170.78	280.97
660.00	37.25	71.15	6.47	9.29	12.08	169.96	280.35
665.00	37.33	71.28	6.43	9.24	12.01	169.14	279.73
670.00	37.42	71.41	6.40	9.19	11.94	168.31	279.11
675.00	37.50	71.54	6.36	9.14	11.88	167.48	278.48
680.00	37.58	71.67	6.32	9.08	11.81	166.65	277.84
685.00	37.66	71.80	6.29	9.03	11.74	165.81	277.20
690.00	37.74	71.92	6.25	8.98	11.68	164.97	276.56
695.00	37.81	72.05	6.22	8.94	11.62	164.12	275.91
700.00	37.89	72.18	6.19	8.89	11.55	163.27	275.25

705.00	37.97	72.30	6.15	8.84	11.49	162.41	274.59
710.00	38.05	72.42	6.12	8.79	11.43	161.56	273.92
715.00	38.13	72.55	6.09	8.75	11.37	160.69	273.25
720.00	38.20	72.67	6.06	8.70	11.31	159.83	272.58
725.00	38.28	72.79	6.02	8.65	11.25	158.96	271.90
730.00	38.36	72.91	5.99	8.61	11.19	158.09	271.21
735.00	38.43	73.03	5.96	8.56	11.13	157.21	270.52
740.00	38.51	73.15	5.93	8.52	11.08	156.33	269.83
745.00	38.58	73.27	5.90	8.48	11.02	155.45	269.13
750.00	38.66	73.39	5.87	8.43	10.97	154.56	268.43
755.00	38.73	73.51	5.84	8.39	10.91	153.67	267.72
760.00	38.81	73.63	5.81	8.35	10.86	152.78	267.01
765.00	38.88	73.74	5.78	8.31	10.80	151.88	266.30
770.00	38.95	73.86	5.76	8.27	10.75	150.98	265.58
775.00	39.03	73.98	5.73	8.23	10.70	150.08	264.85
780.00	39.10	74.09	5.70	8.19	10.64	149.17	264.13
785.00	39.17	74.20	5.67	8.15	10.59	148.26	263.39
790.00	39.25	74.32	5.64	8.11	10.54	147.35	262.66
795.00	39.32	74.43	5.62	8.07	10.49	146.44	261.92
800.00	39.39	74.54	5.59	8.03	10.44	145.52	261.17
805.00	39.46	74.66	5.56	7.99	10.39	144.60	260.43
810.00	39.53	74.77	5.54	7.96	10.34	143.67	259.68
815.00	39.60	74.88	5.51	7.92	10.29	142.75	258.92
820.00	39.67	74.99	5.49	7.88	10.25	141.82	258.16
825.00	39.74	75.10	5.46	7.85	10.20	140.88	257.40
830.00	39.81	75.21	5.44	7.81	10.15	139.95	256.63
835.00	39.88	75.32	5.41	7.77	10.11	139.01	255.86
840.00	39.95	75.42	5.39	7.74	10.06	138.07	255.09
845.00	40.02	75.53	5.36	7.70	10.02	137.13	254.31
850.00	40.09	75.64	5.34	7.67	9.97	136.18	253.53
855.00	40.15	75.75	5.32	7.64	9.93	135.23	252.75
860.00	40.22	75.85	5.29	7.60	9.88	134.28	251.96
865.00	40.29	75.96	5.27	7.57	9.84	133.32	251.17
870.00	40.36	76.06	5.25	7.54	9.80	132.37	250.38
875.00	40.42	76.17	5.22	7.50	9.75	131.41	249.58
880.00	40.49	76.27	5.20	7.47	9.71	130.45	248.78
885.00	40.56	76.37	5.18	7.44	9.67	129.48	247.97
890.00	40.62	76.48	5.16	7.41	9.63	128.51	247.17
895.00	40.69	76.58	5.13	7.38	9.59	127.54	246.36
900.00	40.75	76.68	5.11	7.34	9.55	126.57	245.54
905.00	40.82	76.78	5.09	7.31	9.51	125.60	244.73
910.00	40.88	76.88	5.07	7.28	9.47	124.62	243.91
915.00	40.95	76.98	5.05	7.25	9.43	123.64	243.09
920.00	41.01	77.09	5.03	7.22	9.39	122.66	242.26
925.00	41.08	77.19	5.01	7.19	9.35	121.68	241.43
930.00	41.14	77.28	4.99	7.16	9.31	120.69	240.60
935.00	41.21	77.38	4.97	7.13	9.27	119.70	239.76
940.00	41.27	77.48	4.95	7.10	9.24	118.71	238.93
945.00	41.33	77.58	4.93	7.08	9.20	117.72	238.09
950.00	41.40	77.68	4.91	7.05	9.16	116.73	237.24

955.00	41.46	77.78	4.89	7.02	9.13	115.73	236.40
960.00	41.52	77.87	4.87	6.99	9.09	114.73	235.55
965.00	41.58	77.97	4.85	6.96	9.05	113.73	234.70
970.00	41.64	78.06	4.83	6.94	9.02	112.72	233.84
975.00	41.71	78.16	4.81	6.91	8.98	111.72	232.98
980.00	41.77	78.26	4.79	6.88	8.95	110.71	232.12
985.00	41.83	78.35	4.77	6.86	8.91	109.70	231.26
990.00	41.89	78.44	4.75	6.83	8.88	108.69	230.40
995.00	41.95	78.54	4.74	6.80	8.84	107.68	229.53
1000.00	42.01	78.63	4.72	6.78	8.81	106.66	228.66
1005.00	42.07	78.73	4.70	6.75	8.78	105.64	227.78
1010.00	42.13	78.82	4.68	6.73	8.74	104.62	226.91
1015.00	42.19	78.91	4.66	6.70	8.71	103.60	226.03
1020.00	42.25	79.00	4.65	6.68	8.68	102.58	225.15
1025.00	42.31	79.09	4.63	6.65	8.65	101.55	224.27
1030.00	42.37	79.19	4.61	6.63	8.61	100.52	223.38
1035.00	42.43	79.28	4.60	6.60	8.58	99.49	222.49
1040.00	42.49	79.37	4.58	6.58	8.55	98.46	221.60
1045.00	42.55	79.46	4.56	6.55	8.52	97.43	220.71
1050.00	42.61	79.55	4.55	6.53	8.49	96.40	219.81
1055.00	42.67	79.64	4.53	6.51	8.46	95.36	218.92
1060.00	42.73	79.73	4.51	6.48	8.43	94.32	218.02
1065.00	42.78	79.82	4.50	6.46	8.40	93.28	217.11
1070.00	42.84	79.90	4.48	6.44	8.37	92.24	216.21
1075.00	42.90	79.99	4.46	6.41	8.34	91.19	215.30
1080.00	42.96	80.08	4.45	6.39	8.31	90.15	214.39
1085.00	43.01	80.17	4.43	6.37	8.28	89.10	213.48
1090.00	43.07	80.25	4.42	6.35	8.25	88.05	212.57
1095.00	43.13	80.34	4.40	6.32	8.22	87.00	211.65
1100.00	43.18	80.43	4.39	6.30	8.19	85.95	210.73
1105.00	43.24	80.51	4.37	6.28	8.16	84.90	209.81
1110.00	43.30	80.60	4.36	6.26	8.14	83.84	208.89
1115.00	43.35	80.69	4.34	6.24	8.11	82.78	207.97
1120.00	43.41	80.77	4.33	6.22	8.08	81.72	207.04
1125.00	43.47	80.86	4.31	6.20	8.05	80.66	206.11
1130.00	43.52	80.94	4.30	6.17	8.03	79.60	205.18
1135.00	43.58	81.03	4.28	6.15	8.00	78.54	204.25
1140.00	43.63	81.11	4.27	6.13	7.97	77.47	203.31
1145.00	43.69	81.19	4.25	6.11	7.95	76.40	202.38
1150.00	43.74	81.28	4.24	6.09	7.92	75.34	201.44
1155.00	43.80	81.36	4.23	6.07	7.89	74.27	200.50
1160.00	43.85	81.44	4.21	6.05	7.87	73.19	199.55
1165.00	43.91	81.52	4.20	6.03	7.84	72.12	198.61
1170.00	43.96	81.61	4.18	6.01	7.82	71.05	197.66
1175.00	44.01	81.69	4.17	5.99	7.79	69.97	196.71
1180.00	44.07	81.77	4.16	5.97	7.76	68.89	195.76
1185.00	44.12	81.85	4.14	5.95	7.74	67.81	194.81
1190.00	44.18	81.93	4.13	5.93	7.72	66.73	193.85
1195.00	44.23	82.01	4.12	5.92	7.69	65.65	192.90
1200.00	44.28	82.09	4.10	5.90	7.67	64.57	191.94