CALCULATIONS TABLE - LINES 1 & 2

LOCATION					TIME			SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN														HEADLOSSES								PART FULL			DESIGN LEVELS							
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S			V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C × A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C × A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L × Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m				m	%	m	m	m/s	m	m	m	m	m	m	
5 100	1H	1H to 1G	1I	Urban		5.00 5.00	159 255		0.81 0.99	0.212 0.212	0.172 0.210	0.172 0.210	76 149	76 FLOW WIDTH/DEPTH 2.194m DOWNSTREAM 1.129m	1.00	202	4	58	18	1F	5.00 5.00	159 255	0.172 0.210	149	1983	91 (Pipe flow= Grate flow)	58	16.552	0.48	375(2)	0.53 (1.18)	0.28		Qg 0.058 Qo 0.058 Do 375 CHRT 32: Vo2/2gDo 0.04 H/Do Kg side flow 9.61 end flow 6.89	0.014	9.61	0.138			9.61	0.138	0.11	0.018			26.855 26.775	26.864 26.846	27.002		27.002	27.737	1H
5 100	1G	1G to 1F	1I														24				5.28 5.28	156 250	0.172 0.210	146			58 (Pipe flow= Sum upstr	16.860 atten flows)	0.83	375(2)	0.53 (1.45)	0.28		Qo 0.058 Do 375 CHART 50 Du/Do1.00 alpha 62 K'w 0.27 Vu 0.53 WSE 0.03 Ku 1.52 Kw 1.79	0.014	1.52	0.022			1.79	0.026	0.11	0.018			26.755 26.615	26.824 26.806	26.846		26.850	27.683	1G
5 100	1F	1F to 1E	1I,1G	Urban		5.00 5.00	159 255		0.81 0.99	0.308 0.308	0.249 0.305	0.249 0.305	118 216	128 FLOW WIDTH/DEPTH 2.726m DOWNSTREAM 1.655m	1.00	202	4	88	40	1E	5.56 5.56	154 245	0.421 0.515	350	1983	208 (Pipe flow= Sum upstr	142 atten flows)	43.100	3.13	375(2)	1.29 (2.81)	0.56		Qg 0.085 Qo 0.142 Do 375 CHART 34 Angle 14 Case 3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.60 K 1.88 S/Do 1.56 cor 0.61 Ku 2.49 Kw 2.49	0.085	2.49	0.211			2.49	0.211	0.66	0.285	0.179	2.75	26.595 25.245	26.595 25.818	26.806		26.806	27.466	1F
5 100	1E	1E to 1D	1I,1G,1F	Urban		5.00 5.00	159 255		0.81 0.99	0.150 0.150	0.122 0.149	0.122 0.149	54 105	94 FLOW WIDTH/DEPTH 1.690m DOWNSTREAM 0.865m	5.06	453	4	69	25	2A	6.12 6.12	148 237	0.543 0.664	437	2981	236 (Pipe flow= Sum upstr	201 atten flows)	8.041	1.12	450(2)	1.26 (1.90)	0.11		Qg 0.064 Qo 0.201 Do 450 Angle 69 Chart 43 S/Do 2.5 chart Du/Do 0.83 K0 1.36 K0.5 1.76 Qu/Qo 0.68 Cg 0.71 K 1.64 S/Do 2.5 K0 1.36 K0.5 1.76 K 1.64 S/Do 2.0 K0 1.42 K0.5 1.94 K 1.79	0.081	1.59	0.129		Interp val for S/Do 2.30 Kw 1.73 CHART 42 S/Do 2.5 K0 1.05 K0.5 1.175 K 1.55 S/Do 2.0 K0 1.03 K0.5 1.192 K 1.66 Interp val for S/Do 2.30 Ku 1.59	1.70	0.138	0.50	0.040			25.240 25.150	25.689 25.649	25.818		25.827	26.097	1E
5 100	1D	1D to 1C	1I,1G,1F,1E	Urban		5.00 5.00	159 255		0.81 0.99	0.117 0.117	0.095 0.116	0.095 0.116	42 82	42 FLOW WIDTH/DEPTH 1.150m DOWNSTREAM 0.301m	5.06	453	4	35	7	1C	6.23 6.23	147 235	0.638 0.780	509	2981	277 (Pipe flow= Sum upstr	232 atten flows)	10.118	0.69	450(2)	1.46 (1.49)	0.12		Qg 0.032 Qo 0.232 Do 450 Angle 43 Chart 41 S/Do 2.5 chart Du/Do 1.00 K0 2.39 K0.5 2.19 Qu/Qo 0.86 Cg 0.34 K 2.32 S/Do 2.5 K0 2.39 K0.5 2.19 K 2.32 S/Do 2.0 K0 2.52 K0.5 2.50 K 2.51	0.109	2.20	0.239		Interp val for S/Do 2.23 Kw 2.42 CHART 40 S/Do 2.5 K0 2.15 K0.5 1.98 K 2.09 S/Do 2.0 K0 2.25 K0.5 2.36 K 2.29 Interp val for S/Do 2.23 Ku 2.22	2.42	0.263	0.66	0.067			25.120 25.050	25.410 25.343	25.649		25.673	25.950	1D
5 100	1C	1C to 1B	1I,1G,1F,1E,1D	Urban		5.00 5.00	159 255		0.81 0.99	0.116 0.116	0.094 0.115	0.094 0.115	42 81	49 FLOW WIDTH/DEPTH 0.042m	0.00	104	12S.08W.7	49	0		6.35 6.35	146 234	0.732 0.895	582			276 (Pipe flow= Sum upstr	33.385 atten flows)	1.50	450(2)	1.73 (2.19)	0.32		Qg 0.045 Qo 0.276 Do 450 Angle 85 Chart 47 S/Do 2.5 chart Du/Do 1.00 K0 1.92 K0.5 2.12 Qu/Qo 0.84 Cg 0.48 K 2.00 S/Do 2.0 K0 2.44 K0.5 2.40 K 2.42 S/Do 1.5 K0 2.67 K0.5 2.58 K 2.64	0.153	2.65	0.313		Interp val for S/Do 1.84 Kw 2.49 CHART 46 S/Do 2.0 K0 2.84 K0.5 1.92 K 1.99 S/Do 1.5 K0 2.69 K0.5 2.31 K 2.18 Interp val for S/Do 1.84 Ku 2.05	2.49	0.380	0.94	0.312	0.301	2.43	25.030 24.530	25.030 24.644	25.343		25.418	25.800	1C
5 100	2A	2A to 1B	2A	Urban		5.00 5.00	159 255		0.81 0.99	0.092 0.092	0.075 0.091	0.075 0.091	33 65	58 FLOW WIDTH/DEPTH 0.943m WIER APPROACH SAG 0.283m	0.00	179	17S.08W.7	58	0		5.00 5.00	159 255	0.075 0.091	64			58 (Pipe flow= Grate flow)	18.898	2.65	375(2)	0.53 (2.58)	0.31		Qg 0.058 Qo 0.058 Do 375 CHRT 32: Vo2/2gDo 0.04 H/Do Kg side flow 9.70 end flow 6.96	0.014	9.70	0.139			9.70	0.139	0.11	0.021	0.115	2.83	25.825 24.525	25.025 24.644	25.164		25.164	25.661	2A
5 100	1B	1B to 1A	1I,1G,1F,1E,1D,2A,1B	Urban		5.00 5.00	159 255		0.81 0.99	0.832 0.832	0.626 0.832	0.626 0.832	11 22	11 FLOW WIDTH/DEPTH 0.382m	8.30	581	4	11	0		6.67 6.67	144 239	0.833 1.018	650			334 (Pipe flow= Sum upstr	11.859 atten flows)	1.43	450(2)	2.10 (2.14)	0.09		Qg 0.010 Qo 0.334 Do 450 Routine 2.15 Join Pipes: 1C and 2A Vel1 1.709 Vel2 0.476 Eq Dia 523 Angle 155 Flow 0.324	0.225	0.42	0.094		CHART 34 Angle 25 Case 3 S/Do 2.5 Du/Do 1.15 Qg/Qo 0.23 K 0.38 S/Do 1.21 cor 0.04 Ku 0.42 Kw 0.42	0.42	0.094	1.38	0.163	0.361	2.44	24.510 24.340	24.510 24.340	24.604		24.604	25.137	1B

CALCULATIONS TABLE - LINE 3

LOCATION					TIME			SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN														HEADLOSSES								PART FULL			DESIGN LEVELS							
						tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S			V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	LAND USE	SLOPE OF CATCHMENT	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C × A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C × A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	LAT. HEADLOSS CO-EFFICIENT	LAT. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L × Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	LAT. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs					%	min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m				m	%	m	m	m/s	m	m	m	m	m	m	
5 100	3F	3F to 3E	3F	Urban		5.00 5.00	159 255		0.81 0.99	0.086 0.086	0.070 0.085	0.070 0.085	31 60	31	3.40	399	#0.15L3A.54F.9	31	0	3E	5.00 5.00	159 255	0.070 0.085	60			31 (Pipe flow= Grate flow)	24.700	3.72	225(2)	0.75 (2.20)	0.41		Qg 0.031 Qo 0.031 Do 225 CHRT 32: Vo2/2gDo 0.13 H/Do Kg side flow 7.43 end flow 5.76	0.029	7.43	0.213			7.43	0.213	0.43	0.107	0.693	2.80	23.209 22.289	23.209 22.467	23.422		23.422	23.640	3F
5 100	3E	3E to 3D	3F,3E	Urban		5.00 5.00	159 255		0.81 0.99	0.086 0.086	0.070 0.085	0.070 0.085	31 60	31	3.00	375	#0.15L3A.54F.9	31	0	3D	5.41 5.41	155 248	0.140 0.170	117	579		57 (Pipe flow= Sum upstr	24.660 atten flows)	4.14	225(2)	1.47 (2.32)	0.28		Qg 0.038 Qo 0.060 Do 225 CHART 33 Angle 3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.50 K 1.51 S/Do 1.87 cor 0.29 Ku 1.80 Kw 1.80	0.110	1.80	0.198			1.80	0.198	1.65	0.408	0.132	2.46	22.269 21.249	22.269 21.377	22.467		22.467	22.690	3E
5 100	3D	3D to 3C	3F,3E,3D	Urban		5.00 5.00	159 255		0.81 0.99	0.086 0.086	0.070 0.085	0.070 0.085	31 60	31	0.50	153	#0.15L3A.54F.9	31	0	3C	5.69 5.69	152 243	0.210 0.255	172	236		83 (Pipe flow= Sum upstr	24.279 atten flows)	0.49	300(2)	1.26 (0.96)	0.32		Qg 0.038 Qo 0.089 Do 300 CHART 33 Angle 7 S/Do 2.5 Du/Do 0.75 Qg/Qo 0.33 K 0.52 S/Do 1.52 cor 0.36 Ku 0.88 Kw 0.88	0.081	0.88	0.071			0.88	0.071	0.85	0.206			21.220 21.100	21.306 21.100	21.377		21.377	21.650	3D
5 100	3C	3C to 3B	3F,3E,3D,3C	Urban		5.00 5.00	159 255		0.81 0.99	0.089 0.089	0.072 0.088	0.072 0.088	32 62	32	0.50	153	#0.15Z5L3A.54F.9	32	0		6.01 6.01	149 239	0.282 0.343	228	236		111 (Pipe flow= Sum upstr	117 atten flows)	3.696	1.62	300(2)	1.66 (1.74)	0.84		Qg 0.038 Qo 0.117 Do 300 Flow 3D made eqv grate flow CHRT 32: Vo2/2gDo 0.47 H/Do Kg side flow 3.97 end flow 3.50 K vals above for stepped pipes as grate flow grate flow decreased by 0.087 from 3D	0.140	1.22	0.171		CHART 33 Angle 9 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.26 K 0.96 S/Do 1.57 cor 0.26 Ku 1.22 Kw 1.22 K vals step pipes as pipe flow Ku 1.22 Kw 1.22	1.22	0.171	1.47	0.054	0.234	1.98	20.880 20.740	20.880 20.740	20.971		20.971	21.580	3C
5 100	3B	3B to 3A	3F,3E,3D,3C														24				6.05 6.05	149 238	0.282 0.343	227			117 (Pipe flow= Sum upstr	19.385 atten flows)	4.11	300(2)	1.66 (2.77)	0.19		Qo 0.117 Do 300 Flow 3C made eqv grate flow CHRT 32: Vo2/2gDo 0.47 H/Do Kg side flow 3.97 end flow 3.50 K vals above for stepped pipes as grate flow grate flow decreased by 0.117 from 3C	0.140	1.30	0.183		CHART 51 Ti 224 Do 300 theta 28 r/Do 0.89 Du 300 Du/Do 1.00 Kg 1.30 K'w 0.11 Vu 1.66 WSE 0.20 K vals step pipes as pipe flow Ku 1.30 Kw 1.41	1.41	0.198	1.47	0.285	0.167	2.89	20.516 19.719	20.516 19.719	20.699		20.714	21.758	3B

SAMPLE ONLY

CLARENCE VALLEY COUNCIL APPROVED

THIS APPROVAL :
1 REQUIRES THE DEVELOPER TO RECTIFY ANY ERRORS OR OMISSIONS WHICH BECOME EVIDENT DURING CONSTRUCTION
2 IS CURRENT FOR TWO YEARS FROM THE DATE BELOW
3 REQUIRES THE DEVELOPER TO COMPLY WITH ALL RELEVANT ACTS, REGULATIONS, COUNCILS CURRENT 'DEVELOPMENT DESIGN & CONSTRUCTION MANUAL AUS-SPEC' AND ALL CONDITIONS SET OUT IN :

DEVELOPMENT APPROVAL No's SUB2011/xxxx CONSTR. CERT. No. CC2011/xxxx CHECKED _____ _____ DATE _____
ISSUING OFFICER FOR GENERAL MANAGER

CAD FILE

SURVEY	JM & AR	DESIGN	ID	Mar08	APPROVED
VERT. DATUM	AHD	DRAWN	ID	Mar08	
HORIZ. DATUM	-	PASSED			
AZUMITH	-				
LB/FB					MANAGER CIVIL STRATEGIC — 1-6-2009 DATE

ISSUE	AMENDMENTS	BY	DATE
A	Construction Certificate Application	ID	6-09
B	CC Approval	ID	29-6-09

clarence valley COUNCIL

BAILEYS ESTATE - STAGE 2

DEVELOPMENT APPLICATION
STORMWATER CALCULATION SHEET 1 OF 4
LINES 1, 2 & 3

SHEET No. 32 OF 35

PLAN No. 2008-006 ISSUE B