1 March 2010

Environment Canterbury
PO Box 345
CHRISTCHURCH 8140

Attention: Peter Savage

Dear Peter

RE: DESIGN RAINFALL FOR THE SELWYN DISTRICT

Selwyn District Council (Council) are in the process of developing Engineering Standards for design of stormwater systems within the Selwyn district. Fundamental to the development of this standard is the review of design rainfalls.

To this end, Council commissioned Opus International Consultants (Opus) to review all rainfall information available within the Selwyn District and developed a series of design rainfalls for those sites having high resolution temporal data. To allow these design rainfalls to be applied in a reliable and consistent manner across the district a series of scale factors were also compiled. These scale factors allow the adjustment of the design rainfalls from the nearest site to each of the communities within the district.

Council have reviewed the Opus report which, with the following amendments, has been adopted:

- That the Coopers Knob, Lincoln Broadfield and Ryans Bridge rainfall gauges be replaced with the Christchurch Aero rainfall gauge. This is due to the relatively short record length of the high resolution data of the three gauges. The scale factors using Christchurch Aero are also smaller.

- That the Whitecliffs rainfall gauge be replaced with the Ridgens Road gauge for the township of Hororata. This amendment results in a smaller scale factor and greater rainfall totals for the site which is deemed conservative and appropriate.

- That the scale factors for Sheffield and Waddington be increased to 1 due to uncertainties in the rainfall distribution within this area. This amendment results in greater rainfall totals which are also deemed conservative and appropriate.

- That the Ridgens Road gauge be replaced with the Christchurch Aero gauge for the township of Kirwee. This amendment results in slightly higher rainfall totals with the resulting temporal distribution being more in keeping with the proposed design tables for West Melton and Darfield.

Therefore Table 5.2 of the Opus (2009) report shall be modified as follows:

Table 1 Scale factors for each township within the Selwyn District

Township	Rainfall Gauge	Scale Factor
Arthurs Pass	Arthurs Pass	1.00
Burnham	Christchurch Aero	1.06
Castle Hill	Cheeseman	1.02
Coalgate	Whitecliffs	0.91
Darfield	Ridgens Road	1.20
Doyleston	Christchurch Aero	1.01
Dunstandel	Ridgens Road	1.05
Glentunnel	Whitecliffs	0.92
Hororata	Ridgens Road	1.06
Kirwee	Christchurch Aero	1.06
Lake Coleridge	Highpeak Station	0.72
Leeston	Christchurch Aero	1.01
Lincoln	Christchurch Aero	0.96
Lower Selwyn Huts	Christchurch Aero	0.98
Motukarara	Christchurch Aero	1.01
Prebbleton	Christchurch Aero	1.03
Rolleston	Christchurch Aero	1.03
Sheffield	Whitecliffs	1.00
Southbridge	Christchurch Aero	0.98
Springfield	13 Mile Bush	0.83
Springston	Christchurch Aero	0.99
Tai Tapu	Christchurch Aero	0.98
Templeton	Christchurch Aero	1.02
Terrace Downs	Highpeak Station	1.01
Upper Selwyn Huts	Christchurch Aero	0.96
Waddington	Whitecliffs	1.00
West Melton	Christchurch Aero	1.03
Whitecliffs	Whitecliffs	1.00
Windwhistle	Highpeak Station	0.92

The design rainfall tables for the above rainfall gauges are presented in tables 2 – 7 for your convenience.

Table 2 Arthurs Pass design rainfall table (1955-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
Distribution	*PE3*	*PE3*	*PE3*	*PE3*	*GEV*	*GEV*	*PE3*	*PE3*
2.33	7.1	12.2	16.9	28.3	49.0	106.7	160.8	225.9
5	9.7	15.5	20.6	33.5	57.5	125.2	189.2	265.7
10	12.1	18.4	23.5	37.4	63.8	139.1	211.5	296.6
20	14.4	21.2	26.2	41.0	69.2	151.6	232.1	324.9
50	17.5	24.8	29.7	45.4	75.6	166.6	257.7	359.9
100	19.9	27.4	32.2	48.6	80.0	177.1	276.3	385.2

Table 3 Cheeseman design rainfall table (1990-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
Distribution	*GEV*	*GEV*	*GEV*	*GEV*	*Gumbel*	*GEV*	*PE3*	*Gumbel*
2.33	4.2	7.1	9.5	14.3	22.2	43.6	62.7	79.3
5	5.5	9.1	11.9	16.9	25.9	51.7	75.0	94.9
10	6.8	11.1	14.2	19.1	28.9	58.2	84.7	107.6
20	8.5	13.3	16.8	21.3	31.8	64.6	93.9	119.8
50	11.1	16.8	20.6	24.2	35.5	72.8	105.7	135.5
100	13.6	19.9	24.0	26.5	38.2	79.0	114.4	147.3

Table 4 Christchurch Aero design rainfall table (1955-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
Distribution	*Gumbel*	*Gumbel*	*Gumbel*	*Gumbel*	*PE3*	*PE3*	*PE3*	*Gumbel*
2.33	4.4	6.9	8.5	12.0	16.3	27.8	39.2	51.8
5	6.2	9.7	11.7	15.9	22.1	36.1	51.0	66.9
10	7.7	11.9	14.2	19.0	27.2	44.1	61.5	79.3
20	9.1	14.1	16.7	22.0	32.3	53.1	72.5	91.1
50	10.9	16.9	19.9	25.9	38.8	66.8	89.0	106.3
100	12.3	19.0	22.2	28.8	43.8	78.9	101.0	117.8

Table 5 13 Mile Bush design rainfall table (1988-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
Distribution	*PE3*	*PE3*	*PE3*	*PE3*	*Gumbel*	*PE3*	*PE3*	*PE3*
2.33	5.6	8.9	10.9	14.4	21.2	35.4	47.5	64.0
5	8.2	12.8	15.3	19.3	25.8	42.8	60.7	86.4
10	10.6	16.4	19.3	23.9	29.5	48.8	72.1	106.2
20	13.0	19.9	23.3	28.4	33.1	54.4	83.2	125.7
50	16.2	24.5	28.5	34.5	37.7	61.5	97.7	151.2
100	18.6	28	32.5	39.0	41.2	66.7	108.4	170.4

Table 6 Ridgens Road design rainfall table (1990-2009) without the 15/11/09 storm event (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
Distribution	*Interpolated*	*PE3*	*PE3*	*PE3*	*PE3*	*PE3*	*PE3*	*PE3*
2.33	3.8	5.3	7.3	9.9	14.6	25.6	38.4	50.7
5	5.6	7.8	10.5	13.1	18.0	30.5	45.1	62.7
10	7.4	10.2	13.4	15.9	20.9	34.5	49.9	72.2
20	9.2	12.6	16.2	18.6	23.6	38.3	53.9	81.1
50	11.7	15.7	19.9	22.2	27.1	43.1	58.5	92.5
100	13.6	18.1	22.7	24.8	29.8	46.6	61.5	100.8

Table 7 Whitecliffs design rainfall table (1988-2009) (rainfall depths in mm)

	Duration							
ARI	10-min	20-min	30-min	1-hr	2-hrs	6-hrs	12-hrs	24-hrs
Distribution	*Interpolated*	*PE3*	*PE3*	*PE3*	*PE3*	*PE3*	*Gumbel*	*PE3*
2.33	4.9	6.4	8.1	12.2	19.2	34.8	46.2	55.9
5	6.5	8.8	11.3	15.9	23.9	40.2	56.5	75.4
10	8.0	11.1	14.2	19.2	27.6	43.7	64.9	94.4
20	9.6	13.3	17.1	22.5	31.1	46.5	72.9	114.2
50	11.8	16.2	21.0	26.8	35.3	49.8	83.4	141.1
100	13.3	18.4	23.9	30.0	38.3	51.9	91.2	161.8

The above rainfall data shall to be used for urban development within the Selwyn District.

Council reserves its right to use discretion when applying this rainfall data and during assessment of applications for engineering approval.

Yours faithfully

Murray England
STORMWATER ENGINEER