

AWP		Page 1
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY		0533 Exeter Business Park Geocellular Soakaway 100yr + 40% Climate Change
Date 20/12/2019 09:05 File 0533-SW-101-A - ATTENUATION T...		Designed by tom.richards Checked by
XP Solutions		Source Control 2017.1



Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 1882 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	29.126	0.126	0.1	0.3	0.0	0.4	33.5	O K
30 min Summer	29.165	0.165	0.1	0.3	0.0	0.4	43.9	O K
60 min Summer	29.205	0.205	0.1	0.3	0.0	0.4	54.5	O K
120 min Summer	29.243	0.243	0.1	0.3	0.0	0.4	64.7	O K
180 min Summer	29.264	0.264	0.1	0.3	0.0	0.4	70.2	O K
240 min Summer	29.277	0.277	0.1	0.3	0.0	0.4	73.7	O K
360 min Summer	29.295	0.295	0.1	0.3	0.0	0.4	78.6	O K
480 min Summer	29.307	0.307	0.1	0.3	0.0	0.4	81.5	O K
600 min Summer	29.314	0.314	0.1	0.3	0.0	0.4	83.4	O K
720 min Summer	29.318	0.318	0.1	0.3	0.0	0.4	84.6	O K
960 min Summer	29.322	0.322	0.1	0.3	0.0	0.4	85.7	O K
1440 min Summer	29.319	0.319	0.1	0.3	0.0	0.4	84.9	O K
2160 min Summer	29.307	0.307	0.1	0.3	0.0	0.4	81.8	O K
2880 min Summer	29.295	0.295	0.1	0.3	0.0	0.4	78.6	O K
4320 min Summer	29.271	0.271	0.1	0.3	0.0	0.4	72.1	O K
5760 min Summer	29.246	0.246	0.1	0.3	0.0	0.4	65.4	O K
7200 min Summer	29.222	0.222	0.1	0.3	0.0	0.4	59.2	O K
8640 min Summer	29.201	0.201	0.1	0.3	0.0	0.4	53.5	O K
10080 min Summer	29.182	0.182	0.1	0.3	0.0	0.4	48.3	O K
15 min Winter	29.141	0.141	0.1	0.3	0.0	0.4	37.6	O K
30 min Winter	29.185	0.185	0.1	0.3	0.0	0.4	49.2	O K
60 min Winter	29.230	0.230	0.1	0.3	0.0	0.4	61.1	O K
120 min Winter	29.274	0.274	0.1	0.3	0.0	0.4	72.8	O K
180 min Winter	29.297	0.297	0.1	0.3	0.0	0.4	79.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	144.339	0.0	29.4	0.0	19
30 min Summer	94.873	0.0	35.3	0.0	34
60 min Summer	59.321	0.0	53.6	0.0	64
120 min Summer	35.761	0.0	63.3	0.0	124
180 min Summer	26.206	0.0	67.8	0.0	184
240 min Summer	20.904	0.0	69.8	0.0	244
360 min Summer	15.220	0.0	70.6	0.0	362
480 min Summer	12.132	0.0	70.1	0.0	482
600 min Summer	10.168	0.0	69.4	0.0	602
720 min Summer	8.798	0.0	68.8	0.0	722
960 min Summer	6.996	0.0	67.4	0.0	962
1440 min Summer	5.056	0.0	64.6	0.0	1440
2160 min Summer	3.648	0.0	120.3	0.0	1772
2880 min Summer	2.891	0.0	124.5	0.0	2136
4320 min Summer	2.080	0.0	119.1	0.0	2940
5760 min Summer	1.645	0.0	147.9	0.0	3744
7200 min Summer	1.370	0.0	154.0	0.0	4536
8640 min Summer	1.180	0.0	158.9	0.0	5280
10080 min Summer	1.040	0.0	163.0	0.0	6056
15 min Winter	144.339	0.0	32.1	0.0	19
30 min Winter	94.873	0.0	36.5	0.0	34
60 min Winter	59.321	0.0	59.5	0.0	64
120 min Winter	35.761	0.0	68.7	0.0	122
180 min Winter	26.206	0.0	71.2	0.0	182

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Exeter EX2 5TY	100yr + 40% Climate Change	
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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	29.312	0.312	0.1	0.3	0.0	0.4	83.1	O K
360 min Winter	29.333	0.333	0.1	0.3	0.0	0.4	88.7	O K
480 min Winter	29.347	0.347	0.1	0.3	0.0	0.4	92.2	O K
600 min Winter	29.355	0.355	0.1	0.3	0.0	0.4	94.6	O K
720 min Winter	29.361	0.361	0.1	0.3	0.0	0.4	96.1	O K
960 min Winter	29.368	0.368	0.2	0.3	0.0	0.4	97.8	O K
1440 min Winter	29.368	0.368	0.2	0.3	0.0	0.4	98.0	O K
2160 min Winter	29.355	0.355	0.1	0.3	0.0	0.4	94.5	O K
2880 min Winter	29.339	0.339	0.1	0.3	0.0	0.4	90.3	O K
4320 min Winter	29.307	0.307	0.1	0.3	0.0	0.4	81.8	O K
5760 min Winter	29.273	0.273	0.1	0.3	0.0	0.4	72.7	O K
7200 min Winter	29.237	0.237	0.1	0.3	0.0	0.4	63.1	O K
8640 min Winter	29.204	0.204	0.1	0.3	0.0	0.4	54.3	O K
10080 min Winter	29.175	0.175	0.1	0.3	0.0	0.4	46.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
240 min Winter	20.904	0.0	71.4	0.0	240
360 min Winter	15.220	0.0	70.9	0.0	358
480 min Winter	12.132	0.0	70.3	0.0	476
600 min Winter	10.168	0.0	69.8	0.0	592
720 min Winter	8.798	0.0	69.2	0.0	708
960 min Winter	6.996	0.0	68.2	0.0	936
1440 min Winter	5.056	0.0	66.0	0.0	1384
2160 min Winter	3.648	0.0	131.9	0.0	2008
2880 min Winter	2.891	0.0	131.9	0.0	2272
4320 min Winter	2.080	0.0	122.6	0.0	3196
5760 min Winter	1.645	0.0	165.6	0.0	4096
7200 min Winter	1.370	0.0	172.4	0.0	4904
8640 min Winter	1.180	0.0	178.0	0.0	5704
10080 min Winter	1.040	0.0	182.6	0.0	6456

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.900	Shortest Storm (mins)	15
Ratio R	0.395	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.125

Time (mins)		Area
From:	To:	(ha)
0	4	0.125

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Model Details

Storage is Online Cover Level (m) 31.000

Cellular Storage Structure

Invert Level (m) 29.000 Safety Factor 5.0
Infiltration Coefficient Base (m/hr) 0.00878 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00878

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	280.0	280.0	0.400	280.0	310.4	0.401	0.0	310.4

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0030-3000-0400-3000
Design Head (m) 0.400
Design Flow (l/s) 0.3
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 30
Invert Level (m) 29.000
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	0.3	Kick-Flo®	0.260	0.3
Flush-Flo™	0.129	0.3	Mean Flow over Head Range	-	0.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.3	0.800	0.4	2.000	0.6	4.000	0.8	7.000	1.1
0.200	0.3	1.000	0.4	2.200	0.6	4.500	0.9	7.500	1.1
0.300	0.3	1.200	0.5	2.400	0.6	5.000	0.9	8.000	1.2
0.400	0.3	1.400	0.5	2.600	0.7	5.500	1.0	8.500	1.2
0.500	0.3	1.600	0.5	3.000	0.7	6.000	1.0	9.000	1.2
0.600	0.4	1.800	0.6	3.500	0.8	6.500	1.0	9.500	1.3

Orifice Overflow Control

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 29.368