

Tier Consult					Page 1		
Elm House Farm		Village Bakery - Wrexham					
Saughton		Surface Water Attenuation					
Chester CH3 6EN		100 Year + 30%					
Date 30/04/2014 08:48		Designed By MCH					
File 100 Year Storm + ...		Checked By					
CADS		Source Control W.12.4					
<u>Summary of Results for 100 year Return Period (+30%)</u> Half Drain Time : 574 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	98.491	0.341	0.0	4.1	4.1	139.6	O K
30 min Summer	98.611	0.461	0.0	4.8	4.8	188.6	O K
60 min Summer	98.740	0.590	0.0	5.4	5.4	241.4	O K
120 min Summer	98.867	0.717	0.0	5.9	5.9	293.6	O K
180 min Summer	98.931	0.781	0.0	6.2	6.2	319.8	O K
240 min Summer	98.966	0.816	0.0	6.3	6.3	334.1	O K
360 min Summer	98.995	0.845	0.0	6.4	6.4	346.1	O K
480 min Summer	99.006	0.856	0.0	6.5	6.5	350.7	O K
600 min Summer	99.012	0.862	0.0	6.5	6.5	353.0	O K
720 min Summer	99.014	0.864	0.0	6.5	6.5	353.7	O K
960 min Summer	99.009	0.859	0.0	6.5	6.5	351.8	O K
1440 min Summer	98.982	0.832	0.0	6.4	6.4	340.7	O K
2160 min Summer	98.927	0.777	0.0	6.2	6.2	318.1	O K
2880 min Summer	98.870	0.720	0.0	6.0	6.0	294.9	O K
4320 min Summer	98.770	0.620	0.0	5.5	5.5	253.7	O K
Storm Event	Rain (mm/hr)	Time-Peak (mins)					
15 min Summer	106.150	26					
30 min Summer	72.349	40					
60 min Summer	47.182	70					
120 min Summer	29.753	128					
180 min Summer	22.386	186					
240 min Summer	18.160	244					
360 min Summer	13.437	360					
480 min Summer	10.853	418					
600 min Summer	9.188	480					
720 min Summer	8.014	542					
960 min Summer	6.452	674					
1440 min Summer	4.744	952					
2160 min Summer	3.479	1364					
2880 min Summer	2.788	1764					
4320 min Summer	2.036	2552					
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Elm House Farm

Saughton

Chester CH3 6EN

Village Bakery - Wrexham

Surface Water Attenuation

100 Year + 30%

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Micro Drainage®

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
5760 min Summer	98.687	0.537	0.0	5.1	5.1	219.7	O K
7200 min Summer	98.620	0.470	0.0	4.8	4.8	192.3	O K
8640 min Summer	98.564	0.414	0.0	4.5	4.5	169.6	O K
10080 min Summer	98.518	0.368	0.0	4.3	4.3	150.7	O K
15 min Winter	98.532	0.382	0.0	4.3	4.3	156.6	O K
30 min Winter	98.667	0.517	0.0	5.0	5.0	211.7	O K
60 min Winter	98.813	0.663	0.0	5.7	5.7	271.4	O K
120 min Winter	98.958	0.808	0.0	6.3	6.3	331.0	O K
180 min Winter	99.033	0.883	0.0	6.6	6.6	361.7	O K
240 min Winter	99.075	0.925	0.0	6.7	6.7	378.9	O K
360 min Winter	99.115	0.965	0.0	6.9	6.9	395.0	O K
480 min Winter	99.129	0.979	0.0	6.9	6.9	400.7	O K
600 min Winter	99.129	0.979	0.0	6.9	6.9	400.9	O K
720 min Winter	99.130	0.980	0.0	6.9	6.9	401.2	O K
960 min Winter	99.120	0.970	0.0	6.9	6.9	397.1	O K
1440 min Winter	99.075	0.925	0.0	6.7	6.7	378.7	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
5760 min Summer	1.627	3296
7200 min Summer	1.367	4040
8640 min Summer	1.187	4768
10080 min Summer	1.054	5544
15 min Winter	106.150	26
30 min Winter	72.349	40
60 min Winter	47.182	68
120 min Winter	29.753	126
180 min Winter	22.386	182
240 min Winter	18.160	238
360 min Winter	13.437	350
480 min Winter	10.853	456
600 min Winter	9.188	504
720 min Winter	8.014	570
960 min Winter	6.452	724
1440 min Winter	4.744	1028

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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
2160 min Winter	98.989	0.839	0.0	6.4	6.4	343.6	O K
2880 min Winter	98.905	0.755	0.0	6.1	6.1	309.2	O K
4320 min Winter	98.762	0.612	0.0	5.5	5.5	250.6	O K
5760 min Winter	98.651	0.501	0.0	5.0	5.0	205.2	O K
7200 min Winter	98.566	0.416	0.0	4.5	4.5	170.1	O K
8640 min Winter	98.499	0.349	0.0	4.1	4.1	142.7	O K
10080 min Winter	98.445	0.295	0.0	3.8	3.8	120.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
2160 min Winter	3.479	1472
2880 min Winter	2.788	1884
4320 min Winter	2.036	2688
5760 min Winter	1.627	3464
7200 min Winter	1.367	4248
8640 min Winter	1.187	4944
10080 min Winter	1.054	5744

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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)	18.000	Shortest Storm (mins)	15
Ratio R	0.324	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.720

Time	Area	Time	Area	Time	Area
(mins)	(ha)	(mins)	(ha)	(mins)	(ha)
0-4	0.240	4-8	0.240	8-12	0.240

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Model Details

Storage is Online Cover Level (m) 99.800

Cellular Storage Structure

Invert Level (m) 98.150
Infiltration Coefficient Base (m/hr) 0.00000
Infiltration Coefficient Side (m/hr) 0.00000
Safety Factor 2.0
Porosity 0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	431.0	0.0	1.000	431.0	0.0

Crown Vortex Valve® Outflow Control

Design Head (m) 1.000 **Diameter (mm) 103**
Design Flow (l/s) 7.0 **Invert Level (m) 98.150**
Vortex Valve® Type R2 SW Only

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.2	1.600	8.9	5.000	15.7
0.200	3.2	1.800	9.4	5.500	16.4
0.300	3.8	2.000	9.9	6.000	17.2
0.400	4.4	2.200	10.4	6.500	17.9
0.500	5.0	2.400	10.9	7.000	18.6
0.600	5.4	2.600	11.3	7.500	19.2
0.800	6.3	3.000	12.1	8.000	19.8
1.000	7.0	3.500	13.1	8.500	20.4
1.200	7.7	4.000	14.0	9.000	21.0
1.400	8.3	4.500	14.9	9.500	21.6

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