

Tier Consult					Page 1		
Richmond House		Village Bakery - Wrexham					
Chester Bus. Park		Surface Water Attenuation					
CH4 9QZ		1 in 30 Year Storm					
Date 20/01/2016 15:36		Designed By MCH					
File 1 in 30 Year.srcx		Checked By					
Micro Drainage		Source Control W.12.4					
<u>Summary of Results for 30 year Return Period (+20%)</u> Half Drain Time : 801 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	3.256	0.256	0.0	12.8	12.8	455.9	O K
30 min Summer	3.341	0.341	0.0	12.8	12.8	606.8	O K
60 min Summer	3.432	0.432	0.0	12.8	12.8	770.1	O K
120 min Summer	3.526	0.526	0.0	13.7	13.7	937.0	O K
180 min Summer	3.578	0.578	0.0	14.3	14.3	1028.9	O K
240 min Summer	3.610	0.610	0.0	14.7	14.7	1086.7	O K
360 min Summer	3.646	0.646	0.0	15.1	15.1	1151.3	O K
480 min Summer	3.664	0.664	0.0	15.3	15.3	1183.6	O K
600 min Summer	3.672	0.672	0.0	15.4	15.4	1197.6	O K
720 min Summer	3.678	0.678	0.0	15.5	15.5	1206.9	O K
960 min Summer	3.682	0.682	0.0	15.5	15.5	1215.2	O K
1440 min Summer	3.678	0.678	0.0	15.5	15.5	1207.6	O K
2160 min Summer	3.654	0.654	0.0	15.2	15.2	1165.3	O K
2880 min Summer	3.623	0.623	0.0	14.9	14.9	1110.1	O K
4320 min Summer	3.558	0.558	0.0	14.1	14.1	994.1	O K
5760 min Summer	3.497	0.497	0.0	13.3	13.3	885.3	O K
7200 min Summer	3.441	0.441	0.0	12.8	12.8	785.5	O K
8640 min Summer	3.388	0.388	0.0	12.8	12.8	691.1	O K
Storm Event			Rain (mm/hr)		Time-Peak (mins)		
15 min Summer			77.241		26		
30 min Summer			51.688		41		
60 min Summer			33.184		70		
120 min Summer			20.709		128		
180 min Summer			15.550		186		
240 min Summer			12.629		246		
360 min Summer			9.370		364		
480 min Summer			7.582		480		
600 min Summer			6.429		560		
720 min Summer			5.616		614		
960 min Summer			4.534		740		
1440 min Summer			3.349		1002		
2160 min Summer			2.470		1416		
2880 min Summer			1.988		1824		
4320 min Summer			1.463		2640		
5760 min Summer			1.175		3456		
7200 min Summer			0.992		4192		
8640 min Summer			0.863		4944		
©1982-2010 Micro Drainage Ltd							

Tier Consult					Page 2		
Richmond House Chester Bus. Park CH4 9QZ		Village Bakery - Wrexham Surface Water Attenuation 1 in 30 Year Storm					
Date 20/01/2016 15:36 File 1 in 30 Year.srcx		Designed By MCH Checked By					
Micro Drainage		Source Control W.12.4					
<u>Summary of Results for 30 year Return Period (+20%)</u>							
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
10080 min Summer	3.336	0.336	0.0	12.8	12.8	598.5	O K
15 min Winter	3.287	0.287	0.0	12.8	12.8	511.5	O K
30 min Winter	3.383	0.383	0.0	12.8	12.8	681.5	O K
60 min Winter	3.485	0.485	0.0	13.1	13.1	864.6	O K
120 min Winter	3.591	0.591	0.0	14.5	14.5	1053.5	O K
180 min Winter	3.651	0.651	0.0	15.2	15.2	1158.7	O K
240 min Winter	3.688	0.688	0.0	15.6	15.6	1225.9	O K
360 min Winter	3.732	0.732	0.0	16.1	16.1	1303.6	O K
480 min Winter	3.756	0.756	0.0	16.4	16.4	1345.8	O K
600 min Winter	3.767	0.767	0.0	16.5	16.5	1366.7	O K
720 min Winter	3.772	0.772	0.0	16.5	16.5	1374.4	O K
960 min Winter	3.772	0.772	0.0	16.5	16.5	1375.0	O K
1440 min Winter	3.761	0.761	0.0	16.4	16.4	1356.0	O K
2160 min Winter	3.721	0.721	0.0	16.0	16.0	1285.0	O K
2880 min Winter	3.672	0.672	0.0	15.4	15.4	1197.8	O K
4320 min Winter	3.574	0.574	0.0	14.3	14.3	1022.5	O K
5760 min Winter	3.484	0.484	0.0	13.1	13.1	861.9	O K
7200 min Winter	3.398	0.398	0.0	12.8	12.8	709.6	O K
8640 min Winter	3.307	0.307	0.0	12.8	12.8	547.1	O K
Storm Event	Rain (mm/hr)	Time-Peak (mins)					
10080 min Summer	0.768	5656					
15 min Winter	77.241	26					
30 min Winter	51.688	40					
60 min Winter	33.184	68					
120 min Winter	20.709	126					
180 min Winter	15.550	184					
240 min Winter	12.629	242					
360 min Winter	9.370	356					
480 min Winter	7.582	468					
600 min Winter	6.429	576					
720 min Winter	5.616	678					
960 min Winter	4.534	770					
1440 min Winter	3.349	1076					
2160 min Winter	2.470	1536					
2880 min Winter	1.988	1972					
4320 min Winter	1.463	2820					
5760 min Winter	1.175	3648					
7200 min Winter	0.992	4472					
8640 min Winter	0.863	5104					
©1982-2010 Micro Drainage Ltd							

Tier Consult				Page 3																									
Richmond House Chester Bus. Park CH4 9QZ		Village Bakery - Wrexham Surface Water Attenuation 1 in 30 Year Storm																											
Date 20/01/2016 15:36 File 1 in 30 Year.srcx		Designed By MCH Checked By																											
Micro Drainage		Source Control W.12.4																											
<u>Summary of Results for 30 year Return Period (+20%)</u> <table border="1"> <thead> <tr> <th>Storm Event</th> <th>Max Level (m)</th> <th>Max Depth (m)</th> <th>Max Infiltration (l/s)</th> <th>Max Control (l/s)</th> <th>Max Σ Outflow (l/s)</th> <th>Max Volume (m³)</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>10080 min Winter</td> <td>3.247</td> <td>0.247</td> <td>0.0</td> <td>12.8</td> <td>12.8</td> <td>439.6</td> <td>O K</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Storm Event</th> <th>Rain (mm/hr)</th> <th>Time-Peak (mins)</th> </tr> </thead> <tbody> <tr> <td>10080 min Winter</td> <td>0.768</td> <td>5648</td> </tr> </tbody> </table>								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	10080 min Winter	3.247	0.247	0.0	12.8	12.8	439.6	O K	Storm Event	Rain (mm/hr)	Time-Peak (mins)	10080 min Winter	0.768	5648
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																						
10080 min Winter	3.247	0.247	0.0	12.8	12.8	439.6	O K																						
Storm Event	Rain (mm/hr)	Time-Peak (mins)																											
10080 min Winter	0.768	5648																											
©1982-2010 Micro Drainage Ltd																													

Tier Consult		Page 4
Richmond House Chester Bus. Park CH4 9QZ	Village Bakery - Wrexham Surface Water Attenuation 1 in 30 Year Storm	
Date 20/01/2016 15:36 File 1 in 30 Year.srcx	Designed By MCH Checked By	
Micro Drainage		Source Control W.12.4

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.340	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+20

Time / Area Diagram

Total Area (ha) 3.220

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.073	4-8	1.073	8-12	1.073

©1982-2010 Micro Drainage Ltd

Tier Consult		Page 5
Richmond House Chester Bus. Park CH4 9QZ	Village Bakery - Wrexham Surface Water Attenuation 1 in 30 Year Storm	
Date 20/01/2016 15:36 File 1 in 30 Year.srcx	Designed By MCH Checked By	
Micro Drainage		Source Control W.12.4

Model Details

Storage is Online Cover Level (m) 5.000

Cellular Storage Structure

Invert Level (m) 3.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	1875.0	1875.0	1.300	0.0	2115.0
1.200	1875.0	2115.0			

Hydro-Brake® Outflow Control

Design Head (m) 0.800 Hydro-Brake® Type Md3 Invert Level (m) 3.000
Design Flow (l/s) 16.8 Diameter (mm) 139

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0	1.200	20.6	3.000	32.5	7.000	49.7
0.200	11.6	1.400	22.2	3.500	35.1	7.500	51.4
0.300	12.4	1.600	23.7	4.000	37.5	8.000	53.1
0.400	12.2	1.800	25.2	4.500	39.8	8.500	54.7
0.500	13.3	2.000	26.5	5.000	42.0	9.000	56.3
0.600	14.5	2.200	27.8	5.500	44.0	9.500	57.9
0.800	16.8	2.400	29.1	6.000	46.0		
1.000	18.8	2.600	30.3	6.500	47.9		

©1982-2010 Micro Drainage Ltd