



Baynham Meikle Partnership		Page 1
8 Meadow Road Edgbaston, Birmingham B 17 8BU	HATFIELD LAND WEST OF HATFIELD SWALE 2	
Date 10/09/2018 12:42 File 2018.09.10_SWALE 2.SRCX	Designed by EB Checked by NSB	
Micro Drainage		Source Control 2018.1

Summary of Results for 10 year Return Period

Half Drain Time : 272 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	75.508	0.508	0.0	34.8	34.8	635.0	O K
30 min Summer	75.570	0.570	0.0	36.6	36.6	793.8	O K
60 min Summer	75.620	0.620	0.0	38.0	38.0	929.1	O K
120 min Summer	75.652	0.652	0.0	38.8	38.8	1017.3	O K
180 min Summer	75.656	0.656	0.0	38.9	38.9	1028.9	O K
240 min Summer	75.651	0.651	0.0	38.8	38.8	1013.7	O K
360 min Summer	75.637	0.637	0.0	38.4	38.4	975.5	O K
480 min Summer	75.623	0.623	0.0	38.0	38.0	937.2	O K
600 min Summer	75.610	0.610	0.0	37.7	37.7	900.0	O K
720 min Summer	75.597	0.597	0.0	37.3	37.3	863.8	O K
960 min Summer	75.571	0.571	0.0	36.6	36.6	794.9	O K
1440 min Summer	75.521	0.521	0.0	35.2	35.2	667.5	O K
2160 min Summer	75.453	0.453	0.0	33.1	33.1	501.9	O K
2880 min Summer	75.386	0.386	0.0	32.9	32.9	354.6	O K
4320 min Summer	75.261	0.261	0.0	32.9	32.9	154.0	O K
5760 min Summer	75.186	0.186	0.0	31.8	31.8	75.9	O K
7200 min Summer	75.158	0.158	0.0	27.4	27.4	54.0	O K
8640 min Summer	75.139	0.139	0.0	23.9	23.9	41.3	O K
10080 min Summer	75.125	0.125	0.0	21.3	21.3	32.9	O K
15 min Winter	75.540	0.540	0.0	35.7	35.7	715.0	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	61.324	0.0	671.6	22
30 min Summer	39.180	0.0	858.0	36
60 min Summer	24.003	0.0	1051.2	64
120 min Summer	14.335	0.0	1255.8	122
180 min Summer	10.522	0.0	1382.6	180
240 min Summer	8.426	0.0	1476.2	216
360 min Summer	6.146	0.0	1615.2	278
480 min Summer	4.911	0.0	1720.9	344
600 min Summer	4.125	0.0	1806.6	412
720 min Summer	3.576	0.0	1879.5	482
960 min Summer	2.853	0.0	1999.6	618
1440 min Summer	2.074	0.0	2180.7	884
2160 min Summer	1.507	0.0	2376.5	1276
2880 min Summer	1.201	0.0	2525.2	1644
4320 min Summer	0.872	0.0	2749.4	2296
5760 min Summer	0.694	0.0	2919.6	2944
7200 min Summer	0.582	0.0	3058.6	3672
8640 min Summer	0.504	0.0	3175.9	4400
10080 min Summer	0.446	0.0	3279.8	5136
15 min Winter	61.324	0.0	752.1	22

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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
30 min Winter	75.609	0.609	0.0	37.7	37.7	896.5	O K
60 min Winter	75.665	0.665	0.0	39.2	39.2	1055.7	O K
120 min Winter	75.704	0.704	0.0	40.2	40.2	1168.6	O K
180 min Winter	75.713	0.713	0.0	40.4	40.4	1195.2	O K
240 min Winter	75.710	0.710	0.0	40.3	40.3	1187.6	O K
360 min Winter	75.693	0.693	0.0	39.9	39.9	1137.7	O K
480 min Winter	75.677	0.677	0.0	39.5	39.5	1089.0	O K
600 min Winter	75.659	0.659	0.0	39.0	39.0	1036.5	O K
720 min Winter	75.640	0.640	0.0	38.5	38.5	983.4	O K
960 min Winter	75.602	0.602	0.0	37.5	37.5	879.4	O K
1440 min Winter	75.529	0.529	0.0	35.4	35.4	687.8	O K
2160 min Winter	75.426	0.426	0.0	32.9	32.9	441.1	O K
2880 min Winter	75.309	0.309	0.0	32.9	32.9	220.6	O K
4320 min Winter	75.172	0.172	0.0	29.6	29.6	64.2	O K
5760 min Winter	75.139	0.139	0.0	23.9	23.9	41.1	O K
7200 min Winter	75.118	0.118	0.0	20.1	20.1	29.5	O K
8640 min Winter	75.104	0.104	0.0	17.4	17.4	22.6	O K
10080 min Winter	75.093	0.093	0.0	15.4	15.4	18.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	39.180	0.0	961.0	36
60 min Winter	24.003	0.0	1177.4	64
120 min Winter	14.335	0.0	1406.4	120
180 min Winter	10.522	0.0	1548.4	176
240 min Winter	8.426	0.0	1653.6	232
360 min Winter	6.146	0.0	1809.1	292
480 min Winter	4.911	0.0	1927.3	368
600 min Winter	4.125	0.0	2023.5	446
720 min Winter	3.576	0.0	2105.0	522
960 min Winter	2.853	0.0	2239.6	670
1440 min Winter	2.074	0.0	2442.3	954
2160 min Winter	1.507	0.0	2661.5	1360
2880 min Winter	1.201	0.0	2828.1	1676
4320 min Winter	0.872	0.0	3079.3	2244
5760 min Winter	0.694	0.0	3270.2	2936
7200 min Winter	0.582	0.0	3425.7	3664
8640 min Winter	0.504	0.0	3558.1	4400
10080 min Winter	0.446	0.0	3673.6	5112

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Micro Drainage	Source Control 2018.1
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.429	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 5.840

Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)
0	4 2.920	4	8 2.920

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Model Details

Storage is Online Cover Level (m) 76.500

Swale Structure

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	430.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	3.0
Safety Factor	2.0	Slope (1:X)	1000.0
Porosity	1.00	Cap Volume Depth (m)	1.000
Invert Level (m)	75.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	4.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0253-3300-0500-3300
Design Head (m)	0.500
Design Flow (l/s)	33.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	253
Invert Level (m)	74.950
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	33.0
Flush-Flo™	0.334	32.9
Kick-Flo®	0.455	31.5
Mean Flow over Head Range	-	23.2

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)
0.100	8.2	1.200	50.3	3.000	78.4	7.000	117.9
0.200	26.0	1.400	54.1	3.500	84.5	7.500	122.1
0.300	32.8	1.600	57.8	4.000	90.2	8.000	126.2
0.400	32.5	1.800	61.2	4.500	95.5	8.500	130.2
0.500	33.0	2.000	64.4	5.000	100.5	9.000	134.0
0.600	36.0	2.200	67.4	5.500	104.3	9.500	137.7
0.800	41.3	2.400	70.3	6.000	109.0		
1.000	46.0	2.600	73.1	6.500	113.6		