Summary of Results for 10 year Return Period

Half Drain Time : 264 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	76.149	1.149	0.0	126.0	126.0	2125.7	O K
30 min Summer	76.203	1.203	0.0	128.5	128.5	2654.9	O K
60 min Summer	76.248	1.248	0.0	130.6	130.6	3101.0	O K
120 min Summer	76.276	1.276	0.0	131.8	131.8	3376.2	O K
180 min Summer	76.277	1.277	0.0	131.9	131.9	3392.3	O K
240 min Summer	76.270	1.270	0.0	131.6	131.6	3317.7	O K
360 min Summer	76.254	1.254	0.0	130.8	130.8	3153.7	O K
480 min Summer	76.239	1.239	0.0	130.2	130.2	3009.5	O K
600 min Summer	76.226	1.226	0.0	129.6	129.6	2876.0	O K
720 min Summer	76.213	1.213	0.0	129.0	129.0	2746.1	O K
960 min Summer	76.187	1.187	0.0	127.8	127.8	2496.2	O K
1440 min Summer	76.139	1.139	0.0	125.5	125.5	2030.0	O K
2160 min Summer	76.076	1.076	0.0	122.5	122.5	1431.8	O K
2880 min Summer	76.028	1.028	0.0	120.2	120.2	963.4	O K
4320 min Summer	75.705	0.705	0.0	111.0	111.0	408.4	O K
5760 min Summer	75.271	0.271	0.0	108.4	108.4	107.1	O K
7200 min Summer	75.190	0.190	0.0	93.7	93.7	64.1	O K
8640 min Summer	75.157	0.157	0.0	81.2	81.2	47.6	O K
10080 min Summer	75.133	0.133	0.0	71.9	71.9	36.2	O K
15 min Winter	76.177	1.177	0.0	127.3	127.3	2397.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	61.324	0.0	2267.5	22
30 min Summer	39.180	0.0	2897.5	36
60 min Summer	24.003	0.0	3549.6	64
120 min Summer	14.335	0.0	4239.0	122
180 min Summer	10.522	0.0	4669.2	180
240 min Summer	8.426	0.0	4986.1	216
360 min Summer	6.146	0.0	5454.5	276
480 min Summer	4.911	0.0	5809.9	342
600 min Summer	4.125	0.0	6100.3	410
720 min Summer	3.576	0.0	6347.2	478
960 min Summer	2.853	0.0	6751.7	614
1440 min Summer	2.074	0.0	7363.1	880
2160 min Summer	1.507	0.0	8024.3	1256
2880 min Summer	1.201	0.0	8526.1	1616
4320 min Summer	0.872	0.0	9283.7	2336
5760 min Summer	0.694	0.0	9859.2	2936
7200 min Summer	0.582	0.0	10328.2	3672
8640 min Summer	0.504	0.0	10727.1	4376
10080 min Summer	0.446	0.0	11074.9	5120
15 min Winter	61.324	0.0	2540.1	22

Summary of Results for 10 year Return Period

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	76.239	1.239	0.0	130.2	130.2	3004.2	O K
60 min Winter	76.291	1.291	0.0	132.5	132.5	3532.3	O K
120 min Winter	76.327	1.327	0.0	134.1	134.1	3897.6	O K
180 min Winter	76.334	1.334	0.0	134.4	134.4	3970.2	O K
240 min Winter	76.329	1.329	0.0	134.2	134.2	3925.7	O K
360 min Winter	76.309	1.309	0.0	133.3	133.3	3711.5	O K
480 min Winter	76.289	1.289	0.0	132.4	132.4	3516.5	O K
600 min Winter	76.271	1.271	0.0	131.6	131.6	3325.2	O K
720 min Winter	76.251	1.251	0.0	130.7	130.7	3132.7	O K
960 min Winter	76.213	1.213	0.0	129.0	129.0	2750.8	O K
1440 min Winter	76.140	1.140	0.0	125.6	125.6	2040.1	O K
2160 min Winter	76.049	1.049	0.0	121.2	121.2	1170.9	O K
2880 min Winter	75.923	0.923	0.0	114.8	114.8	604.5	O K
4320 min Winter	75.213	0.213	0.0	101.5	101.5	75.8	O K
5760 min Winter	75.156	0.156	0.0	80.8	80.8	47.2	O K
7200 min Winter	75.123	0.123	0.0	67.8	67.8	31.3	O K
8640 min Winter	75.099	0.099	0.0	58.6	58.6	20.6	O K
10080 min Winter	75.082	0.082	0.0	51.9	51.9	13.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	39.180	0.0	3245.5	36
60 min Winter	24.003	0.0	3975.3	64
120 min Winter	14.335	0.0	4750.0	120
180 min Winter	10.522	0.0	5228.1	178
240 min Winter	8.426	0.0	5582.1	232
360 min Winter	6.146	0.0	6108.5	294
480 min Winter	4.911	0.0	6508.1	368
600 min Winter	4.125	0.0	6831.3	446
720 min Winter	3.576	0.0	7107.0	520
960 min Winter	2.853	0.0	7563.5	668
1440 min Winter	2.074	0.0	8247.8	942
2160 min Winter	1.507	0.0	8987.2	1320
2880 min Winter	1.201	0.0	9549.0	1652
4320 min Winter	0.872	0.0	10397.9	2204
5760 min Winter	0.694	0.0	11042.2	2936
7200 min Winter	0.582	0.0	11567.6	3648
8640 min Winter	0.504	0.0	12014.5	4328
10080 min Winter	0.446	0.0	12404.5	5040

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) 19.720

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	9.860	4	8	9.860

Model Details

Storage is Online Cover Level (m) 78.000

Complex Structure

Swale

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	105.0
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		

Tank or Pond

Invert Level (m) 76.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	778.0	0.500	1145.0	1.000	1545.0
0.250	955.0	0.750	1345.0		

Tank or Pond

Invert Level (m) 76.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	6410.0	0.500	7440.0	1.000	8510.0
0.250	6920.0	0.750	7970.0		

Tank or Pond

Invert Level (m) 76.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1875.0	0.500	2415.0	1.000	3170.0
0.250	2140.0	0.750	2695.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0412-1110-1000-1110
Design Head (m)	1.000
Design Flow (l/s)	111.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes

Hydro-Brake® Optimum Outflow Control

Diameter (mm)	412
Invert Level (m)	74.850
Minimum Outlet Pipe Diameter (mm)	450
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	111.0
Flush-Flo™	0.568	111.0
Kick-Flo®	0.858	103.0
Mean Flow over Head Range	-	83.5

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	11.2	1.200	121.2	3.000	189.6	7.000	287.2
0.200	40.3	1.400	130.7	3.500	204.4	7.500	297.1
0.300	78.4	1.600	139.5	4.000	218.2	8.000	306.7
0.400	107.6	1.800	147.7	4.500	231.2	8.500	316.0
0.500	110.5	2.000	155.5	5.000	243.5	9.000	325.0
0.600	110.9	2.200	162.9	5.500	255.1	9.500	333.8
0.800	106.0	2.400	170.0	6.000	266.3		
1.000	111.0	2.600	176.8	6.500	277.0		