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Windsor House Cornwall Road Harrogate HG1 2PW			Oxspring, Sheffield, S36 8WZ Storage Check				
Date 21/10/2020 File Storage Check 21.10.20....			Designed by TM Checked by				
Micro Drainage			Source Control 2019.1				
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
30 min Winter	8.871	0.871	0.0	3.6	3.6	49.7	0 K
60 min Winter	9.064	1.064	0.0	3.6	3.6	60.7	0 K
120 min Winter	9.190	1.190	0.0	3.6	3.6	67.8	0 K
180 min Winter	9.199	1.199	0.0	3.6	3.6	68.4	0 K
240 min Winter	9.172	1.172	0.0	3.6	3.6	66.8	0 K
360 min Winter	9.107	1.107	0.0	3.6	3.6	63.1	0 K
480 min Winter	9.031	1.031	0.0	3.6	3.6	58.8	0 K
600 min Winter	8.950	0.950	0.0	3.6	3.6	54.2	0 K
720 min Winter	8.866	0.866	0.0	3.6	3.6	49.4	0 K
960 min Winter	8.661	0.661	0.0	3.6	3.6	37.7	0 K
1440 min Winter	8.358	0.358	0.0	3.6	3.6	20.4	0 K
2160 min Winter	8.161	0.161	0.0	3.2	3.2	9.2	0 K
2880 min Winter	8.103	0.103	0.0	2.7	2.7	5.9	0 K
4320 min Winter	8.076	0.076	0.0	2.0	2.0	4.3	0 K
5760 min Winter	8.064	0.064	0.0	1.6	1.6	3.7	0 K
7200 min Winter	8.057	0.057	0.0	1.3	1.3	3.3	0 K
8640 min Winter	8.052	0.052	0.0	1.2	1.2	3.0	0 K
10080 min Winter	8.049	0.049	0.0	1.0	1.0	2.8	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	77.644	0.0	55.2	38			
60 min Winter	49.937	0.0	71.1	66			
120 min Winter	31.015	0.0	88.4	120			
180 min Winter	23.124	0.0	98.8	174			
240 min Winter	18.639	0.0	106.2	198			
360 min Winter	13.717	0.0	117.3	276			
480 min Winter	11.031	0.0	125.7	352			
600 min Winter	9.307	0.0	132.6	430			
720 min Winter	8.096	0.0	138.4	506			
960 min Winter	6.491	0.0	148.0	638			
1440 min Winter	4.745	0.0	162.2	858			
2160 min Winter	3.461	0.0	177.5	1172			
2880 min Winter	2.763	0.0	189.0	1476			
4320 min Winter	2.008	0.0	206.0	2208			
5760 min Winter	1.599	0.0	218.7	2936			
7200 min Winter	1.339	0.0	229.0	3664			
8640 min Winter	1.160	0.0	238.0	4400			
10080 min Winter	1.027	0.0	245.9	5088			
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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)	19.000	Shortest Storm (mins)	15
Ratio R	0.346	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.170

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.056	4 8	0.056	8 12	0.057

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Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 8.000 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	60.0	60.0	1.300	0.0	98.4
1.200	60.0	98.4			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0087-3600-1200-3600
Design Head (m) 1.200
Design Flow (l/s) 3.6
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 87
Invert Level (m) 8.000
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.6
Flush-Flo™	0.362	3.6
Kick-Flo®	0.742	2.9
Mean Flow over Head Range	-	3.2

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	2.7	1.200	3.6	3.000	5.5	7.000	8.2
0.200	3.4	1.400	3.9	3.500	5.9	7.500	8.5
0.300	3.6	1.600	4.1	4.000	6.3	8.000	8.8
0.400	3.6	1.800	4.3	4.500	6.7	8.500	9.0
0.500	3.5	2.000	4.6	5.000	7.0	9.000	9.3
0.600	3.4	2.200	4.8	5.500	7.3	9.500	9.5
0.800	3.0	2.400	5.0	6.000	7.6		
1.000	3.3	2.600	5.2	6.500	7.9		

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