

Aire House
12 Victoria Avenue
Harrogate, HG1 1ED

Howbrook, Sheffield
S35 7EJ
Storage Check



Date 19/10/2021
File Storage Check 19.10.21....

Designed by TM
Checked by

Innovyze Source Control 2019.1

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

Half Drain Time : 266 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m ³)	Status
15 min Summer	159.199	0.349	0.0	0.4	0.4	5.8	O K
30 min Summer	159.312	0.462	0.0	0.4	0.4	7.7	O K
60 min Summer	159.417	0.567	0.0	0.4	0.4	9.4	O K
120 min Summer	159.494	0.644	0.0	0.5	0.5	10.7	O K
180 min Summer	159.511	0.661	0.0	0.5	0.5	11.0	O K
240 min Summer	159.507	0.657	0.0	0.5	0.5	10.9	O K
360 min Summer	159.491	0.641	0.0	0.5	0.5	10.7	O K
480 min Summer	159.471	0.621	0.0	0.4	0.4	10.3	O K
600 min Summer	159.450	0.600	0.0	0.4	0.4	10.0	O K
720 min Summer	159.429	0.579	0.0	0.4	0.4	9.6	O K
960 min Summer	159.388	0.538	0.0	0.4	0.4	8.9	O K
1440 min Summer	159.309	0.459	0.0	0.4	0.4	7.6	O K
2160 min Summer	159.202	0.352	0.0	0.4	0.4	5.9	O K
2880 min Summer	159.084	0.234	0.0	0.4	0.4	3.9	O K
4320 min Summer	158.962	0.112	0.0	0.4	0.4	1.9	O K
5760 min Summer	158.916	0.066	0.0	0.4	0.4	1.1	O K
7200 min Summer	158.901	0.051	0.0	0.3	0.3	0.8	O K
8640 min Summer	158.893	0.043	0.0	0.3	0.3	0.7	O K
10080 min Summer	158.887	0.037	0.0	0.2	0.2	0.6	O K
15 min Winter	159.244	0.394	0.0	0.4	0.4	6.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	115.731	0.0	6.2	25
30 min Summer	77.804	0.0	8.4	39
60 min Summer	49.937	0.0	10.7	68
120 min Summer	30.956	0.0	13.3	124
180 min Summer	23.058	0.0	14.9	180
240 min Summer	18.577	0.0	16.0	208
360 min Summer	13.656	0.0	17.6	272
480 min Summer	10.974	0.0	18.9	340
600 min Summer	9.254	0.0	19.9	410
720 min Summer	8.046	0.0	20.8	478
960 min Summer	6.447	0.0	22.2	616
1440 min Summer	4.709	0.0	24.3	888
2160 min Summer	3.432	0.0	26.6	1288
2880 min Summer	2.739	0.0	28.3	1624
4320 min Summer	1.989	0.0	30.8	2292
5760 min Summer	1.583	0.0	32.7	2944
7200 min Summer	1.325	0.0	34.2	3672
8640 min Summer	1.147	0.0	35.5	4400
10080 min Summer	1.015	0.0	36.7	5136
15 min Winter	115.731	0.0	7.0	25


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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (1/s)	Max Control (1/s)	Max Σ Outflow (1/s)	Max Volume (m³)	Status
30 min Winter	159.371	0.521	0.0	0.4	0.4	8.7	O K
60 min Winter	159.493	0.643	0.0	0.5	0.5	10.7	O K
120 min Winter	159.588	0.738	0.0	0.5	0.5	12.3	O K
180 min Winter	159.614	0.764	0.0	0.5	0.5	12.7	O K
240 min Winter	159.612	0.762	0.0	0.5	0.5	12.7	O K
360 min Winter	159.590	0.740	0.0	0.5	0.5	12.3	O K
480 min Winter	159.564	0.714	0.0	0.5	0.5	11.9	O K
600 min Winter	159.533	0.683	0.0	0.5	0.5	11.4	O K
720 min Winter	159.502	0.652	0.0	0.5	0.5	10.8	O K
960 min Winter	159.438	0.588	0.0	0.4	0.4	9.8	O K
1440 min Winter	159.320	0.470	0.0	0.4	0.4	7.8	O K
2160 min Winter	159.144	0.294	0.0	0.4	0.4	4.9	O K
2880 min Winter	158.995	0.145	0.0	0.4	0.4	2.4	O K
4320 min Winter	158.907	0.057	0.0	0.3	0.3	0.9	O K
5760 min Winter	158.893	0.043	0.0	0.3	0.3	0.7	O K
7200 min Winter	158.885	0.035	0.0	0.2	0.2	0.6	O K
8640 min Winter	158.881	0.031	0.0	0.2	0.2	0.5	O K
10080 min Winter	158.878	0.028	0.0	0.2	0.2	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	77.804	0.0	9.4	39
60 min Winter	49.937	0.0	12.0	66
120 min Winter	30.956	0.0	14.9	122
180 min Winter	23.058	0.0	16.6	178
240 min Winter	18.577	0.0	17.9	230
360 min Winter	13.656	0.0	19.7	286
480 min Winter	10.974	0.0	21.1	364
600 min Winter	9.254	0.0	22.3	442
720 min Winter	8.046	0.0	23.2	518
960 min Winter	6.447	0.0	24.8	666
1440 min Winter	4.709	0.0	27.2	954
2160 min Winter	3.432	0.0	29.8	1376
2880 min Winter	2.739	0.0	31.6	1648
4320 min Winter	1.989	0.0	34.5	2212
5760 min Winter	1.583	0.0	36.6	2936
7200 min Winter	1.325	0.0	38.3	3592
8640 min Winter	1.147	0.0	39.8	4320
10080 min Winter	1.015	0.0	41.1	4952

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Innovyze	Source Control 2019.1
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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	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.029

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
	(ha)		(ha)		(ha)
0	4	4	8	8	12
	0.009		0.009		0.010

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Model Details

Storage is Online Cover Level (m) 161.000

Cellular Storage Structure

Invert Level (m) 158.850 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	17.5	17.5	0.900	0.0	31.1
0.800	17.5	31.1			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0034-5000-0800-5000
Design Head (m) 0.800
Design Flow (l/s) 0.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 34
Invert Level (m) 158.850
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	0.5
Flush-Flo™	0.151	0.4
Kick-Flo®	0.303	0.3
Mean Flow over Head Range	-	0.4

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	0.4	1.200	0.6	3.000	0.9	7.000	1.3
0.200	0.4	1.400	0.6	3.500	1.0	7.500	1.4
0.300	0.3	1.600	0.7	4.000	1.0	8.000	1.4
0.400	0.4	1.800	0.7	4.500	1.1	8.500	1.4
0.500	0.4	2.000	0.7	5.000	1.1	9.000	1.5
0.600	0.4	2.200	0.8	5.500	1.2	9.500	1.5
0.800	0.5	2.400	0.8	6.000	1.2		
1.000	0.6	2.600	0.8	6.500	1.3		