

Topping Engineers Ltd

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Aire House

12 Victoria Avenue

Harrogate, HG1 1ED

Date 20/09/2022 17:09

File albany road source cont...

Designed by Rob

Checked by

Innovyze

Source Control 2020.1

Micro Drainage

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

Half Drain Time : 17 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	8.775	0.275	0.0	14.6	14.6	19.6	O K
30 min Summer	8.840	0.340	0.0	14.6	14.6	24.3	O K
60 min Summer	8.860	0.360	0.0	14.6	14.6	25.6	O K
120 min Summer	8.813	0.313	0.0	14.6	14.6	22.3	O K
180 min Summer	8.755	0.255	0.0	14.6	14.6	18.2	O K
240 min Summer	8.710	0.210	0.0	14.5	14.5	15.0	O K
360 min Summer	8.664	0.164	0.0	13.1	13.1	11.7	O K
480 min Summer	8.643	0.143	0.0	11.1	11.1	10.2	O K
600 min Summer	8.629	0.129	0.0	9.6	9.6	9.2	O K
720 min Summer	8.619	0.119	0.0	8.5	8.5	8.5	O K
960 min Summer	8.605	0.105	0.0	6.9	6.9	7.5	O K
1440 min Summer	8.589	0.089	0.0	5.2	5.2	6.3	O K
2160 min Summer	8.575	0.075	0.0	3.8	3.8	5.3	O K
2880 min Summer	8.566	0.066	0.0	3.1	3.1	4.7	O K
4320 min Summer	8.556	0.056	0.0	2.2	2.2	4.0	O K
5760 min Summer	8.549	0.049	0.0	1.8	1.8	3.5	O K
7200 min Summer	8.545	0.045	0.0	1.5	1.5	3.2	O K
8640 min Summer	8.542	0.042	0.0	1.3	1.3	3.0	O K
10080 min Summer	8.539	0.039	0.0	1.1	1.1	2.8	O K
15 min Winter	8.815	0.315	0.0	14.6	14.6	22.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	110.141	0.0	29.9	20
30 min Summer	73.741	0.0	40.0	30
60 min Summer	47.182	0.0	51.3	46
120 min Summer	29.220	0.0	63.5	78
180 min Summer	21.790	0.0	71.1	108
240 min Summer	17.587	0.0	76.5	138
360 min Summer	12.890	0.0	84.1	194
480 min Summer	10.347	0.0	90.0	254
600 min Summer	8.718	0.0	94.8	314
720 min Summer	7.575	0.0	98.8	374
960 min Summer	6.064	0.0	105.5	494
1440 min Summer	4.424	0.0	115.4	736
2160 min Summer	3.221	0.0	126.1	1100
2880 min Summer	2.568	0.0	134.0	1468
4320 min Summer	1.863	0.0	145.8	2192
5760 min Summer	1.482	0.0	154.7	2872
7200 min Summer	1.240	0.0	161.8	3672
8640 min Summer	1.072	0.0	167.8	4368
10080 min Summer	0.947	0.0	173.0	5104
15 min Winter	110.141	0.0	33.5	21

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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)	18.000	Shortest Storm (mins)	15
Ratio R	0.360	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.145

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.048		0.048		0.048

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Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 8.500 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	75.0	75.0	0.500	0.0	91.0
0.400	75.0	91.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0180-1460-0400-1460
 Design Head (m) 0.400
 Design Flow (l/s) 14.6
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 180
 Invert Level (m) 8.500
 Minimum Outlet Pipe Diameter (mm) 225
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	14.6
Flush-Flo™	0.246	14.6
Kick-Flo®	0.354	13.8
Mean Flow over Head Range	-	10.6

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	6.3	1.200	24.6	3.000	38.3	7.000	57.9
0.200	14.4	1.400	26.5	3.500	41.3	7.500	59.9
0.300	14.4	1.600	28.3	4.000	44.0	8.000	61.9
0.400	14.6	1.800	29.9	4.500	46.2	8.500	63.8
0.500	16.2	2.000	31.5	5.000	48.8	9.000	65.7
0.600	17.7	2.200	33.0	5.500	51.2	9.500	67.5
0.800	20.3	2.400	34.4	6.000	53.5		
1.000	22.6	2.600	35.7	6.500	55.7		

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