

JPG (Leeds) Limited

5 John Charles Way
Leeds
LS12 6QA

Date 03/10/2019 08:32
File 1 in 30 + CC.srcx

XP Solutions

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Designed by Ben.Terry
Checked by

Source Control 2017.1.2

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

Half Drain Time : 212 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	8.502	0.502	0.0	16.1	16.1	178.8	O K
30 min Summer	8.658	0.658	0.0	16.1	16.1	234.5	O K
60 min Summer	8.809	0.809	0.0	16.1	16.1	288.2	O K
120 min Summer	8.923	0.923	0.0	16.1	16.1	328.7	O K
180 min Summer	8.949	0.949	0.0	16.1	16.1	338.1	O K
240 min Summer	8.948	0.948	0.0	16.1	16.1	337.8	O K
360 min Summer	8.929	0.929	0.0	16.1	16.1	331.1	O K
480 min Summer	8.901	0.901	0.0	16.1	16.1	320.9	O K
600 min Summer	8.866	0.866	0.0	16.1	16.1	308.5	O K
720 min Summer	8.827	0.827	0.0	16.1	16.1	294.6	O K
960 min Summer	8.738	0.738	0.0	16.1	16.1	262.8	O K
1440 min Summer	8.580	0.580	0.0	16.1	16.1	206.7	O K
2160 min Summer	8.398	0.398	0.0	16.1	16.1	142.0	O K
2880 min Summer	8.282	0.282	0.0	15.9	15.9	100.6	O K
4320 min Summer	8.184	0.184	0.0	14.5	14.5	65.4	O K
5760 min Summer	8.154	0.154	0.0	12.0	12.0	54.8	O K
7200 min Summer	8.136	0.136	0.0	10.2	10.2	48.6	O K
8640 min Summer	8.124	0.124	0.0	8.9	8.9	44.3	O K
10080 min Summer	8.116	0.116	0.0	8.0	8.0	41.1	O K
15 min Winter	8.567	0.567	0.0	16.1	16.1	201.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	89.487	0.0	192.2	25
30 min Summer	59.577	0.0	256.5	38
60 min Summer	38.009	0.0	329.1	66
120 min Summer	23.546	0.0	407.9	124
180 min Summer	17.594	0.0	457.3	180
240 min Summer	14.237	0.0	493.5	206
360 min Summer	10.537	0.0	547.9	270
480 min Summer	8.507	0.0	589.8	340
600 min Summer	7.201	0.0	624.1	410
720 min Summer	6.281	0.0	653.3	480
960 min Summer	5.060	0.0	701.7	608
1440 min Summer	3.726	0.0	774.9	860
2160 min Summer	2.740	0.0	855.9	1212
2880 min Summer	2.201	0.0	916.6	1552
4320 min Summer	1.614	0.0	1007.9	2212
5760 min Summer	1.295	0.0	1079.1	2936
7200 min Summer	1.091	0.0	1136.1	3672
8640 min Summer	0.948	0.0	1185.3	4408
10080 min Summer	0.843	0.0	1228.3	5136
15 min Winter	89.487	0.0	215.5	25

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	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) 1.158

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 4	0.386	4 8	0.386	8 12	0.386

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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	375.0	375.0	1.300	0.0	471.0
1.200	375.0	471.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0178-1610-1200-1610
Design Head (m) 1.200
Design Flow (l/s) 16.1
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 178
Invert Level (m) 8.000
Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	16.1
Flush-Flo™	0.370	16.1
Kick-Flo®	0.814	13.4
Mean Flow over Head Range	-	13.8

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	16.1	3.000	24.9	7.000	37.5
0.200	15.1	1.400	17.3	3.500	26.8	7.500	38.7
0.300	16.0	1.600	18.5	4.000	28.6	8.000	40.0
0.400	16.1	1.800	19.5	4.500	30.3	8.500	41.2
0.500	15.9	2.000	20.5	5.000	31.8	9.000	42.3
0.600	15.5	2.200	21.5	5.500	33.3	9.500	43.4
0.800	13.7	2.400	22.4	6.000	34.8		
1.000	14.8	2.600	23.3	6.500	36.1		

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