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Summit House, Riparian Way The Crossings, Cross Hills Keighley, BD20 7BW	24030-PWA-00-XX-CA-C-3000 P01 SURFACE WATER CALCULATIONS HERSCHEL AVENUE, BURNLEY	
Date 19/03/2024 File 24030-PWA-00-XX-CA-C-30...	Designed by IB Checked by LS	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+50%)

Half Drain Time : 84 minutes.


Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max $\Sigma$ Outflow (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	136.130	0.430	0.0	1.2	1.2	6.5	O K
30 min Summer	136.258	0.558	0.0	1.3	1.3	8.5	O K
60 min Summer	136.350	0.650	0.0	1.4	1.4	9.9	O K
120 min Summer	136.385	0.685	0.0	1.4	1.4	10.4	O K
180 min Summer	136.369	0.669	0.0	1.4	1.4	10.2	O K
240 min Summer	136.346	0.646	0.0	1.4	1.4	9.8	O K
360 min Summer	136.299	0.599	0.0	1.3	1.3	9.1	O K
480 min Summer	136.251	0.551	0.0	1.3	1.3	8.4	O K
600 min Summer	136.205	0.505	0.0	1.2	1.2	7.7	O K
720 min Summer	136.162	0.462	0.0	1.2	1.2	7.0	O K
960 min Summer	136.085	0.385	0.0	1.1	1.1	5.9	O K
1440 min Summer	135.966	0.266	0.0	1.0	1.0	4.0	O K
2160 min Summer	135.846	0.146	0.0	0.9	0.9	2.2	O K
2880 min Summer	135.772	0.072	0.0	0.8	0.8	1.1	O K
4320 min Summer	135.701	0.001	0.0	0.7	0.7	0.0	O K
5760 min Summer	135.700	0.000	0.0	0.5	0.5	0.0	O K
7200 min Summer	135.700	0.000	0.0	0.5	0.5	0.0	O K
8640 min Summer	135.700	0.000	0.0	0.4	0.4	0.0	O K
10080 min Summer	135.700	0.000	0.0	0.3	0.3	0.0	O K
15 min Winter	136.189	0.489	0.0	1.2	1.2	7.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	133.848	0.0	7.5	17
30 min Summer	92.305	0.0	10.4	31
60 min Summer	60.764	0.0	13.7	58
120 min Summer	38.449	0.0	17.3	90
180 min Summer	28.844	0.0	19.5	124
240 min Summer	23.438	0.0	21.1	158
360 min Summer	17.474	0.0	23.6	228
480 min Summer	14.159	0.0	25.5	294
600 min Summer	12.014	0.0	27.0	362
720 min Summer	10.498	0.0	28.4	426
960 min Summer	8.476	0.0	30.5	550
1440 min Summer	6.253	0.0	33.8	794
2160 min Summer	4.600	0.0	37.3	1152
2880 min Summer	3.693	0.0	39.9	1500
4320 min Summer	2.710	0.0	43.9	2200
5760 min Summer	2.179	0.0	47.1	0
7200 min Summer	1.840	0.0	49.7	0
8640 min Summer	1.603	0.0	51.9	0
10080 min Summer	1.427	0.0	54.0	0
15 min Winter	133.848	0.0	8.4	17

Summary of Results for 100 year Return Period (+50%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m <sup>3</sup> )	Status
30 min Winter	136.338	0.638	0.0	1.4	1.4	9.7	O K
60 min Winter	136.453	0.753	0.0	1.4	1.4	11.4	O K
120 min Winter	136.494	0.794	0.0	1.5	1.5	12.1	O K
180 min Winter	136.472	0.772	0.0	1.5	1.5	11.7	O K
240 min Winter	136.433	0.733	0.0	1.4	1.4	11.1	O K
360 min Winter	136.354	0.654	0.0	1.4	1.4	9.9	O K
480 min Winter	136.279	0.579	0.0	1.3	1.3	8.8	O K
600 min Winter	136.209	0.509	0.0	1.2	1.2	7.7	O K
720 min Winter	136.147	0.447	0.0	1.2	1.2	6.8	O K
960 min Winter	136.041	0.341	0.0	1.1	1.1	5.2	O K
1440 min Winter	135.891	0.191	0.0	0.9	0.9	2.9	O K
2160 min Winter	135.760	0.060	0.0	0.8	0.8	0.9	O K
2880 min Winter	135.700	0.000	0.0	0.7	0.7	0.0	O K
4320 min Winter	135.700	0.000	0.0	0.5	0.5	0.0	O K
5760 min Winter	135.700	0.000	0.0	0.4	0.4	0.0	O K
7200 min Winter	135.700	0.000	0.0	0.3	0.3	0.0	O K
8640 min Winter	135.700	0.000	0.0	0.3	0.3	0.0	O K
10080 min Winter	135.700	0.000	0.0	0.3	0.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
30 min Winter	92.305	0.0	11.6	31
60 min Winter	60.764	0.0	15.2	58
120 min Winter	38.449	0.0	19.4	94
180 min Winter	28.844	0.0	21.8	134
240 min Winter	23.438	0.0	23.6	172
360 min Winter	17.474	0.0	26.4	244
480 min Winter	14.159	0.0	28.5	314
600 min Winter	12.014	0.0	30.3	384
720 min Winter	10.498	0.0	31.7	448
960 min Winter	8.476	0.0	34.2	578
1440 min Winter	6.253	0.0	37.8	822
2160 min Winter	4.600	0.0	41.7	1168
2880 min Winter	3.693	0.0	44.7	0
4320 min Winter	2.710	0.0	49.2	0
5760 min Winter	2.179	0.0	52.7	0
7200 min Winter	1.840	0.0	55.6	0
8640 min Winter	1.603	0.0	58.2	0
10080 min Winter	1.427	0.0	60.4	0

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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)	20.000	Shortest Storm (mins)	15
Ratio R	0.300	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+50

Time Area Diagram

Total Area (ha) 0.030

Time (mins)		Area
From:	To:	(ha)
0	4	0.030

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Model Details

Storage is Online Cover Level (m) 137.200

Cellular Storage Structure

Invert Level (m) 135.700 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 <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	16.0	0.0	0.800	0.0	0.0
0.799	16.0	0.0			

Crown Vortex Valve® Outflow Control

Design Head (m) 1.000 Vortex Valve® Type R1 SW Only Invert Level (m) 135.500  
 Design Flow (l/s) 1.5 Diameter (mm) 50

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.5	1.200	1.6	3.000	2.6	7.000	3.9
0.200	0.7	1.400	1.7	3.500	2.8	7.500	4.0
0.300	0.8	1.600	1.9	4.000	3.0	8.000	4.2
0.400	0.9	1.800	2.0	4.500	3.1	8.500	4.3
0.500	1.0	2.000	2.1	5.000	3.3	9.000	4.4
0.600	1.1	2.200	2.2	5.500	3.5	9.500	4.6
0.800	1.3	2.400	2.3	6.000	3.6		
1.000	1.5	2.600	2.4	6.500	3.8		