

H2OK Systems Limited						Page 1	
Nanjerrick Court Allet, Truro TR4 9DJ							
Date 19/07/2017 13:00 File Permeable Pavement 300m...			Designed by awoolley Checked by				
Micro Drainage			Source Control 2015.1				
<u>Summary of Results for 100 year Return Period (+30%)</u> Half Drain Time : 314 minutes.							
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
15 min Summer	3.318	0.133	0.0	2.0	2.0	30.6	O K
30 min Summer	3.358	0.173	0.0	2.0	2.0	40.9	O K
60 min Summer	3.396	0.211	0.0	2.0	2.0	50.7	O K
120 min Summer	3.427	0.242	0.0	2.0	2.0	58.5	Flood Risk
180 min Summer	3.435	0.250	0.0	2.0	2.0	60.5	Flood Risk
240 min Summer	3.433	0.248	0.0	2.0	2.0	60.1	Flood Risk
360 min Summer	3.423	0.238	0.0	2.0	2.0	57.6	Flood Risk
480 min Summer	3.416	0.231	0.0	2.0	2.0	55.7	O K
600 min Summer	3.409	0.224	0.0	2.0	2.0	53.9	O K
720 min Summer	3.402	0.217	0.0	2.0	2.0	52.1	O K
960 min Summer	3.387	0.202	0.0	2.0	2.0	48.3	O K
1440 min Summer	3.354	0.169	0.0	2.0	2.0	40.0	O K
2160 min Summer	3.309	0.124	0.0	2.0	2.0	28.3	O K
2880 min Summer	3.271	0.086	0.0	2.0	2.0	18.6	O K
4320 min Summer	3.221	0.036	0.0	2.0	2.0	5.6	O K
5760 min Summer	3.194	0.009	0.0	2.0	2.0	0.4	O K
7200 min Summer	3.185	0.000	0.0	1.7	1.7	0.0	O K
8640 min Summer	3.185	0.000	0.0	1.5	1.5	0.0	O K
10080 min Summer	3.185	0.000	0.0	1.3	1.3	0.0	O K
15 min Winter	3.334	0.149	0.0	2.0	2.0	34.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	115.731	0.0	32.7	22			
30 min Summer	77.804	0.0	44.5	36			
60 min Summer	49.937	0.0	57.4	66			
120 min Summer	30.956	0.0	71.4	124			
180 min Summer	23.058	0.0	80.0	182			
240 min Summer	18.577	0.0	86.1	240			
360 min Summer	13.656	0.0	95.0	308			
480 min Summer	10.974	0.0	101.8	372			
600 min Summer	9.254	0.0	107.2	436			
720 min Summer	8.046	0.0	112.0	504			
960 min Summer	6.447	0.0	119.6	644			
1440 min Summer	4.709	0.0	130.9	912			
2160 min Summer	3.432	0.0	143.0	1296			
2880 min Summer	2.739	0.0	151.8	1648			
4320 min Summer	1.989	0.0	164.8	2296			
5760 min Summer	1.583	0.0	174.3	2936			
7200 min Summer	1.325	0.0	181.8	0			
8640 min Summer	1.147	0.0	188.3	0			
10080 min Summer	1.015	0.0	193.8	0			
15 min Winter	115.731	0.0	36.8	22			
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<u>Summary of Results for 100 year Return Period (+30%)</u>							
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	3.380	0.195	0.0	2.0	2.0	46.5	O K
60 min Winter	3.424	0.239	0.0	2.0	2.0	57.9	Flood Risk
120 min Winter	3.461	0.276	0.0	2.0	2.0	67.4	Flood Risk
180 min Winter	3.474	0.289	0.0	2.0	2.0	70.6	Flood Risk
240 min Winter	3.476	0.291	0.0	2.0	2.0	71.1	Flood Risk
360 min Winter	3.466	0.281	0.0	2.0	2.0	68.7	Flood Risk
480 min Winter	3.454	0.269	0.0	2.0	2.0	65.6	Flood Risk
600 min Winter	3.445	0.260	0.0	2.0	2.0	63.2	Flood Risk
720 min Winter	3.435	0.250	0.0	2.0	2.0	60.6	Flood Risk
960 min Winter	3.413	0.228	0.0	2.0	2.0	55.0	O K
1440 min Winter	3.364	0.179	0.0	2.0	2.0	42.5	O K
2160 min Winter	3.293	0.108	0.0	2.0	2.0	24.1	O K
2880 min Winter	3.238	0.053	0.0	2.0	2.0	10.2	O K
4320 min Winter	3.185	0.000	0.0	1.8	1.8	0.0	O K
5760 min Winter	3.185	0.000	0.0	1.5	1.5	0.0	O K
7200 min Winter	3.185	0.000	0.0	1.2	1.2	0.0	O K
8640 min Winter	3.185	0.000	0.0	1.1	1.1	0.0	O K
10080 min Winter	3.185	0.000	0.0	0.9	0.9	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	77.804	0.0	49.9	36			
60 min Winter	49.937	0.0	64.4	64			
120 min Winter	30.956	0.0	80.1	122			
180 min Winter	23.058	0.0	89.6	178			
240 min Winter	18.577	0.0	96.4	234			
360 min Winter	13.656	0.0	106.6	340			
480 min Winter	10.974	0.0	114.0	390			
600 min Winter	9.254	0.0	120.4	464			
720 min Winter	8.046	0.0	125.6	542			
960 min Winter	6.447	0.0	134.2	698			
1440 min Winter	4.709	0.0	146.9	996			
2160 min Winter	3.432	0.0	160.3	1368			
2880 min Winter	2.739	0.0	170.3	1700			
4320 min Winter	1.989	0.0	185.1	0			
5760 min Winter	1.583	0.0	195.8	0			
7200 min Winter	1.325	0.0	204.3	0			
8640 min Winter	1.147	0.0	211.6	0			
10080 min Winter	1.015	0.0	217.9	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)	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) 0.157

Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)
0 4	0.078	4 8	0.079

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Model Details

Storage is Online Cover Level (m) 3.720

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	27.0
Max Percolation (l/s)	75.0	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.95	Evaporation (mm/day)	3
Invert Level (m)	3.185	Cap Volume Depth (m)	0.300

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0075-2000-0400-2000
Design Head (m)	0.400
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	75
Invert Level (m)	3.085
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	2.0
Flush-Flo™	0.124	2.0
Kick-Flo®	0.285	1.7
Mean Flow over Head Range	-	1.6

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	2.0	1.200	3.3	3.000	5.0	7.000	7.5
0.200	1.9	1.400	3.5	3.500	5.4	7.500	7.8
0.300	1.7	1.600	3.7	4.000	5.7	8.000	8.1
0.400	2.0	1.800	3.9	4.500	6.0	8.500	8.3
0.500	2.2	2.000	4.1	5.000	6.4	9.000	8.6
0.600	2.4	2.200	4.3	5.500	6.7	9.500	8.8
0.800	2.7	2.400	4.5	6.000	7.0		
1.000	3.0	2.600	4.7	6.500	7.3		

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