

Tumu Consulting

20 East Sands

Burbage Marlborough

Wiltshire SN8 3AN

Date 21/09/2023

File CA1 GEOCELL PAVING.SRCX

Micro Drainage

19320

Ageas Bowl

CA1-Hotel

Designed by Robbie Parnham

Checked by

Source Control 2018.1

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Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 876 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	39.426	0.126	0.0	0.6	0.6	28.1	O K
30 min Summer	39.470	0.170	0.0	0.7	0.7	37.8	O K
60 min Summer	39.516	0.216	0.0	0.7	0.7	48.1	O K
120 min Summer	39.561	0.261	0.0	0.8	0.8	58.0	O K
180 min Summer	39.583	0.283	0.0	0.8	0.8	63.0	O K
240 min Summer	39.596	0.296	0.0	0.8	0.8	65.8	O K
360 min Summer	39.611	0.311	0.0	0.8	0.8	69.1	O K
480 min Summer	39.617	0.317	0.0	0.8	0.8	70.5	O K
600 min Summer	39.618	0.318	0.0	0.8	0.8	70.7	O K
720 min Summer	39.617	0.317	0.0	0.8	0.8	70.5	O K
960 min Summer	39.613	0.313	0.0	0.8	0.8	69.7	O K
1440 min Summer	39.602	0.302	0.0	0.8	0.8	67.2	O K
2160 min Summer	39.582	0.282	0.0	0.8	0.8	62.6	O K
2880 min Summer	39.564	0.264	0.0	0.8	0.8	58.6	O K
4320 min Summer	39.532	0.232	0.0	0.7	0.7	51.5	O K
5760 min Summer	39.503	0.203	0.0	0.7	0.7	45.2	O K
7200 min Summer	39.479	0.179	0.0	0.7	0.7	39.7	O K
8640 min Summer	39.457	0.157	0.0	0.6	0.6	34.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	130.405	0.0	28.5	23
30 min Summer	87.611	0.0	38.8	37
60 min Summer	56.129	0.0	50.1	66
120 min Summer	34.675	0.0	62.1	126
180 min Summer	25.749	0.0	69.3	184
240 min Summer	20.687	0.0	74.3	244
360 min Summer	15.234	0.0	82.2	362
480 min Summer	12.237	0.0	88.1	482
600 min Summer	10.316	0.0	92.8	600
720 min Summer	8.967	0.0	96.8	658
960 min Summer	7.182	0.0	103.4	770
1440 min Summer	5.242	0.0	105.7	1028
2160 min Summer	3.818	0.0	123.4	1448
2880 min Summer	3.045	0.0	131.0	1852
4320 min Summer	2.209	0.0	142.2	2680
5760 min Summer	1.757	0.0	150.2	3464
7200 min Summer	1.472	0.0	156.9	4248
8640 min Summer	1.274	0.0	162.5	5016

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Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
10080 min Summer	39.438	0.138	0.0	0.6	0.6	30.7	O K
15 min Winter	39.442	0.142	0.0	0.6	0.6	31.6	O K
30 min Winter	39.492	0.192	0.0	0.7	0.7	42.6	O K
60 min Winter	39.544	0.244	0.0	0.8	0.8	54.2	O K
120 min Winter	39.595	0.295	0.0	0.8	0.8	65.5	O K
180 min Winter	39.621	0.321	0.0	0.8	0.8	71.4	O K
240 min Winter	39.636	0.336	0.0	0.8	0.8	74.7	O K
360 min Winter	39.655	0.355	0.0	0.9	0.9	79.0	O K
480 min Winter	39.664	0.364	0.0	0.9	0.9	81.0	O K
600 min Winter	39.668	0.368	0.0	0.9	0.9	81.8	O K
720 min Winter	39.668	0.368	0.0	0.9	0.9	81.9	O K
960 min Winter	39.663	0.363	0.0	0.9	0.9	80.7	O K
1440 min Winter	39.650	0.350	0.0	0.9	0.9	77.9	O K
2160 min Winter	39.624	0.324	0.0	0.8	0.8	71.9	O K
2880 min Winter	39.595	0.295	0.0	0.8	0.8	65.6	O K
4320 min Winter	39.548	0.248	0.0	0.8	0.8	55.1	O K
5760 min Winter	39.507	0.207	0.0	0.7	0.7	46.0	O K
7200 min Winter	39.472	0.172	0.0	0.7	0.7	38.3	O K
8640 min Winter	39.443	0.143	0.0	0.6	0.6	31.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Summer	1.128	0.0	167.3	5752
15 min Winter	130.405	0.0	32.1	22
30 min Winter	87.611	0.0	43.6	37
60 min Winter	56.129	0.0	56.2	66
120 min Winter	34.675	0.0	69.7	124
180 min Winter	25.749	0.0	77.8	182
240 min Winter	20.687	0.0	83.4	240
360 min Winter	15.234	0.0	92.2	356
480 min Winter	12.237	0.0	98.8	468
600 min Winter	10.316	0.0	104.1	580
720 min Winter	8.967	0.0	108.6	686
960 min Winter	7.182	0.0	111.6	878
1440 min Winter	5.242	0.0	112.7	1098
2160 min Winter	3.818	0.0	138.5	1560
2880 min Winter	3.045	0.0	147.1	2016
4320 min Winter	2.209	0.0	159.6	2860
5760 min Winter	1.757	0.0	168.8	3688
7200 min Winter	1.472	0.0	176.2	4472
8640 min Winter	1.274	0.0	182.6	5272

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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)	19.800	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.122

Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)
0	4 0.061	4	8 0.061

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<u>Model Details</u> Storage is Online Cover Level (m) 40.000 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00000</td> <td>Width (m)</td> <td>6.5</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Length (m)</td> <td>36.0</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>65.0</td> <td>Slope (1:X)</td> <td>0.0</td> </tr> <tr> <td>Safety Factor</td> <td>1.5</td> <td>Depression Storage (mm)</td> <td>5</td> </tr> <tr> <td>Porosity</td> <td>0.95</td> <td>Evaporation (mm/day)</td> <td>3</td> </tr> <tr> <td>Invert Level (m)</td> <td>39.300</td> <td>Membrane Depth (m)</td> <td>200</td> </tr> </table> <u>Orifice Outflow Control</u> Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 39.200			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.5	Membrane Percolation (mm/hr)	1000	Length (m)	36.0	Max Percolation (l/s)	65.0	Slope (1:X)	0.0	Safety Factor	1.5	Depression Storage (mm)	5	Porosity	0.95	Evaporation (mm/day)	3	Invert Level (m)	39.300	Membrane Depth (m)	200
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