Appendix C - Microdrainage Calculations

RIDGE

Drainage Network Microdrinage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.000
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	20.664	0.545	37.9	0.006	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	11.267	0.517	21.8	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	18.689	0.312	59.9	0.014	4.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	14.008	0.298	47.0	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	17.367	1.270	13.7	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	12.698	0.360	35.3	0.002	4.00	0.0	0.600	o	100	Pipe/Conduit	
3.001	11.208	1.650	6.8	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
4.000	21.105	0.352	60.0	0.007	4.00	0.0	0.600	o	100	Pipe/Conduit	
4.001	13.357	0.223	59.9	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.21	221.120	0.006	0.0	0.0	0.0	1.64	29.0	0.9
1.001	50.00	4.30	220.575	0.021	0.0	0.0	0.0	2.17	38.3	2.9
2.000	50.00	4.31	220.420	0.014	0.0	0.0	0.0	1.00	7.8	1.8
1.002	50.00	4.47	220.058	0.046	0.0	0.0	0.0	1.47	26.0	6.3
1.003	50.00	4.58	219.760	0.061	0.0	0.0	0.0	2.74	48.4	8.3
3.000	50.00	4.16	220.550	0.002	0.0	0.0	0.0	1.30	10.2	0.3
3.001	50.00	4.22	220.190	0.006	0.0	0.0	0.0	2.99	23.4	0.7
4.000	50.00	4.35	220.030	0.007	0.0	0.0	0.0	1.00	7.8	1.0
4.001	50.00	4.58	219.678	0.007	0.0	0.0	0.0	1.00	7.8	1.0

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.002	4.150	0.915	4.5	0.007	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.004	12.642	0.315	40.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	12.870	0.466	27.6	0.005	4.00	0.0	0.600	o	100	Pipe/Conduit	
6.000	13.857	0.231	60.0	0.005	4.00	0.0	0.600	o	100	Pipe/Conduit	
5.001	6.856	0.189	36.3	0.009	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.005	17.108	0.285	60.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.000	12.999	0.217	59.9	0.005	4.00	0.0	0.600	o	100	Pipe/Conduit	
7.001	4.298	0.253	17.0	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.006	31.016	1.173	26.4	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.000	26.994	0.451	59.9	0.013	4.00	0.0	0.600	o	100	Pipe/Conduit	
8.001	3.403	0.132	25.8	0.002	0.00	0.0	0.600	o	100	Pipe/Conduit	
9.000	20.637	0.345	59.8	0.010	4.00	0.0	0.600	o	100	Pipe/Conduit	
9.001	11.535	0.998	11.6	0.006	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.002	50.00	4.60	219.455	0.014	0.0	0.0	0.0	3.66	28.7	1.9
1.004	50.00	4.70	218.415	0.081	0.0	0.0	0.0	2.07	82.4	10.9
5.000	50.00	4.15	218.805	0.005	0.0	0.0	0.0	1.47	11.6	0.6
6.000	50.00	4.23	218.570	0.005	0.0	0.0	0.0	1.00	7.8	0.6
5.001	50.00	4.32	218.339	0.018	0.0	0.0	0.0	1.28	10.1	2.5
1.005	50.00	4.87	218.025	0.099	0.0	0.0	0.0	1.69	67.2	13.4
7.000	50.00	4.22	218.335	0.005	0.0	0.0	0.0	1.00	7.8	0.6
7.001	50.00	4.26	218.118	0.009	0.0	0.0	0.0	1.88	14.8	1.2
1.006	50.00	5.07	217.740	0.148	0.0	0.0	0.0	2.55	101.6	20.1
8.000	50.00	4.45	217.275	0.013	0.0	0.0	0.0	1.00	7.8	1.7
8.001	50.00	4.49	216.824	0.015	0.0	0.0	0.0	1.53	12.0	2.0
9.000	50.00	4.34	218.035	0.010	0.0	0.0	0.0	1.00	7.8	1.3
9.001	50.00	4.43	217.690	0.015	0.0	0.0	0.0	2.29	18.0	2.1

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
10.000	15.085	0.252	59.9	0.004	4.00	0.0	0.600	o	100	Pipe/Conduit	
10.001	25.639	0.428	59.9	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
11.000	14.465	0.675	21.4	0.008	4.00	0.0	0.600	o	150	Pipe/Conduit	
10.002	6.735	0.113	59.6	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
12.000	19.158	0.320	59.9	0.006	4.00	0.0	0.600	o	100	Pipe/Conduit	
12.001	18.035	0.678	26.6	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.003	30.242	0.505	59.9	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
13.000	16.910	0.282	60.0	0.011	4.00	0.0	0.600	o	100	Pipe/Conduit	
13.001	5.476	0.796	6.9	0.004	0.00	0.0	0.600	o	100	Pipe/Conduit	
10.004	12.503	0.323	38.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
14.000	15.006	0.251	59.8	0.014	4.00	0.0	0.600	o	100	Pipe/Conduit	
14.001	5.109	0.470	10.9	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
15.000	6.979	0.117	59.6	0.002	4.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
10.000	50.00	4.25	220.880	0.004	0.0	0.0	0.0	1.00	7.8	0.6
10.001	50.00	4.58	220.578	0.016	0.0	0.0	0.0	1.30	23.0	2.1
11.000	50.00	4.11	220.875	0.008	0.0	0.0	0.0	2.19	38.6	1.1
10.002	50.00	4.67	220.150	0.026	0.0	0.0	0.0	1.31	23.1	3.5
12.000	50.00	4.32	221.085	0.006	0.0	0.0	0.0	1.00	7.8	0.9
12.001	50.00	4.47	220.715	0.014	0.0	0.0	0.0	1.96	34.6	1.8
10.003	50.00	5.05	220.037	0.043	0.0	0.0	0.0	1.30	23.0	5.8
13.000	50.00	4.28	220.660	0.011	0.0	0.0	0.0	1.00	7.8	1.5
13.001	50.00	4.31	220.378	0.015	0.0	0.0	0.0	2.97	23.3	2.1
10.004	50.00	5.18	219.532	0.058	0.0	0.0	0.0	1.62	28.7	7.9
14.000	50.00	4.25	219.980	0.014	0.0	0.0	0.0	1.00	7.8	1.9
14.001	50.00	4.29	219.729	0.014	0.0	0.0	0.0	2.36	18.5	1.9
15.000	50.00	4.12	219.965	0.002	0.0	0.0	0.0	1.00	7.8	0.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
15.001	4.724	0.589	8.0	0.002	0.00	0.0	0.600	o	100	Pipe/Conduit	
10.005	12.363	0.565	21.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.006	19.453	1.215	16.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
16.000	21.446	0.358	59.9	0.006	4.00	0.0	0.600	o	100	Pipe/Conduit	
16.001	17.659	0.442	40.0	0.004	0.00	0.0	0.600	o	100	Pipe/Conduit	
16.002	6.402	0.321	19.9	0.005	0.00	0.0	0.600	o	100	Pipe/Conduit	
10.007	14.495	0.787	18.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	12.025	0.201	59.8	0.008	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	16.346	0.521	31.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
17.000	18.375	0.478	38.4	0.007	4.00	0.0	0.600	o	100	Pipe/Conduit	
18.000	17.846	0.755	23.6	0.006	4.00	0.0	0.600	o	100	Pipe/Conduit	
17.001	10.668	0.760	14.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.009	23.036	0.370	62.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.010	9.426	0.035	270.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
15.001	50.00	4.15	219.848	0.004	0.0	0.0	0.0	2.75	21.6	0.5
10.005	50.00	5.28	219.209	0.076	0.0	0.0	0.0	2.16	38.2	10.3
10.006	50.00	5.41	218.644	0.076	0.0	0.0	0.0	2.53	44.7	10.3
16.000	50.00	4.36	218.600	0.006	0.0	0.0	0.0	1.00	7.8	0.8
16.001	50.00	4.60	218.242	0.010	0.0	0.0	0.0	1.22	9.6	1.4
16.002	50.00	4.66	217.800	0.016	0.0	0.0	0.0	1.74	13.6	2.1
10.007	50.00	5.51	217.429	0.092	0.0	0.0	0.0	2.36	41.7	12.4
1.007	50.00	5.61	216.492	0.278	0.0	0.0	0.0	2.04	143.9	37.6
1.008	50.00	5.70	216.291	0.278	0.0	0.0	0.0	2.82	199.1	37.6
17.000	50.00	4.25	217.208	0.007	0.0	0.0	0.0	1.25	9.8	0.9
18.000	50.00	4.19	217.485	0.006	0.0	0.0	0.0	1.59	12.5	0.8
17.001	50.00	4.33	216.730	0.013	0.0	0.0	0.0	2.07	16.3	1.7
1.009	50.00	5.90	215.770	0.290	0.0	0.0	0.0	2.00	141.0	39.3
1.010	50.00	6.02	215.400	0.290	0.0	0.0	0.0	1.23	196.0	39.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.011	4.761	0.016	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.012	7.442	0.025	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.011	50.00	6.09	215.365	0.290	0.0	0.0	0.0	1.17	185.8	39.3
1.012	49.60	6.20	215.349	0.290	0.0	0.0	0.0	1.17	185.8	39.3

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.012		215.863	215.324	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Storm

Pump Manhole: 51, DS/PN: 1.012, Volume (m³): 1.3

Invert Level (m) 215.349

Depth (m)	Flow (l/s)
1.000	0.0000

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Storage Structures for Storm

Infiltration Basin Manhole: 50, DS/PN: 1.011

Invert Level (m) 215.365 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 1.99100 Porosity 1.00
Infiltration Coefficient Side (m/hr) 1.99100

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	135.2	0.498	259.3

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.401
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	MH324	15 Winter	1	+0%					221.138
1.001	MH325	15 Winter	1	+0%					220.603
2.000	MH334	15 Winter	1	+0%	100/15 Summer				220.455
1.002	MH326	15 Winter	1	+0%	100/15 Summer				220.109
1.003	MH327	15 Winter	1	+0%					219.802
3.000	MH403	15 Winter	1	+0%					220.562
3.001	MH404	15 Winter	1	+0%					220.202
4.000	MH406	15 Winter	1	+0%					220.055
4.001	MH407	15 Winter	1	+0%					219.704
4.002	MH408	15 Winter	1	+0%					219.473
1.004	MH405	15 Winter	1	+0%					218.473
5.000	MH411	15 Winter	1	+0%					218.821
6.000	MH409	15 Winter	1	+0%					218.590
5.001	MH410	15 Winter	1	+0%	100/15 Summer				218.374
1.005	MH328	15 Winter	1	+0%	100/15 Summer				218.096
7.000	MH412	15 Winter	1	+0%					218.355
7.001	MH413	15 Winter	1	+0%					218.139
1.006	MH329	15 Winter	1	+0%	100/15 Summer				217.808
8.000	MH414	15 Winter	1	+0%	100/15 Summer				217.309

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	MH324	-0.132	0.000	0.04			1.0	OK	
1.001	MH325	-0.122	0.000	0.08			2.7	OK	
2.000	MH334	-0.065	0.000	0.27			2.0	OK	
1.002	MH326	-0.099	0.000	0.25			6.1	OK	
1.003	MH327	-0.108	0.000	0.17			7.8	OK	
3.000	MH403	-0.088	0.000	0.04			0.4	OK	
3.001	MH404	-0.088	0.000	0.03			0.7	OK	
4.000	MH406	-0.075	0.000	0.15			1.1	OK	
4.001	MH407	-0.074	0.000	0.15			1.1	OK	
4.002	MH408	-0.082	0.000	0.08			1.9	OK	
1.004	MH405	-0.167	0.000	0.15			10.4	OK	
5.000	MH411	-0.084	0.000	0.06			0.7	OK	
6.000	MH409	-0.080	0.000	0.09			0.7	OK	
5.001	MH410	-0.065	0.000	0.27			2.4	OK	
1.005	MH328	-0.154	0.000	0.21			12.9	OK	
7.000	MH412	-0.080	0.000	0.09			0.7	OK	
7.001	MH413	-0.079	0.000	0.10			1.2	OK	
1.006	MH329	-0.157	0.000	0.20			18.8	OK	
8.000	MH414	-0.066	0.000	0.25			1.9	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
8.001	MH415	15 Winter	1	+0%	100/15 Summer				216.855
9.000	MH420	15 Winter	1	+0%					218.064
9.001	MH421	15 Winter	1	+0%					217.713
10.000	MH385	15 Winter	1	+0%					220.899
10.001	MH381	15 Winter	1	+0%					220.608
11.000	MH386	15 Winter	1	+0%					220.893
10.002	MH382	15 Winter	1	+0%	100/15 Summer				220.192
12.000	MH387	15 Winter	1	+0%					221.109
12.001	MH388	15 Winter	1	+0%					220.738
10.003	MH335	15 Winter	1	+0%	100/15 Summer				220.088
13.000	MH400	15 Winter	1	+0%					220.691
13.001	MH401	15 Winter	1	+0%					220.400
10.004	MH402	15 Winter	1	+0%	100/15 Summer				219.588
14.000	MH389	15 Winter	1	+0%	100/15 Summer				220.016
14.001	MH390	15 Summer	1	+0%					219.753
15.000	MH391	15 Winter	1	+0%					219.978
15.001	MH392	15 Winter	1	+0%					219.859
10.005	MH336	15 Winter	1	+0%	100/15 Summer				219.265
10.006	MH337	15 Winter	1	+0%	100/15 Summer				218.694
16.000	MH395	15 Winter	1	+0%					218.622
16.001	MH396	15 Winter	1	+0%	100/15 Summer				218.268
16.002	MH397	15 Winter	1	+0%	100/15 Summer				217.827
10.007	MH338	15 Winter	1	+0%	100/15 Summer				217.487
1.007	MH330	15 Winter	1	+0%	100/15 Summer				216.609
1.008	MH331	15 Winter	1	+0%	100/15 Summer				216.385
17.000	MH416	15 Winter	1	+0%					217.229
18.000	MH419	15 Winter	1	+0%					217.503
17.001	MH417	15 Summer	1	+0%					216.753
1.009	MH418	15 Winter	1	+0%	100/15 Summer				215.882
1.010	MH332	15 Winter	1	+0%	100/15 Winter				215.562
1.011	50	15 Winter	1	+0%					215.401
1.012	51	15 Winter	1	+0%					215.401

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	MH415	-0.069	0.000	0.21			2.1	OK	
9.000	MH420	-0.071	0.000	0.19			1.4	OK	
9.001	MH421	-0.077	0.000	0.12			2.1	OK	
10.000	MH385	-0.081	0.000	0.08			0.6	OK	
10.001	MH381	-0.120	0.000	0.09			2.0	OK	
11.000	MH386	-0.132	0.000	0.03			1.2	OK	
10.002	MH382	-0.108	0.000	0.17			3.4	OK	
12.000	MH387	-0.076	0.000	0.13			1.0	OK	
12.001	MH388	-0.127	0.000	0.06			1.8	OK	
10.003	MH335	-0.099	0.000	0.25			5.6	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
13.000	MH400	-0.069	0.000	0.22			1.6	OK	
13.001	MH401	-0.078	0.000	0.10			2.1	OK	
10.004	MH402	-0.094	0.000	0.30			7.7	OK	
14.000	MH389	-0.064	0.000	0.28			2.1	OK	
14.001	MH390	-0.076	0.000	0.13			2.1	OK	
15.000	MH391	-0.087	0.000	0.04			0.3	OK	
15.001	MH392	-0.089	0.000	0.03			0.5	OK	
10.005	MH336	-0.094	0.000	0.30			10.3	OK	
10.006	MH337	-0.100	0.000	0.25			10.3	OK	
16.000	MH395	-0.078	0.000	0.11			0.8	OK	
16.001	MH396	-0.074	0.000	0.15			1.4	OK	
16.002	MH397	-0.073	0.000	0.16			2.0	OK	
10.007	MH338	-0.092	0.000	0.32			12.3	OK	
1.007	MH330	-0.183	0.000	0.32			36.1	OK	
1.008	MH331	-0.206	0.000	0.21			36.0	OK	
17.000	MH416	-0.079	0.000	0.10			1.0	OK	
18.000	MH419	-0.082	0.000	0.08			0.9	OK	
17.001	MH417	-0.077	0.000	0.13			1.9	OK	
1.009	MH418	-0.188	0.000	0.30			37.6	OK	
1.010	MH332	-0.288	0.000	0.28			37.7	OK	
1.011	50	-0.414	0.000	0.00		7	0.2	OK	
1.012	51	-0.398	0.000	0.00			0.0	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.401
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	MH324	15 Winter	30	+0%					221.150
1.001	MH325	15 Winter	30	+0%					220.623
2.000	MH334	15 Winter	30	+0%	100/15 Summer				220.479
1.002	MH326	15 Summer	30	+0%	100/15 Summer				220.152
1.003	MH327	15 Summer	30	+0%					219.835
3.000	MH403	15 Winter	30	+0%					220.570
3.001	MH404	15 Winter	30	+0%					220.210
4.000	MH406	15 Winter	30	+0%					220.072
4.001	MH407	15 Winter	30	+0%					219.720
4.002	MH408	15 Winter	30	+0%					219.486
1.004	MH405	15 Winter	30	+0%					218.516
5.000	MH411	15 Winter	30	+0%					218.831
6.000	MH409	15 Winter	30	+0%					218.602
5.001	MH410	15 Winter	30	+0%	100/15 Summer				218.403
1.005	MH328	15 Winter	30	+0%	100/15 Summer				218.151
7.000	MH412	15 Winter	30	+0%					218.367
7.001	MH413	15 Winter	30	+0%					218.153
1.006	MH329	15 Winter	30	+0%	100/15 Summer				217.862
8.000	MH414	15 Winter	30	+0%	100/15 Summer				217.332

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	MH324	-0.120	0.000	0.09			2.4	OK	
1.001	MH325	-0.102	0.000	0.23			7.8	OK	
2.000	MH334	-0.041	0.000	0.66			5.0	OK	
1.002	MH326	-0.056	0.000	0.71			16.9	OK	
1.003	MH327	-0.075	0.000	0.50			22.4	OK	
3.000	MH403	-0.080	0.000	0.09			0.9	OK	
3.001	MH404	-0.080	0.000	0.09			2.0	OK	
4.000	MH406	-0.058	0.000	0.36			2.7	OK	
4.001	MH407	-0.058	0.000	0.37			2.7	OK	
4.002	MH408	-0.069	0.000	0.21			5.1	OK	
1.004	MH405	-0.124	0.000	0.42			29.4	OK	
5.000	MH411	-0.074	0.000	0.15			1.7	OK	
6.000	MH409	-0.068	0.000	0.22			1.7	OK	
5.001	MH410	-0.036	0.000	0.73			6.6	OK	
1.005	MH328	-0.099	0.000	0.60			35.9	OK	
7.000	MH412	-0.068	0.000	0.23			1.7	OK	
7.001	MH413	-0.065	0.000	0.26			3.4	OK	
1.006	MH329	-0.103	0.000	0.56			53.4	OK	
8.000	MH414	-0.043	0.000	0.61			4.6	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
8.001	MH415	15 Winter	30	+0%	100/15 Summer				216.877
9.000	MH420	15 Winter	30	+0%					218.083
9.001	MH421	15 Winter	30	+0%					217.730
10.000	MH385	15 Winter	30	+0%					220.911
10.001	MH381	15 Winter	30	+0%					220.630
11.000	MH386	15 Winter	30	+0%					220.904
10.002	MH382	15 Winter	30	+0%	100/15 Summer				220.224
12.000	MH387	15 Winter	30	+0%					221.123
12.001	MH388	15 Winter	30	+0%					220.754
10.003	MH335	15 Winter	30	+0%	100/15 Summer				220.131
13.000	MH400	15 Winter	30	+0%					220.712
13.001	MH401	15 Winter	30	+0%					220.413
10.004	MH402	15 Winter	30	+0%	100/15 Summer				219.636
14.000	MH389	15 Winter	30	+0%	100/15 Summer				220.041
14.001	MH390	15 Summer	30	+0%					219.767
15.000	MH391	15 Winter	30	+0%					219.986
15.001	MH392	15 Winter	30	+0%					219.866
10.005	MH336	15 Winter	30	+0%	100/15 Summer				219.311
10.006	MH337	15 Winter	30	+0%	100/15 Summer				218.733
16.000	MH395	15 Winter	30	+0%					218.635
16.001	MH396	15 Winter	30	+0%	100/15 Summer				218.286
16.002	MH397	15 Winter	30	+0%	100/15 Summer				217.848
10.007	MH338	15 Winter	30	+0%	100/15 Summer				217.538
1.007	MH330	15 Winter	30	+0%	100/15 Summer				216.714
1.008	MH331	15 Winter	30	+0%	100/15 Summer				216.458
17.000	MH416	15 Winter	30	+0%					217.242
18.000	MH419	15 Winter	30	+0%					217.514
17.001	MH417	15 Winter	30	+0%					216.768
1.009	MH418	15 Winter	30	+0%	100/15 Summer				215.982
1.010	MH332	15 Winter	30	+0%	100/15 Winter				215.697
1.011	50	15 Winter	30	+0%					215.488
1.012	51	15 Winter	30	+0%					215.490

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	MH415	-0.047	0.000	0.54			5.4	OK	
9.000	MH420	-0.052	0.000	0.46			3.5	OK	
9.001	MH421	-0.060	0.000	0.33			5.6	OK	
10.000	MH385	-0.069	0.000	0.21			1.5	OK	
10.001	MH381	-0.098	0.000	0.26			5.7	OK	
11.000	MH386	-0.121	0.000	0.08			2.9	OK	
10.002	MH382	-0.076	0.000	0.48			9.5	OK	
12.000	MH387	-0.062	0.000	0.31			2.3	OK	
12.001	MH388	-0.111	0.000	0.15			5.0	OK	
10.003	MH335	-0.056	0.000	0.70			15.5	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
13.000	MH400	-0.048	0.000	0.53			4.0	OK	
13.001	MH401	-0.065	0.000	0.27			5.6	OK	
10.004	MH402	-0.046	0.000	0.80			20.9	OK	
14.000	MH389	-0.039	0.000	0.69			5.1	OK	
14.001	MH390	-0.062	0.000	0.32			5.1	OK	
15.000	MH391	-0.079	0.000	0.10			0.7	OK	
15.001	MH392	-0.082	0.000	0.08			1.4	OK	
10.005	MH336	-0.048	0.000	0.78			27.2	OK	
10.006	MH337	-0.061	0.000	0.65			27.4	OK	
16.000	MH395	-0.065	0.000	0.27			2.0	OK	
16.001	MH396	-0.056	0.000	0.40			3.7	OK	
16.002	MH397	-0.052	0.000	0.46			5.7	OK	
10.007	MH338	-0.041	0.000	0.86			33.0	OK	
1.007	MH330	-0.078	0.000	0.88			98.6	OK	
1.008	MH331	-0.133	0.000	0.59			99.5	OK	
17.000	MH416	-0.066	0.000	0.25			2.4	OK	
18.000	MH419	-0.071	0.000	0.19			2.3	OK	
17.001	MH417	-0.062	0.000	0.31			4.7	OK	
1.009	MH418	-0.088	0.000	0.84			104.4	OK	
1.010	MH332	-0.153	0.000	0.77			104.1	FLOOD RISK	
1.011	50	-0.327	0.000	0.01		7	0.8	OK	
1.012	51	-0.310	0.000	0.00			0.0	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.401
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	MH324	15 Winter	100	+40%					221.160
1.001	MH325	15 Winter	100	+40%					220.642
2.000	MH334	15 Winter	100	+40%	100/15 Summer				220.695
1.002	MH326	15 Winter	100	+40%	100/15 Summer				220.343
1.003	MH327	15 Winter	100	+40%					219.867
3.000	MH403	15 Winter	100	+40%					220.577
3.001	MH404	15 Winter	100	+40%					220.217
4.000	MH406	15 Winter	100	+40%					220.089
4.001	MH407	15 Winter	100	+40%					219.738
4.002	MH408	15 Winter	100	+40%					219.498
1.004	MH405	15 Winter	100	+40%					218.558
5.000	MH411	15 Winter	100	+40%					218.841
6.000	MH409	15 Winter	100	+40%					218.616
5.001	MH410	15 Winter	100	+40%	100/15 Summer				218.582
1.005	MH328	15 Winter	100	+40%	100/15 Summer				218.337
7.000	MH412	15 Winter	100	+40%					218.379
7.001	MH413	15 Winter	100	+40%					218.167
1.006	MH329	15 Winter	100	+40%	100/15 Summer				218.072
8.000	MH414	15 Winter	100	+40%	100/15 Summer				217.615

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	MH324	-0.110	0.000	0.16			4.3	OK	
1.001	MH325	-0.083	0.000	0.41			14.2	OK	
2.000	MH334	0.175	0.000	1.08			8.1	SURCHARGED	
1.002	MH326	0.135	0.000	1.20			28.6	SURCHARGED	
1.003	MH327	-0.043	0.000	0.84			37.8	OK	
3.000	MH403	-0.073	0.000	0.17			1.6	OK	
3.001	MH404	-0.073	0.000	0.17			3.7	OK	
4.000	MH406	-0.041	0.000	0.66			5.0	OK	
4.001	MH407	-0.040	0.000	0.67			5.0	OK	
4.002	MH408	-0.057	0.000	0.38			9.3	OK	
1.004	MH405	-0.082	0.000	0.71			50.4	OK	
5.000	MH411	-0.064	0.000	0.28			3.0	OK	
6.000	MH409	-0.054	0.000	0.41			3.0	OK	
5.001	MH410	0.143	0.000	1.26			11.5	SURCHARGED	
1.005	MH328	0.087	0.000	0.99			59.5	SURCHARGED	
7.000	MH412	-0.056	0.000	0.41			3.0	OK	
7.001	MH413	-0.051	0.000	0.48			6.1	OK	
1.006	MH329	0.107	0.000	0.91			86.7	SURCHARGED	
8.000	MH414	0.240	0.000	1.01			7.7	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
8.001	MH415	15 Winter	100	+40%	100/15 Summer				217.229
9.000	MH420	15 Winter	100	+40%					218.106
9.001	MH421	15 Winter	100	+40%					217.746
10.000	MH385	15 Winter	100	+40%					220.922
10.001	MH381	15 Winter	100	+40%					220.653
11.000	MH386	15 Winter	100	+40%					220.913
10.002	MH382	15 Winter	100	+40%	100/15 Summer				220.589
12.000	MH387	15 Winter	100	+40%					221.139
12.001	MH388	15 Winter	100	+40%					220.769
10.003	MH335	15 Winter	100	+40%	100/15 Summer				220.537
13.000	MH400	15 Winter	100	+40%					220.738
13.001	MH401	15 Winter	100	+40%					220.428
10.004	MH402	15 Winter	100	+40%	100/15 Summer				220.074
14.000	MH389	15 Winter	100	+40%	100/15 Summer				220.208
14.001	MH390	15 Winter	100	+40%					219.785
15.000	MH391	15 Winter	100	+40%					219.994
15.001	MH392	15 Winter	100	+40%					219.873
10.005	MH336	15 Winter	100	+40%	100/15 Summer				219.699
10.006	MH337	15 Winter	100	+40%	100/15 Summer				219.071
16.000	MH395	15 Winter	100	+40%					218.649
16.001	MH396	15 Winter	100	+40%	100/15 Summer				218.377
16.002	MH397	15 Winter	100	+40%	100/15 Summer				218.246
10.007	MH338	15 Winter	100	+40%	100/15 Summer				218.142
1.007	MH330	15 Winter	100	+40%	100/15 Summer				217.142
1.008	MH331	15 Winter	100	+40%	100/15 Summer				216.797
17.000	MH416	15 Winter	100	+40%					217.256
18.000	MH419	15 Winter	100	+40%					217.526
17.001	MH417	15 Winter	100	+40%					216.783
1.009	MH418	15 Winter	100	+40%	100/15 Summer				216.404
1.010	MH332	15 Winter	100	+40%	100/15 Winter				215.850
1.011	50	15 Winter	100	+40%					215.621
1.012	51	15 Winter	100	+40%					215.628

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
8.001	MH415	0.305	0.000	0.80			8.0	SURCHARGED	
9.000	MH420	-0.029	0.000	0.84			6.4	OK	
9.001	MH421	-0.044	0.000	0.60			10.2	OK	
10.000	MH385	-0.058	0.000	0.38			2.8	OK	
10.001	MH381	-0.075	0.000	0.47			10.4	OK	
11.000	MH386	-0.112	0.000	0.15			5.3	OK	
10.002	MH382	0.289	0.000	0.71			13.8	SURCHARGED	
12.000	MH387	-0.046	0.000	0.56			4.3	OK	
12.001	MH388	-0.096	0.000	0.28			9.0	OK	
10.003	MH335	0.350	0.000	1.00			22.2	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
13.000	MH400	-0.022	0.000	0.97			7.2	OK	
13.001	MH401	-0.050	0.000	0.50			10.2	OK	
10.004	MH402	0.392	0.000	1.10			28.6	SURCHARGED	
14.000	MH389	0.128	0.000	1.21			9.0	SURCHARGED	
14.001	MH390	-0.044	0.000	0.55			9.0	OK	
15.000	MH391	-0.071	0.000	0.19			1.3	OK	
15.001	MH392	-0.075	0.000	0.14			2.6	OK	
10.005	MH336	0.340	0.000	1.08			37.6	SURCHARGED	
10.006	MH337	0.277	0.000	0.89			37.5	SURCHARGED	
16.000	MH395	-0.051	0.000	0.49			3.7	OK	
16.001	MH396	0.035	0.000	0.70			6.4	SURCHARGED	
16.002	MH397	0.346	0.000	0.71			8.6	SURCHARGED	
10.007	MH338	0.563	0.000	1.21			46.4	SURCHARGED	
1.007	MH330	0.350	0.000	1.31			146.9	SURCHARGED	
1.008	MH331	0.206	0.000	0.87			146.5	SURCHARGED	
17.000	MH416	-0.052	0.000	0.46			4.3	OK	
18.000	MH419	-0.059	0.000	0.35			4.2	OK	
17.001	MH417	-0.047	0.000	0.56			8.5	OK	
1.009	MH418	0.334	0.000	1.22			152.8	SURCHARGED	
1.010	MH332	0.000	0.000	1.14			152.7	FLOOD RISK	
1.011	50	-0.194	0.000	0.01		8	1.6	FLOOD RISK	
1.012	51	-0.171	0.000	0.00			0.0	FLOOD RISK	

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RIDGE

Permeable Road Microdrinage Calculations

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

Half Drain Time : 117 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	218.503	0.228	0.1	0.6	O K
30 min Summer	218.536	0.261	0.1	0.8	O K
60 min Summer	218.559	0.284	0.1	0.9	O K
120 min Summer	218.569	0.294	0.1	1.0	O K
180 min Summer	218.570	0.295	0.1	1.0	O K
240 min Summer	218.567	0.292	0.1	1.0	O K
360 min Summer	218.559	0.284	0.1	0.9	O K
480 min Summer	218.550	0.275	0.1	0.9	O K
600 min Summer	218.540	0.265	0.1	0.8	O K
720 min Summer	218.531	0.256	0.1	0.8	O K
960 min Summer	218.514	0.239	0.1	0.7	O K
1440 min Summer	218.486	0.211	0.1	0.5	O K
2160 min Summer	218.454	0.179	0.1	0.4	O K
2880 min Summer	218.431	0.156	0.1	0.3	O K
4320 min Summer	218.398	0.123	0.0	0.2	O K
5760 min Summer	218.377	0.102	0.0	0.1	O K
7200 min Summer	218.362	0.087	0.0	0.1	O K
8640 min Summer	218.351	0.076	0.0	0.1	O K
10080 min Summer	218.342	0.067	0.0	0.1	O K
15 min Winter	218.519	0.244	0.1	0.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.153	0.0	18
30 min Summer	90.705	0.0	32
60 min Summer	56.713	0.0	60
120 min Summer	34.246	0.0	96
180 min Summer	25.149	0.0	128
240 min Summer	20.078	0.0	162
360 min Summer	14.585	0.0	232
480 min Summer	11.622	0.0	298
600 min Summer	9.738	0.0	364
720 min Summer	8.424	0.0	430
960 min Summer	6.697	0.0	558
1440 min Summer	4.839	0.0	808
2160 min Summer	3.490	0.0	1168
2880 min Summer	2.766	0.0	1528
4320 min Summer	1.989	0.0	2248
5760 min Summer	1.573	0.0	2944
7200 min Summer	1.311	0.0	3672
8640 min Summer	1.129	0.0	4408
10080 min Summer	0.994	0.0	5136
15 min Winter	138.153	0.0	18

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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 Volume (m³)	Status
30 min Winter	218.555	0.280	0.1	0.9	O K
60 min Winter	218.580	0.305	0.1	1.1	O K
120 min Winter	218.589	0.314	0.1	1.2	O K
180 min Winter	218.589	0.314	0.1	1.2	O K
240 min Winter	218.584	0.309	0.1	1.1	O K
360 min Winter	218.572	0.297	0.1	1.0	O K
480 min Winter	218.558	0.283	0.1	0.9	O K
600 min Winter	218.545	0.270	0.1	0.9	O K
720 min Winter	218.532	0.257	0.1	0.8	O K
960 min Winter	218.509	0.234	0.1	0.6	O K
1440 min Winter	218.472	0.197	0.1	0.5	O K
2160 min Winter	218.432	0.157	0.1	0.3	O K
2880 min Winter	218.405	0.130	0.0	0.2	O K
4320 min Winter	218.372	0.097	0.0	0.1	O K
5760 min Winter	218.352	0.077	0.0	0.1	O K
7200 min Winter	218.339	0.064	0.0	0.0	O K
8640 min Winter	218.330	0.055	0.0	0.0	O K
10080 min Winter	218.324	0.049	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	90.705	0.0	32
60 min Winter	56.713	0.0	60
120 min Winter	34.246	0.0	100
180 min Winter	25.149	0.0	138
240 min Winter	20.078	0.0	176
360 min Winter	14.585	0.0	250
480 min Winter	11.622	0.0	320
600 min Winter	9.738	0.0	390
720 min Winter	8.424	0.0	456
960 min Winter	6.697	0.0	586
1440 min Winter	4.839	0.0	836
2160 min Winter	3.490	0.0	1192
2880 min Winter	2.766	0.0	1556
4320 min Winter	1.989	0.0	2248
5760 min Winter	1.573	0.0	2944
7200 min Winter	1.311	0.0	3672
8640 min Winter	1.129	0.0	4376
10080 min Winter	0.994	0.0	5128

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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	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.003

Time (mins) From:	To:	Area (ha)
0	4	0.003

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 218.725

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03200	Width (m)	3.9
Membrane Percolation (mm/hr)	1000	Length (m)	6.4
Max Percolation (l/s)	6.9	Slope (1:X)	20.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	218.275	Cap Volume Depth (m)	0.320

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RIDGE

Permeable Car Park Microdrinage Calculations

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

Half Drain Time : 89 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	218.196	0.196	0.5	3.1	O K
30 min Summer	218.226	0.226	0.5	4.1	O K
60 min Summer	218.245	0.245	0.6	4.8	O K
120 min Summer	218.253	0.253	0.6	5.1	O K
180 min Summer	218.254	0.254	0.6	5.2	O K
240 min Summer	218.251	0.251	0.6	5.0	O K
360 min Summer	218.243	0.243	0.6	4.7	O K
480 min Summer	218.234	0.234	0.6	4.4	O K
600 min Summer	218.225	0.225	0.5	4.0	O K
720 min Summer	218.216	0.216	0.5	3.7	O K
960 min Summer	218.200	0.200	0.5	3.2	O K
1440 min Summer	218.174	0.174	0.4	2.4	O K
2160 min Summer	218.146	0.146	0.3	1.7	O K
2880 min Summer	218.126	0.126	0.3	1.3	O K
4320 min Summer	218.098	0.098	0.2	0.8	O K
5760 min Summer	218.081	0.081	0.2	0.5	O K
7200 min Summer	218.068	0.068	0.2	0.4	O K
8640 min Summer	218.059	0.059	0.1	0.3	O K
10080 min Summer	218.052	0.052	0.1	0.2	O K
15 min Winter	218.211	0.211	0.5	3.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	138.153	0.0	18
30 min Summer	90.705	0.0	32
60 min Summer	56.713	0.0	60
120 min Summer	34.246	0.0	92
180 min Summer	25.149	0.0	126
240 min Summer	20.078	0.0	160
360 min Summer	14.585	0.0	228
480 min Summer	11.622	0.0	294
600 min Summer	9.738	0.0	360
720 min Summer	8.424	0.0	426
960 min Summer	6.697	0.0	550
1440 min Summer	4.839	0.0	794
2160 min Summer	3.490	0.0	1148
2880 min Summer	2.766	0.0	1504
4320 min Summer	1.989	0.0	2208
5760 min Summer	1.573	0.0	2944
7200 min Summer	1.311	0.0	3672
8640 min Summer	1.129	0.0	4400
10080 min Summer	0.994	0.0	5136
15 min Winter	138.153	0.0	18

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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 Volume (m³)	Status
30 min Winter	218.242	0.242	0.6	4.7	O K
60 min Winter	218.263	0.263	0.6	5.6	O K
120 min Winter	218.271	0.271	0.6	5.9	O K
180 min Winter	218.270	0.270	0.6	5.8	O K
240 min Winter	218.265	0.265	0.6	5.6	O K
360 min Winter	218.252	0.252	0.6	5.1	O K
480 min Winter	218.239	0.239	0.6	4.6	O K
600 min Winter	218.226	0.226	0.5	4.1	O K
720 min Winter	218.214	0.214	0.5	3.7	O K
960 min Winter	218.193	0.193	0.5	3.0	O K
1440 min Winter	218.159	0.159	0.4	2.0	O K
2160 min Winter	218.125	0.125	0.3	1.3	O K
2880 min Winter	218.103	0.103	0.2	0.8	O K
4320 min Winter	218.076	0.076	0.2	0.5	O K
5760 min Winter	218.060	0.060	0.1	0.3	O K
7200 min Winter	218.050	0.050	0.1	0.2	O K
8640 min Winter	218.046	0.046	0.1	0.2	O K
10080 min Winter	218.043	0.043	0.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	90.705	0.0	32
60 min Winter	56.713	0.0	60
120 min Winter	34.246	0.0	96
180 min Winter	25.149	0.0	134
240 min Winter	20.078	0.0	172
360 min Winter	14.585	0.0	246
480 min Winter	11.622	0.0	314
600 min Winter	9.738	0.0	382
720 min Winter	8.424	0.0	448
960 min Winter	6.697	0.0	578
1440 min Winter	4.839	0.0	822
2160 min Winter	3.490	0.0	1172
2880 min Winter	2.766	0.0	1528
4320 min Winter	1.989	0.0	2208
5760 min Winter	1.573	0.0	2944
7200 min Winter	1.311	0.0	3648
8640 min Winter	1.129	0.0	4376
10080 min Winter	0.994	0.0	4984

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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	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.016

Time (mins) From:	To:	Area (ha)
0	4	0.016

Time Area Diagram

Total Area (ha) 0.000

Time (mins) From:	To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 218.450

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03200	Width (m)	26.7
Membrane Percolation (mm/hr)	1000	Length (m)	6.0
Max Percolation (l/s)	44.5	Slope (1:X)	20.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	218.000	Cap Volume Depth (m)	0.320

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