

102 Camley Street, Kings Cross,

London N1C 4PW

**Storm water network – Micro Drainage
calculations**

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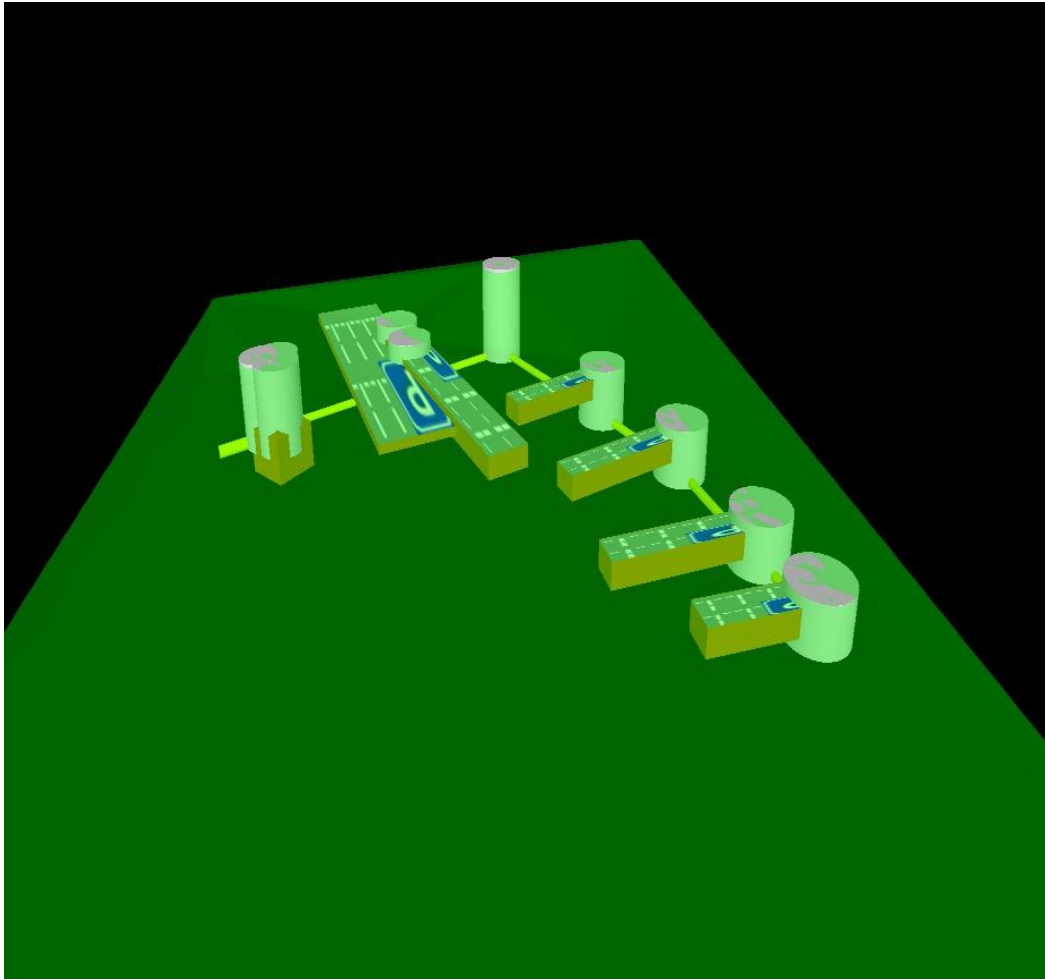
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Add Flow / Climate Change (%)	0
M5-60 (mm)	21.000	Minimum Backdrop Height (m)	0.200
Ratio R	0.440	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	300	Min Design Depth for Optimisation (m)	1.200
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	1.00
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	500
Volumetric Runoff Coeff.	0.750		

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.039	4-8	0.011

Total Area Contributing (ha) = 0.050


Total Pipe Volume (m³) = 2.437

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)	Auto Design
S1.000	9.323	0.078	119.5	0.003	5.00	0.3	0.600	o	150	
S1.001	16.100	0.134	120.1	0.005	0.00	0.3	0.600	o	150	
S1.002	15.731	0.131	120.1	0.006	0.00	0.3	0.600	o	150	
S1.003	26.315	0.219	120.2	0.007	0.00	0.3	0.600	o	150	
S1.004	17.782	0.148	120.1	0.000	0.00	0.3	0.600	o	150	
S2.000	6.538	0.013	500.0	0.000	5.00	0.0	0.600	o	150	

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)
S1.000	180.49	5.17	26.960	0.003	0.3	0.0	0.0	0.92	16.2	1.9
S1.001	176.75	5.46	26.882	0.008	0.6	0.0	0.0	0.92	16.2	4.5
S1.002	173.27	5.75	26.748	0.014	0.9	0.0	0.0	0.92	16.2	7.6
S1.003	167.83	6.23	26.617	0.021	1.2	0.0	0.0	0.92	16.2	10.9
S1.004	164.38	6.55	26.398	0.021	1.5	0.0	0.0	0.92	16.2	11.0
S2.000	179.49	5.25	26.240	0.000	0.0	0.0	0.0	0.44	7.8	0.0

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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)	Auto Design
S1.005	17.782	0.148	120.1	0.008	0.00	0.3	0.600	o	150	
S1.006	2.859	0.029	100.0	0.009	0.00	0.0	0.600	o	225	
S1.007	3.100	0.034	91.2	0.010	0.00	3.0	0.600	o	225	
S1.008	6.622	0.066	100.3	0.002	0.00	0.0	0.600	o	225	

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)
S1.005	161.11	6.87	26.227	0.029	1.8	0.0	0.0	0.92	16.2	14.5
S1.006	160.75	6.91	26.004	0.038	1.8	0.0	0.0	1.31	52.0	18.3
S1.007	160.38	6.95	25.975	0.048	4.8	0.0	0.0	1.37	54.5	25.6
S1.008	159.56	7.03	25.941	0.050	4.8	0.0	0.0	1.31	51.9	26.3

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)
S1.008	S	27.300	25.875	25.000	0	0

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Online Controls for Storm


Hydro-Brake Optimum® Manhole: S8, DS/PN: S1.008, Volume (m³): 1.8

Unit Reference	MD-SHE-0101-5000-1300-5000
Design Head (m)	1.300
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	101
Invert Level (m)	25.941
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	5.0
Flush-Flo™	0.382	5.0
Kick-Flo®	0.797	4.0
Mean Flow over Head Range	-	4.4

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	3.3	1.200	4.8	3.000	7.4	7.000	11.0
0.200	4.6	1.400	5.2	3.500	7.9	7.500	11.4
0.300	4.9	1.600	5.5	4.000	8.4	8.000	11.7
0.400	5.0	1.800	5.8	4.500	8.9	8.500	12.1
0.500	4.9	2.000	6.1	5.000	9.4	9.000	12.4
0.600	4.8	2.200	6.4	5.500	9.8	9.500	12.7
0.800	4.0	2.400	6.6	6.000	10.2		
1.000	4.4	2.600	6.9	6.500	10.6		

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Storage Structures for Storm

Porous Car Park Manhole: S1, DS/PN: S1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1	Length (m)	11.0
Max Percolation (l/s)	0.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.33	Evaporation (mm/day)	3
Invert Level (m)	27.120	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: S2, DS/PN: S1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1	Length (m)	16.0
Max Percolation (l/s)	0.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.33	Evaporation (mm/day)	3
Invert Level (m)	27.120	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: S3, DS/PN: S1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1	Length (m)	16.0
Max Percolation (l/s)	0.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.33	Evaporation (mm/day)	3
Invert Level (m)	27.120	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: S4, DS/PN: S1.003


Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1	Length (m)	14.0
Max Percolation (l/s)	0.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.33	Evaporation (mm/day)	3
Invert Level (m)	27.120	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: S6, DS/PN: S2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1	Length (m)	19.0
Max Percolation (l/s)	0.1	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.95	Evaporation (mm/day)	3
Invert Level (m)	27.120	Cap Volume Depth (m)	0.150

Porous Car Park Manhole: S6, DS/PN: S1.005

Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	48.6
Membrane Percolation (mm/hr)	1000	Safety Factor	2.0

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Porous Car Park Manhole: S6, DS/PN: S1.005

Porosity 0.33 Slope (1:X) 0.0
 Invert Level (m) 27.020 Depression Storage (mm) 0
 Width (m) 5.0 Evaporation (mm/day) 3
 Length (m) 35.0 Cap Volume Depth (m) 0.350

Cellular Storage Manhole: S7, DS/PN: S1.007

Invert Level (m) 25.600 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	32.0	0.0	5.200	0.0	0.0
0.400	32.0	0.0	5.600	0.0	0.0
0.800	32.0	0.0	6.000	0.0	0.0
1.200	0.0	0.0	6.400	0.0	0.0
1.600	0.0	0.0	6.800	0.0	0.0
2.000	0.0	0.0	7.200	0.0	0.0
2.400	0.0	0.0	7.600	0.0	0.0
2.800	0.0	0.0	8.000	0.0	0.0
3.200	0.0	0.0	8.400	0.0	0.0
3.600	0.0	0.0	8.800	0.0	0.0
4.000	0.0	0.0	9.200	0.0	0.0
4.400	0.0	0.0	9.600	0.0	0.0
4.800	0.0	0.0	10.000	0.0	0.0

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2 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 Coefficient 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 7
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 0.440
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 21.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 30


PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Summer	2	+0%	30/360 Summer				26.988
S1.001	S2	15 Summer	2	+0%	30/180 Summer				26.922
S1.002	S3	15 Summer	2	+0%	30/180 Summer				26.800
S1.003	S4	15 Summer	2	+0%	30/180 Summer				26.680
S1.004	S5	15 Summer	2	+0%	30/180 Summer				26.463
S2.000	S6	360 Summer	2	+0%	2/360 Summer				26.403
S1.005	S6	360 Summer	2	+0%	2/360 Summer				26.403
S1.006	S6	360 Summer	2	+0%	2/120 Summer				26.395
S1.007	S7	360 Summer	2	+0%	2/120 Summer				26.394
S1.008	S8	360 Summer	2	+0%	2/60 Summer				26.405

PN	US/MH Name	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.122	0.000	0.08		1.1	OK	
S1.001	S2	-0.110	0.000	0.16		2.4	OK	
S1.002	S3	-0.098	0.000	0.26		3.9	OK	

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

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)			
S1.003	S4	-0.087	0.000	0.36		5.6	OK	
S1.004	S5	-0.085	0.000	0.39		5.9	OK	
S2.000	S6	0.013	0.000	0.00		0.0	SURCHARGED	
S1.005	S6	0.026	0.000	0.20		3.1	SURCHARGED	
S1.006	S6	0.166	0.000	0.11		3.4	SURCHARGED	
S1.007	S7	0.194	0.000	0.18		5.5	SURCHARGED	
S1.008	S8	0.239	0.000	0.14		5.0	SURCHARGED	

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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 Coefficient 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 7
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 0.440
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 21.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 30


PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1 360	Summer	30	+0%	30/360	Summer			27.123
S1.001	S2 360	Summer	30	+0%	30/180	Summer			27.122
S1.002	S3 360	Summer	30	+0%	30/180	Summer			27.120
S1.003	S4 360	Summer	30	+0%	30/180	Summer			27.116
S1.004	S5 360	Summer	30	+0%	30/180	Summer			27.110
S2.000	S6 360	Summer	30	+0%	2/360	Summer			27.103
S1.005	S6 360	Summer	30	+0%	2/360	Summer			27.103
S1.006	S6 360	Summer	30	+0%	2/120	Summer			27.097
S1.007	S7 360	Summer	30	+0%	2/120	Summer			27.097
S1.008	S8 360	Summer	30	+0%	2/60	Summer			27.094

PN	US/MH Name	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.013	0.000	0.04		0.6	SURCHARGED	
S1.001	S2	0.090	0.000	0.09		1.3	SURCHARGED	
S1.002	S3	0.222	0.000	0.14		2.1	SURCHARGED	

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

PN	US/MH Name	Surcharged		Flooded	Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S1.003	S4	0.349	0.000	0.20		3.1	SURCHARGED	
S1.004	S5	0.562	0.000	0.22		3.4	SURCHARGED	
S2.000	S6	0.713	0.000	0.00		0.0	SURCHARGED	
S1.005	S6	0.726	0.000	0.26		3.9	SURCHARGED	
S1.006	S6	0.868	0.000	0.15		4.5	SURCHARGED	
S1.007	S7	0.896	0.000	0.18		5.4	SURCHARGED	
S1.008	S8	0.928	0.000	0.14		5.0	SURCHARGED	

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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 Coefficient 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 7
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 0.440
Region England and Wales Cv (Summer) 1.000
M5-60 (mm) 21.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 30


PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1 360	Winter	100	+30%	30/360	Summer			27.164
S1.001	S2 360	Winter	100	+30%	30/180	Summer			27.163
S1.002	S3 360	Winter	100	+30%	30/180	Summer			27.160
S1.003	S4 360	Winter	100	+30%	30/180	Summer			27.155
S1.004	S5 360	Winter	100	+30%	30/180	Summer			27.148
S2.000	S6 360	Winter	100	+30%	2/360	Summer			27.139
S1.005	S6 360	Winter	100	+30%	2/360	Summer			27.140
S1.006	S6 360	Summer	100	+30%	2/120	Summer			27.135
S1.007	S7 360	Summer	100	+30%	2/120	Summer			27.134
S1.008	S8 360	Summer	100	+30%	2/60	Summer			27.132

PN	US/MH Name	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Status	Level Exceeded
S1.000	S1	0.054	0.000	0.04	0.6	SURCHARGED	
S1.001	S2	0.131	0.000	0.09	1.4	SURCHARGED	
S1.002	S3	0.262	0.000	0.15	2.3	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		Flooded	Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S1.003	S4	0.388	0.000	0.21		3.2	SURCHARGED	
S1.004	S5	0.600	0.000	0.21		3.2	SURCHARGED	
S2.000	S6	0.749	0.000	0.01		0.1	SURCHARGED	
S1.005	S6	0.763	0.000	0.25		3.8	SURCHARGED	
S1.006	S6	0.906	0.000	0.17		5.1	SURCHARGED	
S1.007	S7	0.934	0.000	0.18		5.4	SURCHARGED	
S1.008	S8	0.965	0.000	0.14		5.0	SURCHARGED	


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Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 10 minutes.

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
15 min Summer	23.357	0.057	0.0	1.0	1.0	1.0	O K
30 min Summer	23.365	0.065	0.0	1.0	1.0	1.2	O K
60 min Summer	23.357	0.057	0.0	1.0	1.0	1.0	O K
120 min Summer	23.335	0.035	0.0	1.0	1.0	0.6	O K
180 min Summer	23.317	0.017	0.0	1.0	1.0	0.3	O K
240 min Summer	23.305	0.005	0.0	1.0	1.0	0.1	O K
360 min Summer	23.300	0.000	0.0	0.9	0.9	0.0	O K
480 min Summer	23.300	0.000	0.0	0.7	0.7	0.0	O K
600 min Summer	23.300	0.000	0.0	0.6	0.6	0.0	O K
720 min Summer	23.300	0.000	0.0	0.5	0.5	0.0	O K
960 min Summer	23.300	0.000	0.0	0.4	0.4	0.0	O K
1440 min Summer	23.300	0.000	0.0	0.3	0.3	0.0	O K
2160 min Summer	23.300	0.000	0.0	0.2	0.2	0.0	O K
2880 min Summer	23.300	0.000	0.0	0.2	0.2	0.0	O K
4320 min Summer	23.300	0.000	0.0	0.1	0.1	0.0	O K
5760 min Summer	23.300	0.000	0.0	0.1	0.1	0.0	O K
7200 min Summer	23.300	0.000	0.0	0.1	0.1	0.0	O K
8640 min Summer	23.300	0.000	0.0	0.1	0.1	0.0	O K
10080 min Summer	23.300	0.000	0.0	0.1	0.1	0.0	O K
15 min Winter	23.356	0.056	0.0	1.0	1.0	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.672	0.0	2.1	20
30 min Summer	90.181	0.0	2.7	29
60 min Summer	55.351	0.0	3.4	46
120 min Summer	32.803	0.0	3.9	76
180 min Summer	23.841	0.0	4.3	106
240 min Summer	18.904	0.0	4.5	134
360 min Summer	13.629	0.0	4.9	0
480 min Summer	10.798	0.0	5.2	0
600 min Summer	9.007	0.0	5.4	0
720 min Summer	7.764	0.0	5.6	0
960 min Summer	6.137	0.0	5.9	0
1440 min Summer	4.401	0.0	6.3	0
2160 min Summer	3.151	0.0	6.8	0
2880 min Summer	2.484	0.0	7.2	0
4320 min Summer	1.775	0.0	7.7	0
5760 min Summer	1.397	0.0	8.0	0
7200 min Summer	1.160	0.0	8.3	0
8640 min Summer	0.996	0.0	8.6	0
10080 min Summer	0.875	0.0	8.8	0
15 min Winter	139.672	0.0	2.1	21

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Summary of Results for 100 year Return Period (+30%)

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	23.363	0.063	0.0	1.0	1.0	1.1	O K
60 min Winter	23.348	0.048	0.0	1.0	1.0	0.9	O K
120 min Winter	23.317	0.017	0.0	1.0	1.0	0.3	O K
180 min Winter	23.300	0.000	0.0	1.0	1.0	0.0	O K
240 min Winter	23.300	0.000	0.0	0.8	0.8	0.0	O K
360 min Winter	23.300	0.000	0.0	0.6	0.6	0.0	O K
480 min Winter	23.300	0.000	0.0	0.5	0.5	0.0	O K
600 min Winter	23.300	0.000	0.0	0.4	0.4	0.0	O K
720 min Winter	23.300	0.000	0.0	0.3	0.3	0.0	O K
960 min Winter	23.300	0.000	0.0	0.3	0.3	0.0	O K
1440 min Winter	23.300	0.000	0.0	0.2	0.2	0.0	O K
2160 min Winter	23.300	0.000	0.0	0.1	0.1	0.0	O K
2880 min Winter	23.300	0.000	0.0	0.1	0.1	0.0	O K
4320 min Winter	23.300	0.000	0.0	0.1	0.1	0.0	O K
5760 min Winter	23.300	0.000	0.0	0.1	0.1	0.0	O K
7200 min Winter	23.300	0.000	0.0	0.0	0.0	0.0	O K
8640 min Winter	23.300	0.000	0.0	0.0	0.0	0.0	O K
10080 min Winter	23.300	0.000	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	90.181	0.0	2.7	30
60 min Winter	55.351	0.0	3.3	48
120 min Winter	32.803	0.0	3.9	78
180 min Winter	23.841	0.0	4.3	0
240 min Winter	18.904	0.0	4.5	0
360 min Winter	13.629	0.0	4.9	0
480 min Winter	10.798	0.0	5.2	0
600 min Winter	9.007	0.0	5.4	0
720 min Winter	7.764	0.0	5.6	0
960 min Winter	6.137	0.0	5.9	0
1440 min Winter	4.401	0.0	6.3	0
2160 min Winter	3.151	0.0	6.8	0
2880 min Winter	2.484	0.0	7.2	0
4320 min Winter	1.775	0.0	7.7	0
5760 min Winter	1.397	0.0	8.0	0
7200 min Winter	1.160	0.0	8.3	0
8640 min Winter	0.996	0.0	8.6	0
10080 min Winter	0.875	0.0	8.8	0

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	21.000	Shortest Storm (mins)	15
Ratio R	0.438	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.006

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4 0.002	4	8 0.002	8	12 0.002

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Model Details

Storage is Online Cover Level (m) 23.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.0
Membrane Percolation (mm/hr)	1	Length (m)	20.0
Max Percolation (l/s)	0.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	23.300	Cap Volume Depth (m)	0.350

Pump Outflow Control

Invert Level (m) 22.900

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	0.900	0.0000	1.700	0.0000	2.500	0.0000
0.200	1.0000	1.000	0.0000	1.800	0.0000	2.600	0.0000
0.300	1.0000	1.100	0.0000	1.900	0.0000	2.700	0.0000
0.400	1.0000	1.200	0.0000	2.000	0.0000	2.800	0.0000
0.500	1.0000	1.300	0.0000	2.100	0.0000	2.900	0.0000
0.600	0.0000	1.400	0.0000	2.200	0.0000	3.000	0.0000
0.700	0.0000	1.500	0.0000	2.300	0.0000		
0.800	0.0000	1.600	0.0000	2.400	0.0000		