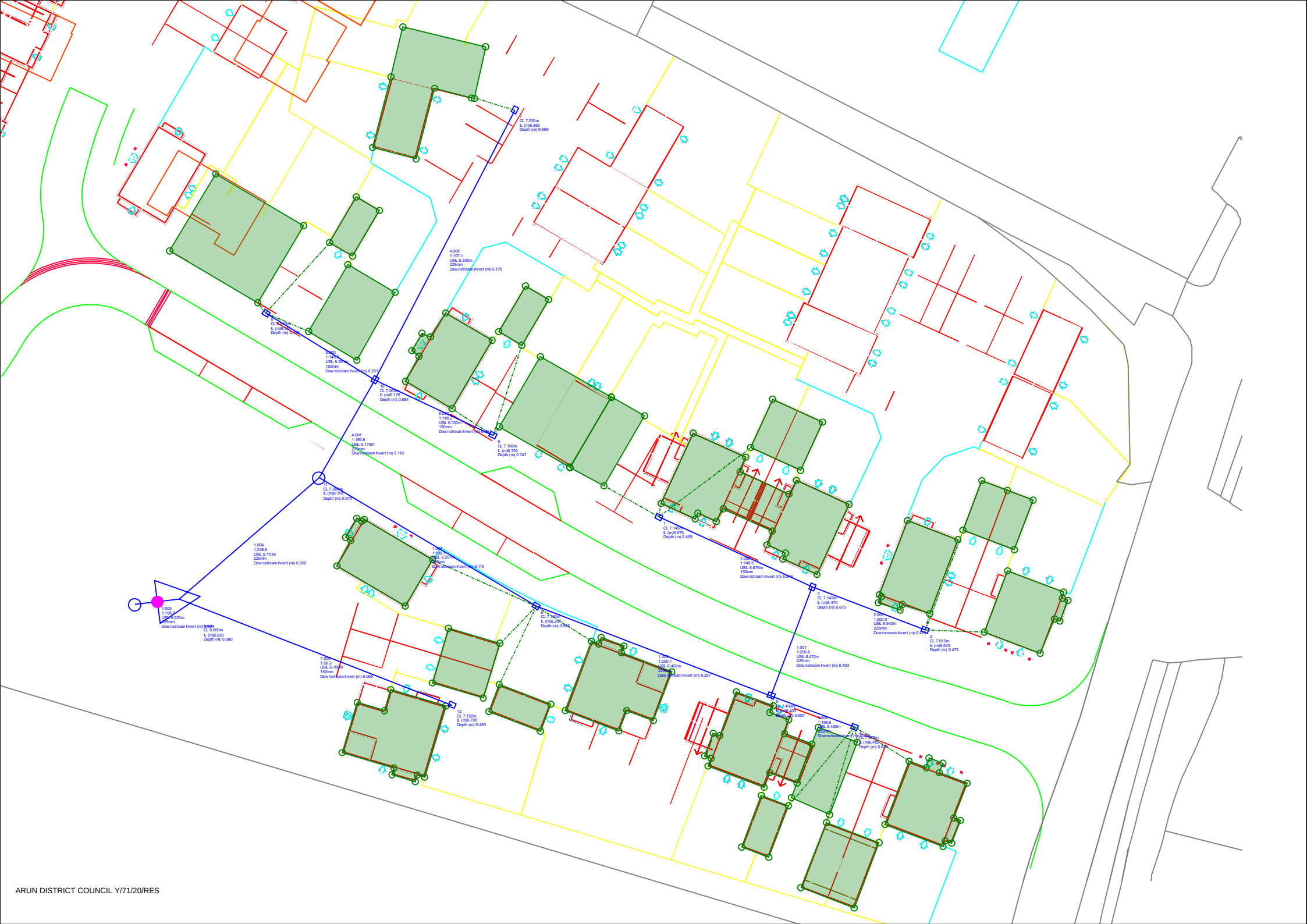




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Tuscany House White Hart Lane Baskingstoke RG21 4AF	NORTH END ROAD YAPTON 38 UNITS	
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model			
Return Period (years)	5	Volumetric Runoff Coeff.	0.750
		PIMP (%)	100
FEH Rainfall Version	2013	Add Flow / Climate Change (%)	0
Site Location	GB 497682 103581 SU 97682 03581	Minimum Backdrop Height (m)	0.400
Data Type	Point	Maximum Backdrop Height (m)	1.500
Maximum Rainfall (mm/hr)	250	Min Design Depth for Optimisation (m)	0.250
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s)	0.50
Foul Sewage (l/s/ha)	0.000	Min Slope for Optimisation (1:X)	200

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.152	4-8	0.075

Total Area Contributing (ha) = 0.227

Total Pipe Volume (m³) = 8.291

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length	Fall	Slope	I.Area	T.E.	Base	k	HYD	DIA	Section Type	Auto
	(m)	(m)	(1:X)	(ha)	(mins)	Flow (l/s)	(mm)	SECT	(mm)		Design

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Network Design Table for Storm

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)
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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
1.000	19.600	0.131	149.6	0.027	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	13.997	0.070	200.0	0.019	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	13.452	0.067	200.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	10.337	0.052	198.8	0.021	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	29.217	0.146	200.1	0.008	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	29.269	0.147	199.1	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	35.273	0.179	197.1	0.014	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	14.817	0.100	148.2	0.020	5.00	0.0	0.600	o	150	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	84.04	5.40	6.676	0.027	0.0	0.0	0.0	0.82	14.5	6.1
2.000	85.01	5.25	6.540	0.019	0.0	0.0	0.0	0.92	36.6	4.4
1.001	82.49	5.64	6.470	0.046	0.0	0.0	0.0	0.92	36.5	10.3
3.000	85.46	5.19	6.455	0.021	0.0	0.0	0.0	0.92	36.7	4.9
1.002	79.36	6.17	6.403	0.075	0.0	0.0	0.0	0.92	36.6	16.1
1.003	76.50	6.70	6.257	0.095	0.0	0.0	0.0	0.92	36.7	19.7
4.000	82.55	5.63	6.355	0.014	0.0	0.0	0.0	0.93	36.9	3.1
5.000	84.69	5.30	6.351	0.020	0.0	0.0	0.0	0.82	14.5	4.6

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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
6.000	15.113	0.102	148.2	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit		
4.001	13.187	0.066	199.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		
1.004	21.473	0.090	238.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit		
7.000	34.037	0.605	56.3	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit		
1.005	5.167	0.026	198.7	0.073	0.00	0.0	0.600	o	225	Pipe/Conduit		
Network Results Table												
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)		
6.000	84.65	5.31	6.353	0.017	0.0	0.0	0.0	0.82	14.5	3.9		
4.001	81.10	5.87	6.176	0.051	0.0	0.0	0.0	0.92	36.6	11.2		
1.004	74.37	7.13	6.110	0.146	0.0	0.0	0.0	0.84	33.5	29.5		
7.000	83.89	5.42	6.700	0.008	0.0	0.0	0.0	1.34	23.7	1.8		
1.005	73.92	7.22	6.020	0.227	0.0	0.0	0.0	0.92	36.7«	45.5		

Manhole Schedules for Storm											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	7.145	0.469	Open Manhole	750 x 600	1.000	6.676	150				
2	7.015	0.475	Open Manhole	750 x 600	2.000	6.540	225				
3	7.145	0.675	Open Manhole	750 x 600	1.001	6.470	225	1.000	6.545	150	
								2.000	6.470	225	
4	7.075	0.620	Open Manhole	750 x 600	3.000	6.455	225				
5	7.400	0.997	Open Manhole	750 x 600	1.002	6.403	225	1.001	6.403	225	
								3.000	6.403	225	
6	7.150	0.893	Open Manhole	750 x 600	1.003	6.257	225	1.002	6.257	225	
7	7.050	0.695	Open Manhole	750 x 600	4.000	6.355	225				
8	6.810	0.459	Open Manhole	750 x 600	5.000	6.351	150				
9	7.100	0.747	Open Manhole	750 x 600	6.000	6.353	150				
10	7.060	0.884	Open Manhole	750 x 600	4.001	6.176	225	4.000	6.176	225	
								5.000	6.251	150	
								6.000	6.251	150	
11	7.080	0.970	Open Manhole	1200	1.004	6.110	225	1.003	6.110	225	
								4.001	6.110	225	
12	7.150	0.450	Open Manhole	750 x 600	7.000	6.700	150				
basin	6.600	0.580	Open Manhole	750 x 600	1.005	6.020	225	1.004	6.020	225	
								7.000	6.095	150	
	6.550	0.556	Open Manhole	0		OUTFALL		1.005	5.994	225	

Manhole Schedules for Storm						
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	497786.922	103774.799	497786.922	103774.799	Required	
2	497817.836	103761.685	497817.836	103761.685	Required	
3	497804.754	103766.662	497804.754	103766.662	Required	
4	497809.631	103750.414	497809.631	103750.414	Required	
5	497799.970	103754.089	497799.970	103754.089	Required	
6	497772.663	103764.479	497772.663	103764.479	Required	
7	497770.204	103822.073	497770.204	103822.073	Required	
8	497741.329	103798.477	497741.329	103798.477	Required	
9	497767.649	103784.318	497767.649	103784.318	Required	
10	497753.975	103790.755	497753.975	103790.755	Required	
11	497747.429	103779.309	497747.429	103779.309	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
12	497762.936	103752.991	497762.936	103752.991	Required	
basin	497731.187	103765.261	497731.187	103765.261	Required	
	497726.061	103764.613			No Entry	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.027	0.027	0.027
2.000	-	-	100	0.019	0.019	0.019
1.001	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.021	0.021	0.021
1.002	User	-	100	0.008	0.008	0.008
1.003	User	-	100	0.008	0.008	0.008
	User	-	100	0.002	0.002	0.010
	User	-	100	0.004	0.004	0.014
	User	-	100	0.006	0.006	0.020
4.000	-	-	100	0.014	0.014	0.014
5.000	User	-	100	0.012	0.012	0.012
	User	-	100	0.002	0.002	0.014
	User	-	100	0.006	0.006	0.020
6.000	User	-	100	0.009	0.009	0.009
	User	-	100	0.002	0.002	0.011
	User	-	100	0.006	0.006	0.017
4.001	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
7.000	User	-	100	0.008	0.008	0.008
1.005	-	-	100	0.073	0.073	0.073
				Total	Total	Total
				0.227	0.227	0.227

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)
1.005		6.550	5.994	0.000	0	0

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Online Controls for Storm

Pump Manhole: basin, DS/PN: 1.005, Volume (m³): 1.7

Invert Level (m) 6.020

Storage Structures for Storm

Complex Manhole: basin, DS/PN: 1.005

Infiltration Blanket

Infiltration Coefficient Base (m/hr) 0.00648 Invert Level (m) 6.020 Cap Volume Depth (m) 0.330
Safety Factor 2.0 Diameter/Width (m) 26.0
Porosity 0.30 Length (m) 26.0

Infiltration Basin

Invert Level (m) 6.450 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 1.00
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	680.0	0.150	728.0

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FEH Site Location GB 497682 103581 SU 97682 03581 Cv (Summer) 0.750
FEH Rainfall Version 2013 Data Type Point Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep 2.5 Second Increment (Extended) 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) 100
Climate Change (%) 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Event	Duration (mins)	US/CL (m)	Water Flooded			Total		Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
					Level (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Infil. Vol (m³)				
1.000	1	15 minute 100 year Winter I+40%	15	7.145	7.130	0.000	1.04			0.202	0.9	14.1	FLOOD RISK
2.000	2	15 minute 100 year Winter I+40%	15	7.015	7.011	0.000	0.32			0.210	0.6	10.1	FLOOD RISK
1.001	3	15 minute 100 year Winter I+40%	15	7.145	7.009	0.000	0.72			1.100	0.8	22.8	FLOOD RISK
3.000	4	15 minute 100 year Winter I+40%	15	7.075	6.991	0.000	0.35			0.239	0.5	10.6	FLOOD RISK
1.002	5	15 minute 100 year Winter I+40%	15	7.400	6.977	0.000	0.97			1.142	1.0	33.2	SURCHARGED
1.003	6	15 minute 100 year Winter I+40%	15	7.150	6.847	0.000	1.18			1.395	1.0	40.4	SURCHARGED
4.000	7	15 minute 100 year Winter I+40%	15	7.050	6.704	0.000	0.21			0.155	0.7	7.3	SURCHARGED

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

								Water	Flooded	Total		Maximum	Half Drain	Pipe			
US/MH						Duration	US/CL	Level	Volume	Flow /	Overflow	Infil.	Maximum	Velocity	Time	Flow	
PN	Name		Event			(mins)	(m)	(m)	(m³)	Cap.	(l/s)	Vol (m³)	Vol (m³)	(m/s)	(mins)	(l/s)	Status
5.000	8	15 minute	100 year Winter I+40%			15	6.810	6.740	0.000	0.78			0.173	0.8		10.5	FLOOD RISK
6.000	9	15 minute	100 year Winter I+40%			15	7.100	6.725	0.000	0.68			0.165	0.8		9.1	SURCHARGED
4.001	10	15 minute	100 year Winter I+40%			15	7.060	6.685	0.000	0.78			2.102	0.7		24.7	SURCHARGED
1.004	11	15 minute	100 year Winter I+40%			15	7.080	6.643	0.000	2.11			2.208	1.6		64.5	SURCHARGED
7.000	12	15 minute	100 year Winter I+40%			15	7.150	6.748	0.000	0.22			0.019	1.1		5.0	OK
1.005	basin	960 minute	100 year Winter I+40%			960	6.600	6.589	0.000	0.00		4484.374	165.806	0.0		0.0	FLOOD RISK