


Appendix E Surface Water Drainage Strategy Calculations

E.1 Appendix E.1 Runoff rates calculation

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Midpoint Alencon Link Basingstoke, RG21 7PP		
Date 16/10/2019 12:15 File	Designed by Borja.Trigueros Checked by	
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IH 124 Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 578 Urban 0.000
Area (ha) 50.000 Soil 0.450 Region Number Region 6


Results 1/s

QBAR Rural 175.6
QBAR Urban 175.6

Q100 years 560.0

Q1 year 149.2
Q2 years 154.7
Q5 years 224.7
Q10 years 284.4
Q20 years 351.7
Q25 years 377.1
Q30 years 397.9
Q50 years 460.0
Q100 years 560.0
Q200 years 658.4
Q250 years 690.0
Q1000 years 905.9

E.2 Appendix E.2 Hydraulic models

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network A














Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Network A

« - Indicates pipe capacity < flow

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
S1.000	22.066	0.224	98.7	0.639	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	12.700	0.129	98.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	65.554	0.575	114.0	0.757	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.003	20.215	0.111	181.4	0.591	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.004	50.722	0.280	181.2	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.005	21.694	0.148	146.6	0.048	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.006	16.255	0.105	154.8	0.038	0.00	0.0	0.600	o	675	Pipe/Conduit	
S2.000	32.658	0.373	87.6	0.992	5.00	0.0	0.600	o	375	Pipe/Conduit	
S2.001	22.764	0.265	85.9	0.066	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.007	25.780	0.190	135.7	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.008	39.042	0.206	189.5	0.332	0.00	0.0	0.600	o	825	Pipe/Conduit	
S1.009	7.764	0.105	73.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.010	18.637	0.295	63.2	0.000	0.00	0.0	0.600	o	225	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)
S1.000	52.06	5.23	19.817	0.639	0.0	0.0	9.0	1.58	111.9	99.1
S1.001	51.47	5.37	19.593	0.639	0.0	0.0	9.0	1.58	112.0	99.1
S1.002	49.33	5.89	19.240	1.397	0.0	0.0	18.7	2.10	454.0	205.2
S1.003	48.66	6.06	18.515	1.987	0.0	0.0	26.2	1.94	695.2	288.1
S1.004	47.08	6.50	18.404	1.987	0.0	0.0	26.2	1.94	695.7	288.1
S1.005	46.50	6.66	18.124	2.035	0.0	0.0	26.2	2.16	773.9	288.1
S1.006	46.06	6.79	17.976	2.073	0.0	0.0	26.2	2.10	753.0	288.1
S2.000	51.84	5.28	18.809	0.992	0.0	0.0	13.9	1.94	214.0	153.2
S2.001	51.01	5.47	18.436	1.058	0.0	0.0	14.6	1.96	216.0	160.7
S1.007	45.47	6.97	17.796	3.131	0.0	0.0	38.6	2.40	1060.7	424.1
S1.008	44.51	7.27	17.606	3.463	0.0	0.0	41.7	2.15	1151.1	459.2
S1.009	44.25	7.36	17.400	3.463	0.0	0.0	41.7	1.52	60.5«	459.2
S1.010	43.69	7.55	17.295	3.463	0.0	0.0	41.7	1.65	65.5«	459.2

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Manhole Schedules for Network A

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)
S1	22.518	2.701	Open Manhole	1200	S1.000	19.817	300				
S2	22.057	2.464	Open Manhole	1200	S1.001	19.593	300	S1.000	19.593	300	
S3	21.865	2.625	Open Manhole	1500	S1.002	19.240	525	S1.001	19.464	300	
S4	22.118	3.603	Open Manhole	1500	S1.003	18.515	675	S1.002	18.665	525	
S5	21.817	3.414	Open Manhole	1500	S1.004	18.404	675	S1.003	18.404	675	
S6	20.956	2.832	Open Manhole	1500	S1.005	18.124	675	S1.004	18.124	675	
S7	20.605	2.629	Open Manhole	1500	S1.006	17.976	675	S1.005	17.976	675	
S8	21.325	2.516	Open Manhole	1350	S2.000	18.809	375				
S9	20.912	2.476	Open Manhole	1350	S2.001	18.436	375	S2.000	18.436	375	
S10	20.607	2.811	Open Manhole	1800	S1.007	17.796	750	S1.006	17.871	675	
								S2.001	18.171	375	
S11-HW	19.100	1.494	Open Manhole	1800	S1.008	17.606	825	S1.007	17.606	750	
S12-HW	19.100	1.700	Open Manhole	1800	S1.009	17.400	225	S1.008	17.400	825	
S13-FCC	19.100	1.805	Open Manhole	1200	S1.010	17.295	225	S1.009	17.295	225	
S	18.000	1.000	Open Manhole	0		OUTFALL		S1.010	17.000	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	580750.698	198481.497	580750.698	198481.497	Required	
S2	580754.914	198503.157	580754.914	198503.157	Required	
S3	580754.472	198515.850	580754.472	198515.850	Required	
S4	580732.480	198577.605	580732.480	198577.605	Required	
S5	580732.526	198597.819	580732.526	198597.819	Required	
S6	580751.896	198644.697	580751.896	198644.697	Required	
S7	580754.868	198666.187	580754.868	198666.187	Required	
S8	580721.887	198727.074	580721.887	198727.074	Required	
S9	580744.440	198703.455	580744.440	198703.455	Required	
S10	580752.904	198682.323	580752.904	198682.323	Required	
S11-HW	580727.584	198677.477	580727.584	198677.477	Required	

Midpoint
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Basingstoke, RG21 7PP

South Woodham Ferrers
Drainage Strategy



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Manhole Schedules for Network A

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S12-HW	580689.220	198684.724	580689.220	198684.724	Required	
S13-FCC	580681.552	198685.934	580681.552	198685.934	Required	
S	580663.242	198689.408			No Entry	

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Area Summary for Network A

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Residential	60	0.899	0.540	0.540
	Classification	Hardstanding	100	0.100	0.100	0.639
1.001	-	-	100	0.000	0.000	0.000
1.002	Classification	Residential	60	1.104	0.663	0.663
	Classification	Hardstanding	100	0.095	0.095	0.757
1.003	Classification	Residential	60	0.770	0.462	0.462
	Classification	Hardstanding	100	0.129	0.129	0.591
1.004	-	-	100	0.000	0.000	0.000
1.005	Classification	Hardstanding	100	0.048	0.048	0.048
1.006	Classification	Hardstanding	100	0.038	0.038	0.038
2.000	Classification	Residential	60	1.545	0.927	0.927
	Classification	Hardstanding	100	0.065	0.065	0.992
2.001	Classification	Hardstanding	100	0.066	0.066	0.066
1.007	-	-	100	0.000	0.000	0.000
1.008	Classification	Ponds	80	0.285	0.228	0.228
	Classification	Landscape	20	0.516	0.103	0.332
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				5.660	3.463	3.463

Free Flowing Outfall Details for Network A


Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S1.010	S	18.000	17.000	0.000	0	0

Simulation Criteria for Network A

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 Offline Controls	0
Number of Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	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)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Network A


Hydro-Brake® Optimum Manhole: S12-HW, DS/PN: S1.009, Volume (m³): 24.2

Unit Reference	MD-SHE-0174-1600-1400-1600
Design Head (m)	1.400
Design Flow (l/s)	16.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	174
Invert Level (m)	17.400
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	16.0	Kick-Flo®	0.911	13.1
Flush-Flo™	0.416	16.0	Mean Flow over Head Range	-	13.8

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)	Depth (m)	Flow (l/s)
0.100	6.2	0.800	14.6	2.000	19.0	4.000	26.4	7.000	34.6
0.200	14.7	1.000	13.6	2.200	19.8	4.500	28.0	7.500	35.8
0.300	15.7	1.200	14.9	2.400	20.7	5.000	29.4	8.000	36.9
0.400	16.0	1.400	16.0	2.600	21.5	5.500	30.8	8.500	38.0
0.500	15.9	1.600	17.0	3.000	23.0	6.000	32.1	9.000	39.1
0.600	15.7	1.800	18.0	3.500	24.8	6.500	33.4	9.500	40.1


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Storage Structures for Network A

Tank or Pond Manhole: S12-HW, DS/PN: S1.009

Invert Level (m) 17.600

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1651.0	1.200	2487.0	1.500	2707.0

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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	Surcharged
									Level (m)	Depth (m)
S1.000	S1	15 Winter	1	+0%	30/15 Summer	100/15 Summer			20.035	-0.082
S1.001	S2	15 Winter	1	+0%	30/15 Summer	100/15 Winter			19.828	-0.065
S1.002	S3	15 Winter	1	+0%	30/15 Winter				19.468	-0.297
S1.003	S4	15 Winter	1	+0%	30/15 Summer				18.847	-0.343
S1.004	S5	15 Winter	1	+0%	30/15 Winter				18.691	-0.388
S1.005	S6	15 Winter	1	+0%	30/15 Summer				18.448	-0.351
S1.006	S7	15 Winter	1	+0%	30/15 Summer				18.312	-0.339
S2.000	S8	15 Winter	1	+0%	30/15 Summer	100/15 Summer			19.042	-0.142
S2.001	S9	15 Winter	1	+0%	30/15 Summer				18.684	-0.127
S1.007	S10	15 Winter	1	+0%	30/15 Summer				18.173	-0.373
S1.008	S11-HW	15 Winter	1	+0%	100/15 Summer				17.989	-0.442
S1.009	S12-HW	180 Winter	1	+0%	1/15 Summer				17.795	0.170
S1.010	S13-FCC	480 Winter	1	+0%					17.374	-0.146

PN	US/MH Name	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level
							Exceeded
S1.000	S1	0.000	0.87		85.7	OK	5
S1.001	S2	0.000	0.94		84.9	OK	1
S1.002	S3	0.000	0.39		163.0	OK	
S1.003	S4	0.000	0.48		225.8	OK	
S1.004	S5	0.000	0.37		224.1	OK	
S1.005	S6	0.000	0.47		227.9	OK	
S1.006	S7	0.000	0.49		230.5	OK	
S2.000	S8	0.000	0.69		131.6	OK	5
S2.001	S9	0.000	0.76		139.4	OK	
S1.007	S10	0.000	0.51		345.8	OK	
S1.008	S11-HW	0.000	0.44		375.2	OK	
S1.009	S12-HW	0.000	0.35		16.0	SURCHARGED	
S1.010	S13-FCC	0.000	0.27		16.0	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1	15 Winter	30	+0%	30/15 Summer	100/15 Summer			21.488	1.371
S1.001	S2	15 Winter	30	+0%	30/15 Summer	100/15 Winter			20.483	0.590
S1.002	S3	15 Winter	30	+0%	30/15 Winter				19.819	0.054
S1.003	S4	15 Winter	30	+0%	30/15 Summer				19.306	0.116
S1.004	S5	15 Winter	30	+0%	30/15 Winter				19.154	0.075
S1.005	S6	15 Winter	30	+0%	30/15 Summer				18.955	0.156
S1.006	S7	15 Winter	30	+0%	30/15 Summer				18.780	0.129
S2.000	S8	15 Winter	30	+0%	30/15 Summer	100/15 Summer			20.515	1.331
S2.001	S9	15 Winter	30	+0%	30/15 Summer				19.448	0.637
S1.007	S10	15 Winter	30	+0%	30/15 Summer				18.599	0.053
S1.008	S11-HW	15 Winter	30	+0%	100/15 Summer				18.279	-0.152
S1.009	S12-HW	360 Winter	30	+0%	1/15 Summer				18.150	0.525
S1.010	S13-FCC	15 Winter	30	+0%					17.374	-0.146

PN	US/MH Name	Flooded Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.000	2.08		204.7	SURCHARGED	5
S1.001	S2	0.000	2.28		205.2	SURCHARGED	1
S1.002	S3	0.000	0.97		402.6	SURCHARGED	
S1.003	S4	0.000	1.19		556.3	SURCHARGED	
S1.004	S5	0.000	0.87		524.0	SURCHARGED	
S1.005	S6	0.000	1.08		526.5	SURCHARGED	
S1.006	S7	0.000	1.15		534.0	SURCHARGED	
S2.000	S8	0.000	1.66		316.9	SURCHARGED	5
S2.001	S9	0.000	1.83		337.5	SURCHARGED	
S1.007	S10	0.000	1.19		812.7	SURCHARGED	
S1.008	S11-HW	0.000	0.99		855.4	OK	
S1.009	S12-HW	0.000	0.35		16.0	SURCHARGED	
S1.010	S13-FCC	0.000	0.27		16.0	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
 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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 DTS Status OFF

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) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	S1	15 Winter	100	+40%	30/15 Summer	100/15 Summer			22.568	2.451
S1.001	S2	15 Winter	100	+40%	30/15 Summer	100/15 Winter			22.059	2.166
S1.002	S3	15 Winter	100	+40%	30/15 Winter				21.848	2.083
S1.003	S4	15 Winter	100	+40%	30/15 Summer				21.037	1.847
S1.004	S5	15 Winter	100	+40%	30/15 Winter				20.650	1.571
S1.005	S6	15 Winter	100	+40%	30/15 Summer				20.160	1.361
S1.006	S7	15 Winter	100	+40%	30/15 Summer				19.740	1.089
S2.000	S8	15 Winter	100	+40%	30/15 Summer	100/15 Summer			21.378	2.194
S2.001	S9	15 Winter	100	+40%	30/15 Summer				20.305	1.494
S1.007	S10	15 Winter	100	+40%	30/15 Summer				19.297	0.751
S1.008	S11-HW	15 Winter	100	+40%	100/15 Summer				18.705	0.274
S1.009	S12-HW	720 Winter	100	+40%	1/15 Summer				18.671	1.046
S1.010	S13-FCC	15 Summer	100	+40%					17.374	-0.146

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	49.556	2.37		233.5	FLOOD	5
S1.001	S2	2.182	2.51		226.1	FLOOD	1
S1.002	S3	0.000	1.27		526.8	FLOOD RISK	
S1.003	S4	0.000	1.73		806.2	SURCHARGED	
S1.004	S5	0.000	1.32		790.2	SURCHARGED	
S1.005	S6	0.000	1.67		815.6	SURCHARGED	
S1.006	S7	0.000	1.79		835.0	SURCHARGED	
S2.000	S8	53.302	1.93		368.3	FLOOD	5
S2.001	S9	0.000	2.21		408.3	SURCHARGED	
S1.007	S10	0.000	1.75		1194.9	SURCHARGED	
S1.008	S11-HW	0.000	1.55		1334.6	FLOOD RISK	
S1.009	S12-HW	0.000	0.35		16.0	FLOOD RISK	
S1.010	S13-FCC	0.000	0.27		16.0	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network B
















Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Network B

« - Indicates pipe capacity < flow

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
S3.000	64.524	0.217	297.3	1.142	5.00	0.0	0.600	o	525	Pipe/Conduit	
S3.001	18.206	0.077	236.4	0.043	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.002	15.168	0.064	237.0	0.039	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.003	14.445	0.064	225.7	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.004	90.545	1.465	61.8	0.155	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.005	79.930	1.339	59.7	0.886	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.006	16.578	0.278	59.6	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.007	66.393	1.150	57.7	0.164	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.008	7.749	0.251	30.9	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.009	43.697	1.263	34.6	0.054	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.010	27.327	0.761	35.9	2.104	0.00	0.0	0.600	o	675	Pipe/Conduit	
S3.011	24.178	0.806	30.0	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S3.012	55.564	0.200	277.8	0.000	0.00	0.0	0.600	o	825	Pipe/Conduit	
S4.000	38.948	0.438	88.9	0.089	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.001	24.114	0.271	89.0	0.090	0.00	0.0	0.600	o	225	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)
S3.000	49.55	5.83	18.675	1.142	0.0	0.0	15.3	1.29	280.1	168.6
S3.001	48.74	6.04	18.458	1.185	0.0	0.0	15.6	1.45	314.4	172.1
S3.002	48.09	6.21	18.381	1.224	0.0	0.0	15.9	1.45	314.0	175.3
S3.003	47.50	6.38	18.318	1.224	0.0	0.0	15.9	1.49	321.9	175.3
S3.004	45.68	6.91	18.254	1.379	0.0	0.0	17.1	2.85	617.6	187.7
S3.005	44.23	7.36	16.790	2.266	0.0	0.0	27.1	2.90	628.4	298.5
S3.006	43.94	7.46	15.451	2.266	0.0	0.0	27.1	2.90	628.8	298.5
S3.007	42.85	7.83	15.175	2.430	0.0	0.0	28.2	2.95	639.1	310.2
S3.008	42.76	7.87	14.025	2.430	0.0	0.0	28.2	4.04	875.0	310.2
S3.009	42.23	8.06	13.774	2.484	0.0	0.0	28.4	3.82	826.4	312.5
S3.010	41.95	8.16	12.361	4.588	0.0	0.0	52.1	4.38	1568.3	573.4
S3.011	41.72	8.24	11.600	4.588	0.0	0.0	52.1	4.80	1716.4	573.4
S3.012	40.38	8.77	10.800	4.588	0.0	0.0	52.1	1.78	949.5	573.4
S4.000	51.04	5.47	14.000	0.089	0.0	0.0	1.2	1.39	55.2	13.5
S4.001	49.84	5.76	13.562	0.179	0.0	0.0	2.4	1.39	55.1	26.6

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Network Design Table for Network B

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
S4.002	28.119	0.316	89.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S5.000	52.703	0.655	80.5	0.171	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.003	37.648	2.100	17.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.004	37.812	0.200	189.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.013	11.673	0.039	299.3	0.496	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.014	11.269	0.066	170.7	0.000	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)
S4.002	48.53	6.10	13.291	0.179	0.0	0.0	2.4	1.39	55.1	26.6
S5.000	50.48	5.60	13.630	0.171	0.0	0.0	2.3	1.46	58.0	25.8
S4.003	47.91	6.26	12.900	0.350	0.0	0.0	4.5	3.73	263.7	50.0
S4.004	45.98	6.82	10.800	0.350	0.0	0.0	4.5	1.14	80.6	50.0
S3.013	39.75	9.03	10.600	5.435	0.0	0.0	58.5	0.75	29.8	643.6
S3.014	39.31	9.21	10.561	5.435	0.0	0.0	58.5	1.00	39.7	643.6

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Manhole Schedules for Network B

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)
S21	21.485	2.810	Open Manhole	1500	S3.000	18.675	525				
S22	21.907	3.449	Open Manhole	1500	S3.001	18.458	525	S3.000	18.458	525	
S23	22.141	3.760	Open Manhole	1500	S3.002	18.381	525	S3.001	18.381	525	
S24	22.120	3.803	Open Manhole	1500	S3.003	18.318	525	S3.002	18.317	525	
S25	21.889	3.635	Open Manhole	1500	S3.004	18.254	525	S3.003	18.254	525	
S26	19.142	2.353	Open Manhole	1500	S3.005	16.790	525	S3.004	16.789	525	
S27	17.565	2.114	Open Manhole	1500	S3.006	15.451	525	S3.005	15.451	525	
S28	17.370	2.197	Open Manhole	1500	S3.007	15.175	525	S3.006	15.173	525	
S29	15.500	1.475	Open Manhole	1500	S3.008	14.025	525	S3.007	14.025	525	
S30	15.500	1.726	Open Manhole	1500	S3.009	13.774	525	S3.008	13.774	525	
S31	15.413	3.052	Open Manhole	1500	S3.010	12.361	675	S3.009	12.511	525	
S32	13.001	1.401	Open Manhole	1500	S3.011	11.600	675	S3.010	11.600	675	
S33-HW	12.300	1.506	Open Manhole	1800	S3.012	10.800	825	S3.011	10.794	675	
S34	15.426	1.426	Open Manhole	1200	S4.000	14.000	225				
S35	14.950	1.388	Open Manhole	1200	S4.001	13.562	225	S4.000	13.562	225	
S36	14.679	1.388	Open Manhole	1200	S4.002	13.291	225	S4.001	13.291	225	
S37	15.057	1.427	Open Manhole	1200	S5.000	13.630	225				
S38	14.400	1.500	Open Manhole	1200	S4.003	12.900	300	S4.002	12.975	225	
								S5.000	12.975	225	
S39	12.300	1.500	Open Manhole	1200	S4.004	10.800	300	S4.003	10.800	300	
S40-HW	12.300	1.700	Open Manhole	1800	S3.013	10.600	225	S3.012	10.600	825	
								S4.004	10.600	300	
S41-FCC	12.300	1.739	Open Manhole	1200	S3.014	10.561	225	S3.013	10.561	225	
S	11.800	1.305	Open Manhole	0		OUTFALL		S3.014	10.495	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S21	580699.324	198753.430	580699.324	198753.430	Required	
S22	580652.091	198797.388	580652.091	198797.388	Required	
S23	580634.952	198803.528	580634.952	198803.528	Required	
S24	580619.837	198802.262	580619.837	198802.262	Required	
S25	580606.496	198796.724	580606.496	198796.724	Required	
S26	580535.762	198740.198	580535.762	198740.198	Required	
S27	580473.718	198689.806	580473.718	198689.806	Required	

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Manhole Schedules for Network B

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S28	580463.039	198677.126	580463.039	198677.126	Required	
S29	580449.909	198612.044	580449.909	198612.044	Required	
S30	580447.348	198604.731	580447.348	198604.731	Required	
S31	580421.411	198569.564	580421.411	198569.564	Required	
S32	580400.199	198552.336	580400.199	198552.336	Required	
S33-HW	580377.205	198544.863	580377.205	198544.863	Required	
S34	580266.337	198583.801	580266.337	198583.801	Required	
S35	580303.953	198593.900	580303.953	198593.900	Required	
S36	580327.993	198592.012	580327.993	198592.012	Required	
S37	580407.224	198576.069	580407.224	198576.069	Required	
S38	580355.630	198586.826	580355.630	198586.826	Required	
S39	580337.334	198553.923	580337.334	198553.923	Required	
S40-HW	580329.124	198517.013	580329.124	198517.013	Required	
S41-FCC	580330.235	198505.393	580330.235	198505.393	Required	
S	580324.906	198495.464			No Entry	

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Area Summary for Network B

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
3.000	Classification	Residential	60	1.693	1.016	1.016
	Classification	Hardstanding	100	0.126	0.126	1.142
3.001	Classification	Hardstanding	100	0.043	0.043	0.043
3.002	Classification	Hardstanding	100	0.039	0.039	0.039
3.003	-	-	100	0.000	0.000	0.000
3.004	Classification	Hardstanding	100	0.155	0.155	0.155
3.005	Classification	Residential	60	1.177	0.706	0.706
	Classification	Hardstanding	100	0.180	0.180	0.886
3.006	-	-	100	0.000	0.000	0.000
3.007	Classification	Hardstanding	100	0.164	0.164	0.164
3.008	-	-	100	0.000	0.000	0.000
3.009	Classification	Hardstanding	100	0.054	0.054	0.054
3.010	Classification	Residential	60	1.564	0.938	0.938
	Classification	Residential	60	1.943	1.166	2.104
3.011	-	-	100	0.000	0.000	0.000
3.012	-	-	100	0.000	0.000	0.000
4.000	Classification	Hardstanding	100	0.089	0.089	0.089
4.001	Classification	Hardstanding	100	0.090	0.090	0.090
4.002	-	-	100	0.000	0.000	0.000
5.000	Classification	Hardstanding	100	0.171	0.171	0.171
4.003	-	-	100	0.000	0.000	0.000
4.004	-	-	100	0.000	0.000	0.000
3.013	Classification	Ponds	80	0.441	0.353	0.353
	Classification	Landscape	20	0.719	0.144	0.496
3.014	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				8.650	5.435	5.435

Free Flowing Outfall Details for Network B

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S3.014	S	11.800	10.495	0.000	0	0


Simulation Criteria for Network B

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 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	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Network B


Hydro-Brake® Optimum Manhole: S40-HW, DS/PN: S3.013, Volume (m³): 35.6

Unit Reference	MD-SHE-0212-2460-1400-2460
Design Head (m)	1.400
Design Flow (l/s)	24.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	212
Invert Level (m)	10.600
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	24.6	Kick-Flo®	0.952	20.5
Flush-Flo™	0.435	24.6	Mean Flow over Head Range	-	21.1

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)	Depth (m)	Flow (l/s)
0.100	7.2	0.800	23.0	2.000	29.2	4.000	40.7	7.000	53.4
0.200	20.6	1.000	20.9	2.200	30.5	4.500	43.1	7.500	55.2
0.300	24.0	1.200	22.8	2.400	31.8	5.000	45.3	8.000	56.9
0.400	24.6	1.400	24.6	2.600	33.1	5.500	47.5	8.500	58.6
0.500	24.5	1.600	26.2	3.000	35.4	6.000	49.5	9.000	60.3
0.600	24.2	1.800	27.7	3.500	38.2	6.500	51.5	9.500	61.9


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Storage Structures for Network B

Tank or Pond Manhole: S40-HW, DS/PN: S3.013

Invert Level (m) 10.800

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	2649.0	1.200	3751.0	1.500	4176.0

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (1/per/day) 0.000
Foul Sewage per hectare (l/s) 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S3.000	S21	15 Winter	1	+0%	30/15 Summer	100/15 Summer			18.970	-0.230
S3.001	S22	15 Winter	1	+0%	30/15 Summer				18.760	-0.223
S3.002	S23	15 Winter	1	+0%	30/15 Summer				18.696	-0.210
S3.003	S24	15 Winter	1	+0%	30/15 Summer				18.629	-0.214
S3.004	S25	15 Winter	1	+0%	100/15 Summer				18.448	-0.331
S3.005	S26	15 Winter	1	+0%	30/15 Summer	100/15 Summer			17.035	-0.280
S3.006	S27	15 Winter	1	+0%	30/15 Summer	100/15 Summer			15.756	-0.220
S3.007	S28	15 Winter	1	+0%	30/15 Summer				15.426	-0.274
S3.008	S29	15 Winter	1	+0%	30/15 Summer	100/15 Summer			14.351	-0.199
S3.009	S30	15 Winter	1	+0%	100/15 Summer				13.997	-0.302
S3.010	S31	15 Winter	1	+0%	30/15 Winter				12.673	-0.363
S3.011	S32	15 Winter	1	+0%	30/15 Summer	100/15 Summer			11.906	-0.369
S3.012	S33-HW	15 Winter	1	+0%	30/15 Summer				11.259	-0.366
S4.000	S34	15 Winter	1	+0%	100/15 Summer				14.073	-0.152
S4.001	S35	15 Winter	1	+0%	30/15 Summer	100/15 Summer			13.666	-0.121
S4.002	S36	15 Winter	1	+0%	30/15 Summer				13.394	-0.122
S5.000	S37	15 Winter	1	+0%	100/15 Summer	100/15 Winter			13.731	-0.124
S4.003	S38	15 Winter	1	+0%					12.987	-0.213
S4.004	S39	240 Winter	1	+0%	30/15 Summer				11.014	-0.086
S3.013	S40-HW	240 Winter	1	+0%	1/15 Summer				11.012	0.187
S3.014	S41-FCC	240 Winter	1	+0%					10.700	-0.086

PN	US/MH Name	Flooded Volume (m ³)	Flow / Cap. (l/s)	Pipe Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S21	0.000	0.58		147.8	OK	4
S3.001	S22	0.000	0.62		149.2	OK	
S3.002	S23	0.000	0.67		154.3	OK	
S3.003	S24	0.000	0.65		153.2	OK	
S3.004	S25	0.000	0.29		167.1	OK	
S3.005	S26	0.000	0.44		256.9	OK	5
S3.006	S27	0.000	0.63		255.6	OK	5

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

PN	US/MH Name	Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Volume (m ³)	Flow / Cap. / Overflow (l/s)			
S3.007	S28	0.000	0.46	269.2	OK	
S3.008	S29	0.000	0.70	270.0	OK	5
S3.009	S30	0.000	0.38	273.9	OK	
S3.010	S31	0.000	0.43	475.5	OK	
S3.011	S32	0.000	0.42	473.9	OK	4
S3.012	S33-HW	0.000	0.59	473.4	OK	
S4.000	S34	0.000	0.22	11.7	OK	
S4.001	S35	0.000	0.43	21.9	OK	2
S4.002	S36	0.000	0.43	21.9	OK	
S5.000	S37	0.000	0.41	22.8	OK	1
S4.003	S38	0.000	0.18	44.9	OK	
S4.004	S39	0.000	0.13	9.5	OK	
S3.013	S40-HW	0.000	0.92	23.5	SURCHARGED	
S3.014	S41-FCC	0.000	0.70	23.5	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S3.000	S21	15 Winter	30	+0%	30/15 Summer	100/15 Summer			19.892	0.692
S3.001	S22	15 Winter	30	+0%	30/15 Summer				19.467	0.484
S3.002	S23	15 Winter	30	+0%	30/15 Summer				19.258	0.352
S3.003	S24	15 Winter	30	+0%	30/15 Summer				19.028	0.185
S3.004	S25	15 Winter	30	+0%	100/15 Summer				18.587	-0.192
S3.005	S26	15 Winter	30	+0%	30/15 Summer	100/15 Summer			17.633	0.318
S3.006	S27	15 Winter	30	+0%	30/15 Summer	100/15 Summer			16.414	0.438
S3.007	S28	15 Winter	30	+0%	30/15 Summer				15.902	0.202
S3.008	S29	15 Winter	30	+0%	30/15 Summer	100/15 Summer			14.818	0.268
S3.009	S30	15 Winter	30	+0%	100/15 Summer				14.126	-0.173
S3.010	S31	15 Winter	30	+0%	30/15 Winter				13.124	0.088
S3.011	S32	15 Winter	30	+0%	30/15 Summer	100/15 Summer			12.420	0.145
S3.012	S33-HW	15 Winter	30	+0%	30/15 Summer				11.730	0.105
S4.000	S34	15 Winter	30	+0%	100/15 Summer				14.121	-0.104
S4.001	S35	15 Winter	30	+0%	30/15 Summer	100/15 Summer			13.867	0.080
S4.002	S36	15 Winter	30	+0%	30/15 Summer				13.550	0.034
S5.000	S37	15 Winter	30	+0%	100/15 Summer	100/15 Winter			13.853	-0.002
S4.003	S38	15 Winter	30	+0%					13.040	-0.160
S4.004	S39	480 Winter	30	+0%	30/15 Summer				11.373	0.273
S3.013	S40-HW	480 Winter	30	+0%	1/15 Summer				11.370	0.545
S3.014	S41-FCC	180 Summer	30	+0%					10.704	-0.082

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S21	0.000	1.36		346.9	SURCHARGED	4
S3.001	S22	0.000	1.48		356.3	SURCHARGED	
S3.002	S23	0.000	1.60		370.0	SURCHARGED	
S3.003	S24	0.000	1.59		372.7	SURCHARGED	
S3.004	S25	0.000	0.69		401.3	OK	
S3.005	S26	0.000	0.97		566.5	SURCHARGED	5
S3.006	S27	0.000	1.36		551.4	SURCHARGED	5

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m ³)	Flow / Cap.	Flow / Overflow (l/s)	Flow (l/s)		
S3.007	S28	0.000	0.97		564.9	SURCHARGED	
S3.008	S29	0.000	1.47		565.9	SURCHARGED	5
S3.009	S30	0.000	0.78		569.7	OK	
S3.010	S31	0.000	0.95		1054.6	SURCHARGED	
S3.011	S32	0.000	0.92		1049.4	SURCHARGED	4
S3.012	S33-HW	0.000	1.31		1045.7	SURCHARGED	
S4.000	S34	0.000	0.55		28.7	OK	
S4.001	S35	0.000	1.11		56.1	SURCHARGED	2
S4.002	S36	0.000	1.06		54.6	SURCHARGED	
S5.000	S37	0.000	0.99		55.3	OK	1
S4.003	S38	0.000	0.44		107.6	OK	
S4.004	S39	0.000	0.17		12.7	SURCHARGED	
S3.013	S40-HW	0.000	0.97		24.6	SURCHARGED	
S3.014	S41-FCC	0.000	0.73		24.6	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S3.000	S21	15 Winter	100	+40%	30/15 Summer	100/15 Summer			21.536
S3.001	S22	15 Winter	100	+40%	30/15 Summer				21.463
S3.002	S23	15 Winter	100	+40%	30/15 Summer				21.214
S3.003	S24	15 Winter	100	+40%	30/15 Summer				20.868
S3.004	S25	15 Winter	100	+40%	100/15 Summer				20.496
S3.005	S26	15 Winter	100	+40%	30/15 Summer	100/15 Summer			19.205
S3.006	S27	30 Winter	100	+40%	30/15 Summer	100/15 Summer			17.584
S3.007	S28	60 Summer	100	+40%	30/15 Summer				17.015
S3.008	S29	15 Winter	100	+40%	30/15 Summer	100/15 Summer			15.533
S3.009	S30	15 Winter	100	+40%	100/15 Summer				15.146
S3.010	S31	15 Winter	100	+40%	30/15 Winter				14.546
S3.011	S32	15 Winter	100	+40%	30/15 Summer	100/15 Summer			13.041
S3.012	S33-HW	15 Winter	100	+40%	30/15 Summer				11.937
S4.000	S34	15 Winter	100	+40%	100/15 Summer				15.361
S4.001	S35	15 Winter	100	+40%	30/15 Summer	100/15 Summer			14.951
S4.002	S36	15 Winter	100	+40%	30/15 Summer				14.129
S5.000	S37	15 Winter	100	+40%	100/15 Summer	100/15 Winter			15.058
S4.003	S38	15 Winter	100	+40%					13.192
S4.004	S39	15 Winter	100	+40%	30/15 Summer				12.133
S3.013	S40-HW	720 Winter	100	+40%	1/15 Summer				11.919
S3.014	S41-FCC	8640 Summer	100	+40%					10.704

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S21	2.336	50.752	1.88		481.6	FLOOD	4
S3.001	S22	2.480	0.000	2.04		491.1	FLOOD RISK	
S3.002	S23	2.308	0.000	2.12		489.1	SURCHARGED	
S3.003	S24	2.025	0.000	1.95		455.8	SURCHARGED	
S3.004	S25	1.717	0.000	0.92		531.2	SURCHARGED	
S3.005	S26	1.890	62.562	1.13		658.2	FLOOD	5
S3.006	S27	1.608	18.738	1.60		647.9	FLOOD	5

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

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)			
S3.007	S28	1.315	0.000	1.12		654.4	FLOOD RISK	
S3.008	S29	0.983	33.196	2.03		781.5	FLOOD	5
S3.009	S30	0.847	0.000	1.08		781.8	FLOOD RISK	
S3.010	S31	1.510	0.000	1.40		1545.2	SURCHARGED	
S3.011	S32	0.766	40.928	1.17		1332.5	FLOOD	4
S3.012	S33-HW	0.312	0.000	1.66		1332.3	FLOOD RISK	
S4.000	S34	1.136	0.000	0.91		47.6	FLOOD RISK	
S4.001	S35	1.164	0.555	1.75		88.8	FLOOD	2
S4.002	S36	0.613	0.000	1.72		88.3	SURCHARGED	
S5.000	S37	1.203	0.505	1.68		93.8	FLOOD	1
S4.003	S38	-0.008	0.000	0.72		175.7	OK	
S4.004	S39	1.033	0.000	2.33		173.4	FLOOD RISK	
S3.013	S40-HW	1.094	0.000	0.96		24.6	FLOOD RISK	
S3.014	S41-FCC	-0.082	0.000	0.73		24.6	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network D











Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Network D

« - Indicates pipe capacity < flow










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
S6.000	15.037	0.100	150.4	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
S6.001	41.671	1.005	41.5	0.092	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.000	18.006	0.072	250.1	0.647	5.00	0.0	0.600	o	450	Pipe/Conduit	
S6.002	42.341	0.511	82.9	0.163	0.00	0.0	0.600	o	450	Pipe/Conduit	
S8.000	16.267	0.108	150.6	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
S6.003	27.721	0.462	60.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S6.004	20.469	0.423	48.4	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S9.000	18.437	0.092	200.4	0.869	5.00	0.0	0.600	o	450	Pipe/Conduit	
S6.005	54.935	0.440	124.9	0.130	0.00	0.0	0.600	o	600	Pipe/Conduit	
S6.006	18.477	0.167	110.6	0.000	0.00	0.0	0.600	o	600	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)
S6.000	50.00	5.31	13.530	0.010	0.0	0.0	0.1	0.82	14.4	1.4
S6.001	49.88	5.75	13.430	0.102	0.0	0.0	1.4	1.57	27.7	15.2
S7.000	50.00	5.23	12.125	0.647	0.0	0.0	8.8	1.28	203.7	96.4
S6.002	48.64	6.07	12.053	0.912	0.0	0.0	12.0	2.23	355.4	132.2
S8.000	50.00	5.33	11.950	0.010	0.0	0.0	0.1	0.82	14.4	1.4
S6.003	47.99	6.24	11.542	0.922	0.0	0.0	12.0	2.63	418.0	132.2
S6.004	47.56	6.36	11.080	0.922	0.0	0.0	12.0	2.93	465.7	132.2
S9.000	50.00	5.21	10.749	0.869	0.0	0.0	11.8	1.43	227.8	129.4
S6.005	46.10	6.78	10.507	1.921	0.0	0.0	24.0	2.18	615.9	263.8
S6.006	45.66	6.91	10.067	1.921	0.0	0.0	24.0	2.31	654.5	263.8

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Network Design Table for Network D

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
S6.007	39.647	0.788	50.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S6.008	43.425	1.091	39.8	0.415	0.00	0.0	0.600	o	600	Pipe/Conduit	
S10.000	7.595	0.044	172.6	0.367	5.00	0.0	0.600	o	375	Pipe/Conduit	
S6.009	14.439	0.240	60.2	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S6.010	35.442	0.181	195.8	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S11.000	15.383	0.077	199.8	0.799	5.00	0.0	0.600	o	450	Pipe/Conduit	
S11.001	51.557	0.261	197.5	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S6.011	12.900	0.038	339.5	0.326	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.012	21.255	0.125	170.0	0.000	0.00	0.0	0.600	o	225	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)
S6.007	45.04	7.10	9.900	1.921	0.0	0.0	24.0	3.44	972.3	263.8
S6.008	44.46	7.29	9.112	2.335	0.0	0.0	28.1	3.87	1093.6	309.3
S10.000	50.00	5.09	8.290	0.367	0.0	0.0	5.0	1.38	152.0	54.6
S6.009	44.22	7.37	8.021	2.702	0.0	0.0	32.4	3.14	888.8	356.0
S6.010	43.34	7.66	7.781	2.702	0.0	0.0	32.4	2.00	882.0	356.0
S11.000	50.00	5.18	7.938	0.799	0.0	0.0	10.8	1.43	228.2	119.1
S11.001	49.78	5.77	7.861	0.799	0.0	0.0	10.8	1.44	229.5	119.1
S6.011	42.47	7.97	7.600	3.827	0.0	0.0	44.0	0.70	28.0	484.2
S6.012	41.51	8.32	7.562	3.827	0.0	0.0	44.0	1.00	39.8	484.2

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Manhole Schedules for Network D

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)
S42	14.880	1.350	Open Manhole	1200	S6.000	13.530	150				
S43	15.257	1.827	Open Manhole	1200	S6.001	13.430	150	S6.000	13.430	150	
S44	14.159	2.034	Open Manhole	1350	S7.000	12.125	450				
S45	14.500	2.447	Open Manhole	1350	S6.002	12.053	450	S6.001	12.425	150	
								S7.000	12.053	450	
S46	13.338	1.388	Open Manhole	1200	S8.000	11.950	150				
S47	13.741	2.199	Open Manhole	1350	S6.003	11.542	450	S6.002	11.542	450	
								S8.000	11.842	150	
S48	13.248	2.168	Open Manhole	1350	S6.004	11.080	450	S6.003	11.080	450	
S49	12.524	1.775	Open Manhole	1200	S9.000	10.749	450				
S50	12.882	2.375	Open Manhole	1500	S6.005	10.507	600	S6.004	10.657	450	
								S9.000	10.657	450	
S51	11.843	1.776	Open Manhole	1500	S6.006	10.067	600	S6.005	10.067	600	
S52	11.731	1.831	Open Manhole	1500	S6.007	9.900	600	S6.006	9.900	600	
S53	10.625	1.513	Open Manhole	1500	S6.008	9.112	600	S6.007	9.112	600	
S54	9.611	1.321	Open Manhole	1350	S10.000	8.290	375				
S55	9.477	1.456	Open Manhole	1500	S6.009	8.021	600	S6.008	8.021	600	
								S10.000	8.246	375	
S56-HW	9.350	1.569	Open Manhole	1800	S6.010	7.781	750	S6.009	7.781	600	
S57	9.408	1.470	Open Manhole	1350	S11.000	7.938	450				
S58-HW	9.350	1.489	Open Manhole	1350	S11.001	7.861	450	S11.000	7.861	450	
S59-HW	9.350	1.750	Open Manhole	1800	S6.011	7.600	225	S6.010	7.600	750	
								S11.001	7.600	450	
S60-FCC	9.350	1.788	Open Manhole	1200	S6.012	7.562	225	S6.011	7.562	225	
S	8.300	0.863	Open Manhole	0		OUTFALL		S6.012	7.437	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S42	580243.825	198559.146	580243.825	198559.146	Required	
S43	580239.478	198573.541	580239.478	198573.541	Required	
S44	580194.705	198579.570	580194.705	198579.570	Required	
S45	580199.385	198562.183	580199.385	198562.183	Required	
S46	580163.066	198535.419	580163.066	198535.419	Required	
S47	580158.536	198551.042	580158.536	198551.042	Required	

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Basingstoke, RG21 7PP

South Woodham Ferrers
Drainage Strategy



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Manhole Schedules for Network D

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S48	580131.696	198544.107	580131.696	198544.107	Required	
S49	580111.768	198561.273	580111.768	198561.273	Required	
S50	580111.267	198542.843	580111.267	198542.843	Required	
S51	580056.334	198542.423	580056.334	198542.423	Required	
S52	580038.148	198539.153	580038.148	198539.153	Required	
S53	580028.134	198500.792	580028.134	198500.792	Required	
S54	580034.388	198462.442	580034.388	198462.442	Required	
S55	580028.734	198457.370	580028.734	198457.370	Required	
S56-HW	580036.484	198445.187	580036.484	198445.187	Required	
S57	580107.407	198443.314	580107.407	198443.314	Required	
S58-HW	580092.794	198438.507	580092.794	198438.507	Required	
S59-HW	580048.636	198411.894	580048.636	198411.894	Required	
S60-FCC	580046.438	198399.182	580046.438	198399.182	Required	
S	580044.186	198378.047			No Entry	

Midpoint
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Basingstoke, RG21 7PP

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Area Summary for Network D

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
6.000	Classification	Hardstanding	100	0.010	0.010	0.010
6.001	Classification	Hardstanding	100	0.092	0.092	0.092
7.000	Classification	Residential	60	1.079	0.647	0.647
6.002	Classification	Hardstanding	100	0.163	0.163	0.163
8.000	Classification	Hardstanding	100	0.010	0.010	0.010
6.003	-	-	100	0.000	0.000	0.000
6.004	-	-	100	0.000	0.000	0.000
9.000	Classification	Residential	60	1.448	0.869	0.869
6.005	Classification	Hardstanding	100	0.130	0.130	0.130
6.006	-	-	100	0.000	0.000	0.000
6.007	-	-	100	0.000	0.000	0.000
6.008	Classification	Hardstanding	100	0.415	0.415	0.415
10.000	Classification	Residential	60	0.611	0.367	0.367
6.009	-	-	100	0.000	0.000	0.000
6.010	-	-	100	0.000	0.000	0.000
11.000	Classification	Residential	60	1.332	0.799	0.799
11.001	-	-	100	0.000	0.000	0.000
6.011	Classification	Ponds	80	0.292	0.233	0.233
	Classification	Landscape	20	0.460	0.092	0.326
6.012	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				6.042	3.827	3.827

Free Flowing Outfall Details for Network D

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S6.012	S	8.300	7.437	0.000	0	0


Simulation Criteria for Network D

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 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	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Network D


Hydro-Brake® Optimum Manhole: S59-HW, DS/PN: S6.011, Volume (m³): 27.3

Unit Reference	MD-SHE-0179-1720-1450-1720
Design Head (m)	1.450
Design Flow (l/s)	17.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	179
Invert Level (m)	7.600
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.450	17.2	Kick-Flo®	0.939	14.0
Flush-Flo™	0.429	17.2	Mean Flow over Head Range	-	14.9

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)	Depth (m)	Flow (l/s)
0.100	6.3	0.800	15.9	2.000	20.0	4.000	27.9	7.000	36.6
0.200	15.6	1.000	14.4	2.200	21.0	4.500	29.6	7.500	37.8
0.300	16.8	1.200	15.7	2.400	21.9	5.000	31.1	8.000	39.0
0.400	17.2	1.400	16.9	2.600	22.7	5.500	32.6	8.500	40.2
0.500	17.1	1.600	18.0	3.000	24.3	6.000	34.0	9.000	41.3
0.600	16.9	1.800	19.1	3.500	26.2	6.500	35.3	9.500	42.4


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Storage Structures for Network D

Tank or Pond Manhole: S59-HW, DS/PN: S6.011

Invert Level (m) 7.850

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1704.0	1.200	2532.0	1.500	2762.0

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)
S6.000	S42	15 Winter	1	+0%	30/15 Summer	100/15 Summer			13.561
S6.001	S43	15 Winter	1	+0%	30/15 Summer	100/15 Summer			13.500
S7.000	S44	15 Winter	1	+0%	30/15 Summer	100/15 Summer			12.362
S6.002	S45	15 Winter	1	+0%	100/15 Summer				12.243
S8.000	S46	15 Winter	1	+0%	100/15 Summer	100/15 Summer			11.981
S6.003	S47	15 Winter	1	+0%	100/15 Summer				11.721
S6.004	S48	15 Winter	1	+0%	30/15 Winter				11.254
S9.000	S49	15 Winter	1	+0%	30/15 Summer	100/15 Summer			11.024
S6.005	S50	15 Winter	1	+0%	30/15 Summer				10.789
S6.006	S51	15 Winter	1	+0%	30/15 Summer	100/15 Summer			10.402
S6.007	S52	15 Winter	1	+0%	100/15 Summer				10.122
S6.008	S53	15 Winter	1	+0%	100/15 Summer	100/15 Summer			9.339
S10.000	S54	15 Winter	1	+0%	30/15 Summer	100/15 Summer			8.472
S6.009	S55	15 Winter	1	+0%	30/15 Summer	100/15 Summer			8.382
S6.010	S56-HW	15 Winter	1	+0%	30/15 Winter				8.151
S11.000	S57	15 Winter	1	+0%	30/15 Summer	100/15 Summer			8.201
S11.001	S58-HW	15 Winter	1	+0%	30/15 Summer				8.091
S6.011	S59-HW	180 Winter	1	+0%	1/15 Summer				8.060
S6.012	S60-FCC	180 Winter	1	+0%					7.670

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S6.000	S42	-0.119	0.000	0.10		1.3	OK	4
S6.001	S43	-0.080	0.000	0.44		11.8	OK	2
S7.000	S44	-0.213	0.000	0.53		86.1	OK	4
S6.002	S45	-0.260	0.000	0.37		116.3	OK	
S8.000	S46	-0.119	0.000	0.10		1.3	OK	3
S6.003	S47	-0.271	0.000	0.33		118.0	OK	
S6.004	S48	-0.276	0.000	0.32		117.7	OK	
S9.000	S49	-0.175	0.000	0.68		115.4	OK	4
S6.005	S50	-0.318	0.000	0.45		243.3	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
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PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)			
S6.006	S51	-0.265	0.000	0.59		242.9	OK	1
S6.007	S52	-0.378	0.000	0.29		243.7	OK	
S6.008	S53	-0.373	0.000	0.30		285.9	OK	3
S10.000	S54	-0.193	0.000	0.47		49.1	OK	4
S6.009	S55	-0.239	0.000	0.67		328.0	OK	4
S6.010	S56-HW	-0.380	0.000	0.49		323.5	OK	
S11.000	S57	-0.187	0.000	0.63		107.0	OK	3
S11.001	S58-HW	-0.220	0.000	0.50		105.5	OK	
S6.011	S59-HW	0.235	0.000	0.75		17.0	SURCHARGED	
S6.012	S60-FCC	-0.117	0.000	0.47		17.0	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)
S6.000	S42	15 Winter	30	+0%	30/15 Summer	100/15 Summer			13.888
S6.001	S43	15 Winter	30	+0%	30/15 Summer	100/15 Summer			13.884
S7.000	S44	15 Winter	30	+0%	30/15 Summer	100/15 Summer			12.627
S6.002	S45	15 Winter	30	+0%	100/15 Summer				12.400
S8.000	S46	15 Winter	30	+0%	100/15 Summer	100/15 Summer			12.000
S6.003	S47	15 Winter	30	+0%	100/15 Summer				11.878
S6.004	S48	15 Winter	30	+0%	30/15 Winter				11.591
S9.000	S49	15 Winter	30	+0%	30/15 Summer	100/15 Summer			11.562
S6.005	S50	15 Winter	30	+0%	30/15 Summer				11.331
S6.006	S51	15 Winter	30	+0%	30/15 Summer	100/15 Summer			10.811
S6.007	S52	15 Winter	30	+0%	100/15 Summer				10.273
S6.008	S53	15 Winter	30	+0%	100/15 Summer	100/15 Summer			9.655
S10.000	S54	15 Winter	30	+0%	30/15 Summer	100/15 Summer			9.189
S6.009	S55	15 Winter	30	+0%	30/15 Summer	100/15 Summer			9.097
S6.010	S56-HW	15 Winter	30	+0%	30/15 Winter				8.538
S11.000	S57	15 Winter	30	+0%	30/15 Summer	100/15 Summer			8.670
S11.001	S58-HW	15 Winter	30	+0%	30/15 Summer				8.446
S6.011	S59-HW	360 Winter	30	+0%	1/15 Summer				8.441
S6.012	S60-FCC	120 Winter	30	+0%					7.671

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S6.000	S42	0.208	0.000	0.40		5.3	SURCHARGED	4
S6.001	S43	0.304	0.000	1.14		30.5	SURCHARGED	2
S7.000	S44	0.052	0.000	1.31		211.3	SURCHARGED	4
S6.002	S45	-0.103	0.000	0.92		293.8	OK	
S8.000	S46	-0.100	0.000	0.23		3.1	OK	3
S6.003	S47	-0.114	0.000	0.83		295.1	OK	
S6.004	S48	0.061	0.000	0.80		292.2	SURCHARGED	
S9.000	S49	0.363	0.000	1.61		275.1	SURCHARGED	4
S6.005	S50	0.224	0.000	1.06		579.1	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
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PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)			
S6.006	S51	0.144	0.000	1.42		582.0	SURCHARGED	1
S6.007	S52	-0.227	0.000	0.70		579.4	OK	
S6.008	S53	-0.057	0.000	0.70		660.1	OK	3
S10.000	S54	0.524	0.000	1.11		116.2	FLOOD RISK	4
S6.009	S55	0.476	0.000	1.52		744.8	FLOOD RISK	4
S6.010	S56-HW	0.007	0.000	1.11		742.7	SURCHARGED	
S11.000	S57	0.282	0.000	1.52		257.3	SURCHARGED	3
S11.001	S58-HW	0.135	0.000	1.23		256.3	SURCHARGED	
S6.011	S59-HW	0.616	0.000	0.75		17.2	SURCHARGED	
S6.012	S60-FCC	-0.116	0.000	0.47		17.2	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)
S6.000	S42	15 Winter	100	+40%	30/15 Summer	100/15 Summer			14.885
S6.001	S43	15 Winter	100	+40%	30/15 Summer	100/15 Summer			15.257
S7.000	S44	15 Winter	100	+40%	30/15 Summer	100/15 Summer			14.178
S6.002	S45	15 Summer	100	+40%	100/15 Summer				14.094
S8.000	S46	15 Winter	100	+40%	100/15 Summer	100/15 Summer			13.338
S6.003	S47	15 Summer	100	+40%	100/15 Summer				13.416
S6.004	S48	15 Summer	100	+40%	30/15 Winter				12.928
S9.000	S49	15 Winter	100	+40%	30/15 Summer	100/15 Summer			12.565
S6.005	S50	15 Summer	100	+40%	30/15 Summer				12.464
S6.006	S51	15 Summer	100	+40%	30/15 Summer	100/15 Summer			11.843
S6.007	S52	15 Summer	100	+40%	100/15 Summer				11.322
S6.008	S53	15 Winter	100	+40%	100/15 Summer	100/15 Summer			10.628
S10.000	S54	15 Winter	100	+40%	30/15 Summer	100/15 Summer			9.621
S6.009	S55	15 Winter	100	+40%	30/15 Summer	100/15 Summer			9.504
S6.010	S56-HW	720 Winter	100	+40%	30/15 Winter				9.009
S11.000	S57	15 Winter	100	+40%	30/15 Summer	100/15 Summer			9.421
S11.001	S58-HW	720 Winter	100	+40%	30/15 Summer				9.009
S6.011	S59-HW	720 Winter	100	+40%	1/15 Summer				9.007
S6.012	S60-FCC	15 Winter	100	+40%					7.671

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S6.000	S42	1.205	5.025	2.19		29.1	FLOOD	4
S6.001	S43	1.677	0.337	1.34		36.0	FLOOD	2
S7.000	S44	1.603	18.626	1.92		309.8	FLOOD	4
S6.002	S45	1.591	0.000	1.25		398.1	FLOOD RISK	
S8.000	S46	1.238	0.361	0.85		11.4	FLOOD	3
S6.003	S47	1.424	0.000	1.06		377.3	FLOOD RISK	
S6.004	S48	1.398	0.000	1.03		377.5	FLOOD RISK	
S9.000	S49	1.366	40.606	2.49		425.2	FLOOD	4
S6.005	S50	1.357	0.000	1.38		753.2	FLOOD RISK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S6.006	S51	1.176	0.131	1.77		726.5	FLOOD	1
S6.007	S52	0.822	0.000	0.88		728.1	FLOOD RISK	
S6.008	S53	0.916	2.774	1.01		947.1	FLOOD	3
S10.000	S54	0.956	9.916	1.78		186.3	FLOOD	4
S6.009	S55	0.883	26.991	1.88		921.1	FLOOD	4
S6.010	S56-HW	0.478	0.000	0.19		129.6	FLOOD RISK	
S11.000	S57	1.033	12.999	2.30		389.6	FLOOD	3
S11.001	S58-HW	0.698	0.000	0.18		37.9	FLOOD RISK	
S6.011	S59-HW	1.182	0.000	0.75		17.2	FLOOD RISK	
S6.012	S60-FCC	-0.116	0.000	0.47		17.2	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network E

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Network E

« - Indicates pipe capacity < flow

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
S12.000	17.890	0.119	150.3	0.159	5.00	0.0	0.600	o	300	Pipe/Conduit	⚠
S13.000	15.370	0.102	150.7	0.381	5.00	0.0	0.600	o	300	Pipe/Conduit	⚠
S12.001	17.827	0.119	149.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	⚠
S12.002	14.771	0.098	150.7	0.056	0.00	0.0	0.600	o	375	Pipe/Conduit	⚠
S14.000	14.705	0.087	169.0	0.008	5.00	0.0	0.600	o	225	Pipe/Conduit	⚠
S12.003	46.607	0.310	150.3	0.061	0.00	0.0	0.600	o	450	Pipe/Conduit	⚠
S15.000	21.926	0.088	249.2	0.173	5.00	0.0	0.600	o	300	Pipe/Conduit	⚠
S12.004	52.128	0.309	168.7	0.101	0.00	0.0	0.600	o	450	Pipe/Conduit	⚠
S16.000	10.963	0.037	296.3	0.486	5.00	0.0	0.600	o	450	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)
S12.000	52.05	5.23	8.536	0.159	0.0	0.0	2.2	1.28	90.5	24.7
S13.000	52.20	5.20	8.519	0.381	0.0	0.0	5.4	1.28	90.4	59.2
S12.001	51.05	5.46	8.417	0.540	0.0	0.0	7.5	1.28	90.6	82.1
S12.002	50.35	5.63	8.223	0.595	0.0	0.0	8.1	1.47	162.7	89.3
S14.000	52.00	5.24	8.362	0.008	0.0	0.0	0.1	1.00	39.9	1.3
S12.003	48.51	6.10	8.050	0.665	0.0	0.0	8.7	1.66	263.3	96.0
S15.000	51.46	5.37	7.978	0.173	0.0	0.0	2.4	0.99	70.1	26.6
S12.004	46.52	6.66	7.740	0.939	0.0	0.0	11.8	1.56	248.5	130.1
S16.000	52.40	5.16	7.468	0.486	0.0	0.0	6.9	1.18	187.0	75.8

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Network Design Table for Network E

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
S12.005	13.989	0.056	249.8	0.046	0.00	0.0	0.600	o	525	Pipe/Conduit	🚫
S12.006	28.931	0.450	64.3	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	🚫
S12.007	35.043	0.100	350.4	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	🚫
S17.000	14.730	0.647	22.8	0.700	5.00	0.0	0.600	o	450	Pipe/Conduit	🚫
S17.001	16.341	0.082	199.3	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	🚫
S18.000	8.891	0.094	94.6	0.073	5.00	0.0	0.600	o	225	Pipe/Conduit	🚫
S18.001	52.444	0.556	94.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🚫
S18.002	20.379	0.100	203.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🚫
S12.008	10.507	0.035	300.2	0.234	0.00	0.0	0.600	o	225	Pipe/Conduit	🚫
S12.009	6.372	0.037	172.2	0.000	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)
S12.005	45.96	6.82	7.356	1.471	0.0	0.0	18.3	1.41	305.8	201.4
S12.006	45.39	6.99	7.300	1.471	0.0	0.0	18.3	2.80	605.5	201.4
S12.007	43.87	7.48	6.850	1.471	0.0	0.0	18.3	1.19	257.8	201.4
S17.000	52.84	5.06	7.477	0.700	0.0	0.0	10.0	4.28	679.9	110.1
S17.001	51.99	5.25	6.830	0.700	0.0	0.0	10.0	1.44	228.5	110.1
S18.000	52.60	5.11	7.500	0.073	0.0	0.0	1.0	1.34	53.5	11.5
S18.001	49.84	5.76	7.406	0.073	0.0	0.0	1.0	1.35	53.5	11.5
S18.002	48.39	6.13	6.850	0.073	0.0	0.0	1.0	0.91	36.3	11.5
S12.008	43.18	7.72	6.750	2.478	0.0	0.0	29.0	0.75	29.8	318.7
S12.009	42.87	7.83	6.715	2.478	0.0	0.0	29.0	0.99	39.5	318.7

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Manhole Schedules for Network E

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)
S61	10.475	1.939	Open Manhole	1200	S12.000	8.536	300				
S62	9.919	1.400	Open Manhole	1200	S13.000	8.519	300				
S63	10.269	1.852	Open Manhole	1200	S12.001	8.417	300	S12.000	8.417	300	
								S13.000	8.417	300	
S64	10.098	1.875	Open Manhole	1350	S12.002	8.223	375	S12.001	8.298	300	
S65	9.577	1.215	Open Manhole	1200	S14.000	8.362	225				
S66	9.928	1.878	Open Manhole	1350	S12.003	8.050	450	S12.002	8.125	375	
								S14.000	8.275	225	
S67	9.614	1.636	Open Manhole	1200	S15.000	7.978	300				
S68	9.437	1.697	Open Manhole	1350	S12.004	7.740	450	S12.003	7.740	450	
								S15.000	7.890	300	
S69	8.700	1.232	Open Manhole	1350	S16.000	7.468	450				
S70	8.628	1.272	Open Manhole	1500	S12.005	7.356	525	S12.004	7.431	450	
								S16.000	7.431	450	
S71	8.400	1.100	Open Manhole	1500	S12.006	7.300	525	S12.005	7.300	525	
S72-HW	8.400	1.550	Open Manhole	1500	S12.007	6.850	525	S12.006	6.850	525	
S73	8.096	0.619	Open Manhole	1350	S17.000	7.477	450				
S74-HW	8.400	1.570	Open Manhole	1350	S17.001	6.830	450	S17.000	6.830	450	
S75	9.058	1.558	Open Manhole	1200	S18.000	7.500	225				
S76	8.621	1.215	Open Manhole	1200	S18.001	7.406	225	S18.000	7.406	225	
S77-HW	8.400	1.550	Open Manhole	1200	S18.002	6.850	225	S18.001	6.850	225	
S78-HW	8.400	1.652	Open Manhole	1500	S12.008	6.750	225	S12.007	6.750	525	
								S17.001	6.748	450	
								S18.002	6.750	225	
S79-FCC	8.400	1.685	Open Manhole	1200	S12.009	6.715	225	S12.008	6.715	225	
S	8.000	1.322	Open Manhole	0		OUTFALL		S12.009	6.678	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S61	580212.446	198216.308	580212.446	198216.308	Required	
S62	580194.683	198200.406	580194.683	198200.406	Required	
S63	580194.564	198215.776	580194.564	198215.776	Required	
S64	580177.440	198220.734	580177.440	198220.734	Required	
S65	580154.382	198221.441	580154.382	198221.441	Required	
S66	580166.151	198230.259	580166.151	198230.259	Required	

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Manhole Schedules for Network E

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S67	580172.285	198266.029	580172.285	198266.029	Required	
S68	580152.152	198274.714	580152.152	198274.714	Required	
S69	580105.376	198254.023	580105.376	198254.023	Required	
S70	580101.111	198264.123	580101.111	198264.123	Required	
S71	580095.470	198276.924	580095.470	198276.924	Required	
S72-HW	580083.806	198303.400	580083.806	198303.400	Required	
S73	580093.578	198342.952	580093.578	198342.952	Required	
S74-HW	580079.367	198339.079	580079.367	198339.079	Required	
S75	580145.144	198323.847	580145.144	198323.847	Required	
S76	580136.258	198324.125	580136.258	198324.125	Required	
S77-HW	580083.873	198326.622	580083.873	198326.622	Required	
S78-HW	580064.380	198332.566	580064.380	198332.566	Required	
S79-FCC	580055.565	198326.848	580055.565	198326.848	Required	
S	580050.589	198322.867			No Entry	

Midpoint
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Basingstoke, RG21 7PP

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Area Summary for Network E

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
12.000	Classification	Residential	60	0.179	0.108	0.108
	Classification	Hardstanding	100	0.051	0.051	0.159
13.000	Classification	Residential	60	0.620	0.372	0.372
	Classification	Hardstanding	100	0.009	0.009	0.381
12.001	-	-	100	0.000	0.000	0.000
12.002	Classification	Hardstanding	100	0.056	0.056	0.056
14.000	Classification	Hardstanding	100	0.008	0.008	0.008
12.003	Classification	Hardstanding	100	0.061	0.061	0.061
15.000	Classification	Residential	60	0.289	0.173	0.173
12.004	Classification	Hardstanding	100	0.101	0.101	0.101
16.000	Classification	Residential	60	0.810	0.486	0.486
12.005	Classification	Hardstanding	100	0.046	0.046	0.046
12.006	-	-	100	0.000	0.000	0.000
12.007	-	-	100	0.000	0.000	0.000
17.000	Classification	Residential	60	1.166	0.700	0.700
17.001	-	-	100	0.000	0.000	0.000
18.000	Classification	Hardstanding	100	0.073	0.073	0.073
18.001	-	-	100	0.000	0.000	0.000
18.002	-	-	100	0.000	0.000	0.000
12.008	Classification	Landscape	20	0.276	0.055	0.055
	Classification	Ponds	80	0.224	0.179	0.234
12.009	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				3.969	2.478	2.478

Free Flowing Outfall Details for Network E

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S12.009	S	8.000	6.678	0.000	0	0


Simulation Criteria for Network E

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 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	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Network E


Hydro-Brake® Optimum Manhole: S78-HW, DS/PN: S12.008, Volume (m³): 13.3

Unit Reference	MD-SHE-0148-1120-1350-1120
Design Head (m)	1.350
Design Flow (l/s)	11.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	148
Invert Level (m)	6.750
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	11.2	Kick-Flo®	0.858	9.0
Flush-Flo™	0.395	11.2	Mean Flow over Head Range	-	9.7

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)	Depth (m)	Flow (l/s)
0.100	5.3	0.800	9.8	2.000	13.5	4.000	18.8	7.000	24.5
0.200	10.4	1.000	9.7	2.200	14.1	4.500	19.8	7.500	25.4
0.300	11.0	1.200	10.6	2.400	14.7	5.000	20.9	8.000	26.2
0.400	11.2	1.400	11.4	2.600	15.3	5.500	21.8	8.500	26.9
0.500	11.1	1.600	12.1	3.000	16.3	6.000	22.8	9.000	27.7
0.600	10.9	1.800	12.8	3.500	17.6	6.500	23.7	9.500	28.4


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Storage Structures for Network E

Tank or Pond Manhole: S78-HW, DS/PN: S12.008

Invert Level (m) 6.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	1013.0	1.200	1830.0	1.500	2056.0

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)
S12.000	S61	15 Winter	1	+0%	30/15 Summer				8.671
S13.000	S62	15 Winter	1	+0%	30/15 Summer	100/15 Summer			8.701
S12.001	S63	15 Winter	1	+0%	30/15 Summer				8.646
S12.002	S64	15 Winter	1	+0%	30/15 Summer				8.441
S14.000	S65	15 Winter	1	+0%	30/15 Summer	100/15 Summer			8.388
S12.003	S66	15 Winter	1	+0%	30/15 Summer				8.237
S15.000	S67	15 Winter	1	+0%	30/15 Summer	100/15 Winter			8.106
S12.004	S68	15 Winter	1	+0%	30/15 Summer				7.971
S16.000	S69	15 Winter	1	+0%	30/15 Summer	100/15 Summer			7.730
S12.005	S70	15 Winter	1	+0%	30/15 Summer	100/15 Summer			7.711
S12.006	S71	15 Winter	1	+0%	30/15 Winter				7.512
S12.007	S72-HW	15 Winter	1	+0%	30/15 Summer				7.205
S17.000	S73	15 Winter	1	+0%	100/15 Summer	100/15 Summer			7.616
S17.001	S74-HW	240 Winter	1	+0%	30/15 Summer				7.135
S18.000	S75	15 Winter	1	+0%	100/15 Winter				7.573
S18.001	S76	15 Winter	1	+0%	100/60 Summer				7.473
S18.002	S77-HW	240 Winter	1	+0%	1/60 Summer				7.134
S12.008	S78-HW	240 Winter	1	+0%	1/15 Summer				7.134
S12.009	S79-FCC	240 Winter	1	+0%					6.810

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S12.000	S61	-0.165	0.000	0.27		21.0	OK	
S13.000	S62	-0.118	0.000	0.67		51.0	OK	6
S12.001	S63	-0.071	0.000	0.92		71.8	OK	
S12.002	S64	-0.157	0.000	0.64		78.2	OK	
S14.000	S65	-0.199	0.000	0.03		1.1	OK	2
S12.003	S66	-0.263	0.000	0.36		84.4	OK	
S15.000	S67	-0.172	0.000	0.37		22.8	OK	1
S12.004	S68	-0.219	0.000	0.51		115.5	OK	
S16.000	S69	-0.188	0.000	0.48		64.1	OK	4

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

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)			
S12.005	S70	-0.170	0.000	0.79		175.0	OK	4
S12.006	S71	-0.313	0.000	0.35		174.4	OK	
S12.007	S72-HW	-0.170	0.000	0.78		173.0	OK	
S17.000	S73	-0.311	0.000	0.21		93.8	OK	2
S17.001	S74-HW	-0.145	0.000	0.11		19.1	OK	
S18.000	S75	-0.152	0.000	0.23		9.8	OK	
S18.001	S76	-0.158	0.000	0.19		9.6	OK	
S18.002	S77-HW	0.059	0.000	0.06		1.8	SURCHARGED	
S12.008	S78-HW	0.159	0.000	0.44		11.1	SURCHARGED	
S12.009	S79-FCC	-0.130	0.000	0.37		11.1	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)
S12.000	S61	15 Winter	30	+0%	30/15 Summer				9.535
S13.000	S62	15 Winter	30	+0%	30/15 Summer	100/15 Summer			9.665
S12.001	S63	15 Winter	30	+0%	30/15 Summer				9.432
S12.002	S64	15 Winter	30	+0%	30/15 Summer				8.932
S14.000	S65	15 Winter	30	+0%	30/15 Summer	100/15 Summer			8.733
S12.003	S66	15 Winter	30	+0%	30/15 Summer				8.733
S15.000	S67	15 Winter	30	+0%	30/15 Summer	100/15 Winter			8.611
S12.004	S68	15 Winter	30	+0%	30/15 Summer				8.533
S16.000	S69	15 Winter	30	+0%	30/15 Summer	100/15 Summer			8.151
S12.005	S70	15 Winter	30	+0%	30/15 Summer	100/15 Summer			8.110
S12.006	S71	15 Winter	30	+0%	30/15 Winter				7.845
S12.007	S72-HW	15 Winter	30	+0%	30/15 Summer				7.571
S17.000	S73	15 Winter	30	+0%	100/15 Summer	100/15 Summer			7.706
S17.001	S74-HW	360 Winter	30	+0%	30/15 Summer				7.515
S18.000	S75	15 Winter	30	+0%	100/15 Winter				7.621
S18.001	S76	360 Winter	30	+0%	100/60 Summer				7.516
S18.002	S77-HW	360 Winter	30	+0%	1/60 Summer				7.515
S12.008	S78-HW	360 Winter	30	+0%	1/15 Summer				7.514
S12.009	S79-FCC	15 Winter	30	+0%					6.810

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S12.000	S61	0.699	0.000	0.62		48.1	SURCHARGED	
S13.000	S62	0.846	0.000	1.56		118.4	FLOOD RISK	6
S12.001	S63	0.715	0.000	2.11		164.5	SURCHARGED	
S12.002	S64	0.334	0.000	1.45		178.1	SURCHARGED	
S14.000	S65	0.146	0.000	0.12		4.3	SURCHARGED	2
S12.003	S66	0.233	0.000	0.80		189.8	SURCHARGED	
S15.000	S67	0.333	0.000	0.83		51.1	SURCHARGED	1
S12.004	S68	0.343	0.000	1.13		256.1	SURCHARGED	
S16.000	S69	0.233	0.000	1.19		158.6	SURCHARGED	4

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

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m ³)			Flow (l/s)		
S12.005	S70	0.229	0.000	1.80	396.5	SURCHARGED	4	
S12.006	S71	0.020	0.000	0.78	393.6	SURCHARGED		
S12.007	S72-HW	0.196	0.000	1.77	390.8	SURCHARGED		
S17.000	S73	-0.221	0.000	0.51	230.1	FLOOD RISK	2	
S17.001	S74-HW	0.235	0.000	0.19	31.6	SURCHARGED		
S18.000	S75	-0.104	0.000	0.56	24.0	OK		
S18.001	S76	-0.115	0.000	0.06	3.3	OK		
S18.002	S77-HW	0.440	0.000	0.09	3.0	SURCHARGED		
S12.008	S78-HW	0.539	0.000	0.45	11.2	SURCHARGED		
S12.009	S79-FCC	-0.130	0.000	0.37	11.2	OK		

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (1/per/day) 0.000
Foul Sewage per hectare (l/s) 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)
S12.000	S61	15 Winter	100	+40%	30/15 Summer				10.114
S13.000	S62	15 Winter	100	+40%	30/15 Summer	100/15 Summer			9.966
S12.001	S63	15 Winter	100	+40%	30/15 Summer				9.925
S12.002	S64	15 Summer	100	+40%	30/15 Summer				9.706
S14.000	S65	15 Winter	100	+40%	30/15 Summer	100/15 Summer			9.577
S12.003	S66	15 Summer	100	+40%	30/15 Summer				9.574
S15.000	S67	15 Winter	100	+40%	30/15 Summer	100/15 Winter			9.614
S12.004	S68	15 Summer	100	+40%	30/15 Summer				9.380
S16.000	S69	15 Winter	100	+40%	30/15 Summer	100/15 Summer			8.720
S12.005	S70	15 Winter	100	+40%	30/15 Summer	100/15 Summer			8.634
S12.006	S71	30 Winter	100	+40%	30/15 Winter				8.225
S12.007	S72-HW	720 Winter	100	+40%	30/15 Summer				8.036
S17.000	S73	15 Winter	100	+40%	100/15 Summer	100/15 Summer			8.100
S17.001	S74-HW	720 Winter	100	+40%	30/15 Summer				8.035
S18.000	S75	720 Winter	100	+40%	100/15 Winter				8.036
S18.001	S76	720 Winter	100	+40%	100/60 Summer				8.036
S18.002	S77-HW	720 Winter	100	+40%	1/60 Summer				8.034
S12.008	S78-HW	720 Winter	100	+40%	1/15 Summer				8.033
S12.009	S79-FCC	10080 Summer	100	+40%					6.810

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S12.000	S61	1.278	0.000	1.20		93.2	FLOOD RISK	
S13.000	S62	1.147	47.207	1.73		131.6	FLOOD	6
S12.001	S63	1.208	0.000	2.25		175.3	FLOOD RISK	
S12.002	S64	1.108	0.000	1.60		196.6	FLOOD RISK	
S14.000	S65	0.990	0.172	0.21		7.4	FLOOD	2
S12.003	S66	1.074	0.000	0.83		196.3	FLOOD RISK	
S15.000	S67	1.336	0.194	1.66		102.3	FLOOD	1
S12.004	S68	1.190	0.000	1.49		337.7	FLOOD RISK	
S16.000	S69	0.802	19.867	1.61		215.0	FLOOD	4

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

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m ³)			Flow (l/s)		
S12.005	S70	0.753	5.984	2.27		500.4	FLOOD	4
S12.006	S71	0.400	0.000	0.99		499.2	FLOOD RISK	
S12.007	S72-HW	0.661	0.000	0.30		67.1	FLOOD RISK	
S17.000	S73	0.173	3.840	0.84		382.9	FLOOD	2
S17.001	S74-HW	0.755	0.000	0.19		32.8	FLOOD RISK	
S18.000	S75	0.311	0.000	0.08		3.5	SURCHARGED	
S18.001	S76	0.405	0.000	0.06		3.3	SURCHARGED	
S18.002	S77-HW	0.959	0.000	0.09		3.1	FLOOD RISK	
S12.008	S78-HW	1.058	0.000	0.45		11.2	FLOOD RISK	
S12.009	S79-FCC	-0.130	0.000	0.37		11.2	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network F

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.300	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Network F

« - Indicates pipe capacity < flow

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
S19.000	40.458	0.690	58.6	0.452	5.00	0.0	0.600	o	375	Pipe/Conduit	🚫
S19.001	12.851	0.064	200.8	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🚫
S20.000	20.528	0.130	157.9	0.237	5.00	0.0	0.600	o	375	Pipe/Conduit	🚫
S20.001	16.719	0.084	199.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🚫
S21.000	41.983	0.416	100.9	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	🚫
S21.001	18.550	0.093	199.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🚫
S22.000	41.602	0.416	100.0	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	🚫
S22.001	13.392	0.067	199.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	🚫
S19.002	6.449	0.021	307.1	0.106	0.00	0.0	0.600	o	450	Pipe/Conduit	🚫
S19.003	25.090	0.167	150.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	🚫
S19.004	25.252	0.168	150.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	🚫
S19.005	10.674	0.071	150.3	0.000	0.00	0.0	0.600	o	150	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)
S19.000	51.57	5.28	9.500	0.452	0.0	0.0	6.3	2.37	261.8	69.5
S19.001	50.84	5.45	8.810	0.452	0.0	0.0	6.3	1.27	140.8	69.5
S20.000	51.77	5.24	8.960	0.237	0.0	0.0	3.3	1.44	159.0	36.6
S20.001	50.83	5.46	8.830	0.237	0.0	0.0	3.3	1.28	141.4	36.6
S21.000	50.49	5.54	9.255	0.013	0.0	0.0	0.2	1.30	51.7	1.9
S21.001	49.14	5.87	8.839	0.013	0.0	0.0	0.2	0.92	36.7	1.9
S22.000	50.52	5.53	9.229	0.010	0.0	0.0	0.1	1.31	52.0	1.5
S22.001	49.53	5.77	8.813	0.010	0.0	0.0	0.1	0.92	36.6	1.5
S19.002	48.78	5.97	8.746	0.818	0.0	0.0	10.8	1.15	183.7	118.9
S19.003	46.90	6.48	8.725	0.818	0.0	0.0	10.8	0.82	14.4«	118.9
S19.004	45.17	6.99	8.588	0.818	0.0	0.0	10.8	0.82	14.4«	118.9
S19.005	44.48	7.21	8.420	0.818	0.0	0.0	10.8	0.82	14.4«	118.9

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Manhole Schedules for Network F

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)
S81	11.588	2.088	Open Manhole	1350	S19.000	9.500	375				
S82-HW	10.400	1.590	Open Manhole	1350	S19.001	8.810	375	S19.000	8.810	375	
S83	10.246	1.286	Open Manhole	1350	S20.000	8.960	375				
S84-HW	10.400	1.570	Open Manhole	1350	S20.001	8.830	375	S20.000	8.830	375	
S85	11.106	1.851	Open Manhole	1200	S21.000	9.255	225				
S86-HW	10.400	1.561	Open Manhole	1200	S21.001	8.839	225	S21.000	8.839	225	
S87	11.482	2.253	Open Manhole	1200	S22.000	9.229	225				
S88-HW	10.400	1.587	Open Manhole	1200	S22.001	8.813	225	S22.000	8.813	225	
S89-HW	10.400	1.654	Open Manhole	1350	S19.002	8.746	450	S19.001	8.746	375	
								S20.001	8.746	375	
								S21.001	8.746	225	
								S22.001	8.746	225	
S90-FCC	10.400	1.675	Open Manhole	1350	S19.003	8.725	150	S19.002	8.725	450	
S91	9.631	1.073	Open Manhole	1200	S19.004	8.588	150	S19.003	8.558	150	
S92	9.435	1.015	Open Manhole	1200	S19.005	8.420	150	S19.004	8.420	150	
S	9.198	0.849	Open Manhole	0		OUTFALL		S19.005	8.349	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S81	579940.105	198553.868	579940.105	198553.868	Required	
S82-HW	579938.549	198513.440	579938.549	198513.440	Required	
S83	579901.233	198488.844	579901.233	198488.844	Required	
S84-HW	579918.051	198500.615	579918.051	198500.615	Required	
S85	579876.303	198516.870	579876.303	198516.870	Required	
S86-HW	579916.837	198505.939	579916.837	198505.939	Required	
S87	579913.296	198551.307	579913.296	198551.307	Required	
S88-HW	579926.877	198511.984	579926.877	198511.984	Required	
S89-HW	579934.761	198501.159	579934.761	198501.159	Required	
S90-FCC	579937.256	198495.213	579937.256	198495.213	Required	

Midpoint
 Alencon Link
 Basingstoke, RG21 7PP

South Woodham Ferrers
 Drainage Strategy



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Manhole Schedules for Network F

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S91	579918.929	198478.076	579918.929	198478.076	Required	
S92	579897.877	198464.131	579897.877	198464.131	Required	
S	579888.978	198458.237			No Entry	

Midpoint
Alencon Link
Basingstoke, RG21 7PP

South Woodham Ferrers
Drainage Strategy



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Area Summary for Network F

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
19.000	Classification	Residential	60	0.754	0.452	0.452
19.001	-	-	100	0.000	0.000	0.000
20.000	Classification	Hardstanding	100	0.237	0.237	0.237
20.001	-	-	100	0.000	0.000	0.000
21.000	Classification	Hardstanding	100	0.013	0.013	0.013
21.001	-	-	100	0.000	0.000	0.000
22.000	Classification	Hardstanding	100	0.010	0.010	0.010
22.001	-	-	100	0.000	0.000	0.000
19.002	Classification	Ponds	80	0.091	0.073	0.073
	Classification	Landscape	20	0.163	0.033	0.106
19.003	-	-	100	0.000	0.000	0.000
19.004	-	-	100	0.000	0.000	0.000
19.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.268	0.818	0.818

Free Flowing Outfall Details for Network F


Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S19.005	S	9.198	8.349	0.000	0	0

Simulation Criteria for Network F

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 Offline Controls	0
Number of Online Controls	1	Number of Storage Structures	1
		Number of Time/Area Diagrams	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)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Network F


Hydro-Brake® Optimum Manhole: S89-HW, DS/PN: S19.002, Volume (m³): 6.5

Unit Reference	MD-SHE-0084-3500-1354-3500
Design Head (m)	1.354
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	84
Invert Level (m)	8.746
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.354	3.5	Kick-Flo®	0.747	2.7
Flush-Flo™	0.366	3.3	Mean Flow over Head Range	-	3.0

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)	Depth (m)	Flow (l/s)
0.100	2.5	0.800	2.7	2.000	4.2	4.000	5.8	7.000	7.5
0.200	3.1	1.000	3.0	2.200	4.4	4.500	6.1	7.500	7.8
0.300	3.3	1.200	3.3	2.400	4.6	5.000	6.4	8.000	8.0
0.400	3.3	1.400	3.5	2.600	4.7	5.500	6.7	8.500	8.3
0.500	3.3	1.600	3.8	3.000	5.1	6.000	7.0	9.000	8.5
0.600	3.1	1.800	4.0	3.500	5.4	6.500	7.3	9.500	8.7


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Storage Structures for Network F

Tank or Pond Manhole: S89-HW, DS/PN: S19.002

Invert Level (m) 8.900

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	298.0	1.200	705.0	1.500	826.0

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
 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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 DTS Status OFF

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	Surcharged
									Level (m)	Depth (m)
S19.000	S81	15 Winter	1	+0%	100/15 Summer				9.629	-0.246
S19.001	S82-HW	240 Winter	1	+0%	30/15 Summer				9.138	-0.047
S20.000	S83	240 Winter	1	+0%	30/15 Winter				9.138	-0.197
S20.001	S84-HW	240 Winter	1	+0%	30/15 Summer				9.137	-0.068
S21.000	S85	15 Winter	1	+0%	30/180 Winter				9.282	-0.198
S21.001	S86-HW	240 Winter	1	+0%	1/30 Winter				9.137	-0.073
S22.000	S87	15 Winter	1	+0%	30/180 Winter				9.254	-0.200
S22.001	S88-HW	240 Winter	1	+0%	1/30 Summer				9.137	0.099
S19.002	S89-HW	240 Winter	1	+0%	30/15 Winter				9.137	-0.059
S19.003	S90-FCC	240 Winter	1	+0%					8.775	-0.100
S19.004	S91	240 Winter	1	+0%					8.638	-0.100
S19.005	S92	240 Winter	1	+0%					8.471	-0.099

PN	US/MH Name	Flooded Volume (m³)	Flow / Overflow Cap.	Pipe Flow (l/s)	Pipe Flow (l/s)	Status	Level
							Exceeded
S19.000	S81	0.000	0.25		60.1	OK	
S19.001	S82-HW	0.000	0.11		12.1	OK	
S20.000	S83	0.000	0.05		6.4	OK	
S20.001	S84-HW	0.000	0.05		6.0	OK	
S21.000	S85	0.000	0.03		1.7	OK	
S21.001	S86-HW	0.000	0.00		0.1	SURCHARGED	
S22.000	S87	0.000	0.03		1.3	OK	
S22.001	S88-HW	0.000	0.00		0.1	SURCHARGED	
S19.002	S89-HW	0.000	0.03		3.3	OK	
S19.003	S90-FCC	0.000	0.24		3.3	OK	
S19.004	S91	0.000	0.24		3.3	OK	
S19.005	S92	0.000	0.25		3.3	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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	Surcharged
									Level (m)	Depth (m)
S19.000	S81	15 Winter	30	+0%	100/15 Summer				9.717	-0.158
S19.001	S82-HW	480 Winter	30	+0%	30/15 Summer				9.519	0.334
S20.000	S83	480 Winter	30	+0%	30/15 Winter				9.519	0.184
S20.001	S84-HW	480 Winter	30	+0%	30/15 Summer				9.518	0.313
S21.000	S85	480 Winter	30	+0%	30/180 Winter				9.518	0.038
S21.001	S86-HW	480 Winter	30	+0%	1/30 Winter				9.518	0.454
S22.000	S87	480 Winter	30	+0%	30/180 Winter				9.518	0.064
S22.001	S88-HW	480 Winter	30	+0%	1/30 Summer				9.518	0.480
S19.002	S89-HW	480 Winter	30	+0%	30/15 Winter				9.518	0.322
S19.003	S90-FCC	240 Summer	30	+0%					8.775	-0.100
S19.004	S91	960 Summer	30	+0%					8.638	-0.100
S19.005	S92	360 Winter	30	+0%					8.471	-0.099

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level
							Exceeded
S19.000	S81	0.000	0.62		147.4	OK	
S19.001	S82-HW	0.000	0.15		16.0	SURCHARGED	
S20.000	S83	0.000	0.06		8.5	SURCHARGED	
S20.001	S84-HW	0.000	0.07		8.3	SURCHARGED	
S21.000	S85	0.000	0.01		0.5	SURCHARGED	
S21.001	S86-HW	0.000	0.01		0.2	SURCHARGED	
S22.000	S87	0.000	0.01		0.4	SURCHARGED	
S22.001	S88-HW	0.000	0.00		0.1	SURCHARGED	
S19.002	S89-HW	0.000	0.03		3.3	SURCHARGED	
S19.003	S90-FCC	0.000	0.24		3.3	OK	
S19.004	S91	0.000	0.24		3.3	OK	
S19.005	S92	0.000	0.26		3.3	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S19.000	S81	15 Winter	100	+40%	100/15 Summer				10.497	0.622
S19.001	S82-HW	720 Winter	100	+40%	30/15 Summer				9.999	0.814
S20.000	S83	720 Winter	100	+40%	30/15 Winter				10.000	0.665
S20.001	S84-HW	720 Winter	100	+40%	30/15 Summer				9.999	0.794
S21.000	S85	720 Winter	100	+40%	30/180 Winter				9.998	0.518
S21.001	S86-HW	720 Winter	100	+40%	1/30 Winter				9.998	0.934
S22.000	S87	720 Winter	100	+40%	30/180 Winter				9.998	0.544
S22.001	S88-HW	720 Winter	100	+40%	1/30 Summer				9.998	0.960
S19.002	S89-HW	720 Winter	100	+40%	30/15 Winter				9.998	0.802
S19.003	S90-FCC	720 Winter	100	+40%					8.775	-0.100
S19.004	S91	720 Winter	100	+40%					8.638	-0.100
S19.005	S92	720 Winter	100	+40%					8.471	-0.099

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S19.000	S81	0.000	1.10		261.4	SURCHARGED	
S19.001	S82-HW	0.000	0.20		21.1	FLOOD RISK	
S20.000	S83	0.000	0.08		11.2	FLOOD RISK	
S20.001	S84-HW	0.000	0.10		11.1	FLOOD RISK	
S21.000	S85	0.000	0.01		0.5	SURCHARGED	
S21.001	S86-HW	0.000	0.01		0.4	FLOOD RISK	
S22.000	S87	0.000	0.01		0.4	SURCHARGED	
S22.001	S88-HW	0.000	0.01		0.3	FLOOD RISK	
S19.002	S89-HW	0.000	0.03		3.3	FLOOD RISK	
S19.003	S90-FCC	0.000	0.24		3.3	OK	
S19.004	S91	0.000	0.24		3.3	OK	
S19.005	S92	0.000	0.26		3.3	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network H

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Network H

« - Indicates pipe capacity < flow

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
S23.000	97.731	0.426	229.4	0.305	5.00	0.0	0.600	o	300	Pipe/Conduit	⚠
S24.000	96.910	4.934	19.6	0.685	5.00	0.0	0.600	o	300	Pipe/Conduit	⚠
S24.001	36.860	1.404	26.3	0.110	0.00	0.0	0.600	o	375	Pipe/Conduit	⚠
S24.002	109.814	0.220	499.2	0.495	0.00	0.0	0.600	o	525	Pipe/Conduit	⚠
S24.003	110.564	0.221	500.3	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	⚠
S23.001	125.435	0.251	499.7	0.100	0.00	0.0	0.600	o	600	Pipe/Conduit	⚠
S25.000	88.839	2.625	33.8	0.794	5.00	0.0	0.600	o	375	Pipe/Conduit	⚠
S23.002	16.651	0.033	504.6	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	⚠
S23.003	68.446	0.137	499.6	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	⚠
S26.000	110.844	1.706	65.0	0.233	5.00	0.0	0.600	o	300	Pipe/Conduit	⚠
S26.001	88.201	1.749	50.4	0.167	0.00	0.0	0.600	o	375	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)
S23.000	46.80	6.58	11.422	0.305	0.0	0.0	3.9	1.03	73.1	42.5
S24.000	50.00	5.45	17.700	0.685	0.0	0.0	9.3	3.56	251.9	102.0
S24.001	50.00	5.63	12.766	0.795	0.0	0.0	10.8	3.55	391.9	118.4
S24.002	43.93	7.46	11.212	1.289	0.0	0.0	15.3	1.00	215.6	168.7
S24.003	39.07	9.32	10.992	1.289	0.0	0.0	15.3	0.99	215.3	168.7
S23.001	35.33	11.25	10.696	1.694	0.0	0.0	16.2	1.08	306.1	178.3
S25.000	50.00	5.47	13.380	0.794	0.0	0.0	10.7	3.12	345.0	118.2
S23.002	34.93	11.49	10.370	2.488	0.0	0.0	23.5	1.16	415.1	258.9
S23.003	33.38	12.47	10.337	2.488	0.0	0.0	23.5	1.17	417.1	258.9
S26.000	49.10	5.95	23.330	0.233	0.0	0.0	3.1	1.95	138.1	34.2
S26.001	46.99	6.52	21.549	0.400	0.0	0.0	5.1	2.56	282.4	56.0

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Network Design Table for Network H

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
S27.000	42.237	1.269	33.3	0.111	5.00	0.0	0.600	o	150	Pipe/Conduit	🔴
S26.002	27.741	0.800	34.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔴
S26.003	106.784	2.643	40.4	0.255	0.00	0.0	0.600	o	375	Pipe/Conduit	🔴
S26.004	20.762	0.514	40.4	0.101	0.00	0.0	0.600	o	375	Pipe/Conduit	🔴
S26.005	20.019	0.496	40.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔴
S26.006	89.314	2.893	30.9	0.176	0.00	0.0	0.600	o	450	Pipe/Conduit	🔴
S26.007	17.133	0.486	35.3	0.062	0.00	0.0	0.600	o	450	Pipe/Conduit	🔴
S26.008	14.480	0.172	84.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	🔴
S26.009	13.492	0.172	78.4	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	🔴
S28.000	25.634	1.925	13.3	0.126	5.00	0.0	0.600	o	225	Pipe/Conduit	🔴
S29.000	16.684	0.300	55.6	1.450	5.00	0.0	0.600	o	600	Pipe/Conduit	🔴
S26.010	21.635	0.250	86.5	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	🔴
S26.011	61.796	0.565	109.4	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	🔴
S26.012	14.341	0.136	105.4	0.246	0.00	0.0	0.600	o	750	Pipe/Conduit	🔴
S26.013	46.414	0.149	311.5	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	🔴
S30.000	21.955	0.483	45.5	1.251	5.00	0.0	0.600	o	450	Pipe/Conduit	🔴
S30.001	59.943	0.149	402.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	🔴
S23.004	14.333	0.029	494.2	0.693	0.00	0.0	0.600	o	1050	Pipe/Conduit	🔴
S23.005	25.656	0.086	298.3	0.000	0.00	0.0	0.600	o	300	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)
S27.000	50.00	5.40	21.294	0.111	0.0	0.0	1.5	1.75	30.9	16.5
S26.002	46.47	6.67	19.800	0.511	0.0	0.0	6.4	3.09	340.8	70.7
S26.003	44.45	7.29	19.050	0.766	0.0	0.0	9.2	2.86	315.7	101.4
S26.004	44.08	7.41	16.407	0.867	0.0	0.0	10.4	2.86	315.7	113.9
S26.005	43.73	7.53	15.893	0.867	0.0	0.0	10.4	2.86	315.8	113.9
S26.006	42.56	7.94	15.322	1.043	0.0	0.0	12.0	3.67	583.6	132.3
S26.007	42.33	8.02	12.429	1.105	0.0	0.0	12.7	3.43	546.0	139.4
S26.008	42.03	8.13	11.943	1.105	0.0	0.0	12.7	2.22	352.6	139.4
S26.009	41.77	8.23	11.772	1.105	0.0	0.0	12.7	2.30	365.4	139.4
S28.000	50.00	5.12	14.050	0.126	0.0	0.0	1.7	3.61	143.3	18.7
S29.000	50.00	5.09	11.750	1.450	0.0	0.0	19.6	3.27	924.6	216.0
S26.010	41.45	8.35	11.300	2.681	0.0	0.0	30.1	3.01	1329.5	331.1
S26.011	40.47	8.73	11.050	2.681	0.0	0.0	30.1	2.68	1182.0	331.1
S26.012	40.25	8.82	10.485	2.927	0.0	0.0	31.9	2.73	1203.9	350.9
S26.013	39.09	9.31	10.349	2.927	0.0	0.0	31.9	1.58	698.1	350.9
S30.000	50.00	5.12	10.982	1.251	0.0	0.0	16.9	3.02	480.6	186.3
S30.001	49.09	5.95	10.349	1.251	0.0	0.0	16.9	1.21	341.5	186.3
S23.004	33.15	12.62	10.200	7.359	0.0	0.0	66.1	1.54	1336.3	726.7
S23.005	32.47	13.09	10.171	7.359	0.0	0.0	66.1	0.91	64.0	726.7

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Manhole Schedules for Network H

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)
S101	12.600	1.178	Open Manhole	1200	S23.000	11.422	300				
S102	19.241	1.541	Open Manhole	1200	S24.000	17.700	300				
S103	14.359	1.593	Open Manhole	1350	S24.001	12.766	375	S24.000	12.766	300	
S104	13.641	2.429	Open Manhole	1500	S24.002	11.212	525	S24.001	11.362	375	
S105	13.319	2.327	Open Manhole	1500	S24.003	10.992	525	S24.002	10.992	525	
S106	13.852	3.156	Open Manhole	1500	S23.001	10.696	600	S23.000	10.996	300	
								S24.003	10.771	525	
S107	14.955	1.575	Open Manhole	1350	S25.000	13.380	375				
S108	12.525	2.155	Open Manhole	1500	S23.002	10.370	675	S23.001	10.445	600	
								S25.000	10.755	375	
S109-HW	12.087	1.750	Open Manhole	1500	S23.003	10.337	675	S23.002	10.337	675	
S110	24.830	1.500	Open Manhole	1200	S26.000	23.330	300				
S111	22.533	0.984	Open Manhole	1350	S26.001	21.549	375	S26.000	21.624	300	
S112	22.636	1.342	Open Manhole	1200	S27.000	21.294	150				
S113	21.713	1.913	Open Manhole	1350	S26.002	19.800	375	S26.001	19.800	375	
								S27.000	20.025	150	
S114	20.806	1.806	Open Manhole	1350	S26.003	19.050	375	S26.002	19.000	375	
S115	19.230	2.823	Open Manhole	1350	S26.004	16.407	375	S26.003	16.407	375	
S116	18.520	2.627	Open Manhole	1350	S26.005	15.893	375	S26.004	15.893	375	
S117	17.852	2.530	Open Manhole	1350	S26.006	15.322	450	S26.005	15.397	375	
S118	14.898	2.469	Open Manhole	1350	S26.007	12.429	450	S26.006	12.429	450	
S119	14.653	2.710	Open Manhole	1350	S26.008	11.943	450	S26.007	11.943	450	
S120	14.649	2.878	Open Manhole	1350	S26.009	11.772	450	S26.008	11.771	450	
S121	15.443	1.393	Open Manhole	1200	S28.000	14.050	225				
S122	13.500	1.750	Open Manhole	1500	S29.000	11.750	600				
S123	14.852	3.552	Open Manhole	1800	S26.010	11.300	750	S26.009	11.600	450	
								S28.000	12.125	225	
								S29.000	11.450	600	
S124	12.749	1.699	Open Manhole	1800	S26.011	11.050	750	S26.010	11.050	750	
S125	11.979	1.494	Open Manhole	1800	S26.012	10.485	750	S26.011	10.485	750	
S126-HW	11.900	1.551	Open Manhole	1800	S26.013	10.349	750	S26.012	10.349	750	
S127	12.599	1.617	Open Manhole	1350	S30.000	10.982	450				
S128-HW	11.900	1.551	Open Manhole	1500	S30.001	10.349	600	S30.000	10.499	450	
S129-HW	11.900	1.700	Open Manhole	1950	S23.004	10.200	1050	S23.003	10.200	675	
								S26.013	10.200	750	
								S30.001	10.200	600	
S130-FCC	11.900	1.729	Open Manhole	1950	S23.005	10.171	300	S23.004	10.171	1050	
S	11.400	1.315	Open Manhole	0		OUTFALL		S23.005	10.085	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
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S101 580454.957 198180.099 580454.957 198180.099 Required

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South Woodham Ferrers
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Manhole Schedules for Network H

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S102	580653.902	198403.218	580653.902	198403.218	Required	
S103	580654.783	198306.312	580654.783	198306.312	Required	
S104	580639.634	198272.710	580639.634	198272.710	Required	
S105	580529.823	198271.894	580529.823	198271.894	Required	
S106	580419.263	198271.079	580419.263	198271.079	Required	
S107	580434.947	198331.505	580434.947	198331.505	Required	
S108	580362.513	198382.942	580362.513	198382.942	Required	
S109-HW	580358.914	198399.199	580358.914	198399.199	Required	
S110	580922.036	198357.426	580922.036	198357.426	Required	
S111	580815.472	198387.930	580815.472	198387.930	Required	
S112	580742.174	198452.773	580742.174	198452.773	Required	
S113	580730.657	198412.137	580730.657	198412.137	Required	
S114	580704.192	198420.453	580704.192	198420.453	Required	
S115	580619.042	198484.891	580619.042	198484.891	Required	
S116	580601.997	198496.745	580601.997	198496.745	Required	
S117	580582.753	198502.262	580582.753	198502.262	Required	
S118	580493.441	198501.550	580493.441	198501.550	Required	
S119	580476.465	198503.858	580476.465	198503.858	Required	
S120	580464.355	198511.796	580464.355	198511.796	Required	
S121	580442.335	198543.979	580442.335	198543.979	Required	

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Manhole Schedules for Network H

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S122	580469.923	198530.441	580469.923	198530.441	Required	
S123	580455.530	198522.003	580455.530	198522.003	Required	
S124	580436.593	198511.540	580436.593	198511.540	Required	
S125	580384.831	198477.785	580384.831	198477.785	Required	
S126-HW	580373.546	198468.936	580373.546	198468.936	Required	
S127	580408.189	198445.247	580408.189	198445.247	Required	
S128-HW	580386.262	198446.338	580386.262	198446.338	Required	
S129-HW	580327.953	198460.242	580327.953	198460.242	Required	
S130-FCC	580317.635	198470.191	580317.635	198470.191	Required	
S	580293.122	198477.765			No Entry	

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Area Summary for Network H

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
23.000	-	-	100	0.305	0.305	0.305
24.000	Classification	Residential	60	0.337	0.202	0.202
	Classification	Residential	60	0.466	0.279	0.481
	Classification	Hardstanding	100	0.203	0.203	0.685
24.001	-	-	100	0.110	0.110	0.110
24.002	Classification	Residential	60	0.824	0.495	0.495
24.003	-	-	100	0.000	0.000	0.000
23.001	-	-	100	0.100	0.100	0.100
25.000	Classification	Residential	60	1.323	0.794	0.794
23.002	-	-	100	0.000	0.000	0.000
23.003	-	-	100	0.000	0.000	0.000
26.000	Classification	Hardstanding	100	0.233	0.233	0.233
26.001	Classification	Hardstanding	100	0.167	0.167	0.167
27.000	Classification	Hardstanding	100	0.111	0.111	0.111
26.002	-	-	100	0.000	0.000	0.000
26.003	Classification	Hardstanding	100	0.091	0.091	0.091
	Classification	Hardstanding	100	0.164	0.164	0.255
26.004	Classification	Hardstanding	100	0.101	0.101	0.101
26.005	-	-	100	0.000	0.000	0.000
26.006	Classification	Hardstanding	100	0.176	0.176	0.176
26.007	Classification	Hardstanding	100	0.062	0.062	0.062
26.008	-	-	100	0.000	0.000	0.000
26.009	-	-	100	0.000	0.000	0.000
28.000	Classification	Hardstanding	100	0.126	0.126	0.126
29.000	Classification	Residential	60	2.417	1.450	1.450
26.010	-	-	100	0.000	0.000	0.000
26.011	-	-	100	0.000	0.000	0.000
26.012	Classification	Residential	60	0.409	0.246	0.246
26.013	-	-	100	0.000	0.000	0.000
30.000	Classification	Residential	60	2.085	1.251	1.251
30.001	-	-	100	0.000	0.000	0.000
23.004	Classification	Landscape	20	1.288	0.258	0.258
	Classification	Ponds	80	0.545	0.436	0.693
23.005	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				11.642	7.359	7.359

Free Flowing Outfall Details for Network H

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S23.005 S 11.400 10.085 0.000 0 0

Simulation Criteria for Network H

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 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

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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)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Network H


Hydro-Brake® Optimum Manhole: S129-HW, DS/PN: S23.004, Volume (m³): 65.1

Unit Reference	MD-SHE-0245-3390-1400-3390
Design Head (m)	1.400
Design Flow (l/s)	33.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	245
Invert Level (m)	10.200
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	33.9	Kick-Flo®	0.978	28.5
Flush-Flo™	0.451	33.9	Mean Flow over Head Range	-	28.8

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)	Depth (m)	Flow (l/s)
0.100	8.0	0.800	32.1	2.000	40.2	4.000	56.2	7.000	73.7
0.200	24.9	1.000	28.8	2.200	42.1	4.500	59.5	7.500	76.3
0.300	33.0	1.200	31.5	2.400	43.9	5.000	62.6	8.000	78.7
0.400	33.8	1.400	33.9	2.600	45.6	5.500	65.6	8.500	81.1
0.500	33.8	1.600	36.1	3.000	48.9	6.000	68.4	9.000	83.3
0.600	33.5	1.800	38.2	3.500	52.7	6.500	71.1	9.500	85.6


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Storage Structures for Network H

Tank or Pond Manhole: S129-HW, DS/PN: S23.004

Invert Level (m) 10.400

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	3757.0	1.200	4896.0	1.500	5203.0

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (1/per/day) 0.000
Foul Sewage per hectare (l/s) 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF


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) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S23.000	S101	15 Winter	1	+0%	30/15 Summer	100/15 Summer			11.587
S24.000	S102	15 Winter	1	+0%	100/15 Summer	100/15 Summer			17.828
S24.001	S103	15 Winter	1	+0%	30/15 Winter	100/15 Summer			12.905
S24.002	S104	15 Winter	1	+0%	30/15 Summer	100/15 Summer			11.566
S24.003	S105	15 Winter	1	+0%	30/15 Summer				11.305
S23.001	S106	15 Winter	1	+0%	30/15 Summer				11.008
S25.000	S107	15 Winter	1	+0%	100/15 Summer	100/15 Summer			13.527
S23.002	S108	30 Winter	1	+0%	30/15 Summer				10.807
S23.003	S109-HW	30 Winter	1	+0%	100/15 Summer				10.663
S26.000	S110	15 Winter	1	+0%	100/15 Winter				23.428
S26.001	S111	15 Winter	1	+0%	100/15 Summer				21.658
S27.000	S112	15 Winter	1	+0%	30/15 Summer	100/15 Summer			21.369
S26.002	S113	15 Winter	1	+0%	100/15 Summer				19.917
S26.003	S114	15 Winter	1	+0%	100/15 Summer	100/15 Summer			19.190
S26.004	S115	15 Winter	1	+0%	100/15 Summer				16.568
S26.005	S116	15 Winter	1	+0%	100/15 Summer				16.054
S26.006	S117	15 Winter	1	+0%	100/15 Summer				15.464
S26.007	S118	15 Winter	1	+0%	30/15 Summer				12.602
S26.008	S119	15 Winter	1	+0%	30/15 Summer				12.177
S26.009	S120	15 Winter	1	+0%	30/15 Summer				12.006
S28.000	S121	15 Winter	1	+0%					14.103
S29.000	S122	15 Winter	1	+0%	100/15 Summer	100/15 Summer			11.998
S26.010	S123	15 Winter	1	+0%	100/15 Summer				11.632
S26.011	S124	15 Winter	1	+0%	100/15 Summer				11.333
S26.012	S125	15 Winter	1	+0%	30/15 Summer	100/15 Summer			10.886
S26.013	S126-HW	15 Winter	1	+0%	30/15 Summer				10.758
S30.000	S127	15 Winter	1	+0%	30/15 Summer	100/15 Summer			11.189
S30.001	S128-HW	15 Winter	1	+0%	30/15 Summer				10.669
S23.004	S129-HW	360 Winter	1	+0%	100/120 Winter				10.610
S23.005	S130-FCC	360 Winter	1	+0%					10.329

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

FN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)			
S23.000	S101	-0.135	0.000	0.58		40.7	OK	6
S24.000	S102	-0.172	0.000	0.37		90.0	OK	4
S24.001	S103	-0.236	0.000	0.29		102.8	OK	5
S24.002	S104	-0.171	0.000	0.70		141.8	OK	5
S24.003	S105	-0.212	0.000	0.60		123.3	OK	
S23.001	S106	-0.288	0.000	0.49		142.4	OK	
S25.000	S107	-0.228	0.000	0.32		104.9	OK	3
S23.002	S108	-0.238	0.000	0.75		175.6	OK	
S23.003	S109-HW	-0.349	0.000	0.47		174.5	OK	
S26.000	S110	-0.202	0.000	0.23		30.7	OK	
S26.001	S111	-0.266	0.000	0.18		48.8	OK	
S27.000	S112	-0.075	0.000	0.49		14.7	OK	4
S26.002	S113	-0.258	0.000	0.21		63.3	OK	
S26.003	S114	-0.235	0.000	0.30		89.7	OK	2
S26.004	S115	-0.214	0.000	0.38		100.5	OK	
S26.005	S116	-0.214	0.000	0.38		100.8	OK	
S26.006	S117	-0.308	0.000	0.21		118.4	OK	
S26.007	S118	-0.277	0.000	0.32		124.4	OK	
S26.008	S119	-0.216	0.000	0.53		123.6	OK	
S26.009	S120	-0.216	0.000	0.53		124.2	OK	
S28.000	S121	-0.172	0.000	0.13		16.9	OK	
S29.000	S122	-0.352	0.000	0.35		194.6	OK	4
S26.010	S123	-0.418	0.000	0.40		313.5	OK	
S26.011	S124	-0.467	0.000	0.30		310.4	OK	
S26.012	S125	-0.349	0.000	0.56		337.9	OK	4
S26.013	S126-HW	-0.341	0.000	0.57		332.1	OK	
S30.000	S127	-0.243	0.000	0.43		167.9	OK	3
S30.001	S128-HW	-0.280	0.000	0.53		161.8	OK	
S23.004	S129-HW	-0.640	0.000	0.05		31.3	OK	
S23.005	S130-FCC	-0.142	0.000	0.55		31.3	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (1/per/day) 0.000
Foul Sewage per hectare (l/s) 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF


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) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S23.000	S101	15 Winter	30	+0%	30/15 Summer	100/15 Summer			12.125
S24.000	S102	15 Winter	30	+0%	100/15 Summer	100/15 Summer			17.928
S24.001	S103	15 Winter	30	+0%	30/15 Winter	100/15 Summer			13.217
S24.002	S104	15 Winter	30	+0%	30/15 Summer	100/15 Summer			12.648
S24.003	S105	15 Winter	30	+0%	30/15 Summer				11.974
S23.001	S106	15 Winter	30	+0%	30/15 Summer				11.477
S25.000	S107	15 Winter	30	+0%	100/15 Summer	100/15 Summer			13.635
S23.002	S108	30 Winter	30	+0%	30/15 Summer				11.078
S23.003	S109-HW	15 Winter	30	+0%	100/15 Summer				11.012
S26.000	S110	15 Winter	30	+0%	100/15 Winter				23.494
S26.001	S111	15 Winter	30	+0%	100/15 Summer				21.734
S27.000	S112	15 Winter	30	+0%	30/15 Summer	100/15 Summer			21.786
S26.002	S113	15 Winter	30	+0%	100/15 Summer				19.996
S26.003	S114	15 Winter	30	+0%	100/15 Summer	100/15 Summer			19.307
S26.004	S115	15 Winter	30	+0%	100/15 Summer				16.740
S26.005	S116	15 Winter	30	+0%	100/15 Summer				16.209
S26.006	S117	15 Winter	30	+0%	100/15 Summer				15.570
S26.007	S118	15 Winter	30	+0%	30/15 Summer				13.041
S26.008	S119	15 Winter	30	+0%	30/15 Summer				12.696
S26.009	S120	15 Winter	30	+0%	30/15 Summer				12.363
S28.000	S121	15 Winter	30	+0%					14.136
S29.000	S122	15 Winter	30	+0%	100/15 Summer	100/15 Summer			12.191
S26.010	S123	15 Winter	30	+0%	100/15 Summer				11.999
S26.011	S124	15 Winter	30	+0%	100/15 Summer				11.762
S26.012	S125	15 Winter	30	+0%	30/15 Summer	100/15 Summer			11.470
S26.013	S126-HW	15 Winter	30	+0%	30/15 Summer				11.200
S30.000	S127	15 Winter	30	+0%	30/15 Summer	100/15 Summer			11.595
S30.001	S128-HW	15 Winter	30	+0%	30/15 Summer				11.045
S23.004	S129-HW	480 Winter	30	+0%	100/120 Winter				10.948
S23.005	S130-FCC	480 Winter	30	+0%					10.337

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

PN	US/MH Name	Surcharged		Flooded		Pipe		Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	
S23.000	S101	0.403	0.000	1.30		92.1	SURCHARGED	6
S24.000	S102	-0.072	0.000	0.90		220.7	OK	4
S24.001	S103	0.076	0.000	0.72		255.7	SURCHARGED	5
S24.002	S104	0.911	0.000	1.75		356.3	SURCHARGED	5
S24.003	S105	0.457	0.000	1.48		301.4	SURCHARGED	
S23.001	S106	0.181	0.000	1.13		326.4	SURCHARGED	
S25.000	S107	-0.120	0.000	0.77		255.3	OK	3
S23.002	S108	0.033	0.000	1.74		408.4	SURCHARGED	
S23.003	S109-HW	0.000	0.000	1.06		393.5	OK	
S26.000	S110	-0.136	0.000	0.55		73.9	OK	
S26.001	S111	-0.190	0.000	0.47		126.2	OK	
S27.000	S112	0.342	0.000	1.12		33.6	SURCHARGED	4
S26.002	S113	-0.179	0.000	0.53		159.6	OK	
S26.003	S114	-0.118	0.000	0.78		237.1	OK	2
S26.004	S115	-0.042	0.000	1.00		265.7	OK	
S26.005	S116	-0.059	0.000	1.00		264.0	OK	
S26.006	S117	-0.202	0.000	0.57		315.6	OK	
S26.007	S118	0.162	0.000	0.83		325.7	SURCHARGED	
S26.008	S119	0.303	0.000	1.39		325.4	SURCHARGED	
S26.009	S120	0.141	0.000	1.38		323.7	SURCHARGED	
S28.000	S121	-0.139	0.000	0.31		41.4	OK	
S29.000	S122	-0.159	0.000	0.87		477.1	OK	4
S26.010	S123	-0.051	0.000	0.99		778.6	OK	
S26.011	S124	-0.038	0.000	0.74		758.2	OK	
S26.012	S125	0.235	0.000	1.32		801.6	SURCHARGED	4
S26.013	S126-HW	0.101	0.000	1.37		798.9	SURCHARGED	
S30.000	S127	0.163	0.000	1.04		405.7	SURCHARGED	3
S30.001	S128-HW	0.096	0.000	1.29		392.5	SURCHARGED	
S23.004	S129-HW	-0.302	0.000	0.06		33.8	OK	
S23.005	S130-FCC	-0.134	0.000	0.59		33.8	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 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 FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S23.000	S101	15 Winter	100	+40%	30/15 Summer	100/15 Summer			12.622
S24.000	S102	15 Winter	100	+40%	100/15 Summer	100/15 Summer			19.274
S24.001	S103	30 Winter	100	+40%	30/15 Winter	100/15 Summer			14.372
S24.002	S104	30 Winter	100	+40%	30/15 Summer	100/15 Summer			13.670
S24.003	S105	15 Winter	100	+40%	30/15 Summer				13.132
S23.001	S106	15 Winter	100	+40%	30/15 Summer				12.410
S25.000	S107	15 Winter	100	+40%	100/15 Summer	100/15 Summer			14.965
S23.002	S108	15 Winter	100	+40%	30/15 Summer				11.802
S23.003	S109-HW	720 Winter	100	+40%	100/15 Summer				11.496
S26.000	S110	15 Winter	100	+40%	100/15 Winter				23.747
S26.001	S111	15 Winter	100	+40%	100/15 Summer				22.193
S27.000	S112	15 Winter	100	+40%	30/15 Summer	100/15 Summer			22.642
S26.002	S113	15 Winter	100	+40%	100/15 Summer				21.282
S26.003	S114	15 Winter	100	+40%	100/15 Summer	100/15 Summer			20.808
S26.004	S115	15 Winter	100	+40%	100/15 Summer				18.157
S26.005	S116	15 Winter	100	+40%	100/15 Summer				17.311
S26.006	S117	15 Winter	100	+40%	100/15 Summer				16.478
S26.007	S118	15 Winter	100	+40%	30/15 Summer				14.879
S26.008	S119	15 Winter	100	+40%	30/15 Summer				14.301
S26.009	S120	15 Winter	100	+40%	30/15 Summer				13.724
S28.000	S121	15 Winter	100	+40%					14.172
S29.000	S122	15 Winter	100	+40%	100/15 Summer	100/15 Summer			13.528
S26.010	S123	15 Winter	100	+40%	100/15 Summer				13.147
S26.011	S124	15 Winter	100	+40%	100/15 Summer				12.648
S26.012	S125	15 Winter	100	+40%	30/15 Summer	100/15 Summer			11.995
S26.013	S126-HW	720 Winter	100	+40%	30/15 Summer				11.495
S30.000	S127	15 Winter	100	+40%	30/15 Summer	100/15 Summer			12.617
S30.001	S128-HW	720 Winter	100	+40%	30/15 Summer				11.495
S23.004	S129-HW	720 Winter	100	+40%	100/120 Winter				11.493
S23.005	S130-FCC	960 Summer	100	+40%					10.337

Midpoint
Alencon Link
Basingstoke, RG21 7PP

South Woodham Ferrers
Drainage Strategy



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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S23.000	S101	0.900	22.303	1.61		114.2	FLOOD	6
S24.000	S102	1.274	32.634	1.02		248.1	FLOOD	4
S24.001	S103	1.231	13.226	0.74		261.4	FLOOD	5
S24.002	S104	1.933	29.635	2.04		416.2	FLOOD	5
S24.003	S105	1.615	0.000	1.90		387.2	FLOOD RISK	
S23.001	S106	1.114	0.000	1.56		452.4	SURCHARGED	
S25.000	S107	1.210	10.076	1.19		391.9	FLOOD	3
S23.002	S108	0.757	0.000	3.27		769.7	SURCHARGED	
S23.003	S109-HW	0.484	0.000	0.32		117.7	SURCHARGED	
S26.000	S110	0.117	0.000	0.98		132.1	SURCHARGED	
S26.001	S111	0.269	0.000	0.80		215.6	FLOOD RISK	
S27.000	S112	1.198	6.165	1.40		41.9	FLOOD	4
S26.002	S113	1.107	0.000	0.76		227.8	FLOOD RISK	
S26.003	S114	1.383	2.005	1.05		318.5	FLOOD	2
S26.004	S115	1.375	0.000	1.30		346.7	SURCHARGED	
S26.005	S116	1.043	0.000	1.32		350.8	SURCHARGED	
S26.006	S117	0.706	0.000	0.74		407.6	SURCHARGED	
S26.007	S118	2.000	0.000	1.11		437.0	FLOOD RISK	
S26.008	S119	1.908	0.000	1.90		444.1	FLOOD RISK	
S26.009	S120	1.502	0.000	1.93		451.3	SURCHARGED	
S28.000	S121	-0.103	0.000	0.57		75.1	OK	
S29.000	S122	1.178	27.824	1.32		723.2	FLOOD	4
S26.010	S123	1.097	0.000	1.41		1103.6	SURCHARGED	
S26.011	S124	0.848	0.000	1.07		1102.4	FLOOD RISK	
S26.012	S125	0.760	16.572	1.87		1131.6	FLOOD	4
S26.013	S126-HW	0.396	0.000	0.24		140.5	FLOOD RISK	
S30.000	S127	1.185	18.006	1.59		623.6	FLOOD	3
S30.001	S128-HW	0.546	0.000	0.19		59.4	FLOOD RISK	
S23.004	S129-HW	0.243	0.000	0.06		33.8	FLOOD RISK	
S23.005	S130-FCC	-0.134	0.000	0.59		33.8	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Network I

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.400	Add Flow / Climate Change (%)	10
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	550	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Network I

« - Indicates pipe capacity < flow

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
S31.000	15.486	0.062	249.8	2.141	5.00	0.0	0.600	o	675	Pipe/Conduit	⚠
S31.001	27.209	0.109	249.6	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	⚠
S31.002	11.357	0.045	252.4	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	⚠
S31.003	9.189	0.037	248.4	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	⚠
S31.004	21.824	0.087	250.8	0.151	0.00	0.0	0.600	o	675	Pipe/Conduit	⚠
S32.000	18.821	0.188	100.1	1.257	5.00	0.0	0.600	o	525	Pipe/Conduit	⚠
S31.005	18.190	0.073	249.2	0.000	0.00	0.0	0.600	o	825	Pipe/Conduit	⚠
S31.006	16.334	0.065	251.3	0.000	0.00	0.0	0.600	o	825	Pipe/Conduit	⚠
S31.007	45.388	1.073	42.3	0.716	0.00	0.0	0.600	o	900	Pipe/Conduit	⚠
S31.008	116.955	2.765	42.3	0.000	0.00	0.0	0.600	o	900	Pipe/Conduit	⚠
S31.009	19.481	0.462	42.2	0.000	0.00	0.0	0.600	o	900	Pipe/Conduit	⚠
S31.010	101.510	0.200	507.5	0.000	0.00	0.0	0.600	o	1050	Pipe/Conduit	⚠
S33.000	17.956	0.151	118.9	1.503	5.00	0.0	0.600	o	525	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)
S31.000	52.40	5.16	15.203	2.141	0.0	0.0	30.4	1.65	591.8	334.1
S31.001	51.20	5.43	15.141	2.141	0.0	0.0	30.4	1.65	592.0	334.1
S31.002	50.71	5.55	15.032	2.141	0.0	0.0	30.4	1.65	588.7	334.1
S31.003	50.33	5.64	14.987	2.141	0.0	0.0	30.4	1.66	593.5	334.1
S31.004	49.45	5.86	14.950	2.291	0.0	0.0	30.7	1.65	590.5	337.5
S32.000	52.47	5.14	15.201	1.257	0.0	0.0	17.9	2.24	484.6	196.4
S31.005	48.82	6.02	14.713	3.548	0.0	0.0	46.9	1.88	1003.0	516.0
S31.006	48.27	6.17	14.640	3.548	0.0	0.0	46.9	1.87	998.7	516.0
S31.007	47.69	6.32	14.500	4.264	0.0	0.0	55.1	4.83	3069.6	605.9
S31.008	46.28	6.73	13.427	4.264	0.0	0.0	55.1	4.83	3069.6	605.9
S31.009	46.05	6.79	10.662	4.264	0.0	0.0	55.1	4.83	3074.4	605.9
S31.010	42.65	7.90	10.200	4.264	0.0	0.0	55.1	1.52	1318.5	605.9
S33.000	52.44	5.15	10.351	1.503	0.0	0.0	21.3	2.05	444.5	234.8

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Network Design Table for Network I

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
S33.001	43.119	0.200	215.6	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	🔴
S31.011	22.098	0.068	325.0	1.324	0.00	0.0	0.600	o	1050	Pipe/Conduit	🔴
S31.012	21.413	1.518	14.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔴
S31.013	22.273	0.114	195.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔴
S34.000	49.903	0.224	222.8	1.065	5.00	0.0	0.600	o	525	Pipe/Conduit	🔴
S34.001	9.922	0.051	194.5	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	🔴
S31.014	10.313	0.033	312.5	0.079	0.00	0.0	0.600	o	825	Pipe/Conduit	🔴
S31.015	84.768	0.283	299.5	0.000	0.00	0.0	0.600	o	375	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)
S33.001	50.41	5.62	10.200	1.503	0.0	0.0	21.3	1.52	329.4	234.8
S31.011	42.12	8.10	10.000	7.091	0.0	0.0	80.9	1.91	1650.5	889.7
S31.012	41.92	8.17	9.932	7.091	0.0	0.0	80.9	4.85	535.2	889.7
S31.013	41.16	8.46	8.414	7.091	0.0	0.0	80.9	1.29	142.8	889.7
S34.000	50.67	5.56	8.575	1.065	0.0	0.0	14.6	1.50	324.0	160.8
S34.001	50.24	5.66	8.351	1.065	0.0	0.0	14.6	1.60	346.9	160.8
S31.014	40.90	8.56	8.300	8.235	0.0	0.0	91.2	1.67	894.9	1003.3
S31.015	37.80	9.92	8.267	8.235	0.0	0.0	91.2	1.04	115.0	1003.3

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Manhole Schedules for Network I

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)
S1	18.000	2.797	Open Manhole	1500	S31.000	15.203	675				
S2	18.080	2.939	Open Manhole	1500	S31.001	15.141	675	S31.000	15.141	675	
S3	18.379	3.347	Open Manhole	1500	S31.002	15.032	675	S31.001	15.032	675	
S4	18.573	3.586	Open Manhole	1500	S31.003	14.987	675	S31.002	14.987	675	
S5	18.797	3.847	Open Manhole	1500	S31.004	14.950	675	S31.003	14.950	675	
S6	20.228	5.027	Open Manhole	1500	S32.000	15.201	525				
S7	19.304	4.591	Open Manhole	1800	S31.005	14.713	825	S31.004	14.863	675	
S8	18.479	3.839	Open Manhole	1800	S31.006	14.640	825	S32.000	15.013	525	
S9	17.676	3.176	Open Manhole	1800	S31.007	14.500	900	S31.005	14.640	825	
S10	16.153	2.726	Open Manhole	1800	S31.008	13.427	900	S31.006	14.575	825	
S131	13.700	3.038	Open Manhole	1800	S31.009	10.662	900	S31.007	13.427	900	
S132-HW	11.700	1.500	Open Manhole	1950	S31.010	10.200	1050	S31.008	10.662	900	
S134	13.500	3.149	Open Manhole	1500	S33.000	10.351	525	S31.009	10.200	900	
S135-HW	11.700	1.500	Open Manhole	1500	S33.001	10.200	525	S33.000	10.200	525	
S136-HW	11.700	1.700	Open Manhole	1950	S31.011	10.000	1050	S33.001	10.000	525	
S137-FCC	11.700	1.768	Open Manhole	1950	S31.012	9.932	375	S31.010	10.000	1050	
S138-HW	10.000	1.586	Open Manhole	1350	S31.013	8.414	375	S33.000	10.000	525	
S139	10.000	1.425	Open Manhole	1500	S34.000	8.575	525	S31.011	9.932	1050	
S140-HW	10.000	1.649	Open Manhole	1500	S34.001	8.351	525	S31.012	8.414	375	
S141-HW	10.000	1.700	Open Manhole	1800	S31.014	8.300	825	S34.000	8.351	525	
S142-FCC	9.730	1.463	Open Manhole	1800	S31.015	8.267	375	S31.013	8.300	375	
S15	9.000	1.016	Open Manhole	1350		OUTFALL		S34.001	8.300	525	
								S31.014	8.267	825	
								S31.015	7.984	375	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	581624.239	198223.799	581624.239	198223.799	Required	
S2	581609.369	198228.124	581609.369	198228.124	Required	
S3	581586.196	198242.384	581586.196	198242.384	Required	
S4	581575.173	198245.119	581575.173	198245.119	Required	
S5	581565.995	198244.662	581565.995	198244.662	Required	
S6	581537.454	198257.063	581537.454	198257.063	Required	

Midpoint
Alencon Link
Basingstoke, RG21 7PP

South Woodham Ferrers
Drainage Strategy



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Manhole Schedules for Network I

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S7	581544.741	198239.709	581544.741	198239.709	Required	
S8	581542.974	198221.605	581542.974	198221.605	Required	
S9	581538.510	198205.893	581538.510	198205.893	Required	
S10	581581.112	198190.238	581581.112	198190.238	Required	
S131	581690.891	198149.899	581690.891	198149.899	Required	
S132-HW	581698.888	198132.135	581698.888	198132.135	Required	
S134	581777.916	198150.662	581777.916	198150.662	Required	
S135-HW	581777.797	198132.707	581777.797	198132.707	Required	
S136-HW	581792.146	198092.045	581792.146	198092.045	Required	
S137-FCC	581803.273	198072.953	581803.273	198072.953	Required	
S138-HW	581805.867	198051.698	581805.867	198051.698	Required	
S139	581758.357	198009.192	581758.357	198009.192	Required	
S140-HW	581802.338	198032.773	581802.338	198032.773	Required	
S141-HW	581811.938	198030.268	581811.938	198030.268	Required	
S142-FCC	581807.435	198020.990	581807.435	198020.990	Required	
S15	581728.933	197989.005			No Entry	

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Area Summary for Network I

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
31.000	Classification	Residential	60	3.396	2.037	2.037
	Classification	Hardstanding	100	0.103	0.103	2.141
31.001	-	-	100	0.000	0.000	0.000
31.002	-	-	100	0.000	0.000	0.000
31.003	-	-	100	0.000	0.000	0.000
31.004	Classification	Hardstanding	100	0.151	0.151	0.151
32.000	Classification	Residential	60	2.048	1.229	1.229
	Classification	Hardstanding	100	0.028	0.028	1.257
31.005	-	-	100	0.000	0.000	0.000
31.006	-	-	100	0.000	0.000	0.000
31.007	Classification	Residential	60	1.194	0.716	0.716
31.008	-	-	100	0.000	0.000	0.000
31.009	-	-	100	0.000	0.000	0.000
31.010	-	-	100	0.000	0.000	0.000
33.000	Classification	Residential	60	2.505	1.503	1.503
33.001	-	-	100	0.000	0.000	0.000
31.011	Classification	Ponds	80	0.542	0.434	0.434
	Classification	Landscape	20	4.450	0.890	1.324
31.012	-	-	100	0.000	0.000	0.000
31.013	-	-	100	0.000	0.000	0.000
34.000	Classification	Residential	60	1.775	1.065	1.065
34.001	-	-	100	0.000	0.000	0.000
31.014	Classification	Ponds	80	0.099	0.079	0.079
31.015	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				16.291	8.235	8.235

Free Flowing Outfall Details for Network I

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S31.015 S15 9.000 7.984 0.000 1350 0


Simulation Criteria for Network I

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start (mins)	0	Inlet Coefficient	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 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)	19.400	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Network I

Hydro-Brake® Optimum Manhole: S136-HW, DS/PN: S31.011, Volume (m³): 100.2

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Unit Reference MD-SHE-0242-3300-1400-3300
Design Head (m) 1.400
Design Flow (l/s) 33.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 242
Invert Level (m) 10.000
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 1800

```

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	32.9	Kick-Flo®	0.977	27.7
Flush-Flo™	0.452	32.9	Mean Flow over Head Range	-	28.0

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)	Depth (m)	Flow (l/s)
0.100	7.9	0.800	31.2	2.000	39.1	4.000	54.6	7.000	71.6
0.200	24.5	1.000	28.0	2.200	40.9	4.500	57.8	7.500	74.1
0.300	32.0	1.200	30.6	2.400	42.7	5.000	60.8	8.000	76.4
0.400	32.8	1.400	32.9	2.600	44.3	5.500	63.7	8.500	78.7
0.500	32.8	1.600	35.1	3.000	47.5	6.000	66.5	9.000	81.0
0.600	32.5	1.800	37.1	3.500	51.2	6.500	69.1	9.500	83.1

Hydro-Brake® Optimum Manhole: S141-HW, DS/PN: S31.014, Volume (m³): 8.4

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Unit Reference MD-SHE-0277-4500-1400-4500
Design Head (m) 1.400
Design Flow (l/s) 45.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 277
Invert Level (m) 8.300
Minimum Outlet Pipe Diameter (mm) 300
Suggested Manhole Diameter (mm) 1800

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Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	45.0	Kick-Flo®	1.003	38.3
Flush-Flo™	0.478	44.9	Mean Flow over Head Range	-	37.9


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)	Depth (m)	Flow (l/s)
0.100	8.7	0.600	44.6	1.600	48.0	2.600	60.7	5.000	83.3
0.200	28.5	0.800	43.0	1.800	50.8	3.000	65.0	5.500	87.3
0.300	43.3	1.000	38.5	2.000	53.4	3.500	70.1	6.000	91.1
0.400	44.7	1.200	41.8	2.200	56.0	4.000	74.8	6.500	94.7
0.500	44.9	1.400	45.0	2.400	58.4	4.500	79.2	7.000	98.2

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Hydro-Brake® Optimum Manhole: S141-HW, DS/PN: S31.014, Volume (m³): 8.4

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
7.500	101.5	8.000	104.8	8.500	107.9	9.000	111.0	9.500	113.9

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Storage Structures for Network I

Tank or Pond Manhole: S136-HW, DS/PN: S31.011


Invert Level (m) 10.200

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	3595.0	1.200	4982.0	1.500	5598.0

Tank or Pond Manhole: S141-HW, DS/PN: S31.014

Invert Level (m) 8.500

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	392.0	1.200	831.0	1.500	1006.0

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S31.000	S1	15 Winter	1	+0%	30/15 Summer	100/15 Summer			15.628
S31.001	S2	15 Winter	1	+0%	30/15 Summer				15.552
S31.002	S3	15 Winter	1	+0%	30/15 Summer				15.483
S31.003	S4	15 Winter	1	+0%	30/15 Summer				15.448
S31.004	S5	15 Winter	1	+0%	30/15 Summer				15.358
S32.000	S6	15 Winter	1	+0%	30/15 Summer				15.468
S31.005	S7	15 Winter	1	+0%	30/15 Summer				15.212
S31.006	S8	15 Winter	1	+0%	30/15 Summer				15.147
S31.007	S9	15 Winter	1	+0%					14.787
S31.008	S10	15 Winter	1	+0%					13.689
S31.009	S131	15 Winter	1	+0%	100/15 Summer				11.024
S31.010	S132-HW	15 Winter	1	+0%	100/15 Summer				10.691
S33.000	S134	15 Winter	1	+0%	30/15 Summer				10.671
S33.001	S135-HW	15 Winter	1	+0%	30/15 Summer	100/15 Summer			10.527
S31.011	S136-HW	180 Winter	1	+0%	100/120 Winter				10.388
S31.012	S137-FCC	180 Winter	1	+0%					9.998
S31.013	S138-HW	240 Winter	1	+0%	1/30 Winter				8.867
S34.000	S139	15 Winter	1	+0%	30/15 Summer	100/15 Summer			8.838
S34.001	S140-HW	240 Winter	1	+0%	30/15 Summer				8.766
S31.014	S141-HW	240 Winter	1	+0%	100/30 Summer				8.761
S31.015	S142-FCC	240 Winter	1	+0%					8.431

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.000	S1	-0.250	0.000	0.71		286.8	OK	5
S31.001	S2	-0.264	0.000	0.61		281.5	OK	
S31.002	S3	-0.224	0.000	0.76		279.4	OK	
S31.003	S4	-0.214	0.000	0.80		276.5	OK	
S31.004	S5	-0.267	0.000	0.67		294.4	OK	
S32.000	S6	-0.258	0.000	0.51		168.8	OK	
S31.005	S7	-0.326	0.000	0.66		442.0	OK	

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

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)			
S31.006	S8	-0.318	0.000	0.69		446.7	OK	
S31.007	S9	-0.613	0.000	0.22		523.0	OK	
S31.008	S10	-0.638	0.000	0.18		513.7	OK	
S31.009	S131	-0.538	0.000	0.34		517.9	OK	
S31.010	S132-HW	-0.559	0.000	0.43		492.0	OK	
S33.000	S134	-0.205	0.000	0.68		201.6	OK	
S33.001	S135-HW	-0.198	0.000	0.69		199.4	OK	3
S31.011	S136-HW	-0.662	0.000	0.03		32.7	OK	
S31.012	S137-FCC	-0.309	0.000	0.07		32.7	OK	
S31.013	S138-HW	0.078	0.000	0.27		32.7	SURCHARGED	
S34.000	S139	-0.262	0.000	0.48		139.8	OK	3
S34.001	S140-HW	-0.110	0.000	0.12		27.7	OK	
S31.014	S141-HW	-0.364	0.000	0.09		43.6	OK	
S31.015	S142-FCC	-0.211	0.000	0.40		43.6	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S31.000	S1	15 Winter	30	+0%	30/15 Summer	100/15 Summer			17.451
S31.001	S2	15 Winter	30	+0%	30/15 Summer				17.173
S31.002	S3	15 Winter	30	+0%	30/15 Summer				16.896
S31.003	S4	15 Winter	30	+0%	30/15 Summer				16.621
S31.004	S5	15 Winter	30	+0%	30/15 Summer				16.348
S32.000	S6	15 Winter	30	+0%	30/15 Summer				16.299
S31.005	S7	15 Winter	30	+0%	30/15 Summer				16.036
S31.006	S8	15 Winter	30	+0%	30/15 Summer				15.696
S31.007	S9	15 Winter	30	+0%					14.975
S31.008	S10	15 Winter	30	+0%					13.852
S31.009	S131	15 Winter	30	+0%	100/15 Summer				11.528
S31.010	S132-HW	15 Winter	30	+0%	100/15 Summer				11.250
S33.000	S134	15 Winter	30	+0%	30/15 Summer				11.523
S33.001	S135-HW	15 Winter	30	+0%	30/15 Summer	100/15 Summer			11.096
S31.011	S136-HW	360 Winter	30	+0%	100/120 Winter				10.731
S31.012	S137-FCC	720 Summer	30	+0%					9.998
S31.013	S138-HW	180 Winter	30	+0%	1/30 Winter				9.190
S34.000	S139	15 Winter	30	+0%	30/15 Summer	100/15 Summer			9.341
S34.001	S140-HW	180 Winter	30	+0%	30/15 Summer				9.087
S31.014	S141-HW	180 Winter	30	+0%	100/30 Summer				9.084
S31.015	S142-FCC	120 Winter	30	+0%					8.434

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Pipe Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.000	S1	1.573	0.000	1.66		670.0	SURCHARGED	5
S31.001	S2	1.357	0.000	1.45		666.8	SURCHARGED	
S31.002	S3	1.189	0.000	1.80		661.8	SURCHARGED	
S31.003	S4	0.959	0.000	1.91		662.3	SURCHARGED	
S31.004	S5	0.723	0.000	1.61		705.1	SURCHARGED	
S32.000	S6	0.573	0.000	1.20		398.6	SURCHARGED	
S31.005	S7	0.498	0.000	1.60		1068.5	SURCHARGED	

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

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m ³)			Flow (l/s)		
S31.006	S8	0.231	0.000	1.66		1073.7	SURCHARGED	
S31.007	S9	-0.425	0.000	0.54		1261.2	OK	
S31.008	S10	-0.475	0.000	0.45		1257.9	OK	
S31.009	S131	-0.034	0.000	0.78		1197.1	OK	
S31.010	S132-HW	0.000	0.000	0.99		1144.1	OK	
S33.000	S134	0.647	0.000	1.64		488.5	SURCHARGED	
S33.001	S135-HW	0.371	0.000	1.69		488.2	SURCHARGED	3
S31.011	S136-HW	-0.319	0.000	0.03		32.8	OK	
S31.012	S137-FCC	-0.309	0.000	0.07		32.8	OK	
S31.013	S138-HW	0.401	0.000	0.27		32.4	SURCHARGED	
S34.000	S139	0.241	0.000	1.18		340.2	SURCHARGED	3
S34.001	S140-HW	0.211	0.000	0.36		82.2	SURCHARGED	
S31.014	S141-HW	-0.041	0.000	0.09		44.9	OK	
S31.015	S142-FCC	-0.208	0.000	0.41		44.9	OK	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details


Rainfall Model FSR M5-60 (mm) 19.300 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

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)
S31.000	S1	15 Winter	100	+40%	30/15 Summer	100/15 Summer			18.128
S31.001	S2	15 Winter	100	+40%	30/15 Summer				17.809
S31.002	S3	15 Summer	100	+40%	30/15 Summer				17.559
S31.003	S4	15 Summer	100	+40%	30/15 Summer				17.315
S31.004	S5	15 Summer	100	+40%	30/15 Summer				17.034
S32.000	S6	15 Winter	100	+40%	30/15 Summer				17.608
S31.005	S7	15 Winter	100	+40%	30/15 Summer				16.650
S31.006	S8	15 Winter	100	+40%	30/15 Summer				16.012
S31.007	S9	15 Winter	100	+40%					15.113
S31.008	S10	15 Winter	100	+40%					13.969
S31.009	S131	15 Winter	100	+40%	100/15 Summer				12.182
S31.010	S132-HW	15 Winter	100	+40%	100/15 Summer				11.504
S33.000	S134	15 Winter	100	+40%	30/15 Summer				13.128
S33.001	S135-HW	15 Winter	100	+40%	30/15 Summer	100/15 Summer			11.728
S31.011	S136-HW	720 Winter	100	+40%	100/120 Winter				11.261
S31.012	S137-FCC	7200 Winter	100	+40%					9.998
S31.013	S138-HW	360 Winter	100	+40%	1/30 Winter				9.660
S34.000	S139	15 Winter	100	+40%	30/15 Summer	100/15 Summer			10.016
S34.001	S140-HW	360 Winter	100	+40%	30/15 Summer				9.556
S31.014	S141-HW	360 Winter	100	+40%	100/30 Summer				9.554
S31.015	S142-FCC	600 Summer	100	+40%					8.434

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S31.000	S1	2.250	128.625	1.98		802.5	FLOOD	5
S31.001	S2	1.993	0.000	1.72		795.3	FLOOD RISK	
S31.002	S3	1.852	0.000	2.18		802.1	SURCHARGED	
S31.003	S4	1.653	0.000	2.31		803.0	SURCHARGED	
S31.004	S5	1.409	0.000	1.87		821.3	SURCHARGED	
S32.000	S6	1.882	0.000	2.26		750.6	SURCHARGED	
S31.005	S7	1.112	0.000	2.25		1506.4	SURCHARGED	

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Innovyze	Network 2019.1	

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

PN	US/MH Name	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)			Flow (l/s)		
S31.006	S8	0.547	0.000	2.33		1504.6	SURCHARGED	
S31.007	S9	-0.287	0.000	0.80		1861.2	OK	
S31.008	S10	-0.358	0.000	0.67		1862.7	OK	
S31.009	S131	0.620	0.000	1.20		1844.9	SURCHARGED	
S31.010	S132-HW	0.254	0.000	1.51		1748.6	FLOOD RISK	
S33.000	S134	2.252	0.000	2.99		892.5	FLOOD RISK	
S33.001	S135-HW	1.003	28.648	2.48		716.5	FLOOD	3
S31.011	S136-HW	0.211	0.000	0.03		32.8	FLOOD RISK	
S31.012	S137-FCC	-0.309	0.000	0.07		32.8	OK	
S31.013	S138-HW	0.871	0.000	0.27		32.5	FLOOD RISK	
S34.000	S139	0.916	15.603	1.81		523.8	FLOOD	3
S34.001	S140-HW	0.680	0.000	0.38		87.5	FLOOD RISK	
S31.014	S141-HW	0.429	0.000	0.09		44.9	FLOOD RISK	
S31.015	S142-FCC	-0.208	0.000	0.41		44.9	OK	