ROMAN BANK SURFACE WATER CALCULATIONS v01

Project	Welland Hospital Redevelopment Holbeach Road Site Spalding
Client	Lindum
Our ref.	P19062
Date	April 2019
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
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 Surface Network 1

« - 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
1.000	7.987	0.085	94.0	0.004	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	3.789	0.050	75.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	12.117	0.130	93.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	7.987	0.140	57.1	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	3.531	0.065	54.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	13.445	0.080	168.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	7.987	0.140	57.1	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	3.521	0.145	24.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	13.446	0.080	168.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	7.987	0.140	57.1	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.13	3.660	0.004	0.0	0.0	0.0	1.04	18.3	0.5
1.001	50.00	5.18	3.575	0.004	0.0	0.0	0.0	1.16	20.4	0.5
1.002	50.00	5.38	3.525	0.004	0.0	0.0	0.0	1.04	18.4	0.5
2.000	50.00	5.10	3.600	0.008	0.0	0.0	0.0	1.33	23.6	1.1
2.001	50.00	5.14	3.460	0.008	0.0	0.0	0.0	1.37	24.2	1.1
1.003	50.00	5.60	3.320	0.012	0.0	0.0	0.0	1.01	40.0	1.6
3.000	50.00	5.10	3.600	0.008	0.0	0.0	0.0	1.33	23.6	1.1
3.001	50.00	5.13	3.460	0.008	0.0	0.0	0.0	2.05	36.3	1.1
1.004	50.00	5.82	3.240	0.020	0.0	0.0	0.0	1.01	40.0	2.7
4.000	50.00	5.10	3.600	0.008	0.0	0.0	0.0	1.33	23.6	1.1

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.001	3.516	0.225	15.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	13.135	0.085	154.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	7.987	0.140	57.1	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	3.448	0.310	11.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	7.039	0.045	156.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	7.987	0.240	33.3	0.004	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	3.482	0.360	9.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	16.123	0.100	161.2	0.055	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	3.831	0.025	153.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.000	7.987	0.100	79.9	0.004	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	6.150	0.520	11.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.009	9.867	0.060	164.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.000	12.176	0.210	58.0	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
8.001	11.948	0.240	49.8	0.003	0.00	0.0	0.600	o	150	Pipe/Conduit	
9.000	9.037	0.100	90.4	0.003	5.00	0.0	0.600	o	150	Pipe/Conduit	
9.001	3.138	0.450	7.0	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.001	50.00	5.12	3.460	0.008	0.0	0.0	0.0	2.56	45.3	1.1
1.005	50.00	6.03	3.160	0.028	0.0	0.0	0.0	1.05	41.7	3.8
5.000	50.00	5.10	3.600	0.008	0.0	0.0	0.0	1.33	23.6	1.1
5.001	50.00	5.12	3.460	0.008	0.0	0.0	0.0	3.04	53.7	1.1
1.006	50.00	6.14	3.075	0.036	0.0	0.0	0.0	1.04	41.5	4.9
6.000	50.00	5.08	3.700	0.004	0.0	0.0	0.0	1.75	30.9	0.5
6.001	50.00	5.09	3.460	0.004	0.0	0.0	0.0	3.26	57.6	0.5
1.007	50.00	6.41	3.030	0.095	0.0	0.0	0.0	1.03	40.8	12.9
1.008	50.00	6.47	2.930	0.095	0.0	0.0	0.0	1.05	41.9	12.9
7.000	50.00	5.12	3.600	0.004	0.0	0.0	0.0	1.13	19.9	0.5
7.001	50.00	5.15	3.500	0.004	0.0	0.0	0.0	2.95	52.1	0.5
1.009	50.00	6.63	2.470	0.099	0.0	0.0	0.0	1.02	40.4	13.4
8.000	50.00	5.15	3.850	0.005	0.0	0.0	0.0	1.32	23.4	0.7
8.001	50.00	5.29	3.640	0.008	0.0	0.0	0.0	1.43	25.3	1.1
9.000	50.00	5.14	3.950	0.003	0.0	0.0	0.0	1.06	18.7	0.4
9.001	50.00	5.16	3.850	0.010	0.0	0.0	0.0	3.84	67.9	1.4

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Network Design Table for Surface Network 1

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
8.002	7.758	0.400	19.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.000	8.712	0.100	87.1	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
10.001	3.894	0.050	77.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.002	5.978	0.110	54.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
11.000	9.037	0.110	82.2	0.003	5.00	0.0	0.600	o	150	Pipe/Conduit	
11.001	3.138	0.070	44.8	0.002	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.003	12.980	0.240	54.1	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	
12.000	12.176	0.850	14.3	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
8.003	7.141	0.050	142.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.010	9.963	0.060	166.1	0.029	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.011	4.743	-1.440	-3.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.012	14.085	0.145	97.1	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)	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)
8.002	50.00	5.35	3.400	0.018	0.0	0.0	0.0	2.30	40.6	2.4
10.000	50.00	5.13	3.500	0.005	0.0	0.0	0.0	1.08	19.0	0.7
10.001	50.00	5.19	3.400	0.005	0.0	0.0	0.0	1.14	20.2	0.7
10.002	50.00	5.26	3.350	0.005	0.0	0.0	0.0	1.37	24.2	0.7
11.000	50.00	5.14	3.420	0.003	0.0	0.0	0.0	1.11	19.6	0.4
11.001	50.00	5.17	3.310	0.005	0.0	0.0	0.0	1.51	26.6	0.7
10.003	50.00	5.42	3.240	0.017	0.0	0.0	0.0	1.37	24.2	2.3
12.000	50.00	5.08	3.850	0.005	0.0	0.0	0.0	2.68	47.3	0.7
8.003	50.00	5.56	3.000	0.040	0.0	0.0	0.0	0.84	14.8	5.4
1.010	50.00	6.79	2.410	0.168	0.0	0.0	0.0	1.01	40.2	22.7
1.011	50.00	7.64	2.350	0.168	0.0	0.0	0.0	0.09	1.6«	22.7
1.012	50.00	7.87	3.790	0.168	0.0	0.0	0.0	1.02	18.0«	22.7

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Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	4.200	0.540	Open Manhole	150	1.000	3.660	150				
S2	4.200	0.625	Open Manhole	450	1.001	3.575	150	1.000	3.575	150	
S3	4.200	0.675	Open Manhole	450	1.002	3.525	150	1.001	3.525	150	
S4	4.200	0.600	Open Manhole	150	2.000	3.600	150				
S5	4.200	0.740	Open Manhole	150	2.001	3.460	150	2.000	3.460	150	
S6	4.080	0.760	Open Manhole	600	1.003	3.320	225	1.002	3.395	150	
								2.001	3.395	150	
S7	4.600	1.000	Open Manhole	150	3.000	3.600	150				
S8	4.200	0.740	Open Manhole	450	3.001	3.460	150	3.000	3.460	150	
S9	4.080	0.840	Open Manhole	600	1.004	3.240	225	1.003	3.240	225	
								3.001	3.315	150	
S10	4.200	0.600	Open Manhole	150	4.000	3.600	150				
S11	4.200	0.740	Open Manhole	450	4.001	3.460	150	4.000	3.460	150	
S12	4.052	0.892	Open Manhole	600	1.005	3.160	225	1.004	3.160	225	
								4.001	3.235	150	
S13	4.200	0.600	Open Manhole	150	5.000	3.600	150				
S14	4.200	0.740	Open Manhole	450	5.001	3.460	150	5.000	3.460	150	
S15	3.882	0.807	Open Manhole	600	1.006	3.075	225	1.005	3.075	225	
								5.001	3.150	150	
S16	4.200	0.500	Open Manhole	150	6.000	3.700	150				
S17	4.200	0.740	Open Manhole	450	6.001	3.460	150	6.000	3.460	150	
S18	3.854	0.824	Open Manhole	600	1.007	3.030	225	1.006	3.030	225	
								6.001	3.100	150	
S19	4.294	1.364	Open Manhole	600	1.008	2.930	225	1.007	2.930	225	
S20	4.200	0.600	Open Manhole	150	7.000	3.600	150				
S21	3.764	0.264	Open Manhole	450	7.001	3.500	150	7.000	3.500	150	
S22	4.281	1.811	Open Manhole	1200	1.009	2.470	225	1.008	2.905	225	435
								7.001	2.980	150	435
S23	4.480	0.630	Open Manhole	150	8.000	3.850	150				
S24	4.450	0.810	Open Manhole	450	8.001	3.640	150	8.000	3.640	150	
S25	4.450	0.500	Open Manhole	150	9.000	3.950	150				
S26	4.450	0.600	Open Manhole	450	9.001	3.850	150	9.000	3.850	150	
S27	4.400	1.000	Open Manhole	450	8.002	3.400	150	8.001	3.400	150	
								9.001	3.400	150	
S28	4.070	0.570	Open Manhole	150	10.000	3.500	150				
S29	3.934	0.534	Open Manhole	450	10.001	3.400	150	10.000	3.400	150	
S30	3.884	0.534	Open Manhole	450	10.002	3.350	150	10.001	3.350	150	
S31	4.006	0.586	Open Manhole	150	11.000	3.420	150				
S32	3.944	0.634	Open Manhole	450	11.001	3.310	150	11.000	3.310	150	
S33	3.915	0.675	Open Manhole	450	10.003	3.240	150	10.002	3.240	150	
								11.001	3.240	150	
S34	4.450	0.600	Open Manhole	150	12.000	3.850	150				
S35	4.300	1.300	Open Manhole	1200	8.003	3.000	150	8.002	3.000	150	
								10.003	3.000	150	

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Manhole Schedules for Surface Network 1

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
								12.000	3.000	150	
S37	4.159	1.749	Junction		1.010	2.410	225	1.009	2.410	225	
								8.003	2.950	150	465
S38	4.036	1.686	Open Manhole	1200	1.011	2.350	150	1.010	2.350	225	
S39	4.000	0.210	Open Manhole	450	1.012	3.790	150	1.011	3.790	150	
S40	4.000	0.355	Open Manhole	1200		OUTFALL		1.012	3.645	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	525824.526	323855.150	525824.526	323855.150	Required	
S2	525817.946	323859.677	525817.946	323859.677	Required	
S3	525814.270	323860.594	525814.270	323860.594	Required	
S4	525816.843	323844.116	525816.843	323844.116	Required	
S5	525810.263	323848.643	525810.263	323848.643	Required	
S6	525807.353	323850.645	525807.353	323850.645	Required	
S7	525809.159	323833.082	525809.159	323833.082	Required	
S8	525802.579	323837.609	525802.579	323837.609	Required	
S9	525799.679	323839.605	525799.679	323839.605	Required	
S10	525801.480	323822.045	525801.480	323822.045	Required	
S11	525794.900	323826.572	525794.900	323826.572	Required	
S12	525792.004	323828.565	525792.004	323828.565	Required	
S13	525793.927	323811.299	525793.927	323811.299	Required	

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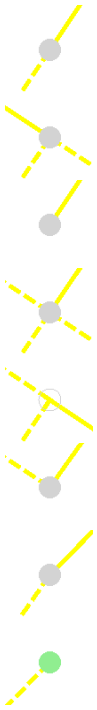
Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S14	525787.347	323815.826	525787.347	323815.826	Required	
S15	525784.506	323817.781	525784.506	323817.781	Required	
S16	525789.928	323805.486	525789.928	323805.486	Required	
S17	525783.348	323810.013	525783.348	323810.013	Required	
S18	525780.488	323812.001	525780.488	323812.001	Required	
S19	525771.285	323798.762	525771.285	323798.762	Required	
S20	525783.590	323796.275	525783.590	323796.275	Required	
S21	525777.010	323800.802	525777.010	323800.802	Required	
S22	525773.582	323795.696	525773.582	323795.696	Required	
S23	525754.646	323785.143	525754.646	323785.143	Required	
S24	525761.433	323795.252	525761.433	323795.252	Required	
S25	525764.566	323778.483	525764.566	323778.483	Required	
S26	525769.603	323785.986	525769.603	323785.986	Required	
S27	525771.353	323788.592	525771.353	323788.592	Required	
S28	525788.224	323762.599	525788.224	323762.599	Required	
S29	525793.080	323769.832	525793.080	323769.832	Required	
S30	525793.533	323773.700	525793.533	323773.700	Required	
S31	525781.783	323766.924	525781.783	323766.924	Required	

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Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S32	525786.821	323774.427	525786.821	323774.427	Required	
S33	525788.570	323777.032	525788.570	323777.032	Required	
S34	525771.007	323774.159	525771.007	323774.159	Required	
S35	525777.794	323784.267	525777.794	323784.267	Required	
S37	525781.774	323790.196			No Entry	
S38	525790.045	323784.643	525790.045	323784.643	Required	
S39	525792.770	323788.525	525792.770	323788.525	Required	
S40	525802.642	323798.572			No Entry	



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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	S1	4.200	3.660	0.390	Open Manhole	150
1.001	o	150	S2	4.200	3.575	0.475	Open Manhole	450
1.002	o	150	S3	4.200	3.525	0.525	Open Manhole	450
2.000	o	150	S4	4.200	3.600	0.450	Open Manhole	150
2.001	o	150	S5	4.200	3.460	0.590	Open Manhole	150
1.003	o	225	S6	4.080	3.320	0.535	Open Manhole	600
3.000	o	150	S7	4.600	3.600	0.850	Open Manhole	150
3.001	o	150	S8	4.200	3.460	0.590	Open Manhole	450
1.004	o	225	S9	4.080	3.240	0.615	Open Manhole	600
4.000	o	150	S10	4.200	3.600	0.450	Open Manhole	150
4.001	o	150	S11	4.200	3.460	0.590	Open Manhole	450
1.005	o	225	S12	4.052	3.160	0.667	Open Manhole	600
5.000	o	150	S13	4.200	3.600	0.450	Open Manhole	150
5.001	o	150	S14	4.200	3.460	0.590	Open Manhole	450
1.006	o	225	S15	3.882	3.075	0.582	Open Manhole	600
6.000	o	150	S16	4.200	3.700	0.350	Open Manhole	150

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	7.987	94.0	S2	4.200	3.575	0.475	Open Manhole	450
1.001	3.789	75.8	S3	4.200	3.525	0.525	Open Manhole	450
1.002	12.117	93.2	S6	4.080	3.395	0.535	Open Manhole	600
2.000	7.987	57.1	S5	4.200	3.460	0.590	Open Manhole	150
2.001	3.531	54.3	S6	4.080	3.395	0.535	Open Manhole	600
1.003	13.445	168.1	S9	4.080	3.240	0.615	Open Manhole	600
3.000	7.987	57.1	S8	4.200	3.460	0.590	Open Manhole	450
3.001	3.521	24.3	S9	4.080	3.315	0.615	Open Manhole	600
1.004	13.446	168.1	S12	4.052	3.160	0.667	Open Manhole	600
4.000	7.987	57.1	S11	4.200	3.460	0.590	Open Manhole	450
4.001	3.516	15.6	S12	4.052	3.235	0.667	Open Manhole	600
1.005	13.135	154.5	S15	3.882	3.075	0.582	Open Manhole	600
5.000	7.987	57.1	S14	4.200	3.460	0.590	Open Manhole	450
5.001	3.448	11.1	S15	3.882	3.150	0.582	Open Manhole	600
1.006	7.039	156.4	S18	3.854	3.030	0.599	Open Manhole	600
6.000	7.987	33.3	S17	4.200	3.460	0.590	Open Manhole	450

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.001	o	150	S17	4.200	3.460	0.590	Open Manhole	450
1.007	o	225	S18	3.854	3.030	0.599	Open Manhole	600
1.008	o	225	S19	4.294	2.930	1.139	Open Manhole	600
7.000	o	150	S20	4.200	3.600	0.450	Open Manhole	150
7.001	o	150	S21	3.764	3.500	0.114	Open Manhole	450
1.009	o	225	S22	4.281	2.470	1.586	Open Manhole	1200
8.000	o	150	S23	4.480	3.850	0.480	Open Manhole	150
8.001	o	150	S24	4.450	3.640	0.660	Open Manhole	450
9.000	o	150	S25	4.450	3.950	0.350	Open Manhole	150
9.001	o	150	S26	4.450	3.850	0.450	Open Manhole	450
8.002	o	150	S27	4.400	3.400	0.850	Open Manhole	450
10.000	o	150	S28	4.070	3.500	0.420	Open Manhole	150
10.001	o	150	S29	3.934	3.400	0.384	Open Manhole	450
10.002	o	150	S30	3.884	3.350	0.384	Open Manhole	450
11.000	o	150	S31	4.006	3.420	0.436	Open Manhole	150
11.001	o	150	S32	3.944	3.310	0.484	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
6.001	3.482	9.7	S18	3.854	3.100	0.604	Open Manhole	600
1.007	16.123	161.2	S19	4.294	2.930	1.139	Open Manhole	600
1.008	3.831	153.2	S22	4.281	2.905	1.151	Open Manhole	1200
7.000	7.987	79.9	S21	3.764	3.500	0.114	Open Manhole	450
7.001	6.150	11.8	S22	4.281	2.980	1.151	Open Manhole	1200
1.009	9.867	164.5	S37	4.159	2.410	1.524	Junction	
8.000	12.176	58.0	S24	4.450	3.640	0.660	Open Manhole	450
8.001	11.948	49.8	S27	4.400	3.400	0.850	Open Manhole	450
9.000	9.037	90.4	S26	4.450	3.850	0.450	Open Manhole	450
9.001	3.138	7.0	S27	4.400	3.400	0.850	Open Manhole	450
8.002	7.758	19.4	S35	4.300	3.000	1.150	Open Manhole	1200
10.000	8.712	87.1	S29	3.934	3.400	0.384	Open Manhole	450
10.001	3.894	77.9	S30	3.884	3.350	0.384	Open Manhole	450
10.002	5.978	54.3	S33	3.915	3.240	0.525	Open Manhole	450
11.000	9.037	82.2	S32	3.944	3.310	0.484	Open Manhole	450
11.001	3.138	44.8	S33	3.915	3.240	0.525	Open Manhole	450

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.003	o	150	S33	3.915	3.240	0.525	Open Manhole	450
12.000	o	150	S34	4.450	3.850	0.450	Open Manhole	150
8.003	o	150	S35	4.300	3.000	1.150	Open Manhole	1200
1.010	o	225	S37	4.159	2.410	1.524	Junction	
1.011	o	150	S38	4.036	2.350	1.536	Open Manhole	1200
1.012	o	150	S39	4.000	3.790	0.060	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.003	12.980	54.1	S35	4.300	3.000	1.150	Open Manhole	1200
12.000	12.176	14.3	S35	4.300	3.000	1.150	Open Manhole	1200
8.003	7.141	142.8	S37	4.159	2.950	1.059	Junction	
1.010	9.963	166.1	S38	4.036	2.350	1.461	Open Manhole	1200
1.011	4.743	-3.3	S39	4.000	3.790	0.060	Open Manhole	450
1.012	14.085	97.1	S40	4.000	3.645	0.205	Open Manhole	1200

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.012	S40	4.000	3.645	0.000	1200	0

Simulation Criteria for Surface Network 1

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

Number of Input Hydrographs 0 Number of 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)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Surface Network 1

Pump Manhole: S38, DS/PN: 1.011, Volume (m³): 2.3

Invert Level (m) 2.350

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	5.0000	0.300	5.0000	0.500	5.0000	0.700	5.0000	0.900	5.0000
0.200	5.0000	0.400	5.0000	0.600	5.0000	0.800	5.0000	1.000	5.0000

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Storage Structures for Surface Network 1

Cellular Storage Manhole: S38, DS/PN: 1.011

Invert Level (m) 2.350 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	61.5	0.0	0.800	61.5	0.0	0.801	0.0	0.0

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

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 Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of 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) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	S1	120 Winter	100	+40%					3.793	-0.017
1.001	S2	120 Winter	100	+40%	100/60 Winter				3.792	0.067
1.002	S3	120 Winter	100	+40%	100/60 Winter				3.792	0.117
2.000	S4	120 Winter	100	+40%	100/60 Winter				3.793	0.043
2.001	S5	120 Winter	100	+40%	100/60 Winter				3.792	0.182
1.003	S6	120 Winter	100	+40%	100/60 Winter				3.791	0.246
3.000	S7	120 Winter	100	+40%	100/60 Winter				3.792	0.042
3.001	S8	120 Winter	100	+40%	100/60 Winter				3.791	0.181
1.004	S9	120 Winter	100	+40%	100/15 Winter				3.790	0.325
4.000	S10	120 Winter	100	+40%	100/60 Winter				3.791	0.041
4.001	S11	120 Winter	100	+40%	100/60 Winter				3.789	0.179
1.005	S12	120 Winter	100	+40%	100/15 Winter				3.789	0.404
5.000	S13	120 Winter	100	+40%	100/60 Winter				3.788	0.038
5.001	S14	120 Winter	100	+40%	100/60 Winter				3.787	0.177
1.006	S15	120 Winter	100	+40%	100/15 Winter				3.787	0.487
6.000	S16	120 Winter	100	+40%					3.786	-0.064
6.001	S17	120 Winter	100	+40%	100/60 Winter				3.785	0.175
1.007	S18	120 Winter	100	+40%	100/15 Winter				3.785	0.530
1.008	S19	120 Winter	100	+40%	100/15 Winter				3.777	0.622
7.000	S20	120 Winter	100	+40%	100/60 Winter				3.763	0.013
7.001	S21	120 Winter	100	+40%	100/60 Winter				3.763	0.113
1.009	S22	120 Winter	100	+40%	100/15 Winter				3.774	1.079
8.000	S23	15 Winter	100	+40%					3.887	-0.113
8.001	S24	120 Winter	100	+40%					3.780	-0.010
9.000	S25	15 Winter	100	+40%					3.983	-0.117
9.001	S26	15 Winter	100	+40%					3.888	-0.112
8.002	S27	120 Winter	100	+40%	100/60 Winter				3.779	0.229
10.000	S28	120 Winter	100	+40%	100/60 Winter				3.781	0.131
10.001	S29	120 Winter	100	+40%	100/60 Winter				3.780	0.230
10.002	S30	120 Winter	100	+40%	100/60 Winter				3.780	0.280

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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.000	0.05			0.8	OK	
1.001	S2	0.000	0.05			0.8	SURCHARGED	
1.002	S3	0.000	0.05			0.8	SURCHARGED	
2.000	S4	0.000	0.07			1.5	SURCHARGED	
2.001	S5	0.000	0.10			1.5	SURCHARGED	
1.003	S6	0.000	0.07			2.3	FLOOD RISK	
3.000	S7	0.000	0.07			1.5	SURCHARGED	
3.001	S8	0.000	0.06			1.5	SURCHARGED	
1.004	S9	0.000	0.11			3.8	FLOOD RISK	
4.000	S10	0.000	0.07			1.5	SURCHARGED	
4.001	S11	0.000	0.05			1.5	SURCHARGED	
1.005	S12	0.000	0.15			5.3	FLOOD RISK	
5.000	S13	0.000	0.07			1.5	SURCHARGED	
5.001	S14	0.000	0.04			1.5	SURCHARGED	
1.006	S15	0.000	0.23			6.9	FLOOD RISK	
6.000	S16	0.000	0.03			0.8	OK	
6.001	S17	0.000	0.02			0.8	SURCHARGED	
1.007	S18	0.000	0.50			18.1	FLOOD RISK	
1.008	S19	0.000	0.63			18.1	SURCHARGED	
7.000	S20	0.000	0.04			0.8	SURCHARGED	
7.001	S21	0.000	0.10			4.5	FLOOD RISK	
1.009	S22	0.000	0.54			18.3	SURCHARGED	
8.000	S23	0.000	0.14			2.9	OK	
8.001	S24	0.000	0.07			1.5	OK	
9.000	S25	0.000	0.11			1.8	OK	
9.001	S26	0.000	0.15			6.1	OK	
8.002	S27	0.000	0.10			3.4	SURCHARGED	
10.000	S28	0.000	0.06			1.0	FLOOD RISK	
10.001	S29	0.000	0.07			1.0	FLOOD RISK	
10.002	S30	0.000	0.05			1.0	FLOOD RISK	

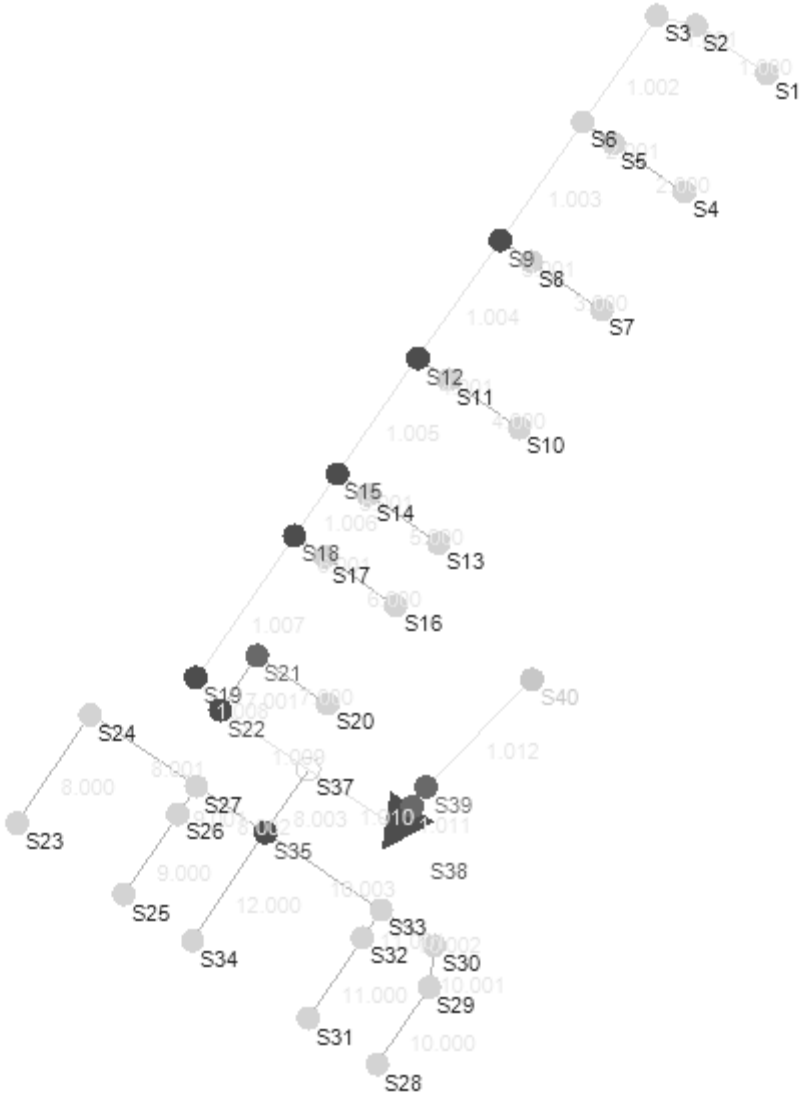
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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
11.000	S31	120 Winter	100	+40%	100/60 Winter				3.780	0.210
11.001	S32	120 Winter	100	+40%	100/60 Winter				3.780	0.320
10.003	S33	120 Winter	100	+40%	100/60 Winter				3.780	0.390
12.000	S34	15 Winter	100	+40%					3.876	-0.124
8.003	S35	120 Winter	100	+40%	100/15 Winter				3.777	0.627
1.010	S37	30 Winter	100	+40%	100/15 Winter				3.100	0.465
1.011	S38	120 Winter	100	+40%	100/15 Winter				3.766	1.266
1.012	S39	180 Winter	100	+40%					3.846	-0.094

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
11.000	S31	0.000	0.03			0.6	FLOOD RISK	
11.001	S32	0.000	0.06			1.0	FLOOD RISK	
10.003	S33	0.000	0.15			3.2	FLOOD RISK	
12.000	S34	0.000	0.07			2.9	OK	
8.003	S35	0.000	0.60			7.6	SURCHARGED	
1.010	S37	0.000	2.02			69.8	SURCHARGED*	
1.011	S38	0.000	0.54		150	5.0	FLOOD RISK	
1.012	S39	0.000	0.30			5.0	FLOOD RISK	

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