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Amber House Green Lane, Old Swan Liverpool, L13 7GD	Fernhill Traellers Site SW Hydraulic Calcs	
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Innovyze	Network 2018.1.1	

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)	1	PIMP (%)	100
M5-60 (mm)	18.600	Add Flow / Climate Change (%)	0
Ratio R	0.350	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

Time Area Diagram for Surface Network 1

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.296	4-8	0.089

Total Area Contributing (ha) = 0.385

Total Pipe Volume (m³) = 7.462

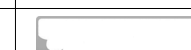
Network Design Table for Surface Network 1

« - 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	4.005	0.040	100.1	0.004	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	13.653	0.137	99.7	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	4.067	0.041	99.2	0.009	5.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	4.839	0.136	35.6	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	24.475	0.431	56.8	0.009	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)
1.000	47.31	5.09	103.400	0.004	0.0	0.0	0.0	0.77	6.0	0.5
1.001	46.45	5.31	103.310	0.013	0.0	0.0	0.0	1.01	17.8	1.6
2.000	47.30	5.09	103.400	0.009	0.0	0.0	0.0	0.77	6.1	1.2
2.001	47.12	5.14	103.309	0.019	0.0	0.0	0.0	1.69	29.9	2.4
1.002	45.34	5.62	103.173	0.041	0.0	0.0	0.0	1.34	23.6	5.0

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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
3.000	4.508	0.045	100.2	0.007	5.00	0.0	0.600	o	100	Pipe/Conduit	
3.001	11.457	0.115	99.6	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.000	4.420	0.044	100.5	0.007	5.00	0.0	0.600	o	100	Pipe/Conduit	
4.001	6.916	0.116	59.6	0.011	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	22.042	0.448	49.2	0.012	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	38.261	0.255	150.0	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	3.585	0.036	99.6	0.009	5.00	0.0	0.600	o	100	Pipe/Conduit	
5.001	18.366	0.184	100.0	0.008	0.00	0.0	0.600	o	100	Pipe/Conduit	
6.000	3.763	0.038	99.0	0.009	5.00	0.0	0.600	o	100	Pipe/Conduit	
5.002	20.365	0.434	47.0	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.000	3.756	0.038	100.0	0.006	5.00	0.0	0.600	o	100	Pipe/Conduit	
7.001	18.331	0.183	100.2	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.000	3.980	0.221	18.0	0.009	5.00	0.0	0.600	o	100	Pipe/Conduit	
7.002	19.848	0.132	150.0	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.003	5.347	0.510	10.5	0.012	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)
3.000	47.27	5.10	103.400	0.007	0.0	0.0	0.0	0.77	6.0	0.9
3.001	46.54	5.29	103.305	0.016	0.0	0.0	0.0	1.01	17.8	2.0
4.000	47.27	5.10	103.400	0.007	0.0	0.0	0.0	0.77	6.0	0.9
4.001	46.93	5.18	103.306	0.018	0.0	0.0	0.0	1.31	23.1	2.3
3.002	45.61	5.54	103.190	0.046	0.0	0.0	0.0	1.44	25.4	5.7
1.003	43.34	6.22	102.667	0.099	0.0	0.0	0.0	1.07	42.4	11.6
5.000	47.34	5.08	103.700	0.009	0.0	0.0	0.0	0.77	6.1	1.2
5.001	45.85	5.48	103.664	0.017	0.0	0.0	0.0	0.77	6.0	2.1
6.000	47.33	5.08	103.700	0.009	0.0	0.0	0.0	0.77	6.1	1.2
5.002	45.03	5.71	103.431	0.035	0.0	0.0	0.0	1.47	26.0	4.3
7.000	47.33	5.08	103.400	0.006	0.0	0.0	0.0	0.77	6.0	0.8
7.001	46.18	5.39	103.312	0.015	0.0	0.0	0.0	1.00	17.7	1.9
8.000	47.51	5.04	103.400	0.009	0.0	0.0	0.0	1.83	14.4	1.2
7.002	44.74	5.79	103.129	0.033	0.0	0.0	0.0	0.82	14.5	4.0
5.003	44.65	5.82	102.997	0.080	0.0	0.0	0.0	3.13	55.3	9.7

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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
14.000	7.431	0.265	28.0	0.020	5.00	0.0	0.600	o	225	Pipe/Conduit	
13.003	2.653	0.261	10.2	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	2.881	0.019	151.6	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)
14.000	47.45	5.05	102.545	0.020	0.0	0.0	0.0	2.48	98.6	2.6
13.003	46.64	5.26	102.280	0.070	0.0	0.0	0.0	4.13	164.1	8.8
1.006	41.93	6.68	102.019	0.385	0.0	0.0	0.0	0.81	14.4	43.7

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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	100	S1	103.950	103.400	0.450	Open Manhole	300
1.001	o	150	S2	103.950	103.310	0.490	Open Manhole	450
2.000	o	100	S3	103.950	103.400	0.450	Open Manhole	300
2.001	o	150	S4	103.950	103.309	0.491	Open Manhole	450
1.002	o	150	S5	103.950	103.173	0.627	Open Manhole	450
3.000	o	100	S6	103.950	103.400	0.450	Open Manhole	300
3.001	o	150	S7	103.950	103.305	0.495	Open Manhole	450
4.000	o	100	S8	103.950	103.400	0.450	Open Manhole	300
4.001	o	150	S9	103.950	103.306	0.494	Open Manhole	450
3.002	o	150	S10	103.950	103.190	0.610	Open Manhole	450
1.003	o	225	S11	103.793	102.667	0.901	Open Manhole	1200
5.000	o	100	S12	104.250	103.700	0.450	Open Manhole	300
5.001	o	100	S13	104.250	103.664	0.486	Open Manhole	450
6.000	o	100	S14	104.250	103.700	0.450	Open Manhole	300
5.002	o	150	S15	104.250	103.431	0.670	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)
1.000	4.005	100.1	S2	103.950	103.360	0.490	Open Manhole	450
1.001	13.653	99.7	S5	103.950	103.173	0.627	Open Manhole	450
2.000	4.067	99.2	S4	103.950	103.359	0.491	Open Manhole	450
2.001	4.839	35.6	S5	103.950	103.173	0.627	Open Manhole	450
1.002	24.475	56.8	S11	103.793	102.742	0.901	Open Manhole	1200
3.000	4.508	100.2	S7	103.950	103.355	0.495	Open Manhole	450
3.001	11.457	99.6	S10	103.950	103.190	0.610	Open Manhole	450
4.000	4.420	100.5	S9	103.950	103.356	0.494	Open Manhole	450
4.001	6.916	59.6	S10	103.950	103.190	0.610	Open Manhole	450
3.002	22.042	49.2	S11	103.793	102.742	0.901	Open Manhole	1200
1.003	38.261	150.0	S21	103.993	102.412	1.356	Open Manhole	1200
5.000	3.585	99.6	S13	104.250	103.664	0.486	Open Manhole	450
5.001	18.366	100.0	S15	104.250	103.481	0.669	Open Manhole	450
6.000	3.763	99.0	S15	104.250	103.662	0.488	Open Manhole	450
5.002	20.365	47.0	S20	103.743	102.997	0.596	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)
7.000	o	100	S16	103.950	103.400	0.450	Open Manhole	300
7.001	o	150	S17	103.950	103.312	0.488	Open Manhole	450
8.000	o	100	S18	103.950	103.400	0.450	Open Manhole	300
7.002	o	150	S19	103.950	103.129	0.671	Open Manhole	450
5.003	o	150	S20	103.743	102.997	0.596	Open Manhole	450
1.004	o	225	S21	103.993	102.412	1.356	Open Manhole	1200
9.000	o	100	S22	103.950	103.400	0.450	Open Manhole	300
9.001	o	100	S23	103.950	103.361	0.489	Open Manhole	450
10.000	o	100	S24	103.950	103.400	0.450	Open Manhole	300
10.001	o	100	S25	103.950	103.362	0.488	Open Manhole	450
9.002	o	150	S26	103.950	103.204	0.596	Open Manhole	450
1.005	o	225	S27	103.690	102.292	1.173	Open Manhole	1200
11.000	o	100	S28	103.950	103.400	0.450	Open Manhole	300
11.001	o	100	S29	103.950	103.360	0.490	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)
7.000	3.756	100.0	S17	103.950	103.362	0.488	Open Manhole	450
7.001	18.331	100.2	S19	103.950	103.129	0.671	Open Manhole	450
8.000	3.980	18.0	S19	103.950	103.179	0.671	Open Manhole	450
7.002	19.848	150.0	S20	103.743	102.997	0.596	Open Manhole	450
5.003	5.347	10.5	S21	103.993	102.487	1.356	Open Manhole	1200
1.004	17.929	149.4	S27	103.690	102.292	1.173	Open Manhole	1200
9.000	3.896	99.9	S23	103.950	103.361	0.489	Open Manhole	450
9.001	10.733	100.3	S26	103.950	103.254	0.596	Open Manhole	450
10.000	3.820	100.5	S25	103.950	103.362	0.488	Open Manhole	450
10.001	8.309	76.9	S26	103.950	103.254	0.596	Open Manhole	450
9.002	15.033	100.0	S27	103.690	103.054	0.486	Open Manhole	1200
1.005	13.740	50.3	S39 HB	103.589	102.019	1.345	Open Manhole	1500
11.000	3.995	100.0	S29	103.950	103.360	0.490	Open Manhole	450
11.001	16.099	100.1	S32	103.950	103.199	0.651	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)
12.000	o	100	S30	103.950	103.400	0.450	Open Manhole	300
12.001	o	100	S31	103.950	103.363	0.487	Open Manhole	450
11.002	o	150	S32	103.950	103.149	0.651	Open Manhole	450
11.003	o	150	S33	103.800	102.750	0.900	Open Manhole	450
13.000	o	100	S34	103.600	103.050	0.450	Open Manhole	300
13.001	o	100	S35	103.600	102.972	0.528	Open Manhole	450
13.002	o	100	S36	103.600	102.953	0.547	Open Manhole	450
14.000	o	225	S37	103.206	102.545	0.436	Open Manhole	450
13.003	o	225	S38	103.600	102.280	1.095	Open Manhole	600
1.006	o	150	S39 HB	103.589	102.019	1.420	Open Manhole	1500

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)
12.000	3.734	100.1	S31	103.950	103.363	0.487	Open Manhole	450
12.001	1.990	13.8	S32	103.950	103.218	0.632	Open Manhole	450
11.002	12.259	30.7	S33	103.800	102.750	0.900	Open Manhole	450
11.003	12.072	18.4	S39 HB	103.589	102.094	1.345	Open Manhole	1500
13.000	7.750	99.4	S35	103.600	102.972	0.528	Open Manhole	450
13.001	1.944	102.3	S36	103.600	102.953	0.547	Open Manhole	450
13.002	5.822	10.6	S38	103.600	102.405	1.095	Open Manhole	600
14.000	7.431	28.0	S38	103.600	102.280	1.095	Open Manhole	600
13.003	2.653	10.2	S39 HB	103.589	102.019	1.345	Open Manhole	1500
1.006	2.881	151.6	S40 OF	103.606	102.000	1.456	Open Manhole	1200

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Network Classifications for Surface Network 1

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	S1	100	0.450	0.490	Unclassified	300	0	0.450	Unclassified
1.001	S2	150	0.490	0.627	Unclassified	450	0	0.490	Unclassified
2.000	S3	100	0.450	0.491	Unclassified	300	0	0.450	Unclassified
2.001	S4	150	0.491	0.627	Unclassified	450	0	0.491	Unclassified
1.002	S5	150	0.627	0.901	Unclassified	450	0	0.627	Unclassified
3.000	S6	100	0.450	0.495	Unclassified	300	0	0.450	Unclassified
3.001	S7	150	0.495	0.610	Unclassified	450	0	0.495	Unclassified
4.000	S8	100	0.450	0.494	Unclassified	300	0	0.450	Unclassified
4.001	S9	150	0.494	0.610	Unclassified	450	0	0.494	Unclassified
3.002	S10	150	0.610	0.901	Unclassified	450	0	0.610	Unclassified
1.003	S11	225	0.901	1.356	Unclassified	1200	0	0.901	Unclassified
5.000	S12	100	0.450	0.486	Unclassified	300	0	0.450	Unclassified
5.001	S13	100	0.486	0.669	Unclassified	450	0	0.486	Unclassified
6.000	S14	100	0.450	0.488	Unclassified	300	0	0.450	Unclassified
5.002	S15	150	0.596	0.670	Unclassified	450	0	0.670	Unclassified
7.000	S16	100	0.450	0.488	Unclassified	300	0	0.450	Unclassified
7.001	S17	150	0.488	0.671	Unclassified	450	0	0.488	Unclassified
8.000	S18	100	0.450	0.671	Unclassified	300	0	0.450	Unclassified
7.002	S19	150	0.596	0.671	Unclassified	450	0	0.671	Unclassified
5.003	S20	150	0.596	1.356	Unclassified	450	0	0.596	Unclassified
1.004	S21	225	1.173	1.356	Unclassified	1200	0	1.356	Unclassified
9.000	S22	100	0.450	0.489	Unclassified	300	0	0.450	Unclassified
9.001	S23	100	0.489	0.596	Unclassified	450	0	0.489	Unclassified
10.000	S24	100	0.450	0.488	Unclassified	300	0	0.450	Unclassified
10.001	S25	100	0.488	0.596	Unclassified	450	0	0.488	Unclassified
9.002	S26	150	0.486	0.596	Unclassified	450	0	0.596	Unclassified
1.005	S27	225	1.173	1.345	Unclassified	1200	0	1.173	Unclassified
11.000	S28	100	0.450	0.490	Unclassified	300	0	0.450	Unclassified
11.001	S29	100	0.490	0.651	Unclassified	450	0	0.490	Unclassified
12.000	S30	100	0.450	0.487	Unclassified	300	0	0.450	Unclassified
12.001	S31	100	0.487	0.632	Unclassified	450	0	0.487	Unclassified
11.002	S32	150	0.651	0.900	Unclassified	450	0	0.651	Unclassified
11.003	S33	150	0.900	1.345	Unclassified	450	0	0.900	Unclassified
13.000	S34	100	0.450	0.528	Unclassified	300	0	0.450	Unclassified
13.001	S35	100	0.528	0.547	Unclassified	450	0	0.528	Unclassified
13.002	S36	100	0.547	1.095	Unclassified	450	0	0.547	Unclassified
14.000	S37	225	0.436	1.095	Unclassified	450	0	0.436	Unclassified
13.003	S38	225	1.095	1.345	Unclassified	600	0	1.095	Unclassified
1.006	S39 HB	150	1.420	1.456	Unclassified	1500	0	1.420	Unclassified

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)
1.006	S40 OF	103.606	102.000	0.000	1200	0

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Simulation Criteria for Surface Network 1

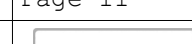
Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
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)	18.600	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for Surface Network 1

Hydro-Brake® Optimum Manhole: S39 HB, DS/PN: 1.006, Volume (m³): 3.5

Unit Reference	MD-SHE-0103-5000-1200-5000
Design Head (m)	1.200
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	103
Invert Level (m)	102.019
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	5.0	Kick-Flo®	0.745	4.0
Flush-Flo™	0.354	5.0	Mean Flow over Head Range	-	4.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.4	1.200	5.0	3.000	7.7	7.000	11.5
0.200	4.7	1.400	5.4	3.500	8.3	7.500	11.8
0.300	5.0	1.600	5.7	4.000	8.8	8.000	12.2
0.400	5.0	1.800	6.0	4.500	9.3	8.500	12.6
0.500	4.9	2.000	6.3	5.000	9.8	9.000	12.9
0.600	4.7	2.200	6.6	5.500	10.2	9.500	13.3
0.800	4.1	2.400	6.9	6.000	10.7		
1.000	4.6	2.600	7.2	6.500	11.1		

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Storage Structures for Surface Network 1

Cellular Storage Manhole: S39 HB, DS/PN: 1.006

Invert Level (m) 102.069 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	190.0	190.0	1.100	0.0	248.0
1.000	190.0	248.0			

Manhole Headloss for Surface Network 1

PN	US/MH Name	US/MH Headloss
1.000	S1	0.500
1.001	S2	0.500
2.000	S3	0.500
2.001	S4	0.500
1.002	S5	0.500
3.000	S6	0.500
3.001	S7	0.500
4.000	S8	0.500
4.001	S9	0.500
3.002	S10	0.500
1.003	S11	0.500
5.000	S12	0.500
5.001	S13	0.500
6.000	S14	0.500
5.002	S15	0.500
7.000	S16	0.500
7.001	S17	0.500
8.000	S18	0.500
7.002	S19	0.500
5.003	S20	0.500
1.004	S21	0.500
9.000	S22	0.500
9.001	S23	0.500
10.000	S24	0.500
10.001	S25	0.500
9.002	S26	0.500
1.005	S27	0.500
11.000	S28	0.500
11.001	S29	0.500
12.000	S30	0.500
12.001	S31	0.500
11.002	S32	0.500
11.003	S33	0.500
13.000	S34	0.500
13.001	S35	0.500
13.002	S36	0.500
14.000	S37	0.500
13.003	S38	0.500
1.006	S39 HB	0.500

Fernhill Traellers Site
SW Hydraulic Calcs

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Surface Network 1

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000

Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
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Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
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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)	18.600	Cv (Summer)	0.750
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Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
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Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status OFF

Inertia Status	OFF
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Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 40

									Water	Surcharged
US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	Depth (m)
1.000	S1	15 Winter	1	+0%	100/15 Summer				103.421	-0.079
1.001	S2	15 Winter	1	+0%	100/15 Summer				103.340	-0.120
2.000	S3	15 Winter	1	+0%	100/15 Summer				103.431	-0.069
2.001	S4	15 Winter	1	+0%	100/15 Summer				103.340	-0.119
1.002	S5	15 Winter	1	+0%	100/15 Summer				103.219	-0.104
3.000	S6	15 Winter	1	+0%	100/15 Summer				103.427	-0.073
3.001	S7	15 Winter	1	+0%	100/15 Summer				103.339	-0.116
4.000	S8	15 Winter	1	+0%	100/15 Summer				103.427	-0.073
4.001	S9	15 Winter	1	+0%	100/15 Summer				103.338	-0.118
3.002	S10	15 Winter	1	+0%	100/15 Summer				103.237	-0.103
1.003	S11	15 Winter	1	+0%	30/15 Summer				102.747	-0.145
5.000	S12	15 Winter	1	+0%	100/15 Summer				103.732	-0.068
5.001	S13	15 Winter	1	+0%	100/15 Summer				103.704	-0.060
6.000	S14	15 Winter	1	+0%	100/15 Summer				103.732	-0.068
5.002	S15	15 Winter	1	+0%	100/15 Summer				103.471	-0.109
7.000	S16	15 Winter	1	+0%	100/15 Summer				103.425	-0.075
7.001	S17	15 Winter	1	+0%	100/15 Summer				103.344	-0.118
8.000	S18	15 Winter	1	+0%	100/15 Summer				103.420	-0.080
7.002	S19	15 Winter	1	+0%	100/15 Summer				103.183	-0.096
5.003	S20	15 Winter	1	+0%	100/15 Summer				103.042	-0.105
1.004	S21	15 Winter	1	+0%	30/15 Summer				102.534	-0.103
9.000	S22	15 Winter	1	+0%	100/15 Summer				103.423	-0.077
9.001	S23	15 Winter	1	+0%	100/15 Summer				103.397	-0.064
10.000	S24	15 Winter	1	+0%	100/15 Summer				103.423	-0.077
10.001	S25	15 Winter	1	+0%	100/15 Summer				103.396	-0.066
9.002	S26	15 Winter	1	+0%	100/15 Summer				103.258	-0.096
1.005	S27	15 Winter	1	+0%	30/15 Summer				102.395	-0.122

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Flow / Cap.	Flow (l/s)		
1.000	S1	0.000	0.10		0.5	OK	
1.001	S2	0.000	0.09		1.4	OK	
2.000	S3	0.000	0.21		1.1	OK	
2.001	S4	0.000	0.09		2.1	OK	
1.002	S5	0.000	0.20		4.5	OK	
3.000	S6	0.000	0.17		0.9	OK	
3.001	S7	0.000	0.11		1.8	OK	
4.000	S8	0.000	0.17		0.9	OK	
4.001	S9	0.000	0.10		2.0	OK	
3.002	S10	0.000	0.21		5.1	OK	
1.003	S11	0.000	0.27		10.7	OK	
5.000	S12	0.000	0.22		1.1	OK	
5.001	S13	0.000	0.34		1.9	OK	
6.000	S14	0.000	0.22		1.1	OK	
5.002	S15	0.000	0.16		4.0	OK	
7.000	S16	0.000	0.15		0.7	OK	
7.001	S17	0.000	0.10		1.7	OK	
8.000	S18	0.000	0.09		1.1	OK	
7.002	S19	0.000	0.27		3.7	OK	
5.003	S20	0.000	0.20		9.0	OK	
1.004	S21	0.000	0.56		21.5	OK	
9.000	S22	0.000	0.12		0.6	OK	
9.001	S23	0.000	0.27		1.5	OK	
10.000	S24	0.000	0.12		0.6	OK	
10.001	S25	0.000	0.24		1.5	OK	
9.002	S26	0.000	0.27		4.5	OK	
1.005	S27	0.000	0.43		27.5	OK	

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1 year Return Period 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)
11.000	S28	15 Winter	1	+0%	100/15 Summer				103.430
11.001	S29	15 Winter	1	+0%	100/15 Summer				103.400
12.000	S30	15 Winter	1	+0%					103.432
12.001	S31	15 Winter	1	+0%					103.393
11.002	S32	15 Winter	1	+0%					103.191
11.003	S33	15 Winter	1	+0%	100/120 Summer				102.791
13.000	S34	15 Winter	1	+0%	100/15 Summer				103.082
13.001	S35	15 Winter	1	+0%	30/15 Summer				103.027
13.002	S36	15 Winter	1	+0%	100/240 Winter				102.983
14.000	S37	15 Winter	1	+0%	100/60 Summer				102.572
13.003	S38	15 Winter	1	+0%	30/120 Winter				102.330
1.006	S39 HB	120 Winter	1	+0%	1/15 Winter				102.219

		Surcharged		Flooded	Pipe			
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
11.000	S28	-0.070	0.000	0.19		1.0	OK	
11.001	S29	-0.060	0.000	0.33		1.9	OK	
12.000	S30	-0.068	0.000	0.22		1.1	OK	
12.001	S31	-0.069	0.000	0.20		2.1	OK	
11.002	S32	-0.108	0.000	0.17		5.0	OK	
11.003	S33	-0.109	0.000	0.17		6.3	OK	
13.000	S34	-0.068	0.000	0.22		1.2	OK	
13.001	S35	-0.045	0.000	0.58		2.3	OK	
13.002	S36	-0.070	0.000	0.20		3.3	OK	
14.000	S37	-0.198	0.000	0.03		2.5	OK	
13.003	S38	-0.175	0.000	0.11		7.8	OK	
1.006	S39 HB	0.050	0.000	0.44		4.7	SURCHARGED	

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30 year Return Period 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 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of 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) 18.600 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 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) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
1.000	S1	15 Winter	30	+0%	100/15 Summer				103.433	-0.067
1.001	S2	15 Winter	30	+0%	100/15 Summer				103.361	-0.099
2.000	S3	15 Winter	30	+0%	100/15 Summer				103.452	-0.048
2.001	S4	15 Winter	30	+0%	100/15 Summer				103.361	-0.098
1.002	S5	15 Winter	30	+0%	100/15 Summer				103.255	-0.068
3.000	S6	15 Winter	30	+0%	100/15 Summer				103.445	-0.055
3.001	S7	15 Winter	30	+0%	100/15 Summer				103.363	-0.092
4.000	S8	15 Winter	30	+0%	100/15 Summer				103.445	-0.055
4.001	S9	15 Winter	30	+0%	100/15 Summer				103.361	-0.095
3.002	S10	15 Winter	30	+0%	100/15 Summer				103.275	-0.065
1.003	S11	15 Winter	30	+0%	30/15 Summer				102.930	0.038
5.000	S12	15 Winter	30	+0%	100/15 Summer				103.753	-0.047
5.001	S13	15 Winter	30	+0%	100/15 Summer				103.739	-0.025
6.000	S14	15 Winter	30	+0%	100/15 Summer				103.752	-0.048
5.002	S15	15 Winter	30	+0%	100/15 Summer				103.501	-0.080
7.000	S16	15 Winter	30	+0%	100/15 Summer				103.441	-0.059
7.001	S17	15 Winter	30	+0%	100/15 Summer				103.367	-0.095
8.000	S18	15 Winter	30	+0%	100/15 Summer				103.432	-0.068
7.002	S19	15 Winter	30	+0%	100/15 Summer				103.228	-0.051
5.003	S20	15 Winter	30	+0%	100/15 Summer				103.077	-0.069
1.004	S21	15 Winter	30	+0%	30/15 Summer				102.814	0.177
9.000	S22	15 Winter	30	+0%	100/15 Summer				103.439	-0.061
9.001	S23	15 Winter	30	+0%	100/15 Summer				103.428	-0.033
10.000	S24	15 Winter	30	+0%	100/15 Summer				103.437	-0.063
10.001	S25	15 Winter	30	+0%	100/15 Summer				103.424	-0.038
9.002	S26	15 Winter	30	+0%	100/15 Summer				103.306	-0.048
1.005	S27	15 Winter	30	+0%	30/15 Summer				102.564	0.047

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

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
1.000	S1	0.000	0.24	1.2	OK	
1.001	S2	0.000	0.25	4.1	OK	
2.000	S3	0.000	0.53	2.7	OK	
2.001	S4	0.000	0.26	5.9	OK	
1.002	S5	0.000	0.57	12.8	OK	
3.000	S6	0.000	0.41	2.1	OK	
3.001	S7	0.000	0.31	5.0	OK	
4.000	S8	0.000	0.41	2.1	OK	
4.001	S9	0.000	0.29	5.7	OK	
3.002	S10	0.000	0.60	14.5	OK	
1.003	S11	0.000	0.69	27.8	SURCHARGED	
5.000	S12	0.000	0.54	2.7	OK	
5.001	S13	0.000	0.90	5.2	OK	
6.000	S14	0.000	0.53	2.7	OK	
5.002	S15	0.000	0.44	10.8	OK	
7.000	S16	0.000	0.36	1.8	OK	
7.001	S17	0.000	0.28	4.7	OK	
8.000	S18	0.000	0.22	2.7	OK	
7.002	S19	0.000	0.74	10.0	OK	
5.003	S20	0.000	0.55	24.4	OK	
1.004	S21	0.000	1.44	54.6	SURCHARGED	
9.000	S22	0.000	0.30	1.5	OK	
9.001	S23	0.000	0.78	4.4	OK	
10.000	S24	0.000	0.30	1.5	OK	
10.001	S25	0.000	0.70	4.4	OK	
9.002	S26	0.000	0.79	13.0	OK	
1.005	S27	0.000	1.08	69.3	SURCHARGED	

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30 year Return Period 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)
11.000	S28	15 Winter	30	+0%	100/15 Summer				103.449
11.001	S29	15 Winter	30	+0%	100/15 Summer				103.436
12.000	S30	15 Winter	30	+0%					103.452
12.001	S31	15 Winter	30	+0%					103.417
11.002	S32	15 Winter	30	+0%					103.223
11.003	S33	15 Winter	30	+0%	100/120 Summer				102.823
13.000	S34	15 Winter	30	+0%	100/15 Summer				103.123
13.001	S35	15 Winter	30	+0%	30/15 Summer				103.099
13.002	S36	15 Winter	30	+0%	100/240 Winter				103.007
14.000	S37	15 Winter	30	+0%	100/60 Summer				102.589
13.003	S38	120 Winter	30	+0%	30/120 Winter				102.531
1.006	S39 HB	120 Winter	30	+0%	1/15 Winter				102.530

PN	US/MH Name	Surcharged		Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)			
11.000	S28	-0.051	0.000	0.47		2.4		OK	
11.001	S29	-0.024	0.000	0.91		5.3		OK	
12.000	S30	-0.048	0.000	0.53		2.7		OK	
12.001	S31	-0.046	0.000	0.56		5.9		OK	
11.002	S32	-0.076	0.000	0.48		14.0		OK	
11.003	S33	-0.077	0.000	0.47		17.8		OK	
13.000	S34	-0.027	0.000	0.54		3.0		OK	
13.001	S35	0.027	0.000	1.56		6.1	SURCHARGED		
13.002	S36	-0.046	0.000	0.56		9.3		OK	
14.000	S37	-0.181	0.000	0.08		6.0		OK	
13.003	S38	0.026	0.000	0.10		7.3	SURCHARGED		
1.006	S39 HB	0.361	0.000	0.47		5.0	SURCHARGED		

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
1.000	S1	0.000	0.37		1.9	FLOOD RISK	
1.001	S2	0.000	0.37		6.0	FLOOD RISK	
2.000	S3	0.000	0.85		4.4	FLOOD RISK	
2.001	S4	0.000	0.39		9.0	FLOOD RISK	
1.002	S5	0.000	0.73		16.5	FLOOD RISK	
3.000	S6	0.000	0.61		3.2	FLOOD RISK	
3.001	S7	0.000	0.44		7.0	FLOOD RISK	
4.000	S8	0.000	0.62		3.2	FLOOD RISK	
4.001	S9	0.000	0.41		8.0	FLOOD RISK	
3.002	S10	0.000	0.79		18.9	FLOOD RISK	
1.003	S11	0.000	0.90		36.0	FLOOD RISK	
5.000	S12	0.000	0.82		4.2	FLOOD RISK	
5.001	S13	0.000	1.37		8.0	FLOOD RISK	
6.000	S14	0.000	0.96		4.9	SURCHARGED	
5.002	S15	0.000	0.66		16.3	SURCHARGED	
7.000	S16	0.000	0.59		3.0	FLOOD RISK	
7.001	S17	0.000	0.46		7.6	FLOOD RISK	
8.000	S18	0.000	0.37		4.5	FLOOD RISK	
7.002	S19	0.000	0.97		13.2	FLOOD RISK	
5.003	S20	0.000	0.70		31.3	FLOOD RISK	
1.004	S21	0.000	1.93		73.3	SURCHARGED	
9.000	S22	0.000	0.53		2.7	FLOOD RISK	
9.001	S23	0.000	1.31		7.4	FLOOD RISK	
10.000	S24	0.000	0.53		2.7	SURCHARGED	
10.001	S25	0.000	1.17		7.4	SURCHARGED	
9.002	S26	0.000	1.32		21.6	SURCHARGED	
1.005	S27	0.000	0.44		28.0	SURCHARGED	

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Amber House Green Lane, Old Swan Liverpool, L13 7GD	Fernhill Traellers Site SW Hydraulic Calcs	
Date 26/01/2022 14:47 File X-DESIGN 26.01.2022.MDX	Designed by EJC Checked by	
Innovyze	Network 2018.1.1	

100 year Return Period 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)
11.000	S28	15 Winter	100	+40%	100/15 Summer				103.709
11.001	S29	15 Winter	100	+40%	100/15 Summer				103.683
12.000	S30	15 Winter	100	+40%					103.489
12.001	S31	15 Winter	100	+40%					103.455
11.002	S32	15 Winter	100	+40%					103.255
11.003	S33	240 Winter	100	+40%	100/120 Summer				103.112
13.000	S34	15 Winter	100	+40%	100/15 Summer				103.287
13.001	S35	15 Winter	100	+40%	30/15 Summer				103.212
13.002	S36	240 Winter	100	+40%	100/240 Winter				103.112
14.000	S37	240 Winter	100	+40%	100/60 Summer				103.110
13.003	S38	240 Winter	100	+40%	30/120 Winter				103.110
1.006	S39 HB	240 Winter	100	+40%	1/15 Winter				103.110

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
11.000	S28	0.209	0.000	0.83		4.2	FLOOD RISK	
11.001	S29	0.223	0.000	1.54		8.9	FLOOD RISK	
12.000	S30	-0.011	0.000	0.96		4.9	OK	
12.001	S31	-0.008	0.000	1.00		10.6	OK	
11.002	S32	-0.044	0.000	0.82		24.0	OK	
11.003	S33	0.212	0.000	0.17		6.6	SURCHARGED	
13.000	S34	0.137	0.000	0.99		5.5	SURCHARGED	
13.001	S35	0.140	0.000	2.76		10.9	SURCHARGED	
13.002	S36	0.059	0.000	0.21		3.5	SURCHARGED	
14.000	S37	0.340	0.000	0.03		2.3	FLOOD RISK	
13.003	S38	0.605	0.000	0.11		7.6	SURCHARGED	
1.006	S39 HB	0.941	0.000	0.47		5.0	SURCHARGED	