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Pickfords Wharf Clink Street London, SE1 9DG	Rochdale Road Proposed Drainage Design	
Date 13/01/2023 File Microdrainage (12 Jan 2023).MDX	Designed by K. Sin Checked by N. Fitzpatrick	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales		
Return Period (years)	1	Foul Sewage (l/s/ha) 0.000
M5-60 (mm)	18.100	Maximum Backdrop Height (m) 1.500
Ratio R	0.357	Volumetric Runoff Coeff. 0.750
		Min Design Depth for Optimisation (m) 1.200
Maximum Rainfall (mm/hr)	50	PIMP (%) 100
Maximum Time of Concentration (mins)	30	Min Vel for Auto Design only (m/s) 1.00
	Add Flow / Climate Change (%) 0	Min Slope for Optimisation (1:X) 500
	Minimum Backdrop Height (m) 0.200	

Designed with Level Soffits

Network Design Table for Storm

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

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

Network Results Table

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
2.000	4.104	0.027	150.0	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit		
3.000	34.319	0.343	100.0	0.016	5.00	0.0	0.600	o	225	Pipe/Conduit		
3.001	23.652	0.237	100.0	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit		
3.002	18.528	0.185	100.0	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit		
4.000	27.609	0.323	85.5	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit		
5.000	18.279	0.041	450.0	0.012	5.00	0.0	0.600	o	450	Pipe/Conduit		
5.001	11.976	0.027	450.0	0.015	0.00	0.0	0.600	o	450	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)
2.000	46.54	5.08	46.099	0.018	0.0	0.0	0.0	0.82	14.5	2.3
3.000	45.22	5.44	50.380	0.016	0.0	0.0	0.0	1.31	52.0	2.0
3.001	44.16	5.74	50.037	0.063	0.0	0.0	0.0	1.31	52.0	7.5
3.002	43.37	5.98	49.800	0.103	0.0	0.0	0.0	1.31	52.0	12.1
4.000	45.62	5.33	49.600	0.010	0.0	0.0	0.0	1.42	56.3	1.2
5.000	45.64	5.32	49.580	0.012	0.0	0.0	0.0	0.95	151.4	1.5
5.001	44.89	5.53	49.539	0.027	0.0	0.0	0.0	0.95	151.4	3.3

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
3.007	8.074#	0.081	100.0	0.006	0.00	0.0	0.600	o	450	Pipe/Conduit		
7.000	1.062#	0.011	100.0	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit		
8.000	13.525	0.135	100.0	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit		
9.000	23.110	0.231	100.0	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit		
8.001	12.633#	0.126	100.0	0.027	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)
3.007	42.20	6.35	48.785	0.238	0.0	0.0	0.0	2.03	323.4	27.2
7.000	46.81	5.01	48.795	0.015	0.0	0.0	0.0	1.31	52.0	1.9
8.000	46.20	5.17	50.370	0.013	0.0	0.0	0.0	1.31	52.0	1.6
9.000	45.74	5.29	50.370	0.015	0.0	0.0	0.0	1.31	52.0	1.9
8.001	45.15	5.46	48.911	0.055	0.0	0.0	0.0	1.31	52.0	6.7

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.008	1.000#	0.000	0.0	0.031	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.009	7.680#	0.077	100.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.010	4.300	0.043	100.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.011	4.537	0.045	100.0	0.024	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.012	6.389	0.142	45.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	8.294	0.101	81.9	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
10.000	16.310	0.082	200.0	0.016	5.00	0.0	0.600	o	525	Pipe/Conduit	
10.001	2.328	0.012	200.0	0.018	0.00	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)
3.008	41.94	6.43	47.285	0.339	0.0	0.0	0.0	0.19	31.0	38.5
3.009	41.75	6.49	47.285	0.339	0.0	0.0	0.0	2.03	323.4	38.5
3.010	41.64	6.53	46.908	0.339	0.0	0.0	0.0	2.03	323.4	38.5
3.011	41.53	6.57	46.565	0.363	0.0	0.0	0.0	2.03	323.4	40.8
3.012	41.37	6.62	46.214	0.363	0.0	0.0	0.0	1.96	77.7	40.8
2.001	41.09	6.72	46.072	0.397	0.0	0.0	0.0	1.45	57.5	44.2
10.000	46.20	5.17	47.700	0.016	0.0	0.0	0.0	1.58	342.1	2.0
10.001	46.10	5.20	47.618	0.034	0.0	0.0	0.0	1.58	342.1	4.2

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	51.828	5.729	Open Manhole	1200	2.000	46.099	150				
S21	51.330	0.950	Open Manhole	1200	3.000	50.380	225				
S20	51.230	1.193	Open Manhole	1200	3.001	50.037	225	3.000	50.037	225	
S19	51.230	1.430	Open Manhole	1200	3.002	49.800	225	3.001	49.800	225	
S14	50.550	0.950	Open Manhole	1200	4.000	49.600	225				
S15	50.530	0.950	Open Manhole	1350	5.000	49.580	450				
S16	50.530	0.991	Open Manhole	1350	5.001	49.539	450	5.000	49.539	450	
S17	50.650	1.373	Open Manhole	1350	4.001	49.512	450	4.000	49.277	225	
								5.001	49.512	450	
S18	50.950	1.794	Open Manhole	1350	3.003	49.156	450	3.002	49.615	225	234
								4.001	49.485	450	329
S13	51.330	2.268	Open Manhole	1350	3.004	49.062	450	3.003	49.062	450	
S11	51.300	1.990	Open Manhole	1200	6.000	49.310	225				
S12	51.330	2.306	Open Manhole	1350	3.005	49.024	450	3.004	49.024	450	
								6.000	49.268	225	19
S10	51.290	2.407	Open Manhole	1350	3.006	48.883	450	3.005	48.883	450	
S9	51.290	2.505	Open Manhole	1350	3.007	48.785	450	3.006	48.785	450	
S5	51.290	2.495	Open Manhole	1200	7.000	48.795	225				
S6	51.320	0.950	Open Manhole	1200	8.000	50.370	225				

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S7	51.320	0.950	Open Manhole	1200	9.000	50.370	225				
S8	51.320	2.409	Open Manhole	1200	8.001	48.911	225	8.000	50.235	225	1324
								9.000	50.139	225	1228
Tank	51.290	4.005	Open Manhole	1350	3.008	47.285	450	3.007	48.704	450	1419
								7.000	48.784	225	1274
								8.001	48.785	225	1275
Tank Outlet	51.290	4.005	Open Manhole	1350	3.009	47.285	450	3.008	47.285	450	
S4	51.280	4.372	Open Manhole	1350	3.010	46.908	450	3.009	47.208	450	300
S3	51.355	4.790	Open Manhole	1350	3.011	46.565	450	3.010	46.865	450	300
S2 (FC 1)	51.430	5.216	Open Manhole	1500	3.012	46.214	225	3.011	46.520	450	531
C01	51.899	5.827	Open Manhole	1200	2.001	46.072	225	2.000	46.072	150	
								3.012	46.072	225	
	52.090	6.119	Open Manhole	1200		OUTFALL		2.001	45.971	225	
S22	48.900	1.200	Open Manhole	1500	10.000	47.700	525				
S23	48.900	1.282	Open Manhole	1500	10.001	47.618	525	10.000	47.618	525	
S24 (FC2)	49.430	1.824	Open Manhole	1500	10.002	47.606	150	10.001	47.606	525	
C02	49.430	2.946	Open Manhole	1200	10.003	46.484	300	10.002	47.484	150	850
	50.560	4.208	Open Manhole	1200		OUTFALL		10.003	46.352	300	

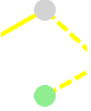
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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S17	384735.959	399165.979	384735.959	399165.979	Required	
S18	384733.239	399154.192	384733.239	399154.192	Required	
S13	384725.934	399148.325	384725.934	399148.325	Required	
S11	384737.480	399143.392	384737.480	399143.392	Required	
S12	384728.124	399145.227	384728.124	399145.227	Required	
S10	384716.028	399138.066	384716.028	399138.066	Required	
S9	384707.570	399133.058	384707.570	399133.058	Required	
S5	384697.738	399115.682	384697.738	399115.682	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
C01	384725.679	399104.199	384725.679	399104.199	Required	
	384724.374	399096.008			No Entry	
S22	384648.990	399136.435	384648.990	399136.435	Required	
S23	384657.351	399122.431	384657.351	399122.431	Required	
S24 (FC2)	384655.389	399121.178	384655.389	399121.178	Required	
C02	384650.034	399126.150	384650.034	399126.150	Required	
	384644.300	399122.898			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
2.000	o	150	S1	51.828	46.099	5.579	Open Manhole	1200
3.000	o	225	S21	51.330	50.380	0.725	Open Manhole	1200
3.001	o	225	S20	51.230	50.037	0.968	Open Manhole	1200
3.002	o	225	S19	51.230	49.800	1.205	Open Manhole	1200
4.000	o	225	S14	50.550	49.600	0.725	Open Manhole	1200

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)
2.000	4.104	150.0	C01	51.899	46.072	5.677	Open Manhole	1200
3.000	34.319	100.0	S20	51.230	50.037	0.968	Open Manhole	1200
3.001	23.652	100.0	S19	51.230	49.800	1.205	Open Manhole	1200
3.002	18.528	100.0	S18	50.950	49.615	1.110	Open Manhole	1350
4.000	27.609	85.5	S17	50.650	49.277	1.148	Open Manhole	1350

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PIPELINE SCHEDULES for Storm

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)
5.000	o	450	S15	50.530	49.580	0.500	Open Manhole	1350
5.001	o	450	S16	50.530	49.539	0.541	Open Manhole	1350
4.001	o	450	S17	50.650	49.512	0.688	Open Manhole	1350
3.003	o	450	S18	50.950	49.156	1.344	Open Manhole	1350
3.004	o	450	S13	51.330	49.062	1.818	Open Manhole	1350

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)
5.000	18.279	450.0	S16	50.530	49.539	0.541	Open Manhole	1350
5.001	11.976	450.0	S17	50.650	49.512	0.688	Open Manhole	1350
4.001	12.097	450.0	S18	50.950	49.485	1.015	Open Manhole	1350
3.003	9.369	100.0	S13	51.330	49.062	1.818	Open Manhole	1350
3.004	3.794	100.0	S12	51.330	49.024	1.856	Open Manhole	1350

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PIPELINE SCHEDULES for Storm

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)
6.000	o	225	S11	51.300	49.310	1.765	Open Manhole	1200
3.005	o	450	S12	51.330	49.024	1.856	Open Manhole	1350
3.006	o	450	S10	51.290	48.883	1.957	Open Manhole	1350
3.007	o	450	S9	51.290	48.785	2.055	Open Manhole	1350
7.000	o	225	S5	51.290	48.795	2.270	Open Manhole	1200
8.000	o	225	S6	51.320	50.370	0.725	Open Manhole	1200

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)
6.000	9.534	225.0	S12	51.330	49.268	1.837	Open Manhole	1350
3.005	14.057	100.0	S10	51.290	48.883	1.957	Open Manhole	1350
3.006	9.829	100.0	S9	51.290	48.785	2.055	Open Manhole	1350
3.007	8.074#	100.0	Tank	51.290	48.704	2.136	Open Manhole	1350
7.000	1.062#	100.0	Tank	51.290	48.784	2.281	Open Manhole	1350
8.000	13.525	100.0	S8	51.320	50.235	0.860	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

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)
9.000	o	225	S7	51.320	50.370	0.725	Open Manhole	1200
8.001	o	225	S8	51.320	48.911	2.184	Open Manhole	1200
3.008	o	450	Tank	51.290	47.285	3.555	Open Manhole	1350
3.009	o	450	Tank Outlet	51.290	47.285	3.555	Open Manhole	1350
3.010	o	450	S4	51.280	46.908	3.922	Open Manhole	1350
3.011	o	450	S3	51.355	46.565	4.340	Open Manhole	1350

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)
9.000	23.110	100.0	S8	51.320	50.139	0.956	Open Manhole	1200
8.001	12.633#	100.0	Tank	51.290	48.785	2.280	Open Manhole	1350
3.008	1.000#	0.0	Tank Outlet	51.290	47.285	3.555	Open Manhole	1350
3.009	7.680#	100.0	S4	51.280	47.208	3.622	Open Manhole	1350
3.010	4.300	100.0	S3	51.355	46.865	4.040	Open Manhole	1350
3.011	4.537	100.0	S2 (FC 1)	51.430	46.520	4.460	Open Manhole	1500

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PIPELINE SCHEDULES for Storm Upstream Manhole <table><thead><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>3.012</td><td>o</td><td>225</td><td>S2 (FC 1)</td><td>51.430</td><td>46.214</td><td>4.991</td><td>Open Manhole</td><td>1500</td></tr><tr><td>2.001</td><td>o</td><td>225</td><td>C01</td><td>51.899</td><td>46.072</td><td>5.602</td><td>Open Manhole</td><td>1200</td></tr><tr><td>10.000</td><td>o</td><td>525</td><td>S22</td><td>48.900</td><td>47.700</td><td>0.675</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.001</td><td>o</td><td>525</td><td>S23</td><td>48.900</td><td>47.618</td><td>0.757</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.002</td><td>o</td><td>150</td><td>S24 (FC2)</td><td>49.430</td><td>47.606</td><td>1.674</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.003</td><td>o</td><td>300</td><td>C02</td><td>49.430</td><td>46.484</td><td>2.646</td><td>Open Manhole</td><td>1200</td></tr></tbody></table> Downstream Manhole <table><thead><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>3.012</td><td>6.389</td><td>45.0</td><td>C01</td><td>51.899</td><td>46.072</td><td>5.602</td><td>Open Manhole</td><td>1200</td></tr><tr><td>2.001</td><td>8.294</td><td>81.9</td><td></td><td>52.090</td><td>45.971</td><td>5.894</td><td>Open Manhole</td><td>1200</td></tr><tr><td>10.000</td><td>16.310</td><td>200.0</td><td>S23</td><td>48.900</td><td>47.618</td><td>0.757</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.001</td><td>2.328</td><td>200.0</td><td>S24 (FC2)</td><td>49.430</td><td>47.606</td><td>1.299</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.002</td><td>7.307</td><td>60.0</td><td>C02</td><td>49.430</td><td>47.484</td><td>1.796</td><td>Open Manhole</td><td>1200</td></tr><tr><td>10.003</td><td>6.592</td><td>50.0</td><td></td><td>50.560</td><td>46.352</td><td>3.908</td><td>Open Manhole</td><td>1200</td></tr></tbody></table>				PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	3.012	o	225	S2 (FC 1)	51.430	46.214	4.991	Open Manhole	1500	2.001	o	225	C01	51.899	46.072	5.602	Open Manhole	1200	10.000	o	525	S22	48.900	47.700	0.675	Open Manhole	1500	10.001	o	525	S23	48.900	47.618	0.757	Open Manhole	1500	10.002	o	150	S24 (FC2)	49.430	47.606	1.674	Open Manhole	1500	10.003	o	300	C02	49.430	46.484	2.646	Open Manhole	1200	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	3.012	6.389	45.0	C01	51.899	46.072	5.602	Open Manhole	1200	2.001	8.294	81.9		52.090	45.971	5.894	Open Manhole	1200	10.000	16.310	200.0	S23	48.900	47.618	0.757	Open Manhole	1500	10.001	2.328	200.0	S24 (FC2)	49.430	47.606	1.299	Open Manhole	1500	10.002	7.307	60.0	C02	49.430	47.484	1.796	Open Manhole	1200	10.003	6.592	50.0		50.560	46.352	3.908	Open Manhole	1200
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Innovyze				Network 2020.1.3		
Micro Drainage						
<u>Area Summary for Storm</u>						
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
2.000	-	-	100	0.018	0.018	0.018
3.000	-	-	100	0.016	0.016	0.016
3.001	-	-	100	0.047	0.047	0.047
3.002	-	-	100	0.040	0.040	0.040
4.000	-	-	100	0.010	0.010	0.010
5.000	-	-	100	0.012	0.012	0.012
5.001	-	-	100	0.015	0.015	0.015
4.001	-	-	100	0.019	0.019	0.019
3.003	-	-	100	0.015	0.015	0.015
3.004	-	-	100	0.007	0.007	0.007
6.000	-	-	100	0.021	0.021	0.021
3.005	-	-	100	0.021	0.021	0.021
3.006	-	-	100	0.009	0.009	0.009
3.007	-	-	100	0.006	0.006	0.006
7.000	-	-	100	0.015	0.015	0.015
8.000	-	-	100	0.013	0.013	0.013
9.000	-	-	100	0.015	0.015	0.015
8.001	-	-	100	0.027	0.027	0.027
3.008	-	-	100	0.031	0.031	0.031
3.009	-	-	100	0.000	0.000	0.000
3.010	-	-	100	0.000	0.000	0.000
3.011	-	-	100	0.024	0.024	0.024
3.012	-	-	100	0.000	0.000	0.000
2.001	-	-	100	0.016	0.016	0.016
10.000	-	-	100	0.016	0.016	0.016
10.001	-	-	100	0.018	0.018	0.018
10.002	-	-	100	0.000	0.000	0.000
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Innovyze	Network 2020.1.3	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
10.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.431	0.431	0.431

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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2.001		52.090	45.971	0.000	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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10.003		50.560	46.352	0.000	1200	0
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<u>Simulation Criteria for Storm</u>		
Volumetric Runoff Coeff 0.750 Manhole Headloss Coeff (Global) 0.500 Inlet Coeffiecient 0.800		
Areal Reduction Factor 1.000 Foul Sewage per hectare (l/s) 0.000 Flow per Person per Day (l/per/day) 0.000		
Hot Start (mins) 0 Additional Flow - % of Total Flow 45.000 Run Time (mins) 60		
Hot Start Level (mm) 0 MADD Factor * 10m³/ha Storage 2.000 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 1 Number of Real Time Controls 0		
<u>Synthetic Rainfall Details</u>		
Rainfall Model FSR M5-60 (mm) 18.100 Cv (Summer) 0.750		
Return Period (years) 100 Ratio R 0.357 Cv (Winter) 0.840		
Region England and Wales Profile Type Summer Storm Duration (mins) 30		
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Innovyze Network 2020.1.3		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S2 (FC 1), DS/PN: 3.012, Volume (m³): 9.7

Unit Reference	MD-SHE-0170-1400-1000-1400	Sump Available	Yes
Design Head (m)	1.000	Diameter (mm)	170
Design Flow (l/s)	14.0	Invert Level (m)	46.214
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	14.0	Kick-Flo®	0.694	11.8
Flush-Flo™	0.317	13.9	Mean Flow over Head Range	-	11.9

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)	Depth (m)	Flow (l/s)
0.100	6.0	0.600	13.0	1.600	17.5	2.600	22.1	5.000	30.2	7.500	36.7
0.200	13.4	0.800	12.6	1.800	18.5	3.000	23.6	5.500	31.6	8.000	37.9
0.300	13.9	1.000	14.0	2.000	19.5	3.500	25.4	6.000	33.0	8.500	39.0
0.400	13.8	1.200	15.3	2.200	20.4	4.000	27.1	6.500	34.3	9.000	40.1
0.500	13.5	1.400	16.4	2.400	21.2	4.500	28.7	7.000	35.5	9.500	41.2

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Hydro-Brake® Optimum Manhole: S24 (FC2), DS/PN: 10.002, Volume (m³): 3.4

Unit Reference	MD-SHE-0101-4000-0600-4000	Sump Available	Yes
Design Head (m)	0.600	Diameter (mm)	101
Design Flow (l/s)	4.0	Invert Level (m)	47.606
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.600	4.0	Kick-Flo®	0.419	3.4
Flush-Flo™	0.185	4.0	Mean Flow over Head Range	-	3.4

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)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	0.600	4.0	1.600	6.3	2.600	7.9	5.000	10.8	7.500	13.1
0.200	4.0	0.800	4.6	1.800	6.7	3.000	8.5	5.500	11.3	8.000	13.6
0.300	3.9	1.000	5.1	2.000	7.0	3.500	9.1	6.000	11.8	8.500	14.0
0.400	3.5	1.200	5.5	2.200	7.3	4.000	9.7	6.500	12.2	9.000	14.4
0.500	3.7	1.400	5.9	2.400	7.6	4.500	10.3	7.000	12.7	9.500	14.8

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>													
<u>Simulation Criteria</u>													
Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000													
Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coeffiecient 0.800													
Hot Start Level (mm) 0 Additional Flow - % of Total Flow 45.000 Flow per Person per Day (l/per/day) 0.000													
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0													
Number of Online Controls 2 Number of Storage Structures 1 Number of Real Time Controls 0													
<u>Synthetic Rainfall Details</u>													
Rainfall Model FSR M5-60 (mm) 18.100 Cv (Summer) 0.750													
Region England and Wales Ratio R 0.357 Cv (Winter) 0.840													
Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF													
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status OFF													
DTS Status ON													
Profile(s) Summer and Winter													
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440													
Return Period(s) (years) 1													
Climate Change (%) 0													

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<table><tr><td></td><td>US/MH</td><td>Level</td></tr><tr><td>PN</td><td>Name</td><td>Status Exceeded</td></tr><tr><td>2.000</td><td>S1</td><td>OK</td></tr><tr><td>3.000</td><td>S21</td><td>OK</td></tr></table>				US/MH	Level	PN	Name	Status Exceeded	2.000	S1	OK	3.000	S21	OK
	US/MH	Level												
PN	Name	Status Exceeded												
2.000	S1	OK												
3.000	S21	OK												
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>				
PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
3.001	S20	9.7	OK	
3.002	S19	15.6	OK	
4.000	S14	1.7	OK	
5.000	S15	2.0	OK	
5.001	S16	3.9	OK	
4.001	S17	7.9	OK	
3.003	S18	24.9	OK	
3.004	S13	26.1	OK	
6.000	S11	3.7	OK	
3.005	S12	32.2	OK	
3.006	S10	33.6	OK	
3.007	S9	34.3	OK	
7.000	S5	2.6	OK	
8.000	S6	2.3	OK	
9.000	S7	2.6	OK	
8.001	S8	8.8	OK	
3.008	Tank	34.2	OK	
3.009	Tank Outlet	27.8	OK	
3.010	S4	28.5	SURCHARGED	
3.011	S3	22.9	SURCHARGED	
3.012	S2 (FC 1)	15.8	SURCHARGED	
2.001	C01	18.4	OK	
10.000	S22	2.6	OK	
10.001	S23	4.2	OK	
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PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded								
10.002	S24 (FC2)	3.9	OK									
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

									Water	Surcharged	Flooded				Half Drain	Pipe
PN	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Time	Flow	
	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	
10.003	C02 15	Winter	1	+0%					46.524	-0.260	0.000	0.04			3.9	

US/MH		Level
PN	Name	
10.003	C02	OK

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	30	Foul Sewage (l/s/ha)	0.000
M5-60 (mm)	18.100	Volumetric Runoff Coeff.	0.750
Ratio R	0.357	PIMP (%)	100
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200
		Maximum Backdrop Height (m)	1.500
		Min Design Depth for Optimisation (m)	1.200
		Min Vel for Auto Design only (m/s)	1.00
		Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

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

Network Results Table

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Innovyze	Network 2020.1.3																									
Network Design Table for Storm <table><thead><tr><th>PN</th><th>Rain</th><th>T.C.</th><th>US/IL</th><th>Σ I</th><th>Area</th><th>Σ Base</th><th>Foul</th><th>Add Flow</th><th>Vel</th><th>Cap</th><th>Flow</th></tr><tr><th></th><th>(mm/hr)</th><th>(mins)</th><th>(m)</th><th></th><th>(ha)</th><th>Flow (l/s)</th><th>(l/s)</th><th>(l/s)</th><th>(m/s)</th><th>(l/s)</th><th>(l/s)</th></tr></thead><tbody></tbody></table>			PN	Rain	T.C.	US/IL	Σ I	Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow		(mm/hr)	(mins)	(m)		(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)
PN	Rain	T.C.	US/IL	Σ I	Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow															
	(mm/hr)	(mins)	(m)		(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)															
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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
2.000	4.104	0.027	150.0	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit		
3.000	34.319	0.343	100.0	0.016	5.00	0.0	0.600	o	225	Pipe/Conduit		
3.001	23.652	0.237	100.0	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit		
3.002	18.528	0.185	100.0	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit		
4.000	27.609	0.323	85.5	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit		
5.000	18.279	0.041	450.0	0.012	5.00	0.0	0.600	o	450	Pipe/Conduit		
5.001	11.976	0.027	450.0	0.015	0.00	0.0	0.600	o	450	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)
2.000	50.00	5.08	46.099	0.018	0.0	0.0	0.0	0.82	14.5	2.4
3.000	50.00	5.44	50.380	0.016	0.0	0.0	0.0	1.31	52.0	2.2
3.001	50.00	5.74	50.037	0.063	0.0	0.0	0.0	1.31	52.0	8.5
3.002	50.00	5.98	49.800	0.103	0.0	0.0	0.0	1.31	52.0	13.9
4.000	50.00	5.33	49.600	0.010	0.0	0.0	0.0	1.42	56.3	1.4
5.000	50.00	5.32	49.580	0.012	0.0	0.0	0.0	0.95	151.4	1.6
5.001	50.00	5.53	49.539	0.027	0.0	0.0	0.0	0.95	151.4	3.7

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
3.007	8.074#	0.081	100.0	0.006	0.00	0.0	0.600	o	450	Pipe/Conduit		
7.000	1.062#	0.011	100.0	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit		
8.000	13.525	0.135	100.0	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit		
9.000	23.110	0.231	100.0	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit		
8.001	12.633#	0.126	100.0	0.027	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)
3.007	50.00	6.35	48.785	0.238	0.0	0.0	0.0	2.03	323.4	32.2
7.000	50.00	5.01	48.795	0.015	0.0	0.0	0.0	1.31	52.0	2.0
8.000	50.00	5.17	50.370	0.013	0.0	0.0	0.0	1.31	52.0	1.8
9.000	50.00	5.29	50.370	0.015	0.0	0.0	0.0	1.31	52.0	2.0
8.001	50.00	5.46	48.911	0.055	0.0	0.0	0.0	1.31	52.0	7.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S7	51.320	0.950	Open Manhole	1200	9.000	50.370	225				
S8	51.320	2.409	Open Manhole	1200	8.001	48.911	225	8.000	50.235	225	1324
								9.000	50.139	225	1228
Tank	51.290	4.005	Open Manhole	1350	3.008	47.285	450	3.007	48.704	450	1419
								7.000	48.784	225	1274
								8.001	48.785	225	1275
Tank Outlet	51.290	4.005	Open Manhole	1350	3.009	47.285	450	3.008	47.285	450	
S4	51.280	4.372	Open Manhole	1350	3.010	46.908	450	3.009	47.208	450	300
S3	51.355	4.790	Open Manhole	1350	3.011	46.565	450	3.010	46.865	450	300
S2 (FC 1)	51.430	5.216	Open Manhole	1500	3.012	46.214	225	3.011	46.520	450	531
C01	51.899	5.827	Open Manhole	1200	2.001	46.072	225	2.000	46.072	150	
								3.012	46.072	225	
	52.090	6.119	Open Manhole	1200		OUTFALL		2.001	45.971	225	
S22	48.900	1.200	Open Manhole	1500	10.000	47.700	525				
S23	48.900	1.282	Open Manhole	1500	10.001	47.618	525	10.000	47.618	525	
S24 (FC2)	49.430	1.824	Open Manhole	1500	10.002	47.606	150	10.001	47.606	525	
C02	49.430	2.946	Open Manhole	1200	10.003	46.484	300	10.002	47.484	150	850
	50.560	4.208	Open Manhole	1200		OUTFALL		10.003	46.352	300	

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Innovyze	Network 2020.1.3	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S17	384735.959	399165.979	384735.959	399165.979	Required	
S18	384733.239	399154.192	384733.239	399154.192	Required	
S13	384725.934	399148.325	384725.934	399148.325	Required	
S11	384737.480	399143.392	384737.480	399143.392	Required	
S12	384728.124	399145.227	384728.124	399145.227	Required	
S10	384716.028	399138.066	384716.028	399138.066	Required	
S9	384707.570	399133.058	384707.570	399133.058	Required	
S5	384697.738	399115.682	384697.738	399115.682	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
C01	384725.679	399104.199	384725.679	399104.199	Required	
	384724.374	399096.008			No Entry	
S22	384648.990	399136.435	384648.990	399136.435	Required	
S23	384657.351	399122.431	384657.351	399122.431	Required	
S24 (FC2)	384655.389	399121.178	384655.389	399121.178	Required	
C02	384650.034	399126.150	384650.034	399126.150	Required	
	384644.300	399122.898			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
2.000	o	150	S1	51.828	46.099	5.579	Open Manhole	1200
3.000	o	225	S21	51.330	50.380	0.725	Open Manhole	1200
3.001	o	225	S20	51.230	50.037	0.968	Open Manhole	1200
3.002	o	225	S19	51.230	49.800	1.205	Open Manhole	1200
4.000	o	225	S14	50.550	49.600	0.725	Open Manhole	1200

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)
2.000	4.104	150.0	C01	51.899	46.072	5.677	Open Manhole	1200
3.000	34.319	100.0	S20	51.230	50.037	0.968	Open Manhole	1200
3.001	23.652	100.0	S19	51.230	49.800	1.205	Open Manhole	1200
3.002	18.528	100.0	S18	50.950	49.615	1.110	Open Manhole	1350
4.000	27.609	85.5	S17	50.650	49.277	1.148	Open Manhole	1350

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PIPELINE SCHEDULES for Storm

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)
5.000	o	450	S15	50.530	49.580	0.500	Open Manhole	1350
5.001	o	450	S16	50.530	49.539	0.541	Open Manhole	1350
4.001	o	450	S17	50.650	49.512	0.688	Open Manhole	1350
3.003	o	450	S18	50.950	49.156	1.344	Open Manhole	1350
3.004	o	450	S13	51.330	49.062	1.818	Open Manhole	1350

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)
5.000	18.279	450.0	S16	50.530	49.539	0.541	Open Manhole	1350
5.001	11.976	450.0	S17	50.650	49.512	0.688	Open Manhole	1350
4.001	12.097	450.0	S18	50.950	49.485	1.015	Open Manhole	1350
3.003	9.369	100.0	S13	51.330	49.062	1.818	Open Manhole	1350
3.004	3.794	100.0	S12	51.330	49.024	1.856	Open Manhole	1350

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W
6.000	o	225	S11	51.300	49.310	1.765	Open Manhole		1200
3.005	o	450	S12	51.330	49.024	1.856	Open Manhole		1350
3.006	o	450	S10	51.290	48.883	1.957	Open Manhole		1350
3.007	o	450	S9	51.290	48.785	2.055	Open Manhole		1350
7.000	o	225	S5	51.290	48.795	2.270	Open Manhole		1200
8.000	o	225	S6	51.320	50.370	0.725	Open Manhole		1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	I*W
6.000	9.534	225.0	S12	51.330	49.268	1.837	Open Manhole		1350
3.005	14.057	100.0	S10	51.290	48.883	1.957	Open Manhole		1350
3.006	9.829	100.0	S9	51.290	48.785	2.055	Open Manhole		1350
3.007	8.074#	100.0	Tank	51.290	48.704	2.136	Open Manhole		1350
7.000	1.062#	100.0	Tank	51.290	48.784	2.281	Open Manhole		1350
8.000	13.525	100.0	S8	51.320	50.235	0.860	Open Manhole		1200

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PIPELINE SCHEDULES for Storm

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)
9.000	o	225	S7	51.320	50.370	0.725	Open Manhole	1200
8.001	o	225	S8	51.320	48.911	2.184	Open Manhole	1200
3.008	o	450	Tank	51.290	47.285	3.555	Open Manhole	1350
3.009	o	450	Tank Outlet	51.290	47.285	3.555	Open Manhole	1350
3.010	o	450	S4	51.280	46.908	3.922	Open Manhole	1350
3.011	o	450	S3	51.355	46.565	4.340	Open Manhole	1350

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)
9.000	23.110	100.0	S8	51.320	50.139	0.956	Open Manhole	1200
8.001	12.633#	100.0	Tank	51.290	48.785	2.280	Open Manhole	1350
3.008	1.000#	0.0	Tank Outlet	51.290	47.285	3.555	Open Manhole	1350
3.009	7.680#	100.0	S4	51.280	47.208	3.622	Open Manhole	1350
3.010	4.300	100.0	S3	51.355	46.865	4.040	Open Manhole	1350
3.011	4.537	100.0	S2 (FC 1)	51.430	46.520	4.460	Open Manhole	1500

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PIPELINE SCHEDULES for Storm Upstream Manhole <table><thead><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>3.012</td><td>o</td><td>225</td><td>S2 (FC 1)</td><td>51.430</td><td>46.214</td><td>4.991</td><td>Open Manhole</td><td>1500</td></tr><tr><td>2.001</td><td>o</td><td>225</td><td>C01</td><td>51.899</td><td>46.072</td><td>5.602</td><td>Open Manhole</td><td>1200</td></tr><tr><td>10.000</td><td>o</td><td>525</td><td>S22</td><td>48.900</td><td>47.700</td><td>0.675</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.001</td><td>o</td><td>525</td><td>S23</td><td>48.900</td><td>47.618</td><td>0.757</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.002</td><td>o</td><td>150</td><td>S24 (FC2)</td><td>49.430</td><td>47.606</td><td>1.674</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.003</td><td>o</td><td>300</td><td>C02</td><td>49.430</td><td>46.484</td><td>2.646</td><td>Open Manhole</td><td>1200</td></tr></tbody></table> Downstream Manhole <table><thead><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>3.012</td><td>6.389</td><td>45.0</td><td>C01</td><td>51.899</td><td>46.072</td><td>5.602</td><td>Open Manhole</td><td>1200</td></tr><tr><td>2.001</td><td>8.294</td><td>81.9</td><td></td><td>52.090</td><td>45.971</td><td>5.894</td><td>Open Manhole</td><td>1200</td></tr><tr><td>10.000</td><td>16.310</td><td>200.0</td><td>S23</td><td>48.900</td><td>47.618</td><td>0.757</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.001</td><td>2.328</td><td>200.0</td><td>S24 (FC2)</td><td>49.430</td><td>47.606</td><td>1.299</td><td>Open Manhole</td><td>1500</td></tr><tr><td>10.002</td><td>7.307</td><td>60.0</td><td>C02</td><td>49.430</td><td>47.484</td><td>1.796</td><td>Open Manhole</td><td>1200</td></tr><tr><td>10.003</td><td>6.592</td><td>50.0</td><td></td><td>50.560</td><td>46.352</td><td>3.908</td><td>Open Manhole</td><td>1200</td></tr></tbody></table>				PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	3.012	o	225	S2 (FC 1)	51.430	46.214	4.991	Open Manhole	1500	2.001	o	225	C01	51.899	46.072	5.602	Open Manhole	1200	10.000	o	525	S22	48.900	47.700	0.675	Open Manhole	1500	10.001	o	525	S23	48.900	47.618	0.757	Open Manhole	1500	10.002	o	150	S24 (FC2)	49.430	47.606	1.674	Open Manhole	1500	10.003	o	300	C02	49.430	46.484	2.646	Open Manhole	1200	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	3.012	6.389	45.0	C01	51.899	46.072	5.602	Open Manhole	1200	2.001	8.294	81.9		52.090	45.971	5.894	Open Manhole	1200	10.000	16.310	200.0	S23	48.900	47.618	0.757	Open Manhole	1500	10.001	2.328	200.0	S24 (FC2)	49.430	47.606	1.299	Open Manhole	1500	10.002	7.307	60.0	C02	49.430	47.484	1.796	Open Manhole	1200	10.003	6.592	50.0		50.560	46.352	3.908	Open Manhole	1200
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Innovyze				Network 2020.1.3		
Micro Drainage						
<u>Area Summary for Storm</u>						
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
2.000	-	-	100	0.018	0.018	0.018
3.000	-	-	100	0.016	0.016	0.016
3.001	-	-	100	0.047	0.047	0.047
3.002	-	-	100	0.040	0.040	0.040
4.000	-	-	100	0.010	0.010	0.010
5.000	-	-	100	0.012	0.012	0.012
5.001	-	-	100	0.015	0.015	0.015
4.001	-	-	100	0.019	0.019	0.019
3.003	-	-	100	0.015	0.015	0.015
3.004	-	-	100	0.007	0.007	0.007
6.000	-	-	100	0.021	0.021	0.021
3.005	-	-	100	0.021	0.021	0.021
3.006	-	-	100	0.009	0.009	0.009
3.007	-	-	100	0.006	0.006	0.006
7.000	-	-	100	0.015	0.015	0.015
8.000	-	-	100	0.013	0.013	0.013
9.000	-	-	100	0.015	0.015	0.015
8.001	-	-	100	0.027	0.027	0.027
3.008	-	-	100	0.031	0.031	0.031
3.009	-	-	100	0.000	0.000	0.000
3.010	-	-	100	0.000	0.000	0.000
3.011	-	-	100	0.024	0.024	0.024
3.012	-	-	100	0.000	0.000	0.000
2.001	-	-	100	0.016	0.016	0.016
10.000	-	-	100	0.016	0.016	0.016
10.001	-	-	100	0.018	0.018	0.018
10.002	-	-	100	0.000	0.000	0.000
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Pickfords Wharf Clink Street London, SE1 9DG	Rochdale Road Proposed Drainage Design	
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Innovyze	Network 2020.1.3	

Network Classifications for Storm

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
10.001	S23	525	0.757	1.299	Unclassified	1500	0	0.757	Unclassified
10.002	S24 (FC2)	150	1.674	1.796	Unclassified	1500	0	1.674	Unclassified
10.003	C02	300	2.646	3.908	Unclassified	1200	0	2.646	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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2.001		52.090	45.971	0.000	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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10.003		50.560	46.352	0.000	1200	0
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Pickfords Wharf Clink Street London, SE1 9DG	Rochdale Road Proposed Drainage Design																						
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Rainfall Model FSR M5-60 (mm) 18.100 Cv (Summer) 0.750													
Region England and Wales Ratio R 0.357 Cv (Winter) 0.840													
Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF													
Analysis Timestep 2.5 Second Increment (Extended) Inertia Status OFF													
DTS Status ON													
Profile(s) Summer and Winter													
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440													
Return Period(s) (years) 30													
Climate Change (%) 0													

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<table><thead><tr><th></th><th>US/MH</th><th>Level</th></tr><tr><th>PN</th><th>Name</th><th>Status Exceeded</th></tr></thead><tbody><tr><td>2.000</td><td>S1</td><td>OK</td></tr><tr><td>3.000</td><td>S21</td><td>OK</td></tr></tbody></table>				US/MH	Level	PN	Name	Status Exceeded	2.000	S1	OK	3.000	S21	OK
	US/MH	Level												
PN	Name	Status Exceeded												
2.000	S1	OK												
3.000	S21	OK												
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>														
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)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)
3.001	S20	15 Winter	30	+0%					50.162	-0.100	0.000	0.58		
3.002	S19	15 Winter	30	+0%					49.980	-0.045	0.000	0.98		
4.000	S14	15 Winter	30	+0%					49.676	-0.149	0.000	0.08		
5.000	S15	15 Winter	30	+0%					49.687	-0.343	0.000	0.05		
5.001	S16	15 Winter	30	+0%					49.679	-0.310	0.000	0.12		
4.001	S17	15 Winter	30	+0%					49.665	-0.297	0.000	0.25		
3.003	S18	15 Winter	30	+0%					49.364	-0.242	0.000	0.43		
3.004	S13	15 Winter	30	+0%					49.280	-0.232	0.000	0.47		
6.000	S11	15 Winter	30	+0%					49.397	-0.138	0.000	0.31		
3.005	S12	15 Winter	30	+0%					49.237	-0.237	0.000	0.45		
3.006	S10	15 Winter	30	+0%					49.123	-0.210	0.000	0.56		
3.007	S9	15 Winter	30	+0%					49.036	-0.199	0.000	0.59		
7.000	S5	15 Winter	30	+0%					48.866	-0.154	0.000	0.21		
8.000	S6	15 Winter	30	+0%					50.423	-0.172	0.000	0.12		
9.000	S7	15 Winter	30	+0%					50.425	-0.170	0.000	0.13		
8.001	S8	15 Winter	30	+0%					49.030	-0.106	0.000	0.54		
3.008	Tank	60 Winter	30	+0%	30/15 Summer				48.202	0.467	0.000	1.01		
3.009	Tank Outlet	60 Winter	30	+0%	30/15 Summer				48.533	0.798	0.000	0.72		
3.010	S4	60 Winter	30	+0%	30/15 Summer				48.651	1.293	0.000	0.52		
3.011	S3	60 Winter	30	+0%	30/15 Summer				48.710	1.695	0.000	0.34		
3.012	S2 (FC 1)	60 Winter	30	+0%	30/15 Summer				48.747	2.308	0.000	0.37		
2.001	C01	15 Winter	30	+0%					46.208	-0.089	0.000	0.66		
10.000	S22	30 Winter	30	+0%					47.995	-0.230	0.000	0.02		
10.001	S23	30 Winter	30	+0%					47.995	-0.148	0.000	0.03		
10.002	S24 (FC2)	30 Winter	30	+0%	30/15 Summer				47.994	0.238	0.000	0.20		
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Pickfords Wharf Clink Street London, SE1 9DG	Rochdale Road Proposed Drainage Design			
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>				

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u> <table><thead><tr><th>PN</th><th>US/MH Name</th><th>Pipe Flow (l/s)</th><th>Status</th><th>Level Exceeded</th></tr></thead><tbody><tr><td>10.002</td><td>S24 (FC2)</td><td>4.0</td><td>SURCHARGED</td><td></td></tr></tbody></table>			PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded	10.002	S24 (FC2)	4.0	SURCHARGED
PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded							
10.002	S24 (FC2)	4.0	SURCHARGED								
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water		Flooded	Flow /	Overflow	Half Drain	Pipe
PN	Name							Level	Depth		Cap.	(l/s)	Time	Flow
		Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m ³)		(mins)	(l/s)
10.003	C02 15	Summer	30	+0%					46.524	-0.260	0.000	0.04		4.0

US/MH		Level
PN	Name	
10.003	C02	OK

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales		
Return Period (years)	100	Foul Sewage (l/s/ha) 0.000
M5-60 (mm)	18.100	Volumetric Runoff Coeff. 0.750
Ratio R	0.357	PIMP (%) 100
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%) 40
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m) 0.200
		Maximum Backdrop Height (m) 1.500
		Min Design Depth for Optimisation (m) 1.200
		Min Vel for Auto Design only (m/s) 1.00
		Min Slope for Optimisation (1:X) 500

Designed with Level Soffits

Network Design Table for Storm

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

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

Network Results Table

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Waterman Group		Page 2																								
Pickfords Wharf Clink Street London, SE1 9DG	Rochdale Road Proposed Drainage Design																									
Date 13/01/2023 File Microdrainage (12 Jan 2023).MDX	Designed by K. Sin Checked by N. Fitzpatrick																									
Innovyze	Network 2020.1.3																									
Network Design Table for Storm <table><tr><td>PN</td><td>Rain</td><td>T.C.</td><td>US/IL</td><td>Σ I</td><td>Area</td><td>Σ Base</td><td>Foul</td><td>Add Flow</td><td>Vel</td><td>Cap</td><td>Flow</td></tr><tr><td></td><td>(mm/hr)</td><td>(mins)</td><td>(m)</td><td></td><td>(ha)</td><td>Flow (l/s)</td><td>(l/s)</td><td>(l/s)</td><td>(m/s)</td><td>(l/s)</td><td>(l/s)</td></tr></table>			PN	Rain	T.C.	US/IL	Σ I	Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow		(mm/hr)	(mins)	(m)		(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)
PN	Rain	T.C.	US/IL	Σ I	Area	Σ Base	Foul	Add Flow	Vel	Cap	Flow															
	(mm/hr)	(mins)	(m)		(ha)	Flow (l/s)	(l/s)	(l/s)	(m/s)	(l/s)	(l/s)															
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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	4.104	0.027	150.0	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	34.319	0.343	100.0	0.016	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	23.652	0.237	100.0	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.002	18.528	0.185	100.0	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	27.609	0.323	85.5	0.010	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	18.279	0.041	450.0	0.012	5.00	0.0	0.600	o	450	Pipe/Conduit	
5.001	11.976	0.027	450.0	0.015	0.00	0.0	0.600	o	450	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)
2.000	50.00	5.08	46.099	0.018	0.0	0.0	1.0	0.82	14.5	3.4
3.000	50.00	5.44	50.380	0.016	0.0	0.0	0.9	1.31	52.0	3.0
3.001	50.00	5.74	50.037	0.063	0.0	0.0	3.4	1.31	52.0	11.9
3.002	50.00	5.98	49.800	0.103	0.0	0.0	5.6	1.31	52.0	19.5
4.000	50.00	5.33	49.600	0.010	0.0	0.0	0.5	1.42	56.3	1.9
5.000	50.00	5.32	49.580	0.012	0.0	0.0	0.6	0.95	151.4	2.3
5.001	50.00	5.53	49.539	0.027	0.0	0.0	1.5	0.95	151.4	5.1

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
4.001	12.097	0.027	450.0	0.019	0.00	0.0	0.600	o	450	Pipe/Conduit		
3.003	9.369	0.094	100.0	0.015	0.00	0.0	0.600	o	450	Pipe/Conduit		
3.004	3.794	0.038	100.0	0.007	0.00	0.0	0.600	o	450	Pipe/Conduit		
6.000	9.534	0.042	225.0	0.021	5.00	0.0	0.600	o	225	Pipe/Conduit		
3.005	14.057	0.141	100.0	0.021	0.00	0.0	0.600	o	450	Pipe/Conduit		
3.006	9.829	0.098	100.0	0.009	0.00	0.0	0.600	o	450	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	5.74	49.512	0.056	0.0	0.0	3.0	0.95	151.4	10.6
3.003	50.00	6.05	49.156	0.174	0.0	0.0	9.4	2.03	323.4	33.0
3.004	50.00	6.08	49.062	0.181	0.0	0.0	9.8	2.03	323.4	34.3
6.000	50.00	5.18	49.310	0.021	0.0	0.0	1.1	0.87	34.5	4.0
3.005	50.00	6.20	49.024	0.223	0.0	0.0	12.1	2.03	323.4	42.3
3.006	50.00	6.28	48.883	0.232	0.0	0.0	12.6	2.03	323.4	44.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
3.007	8.074#	0.081	100.0	0.006	0.00	0.0	0.600	o	450	Pipe/Conduit		🔒
7.000	1.062#	0.011	100.0	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit		🔒
8.000	13.525	0.135	100.0	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit		🔒
9.000	23.110	0.231	100.0	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit		🔒
8.001	12.633#	0.126	100.0	0.027	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)
3.007	50.00	6.35	48.785	0.238	0.0	0.0	12.9	2.03	323.4	45.1
7.000	50.00	5.01	48.795	0.015	0.0	0.0	0.8	1.31	52.0	2.8
8.000	50.00	5.17	50.370	0.013	0.0	0.0	0.7	1.31	52.0	2.5
9.000	50.00	5.29	50.370	0.015	0.0	0.0	0.8	1.31	52.0	2.8
8.001	50.00	5.46	48.911	0.055	0.0	0.0	3.0	1.31	52.0	10.4

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
3.008	1.000#	0.000	0.0	0.031	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.009	7.680#	0.077	100.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.010	4.300	0.043	100.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.011	4.537	0.045	100.0	0.024	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.012	6.389	0.142	45.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	8.294	0.101	81.9	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
10.000	16.310	0.082	200.0	0.016	5.00	0.0	0.600	o	525	Pipe/Conduit	
10.001	2.328	0.012	200.0	0.018	0.00	0.0	0.600	o	525	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)
3.008	50.00	6.43	47.285	0.339	0.0	0.0	18.4	0.19	31.0	64.3
3.009	50.00	6.49	47.285	0.339	0.0	0.0	18.4	2.03	323.4	64.3
3.010	50.00	6.53	46.908	0.339	0.0	0.0	18.4	2.03	323.4	64.3
3.011	50.00	6.57	46.565	0.363	0.0	0.0	19.7	2.03	323.4	68.8
3.012	50.00	6.62	46.214	0.363	0.0	0.0	19.7	1.96	77.7	68.8
2.001	50.00	6.72	46.072	0.397	0.0	0.0	21.5	1.45	57.5	75.3
10.000	50.00	5.17	47.700	0.016	0.0	0.0	0.9	1.58	342.1	3.0
10.001	50.00	5.20	47.618	0.034	0.0	0.0	1.8	1.58	342.1	6.4

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
10.002	7.307	0.122	60.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.003	6.592	0.132	50.0	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)
10.002	50.00	5.29	47.606	0.034	0.0	0.0	1.8	1.30	23.0	6.4
10.003	50.00	5.34	46.484	0.034	0.0	0.0	1.8	2.23	157.5	6.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	51.828	5.729	Open Manhole	1200	2.000	46.099	150				
S21	51.330	0.950	Open Manhole	1200	3.000	50.380	225				
S20	51.230	1.193	Open Manhole	1200	3.001	50.037	225	3.000	50.037	225	
S19	51.230	1.430	Open Manhole	1200	3.002	49.800	225	3.001	49.800	225	
S14	50.550	0.950	Open Manhole	1200	4.000	49.600	225				
S15	50.530	0.950	Open Manhole	1350	5.000	49.580	450				
S16	50.530	0.991	Open Manhole	1350	5.001	49.539	450	5.000	49.539	450	
S17	50.650	1.373	Open Manhole	1350	4.001	49.512	450	4.000	49.277	225	
								5.001	49.512	450	
S18	50.950	1.794	Open Manhole	1350	3.003	49.156	450	3.002	49.615	225	234
								4.001	49.485	450	329
S13	51.330	2.268	Open Manhole	1350	3.004	49.062	450	3.003	49.062	450	
S11	51.300	1.990	Open Manhole	1200	6.000	49.310	225				
S12	51.330	2.306	Open Manhole	1350	3.005	49.024	450	3.004	49.024	450	
								6.000	49.268	225	19
S10	51.290	2.407	Open Manhole	1350	3.006	48.883	450	3.005	48.883	450	
S9	51.290	2.505	Open Manhole	1350	3.007	48.785	450	3.006	48.785	450	
S5	51.290	2.495	Open Manhole	1200	7.000	48.795	225				
S6	51.320	0.950	Open Manhole	1200	8.000	50.370	225				

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S17	384735.959	399165.979	384735.959	399165.979	Required	
S18	384733.239	399154.192	384733.239	399154.192	Required	
S13	384725.934	399148.325	384725.934	399148.325	Required	
S11	384737.480	399143.392	384737.480	399143.392	Required	
S12	384728.124	399145.227	384728.124	399145.227	Required	
S10	384716.028	399138.066	384716.028	399138.066	Required	
S9	384707.570	399133.058	384707.570	399133.058	Required	
S5	384697.738	399115.682	384697.738	399115.682	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S6	384685.258	399125.231	384685.258	399125.231	Required	
S7	384716.782	399143.894	384716.782	399143.894	Required	
S8	384696.896	399132.121	384696.896	399132.121	Required	
Tank	384706.427	399120.656	384706.427	399120.656	Required	
Tank Outlet	384711.643	399118.330	384711.643	399118.330	Required	
S4	384716.936	399115.655	384716.936	399115.655	Required	
S3	384720.919	399114.034	384720.919	399114.034	Required	
S2 (FC 1)	384722.896	399109.950	384722.896	399109.950	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
C01	384725.679	399104.199	384725.679	399104.199	Required	
	384724.374	399096.008			No Entry	
S22	384648.990	399136.435	384648.990	399136.435	Required	
S23	384657.351	399122.431	384657.351	399122.431	Required	
S24 (FC2)	384655.389	399121.178	384655.389	399121.178	Required	
C02	384650.034	399126.150	384650.034	399126.150	Required	
	384644.300	399122.898			No Entry	

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PIPELINE SCHEDULES for Storm

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
2.000	o	150	S1	51.828	46.099	5.579	Open Manhole	1200
3.000	o	225	S21	51.330	50.380	0.725	Open Manhole	1200
3.001	o	225	S20	51.230	50.037	0.968	Open Manhole	1200
3.002	o	225	S19	51.230	49.800	1.205	Open Manhole	1200
4.000	o	225	S14	50.550	49.600	0.725	Open Manhole	1200

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)
2.000	4.104	150.0	C01	51.899	46.072	5.677	Open Manhole	1200
3.000	34.319	100.0	S20	51.230	50.037	0.968	Open Manhole	1200
3.001	23.652	100.0	S19	51.230	49.800	1.205	Open Manhole	1200
3.002	18.528	100.0	S18	50.950	49.615	1.110	Open Manhole	1350
4.000	27.609	85.5	S17	50.650	49.277	1.148	Open Manhole	1350

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PIPELINE SCHEDULES for Storm

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)
5.000	o	450	S15	50.530	49.580	0.500	Open Manhole	1350
5.001	o	450	S16	50.530	49.539	0.541	Open Manhole	1350
4.001	o	450	S17	50.650	49.512	0.688	Open Manhole	1350
3.003	o	450	S18	50.950	49.156	1.344	Open Manhole	1350
3.004	o	450	S13	51.330	49.062	1.818	Open Manhole	1350

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)
5.000	18.279	450.0	S16	50.530	49.539	0.541	Open Manhole	1350
5.001	11.976	450.0	S17	50.650	49.512	0.688	Open Manhole	1350
4.001	12.097	450.0	S18	50.950	49.485	1.015	Open Manhole	1350
3.003	9.369	100.0	S13	51.330	49.062	1.818	Open Manhole	1350
3.004	3.794	100.0	S12	51.330	49.024	1.856	Open Manhole	1350

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PIPELINE SCHEDULES for Storm

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)
6.000	o	225	S11	51.300	49.310	1.765	Open Manhole	1200
3.005	o	450	S12	51.330	49.024	1.856	Open Manhole	1350
3.006	o	450	S10	51.290	48.883	1.957	Open Manhole	1350
3.007	o	450	S9	51.290	48.785	2.055	Open Manhole	1350
7.000	o	225	S5	51.290	48.795	2.270	Open Manhole	1200
8.000	o	225	S6	51.320	50.370	0.725	Open Manhole	1200

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)
6.000	9.534	225.0	S12	51.330	49.268	1.837	Open Manhole	1350
3.005	14.057	100.0	S10	51.290	48.883	1.957	Open Manhole	1350
3.006	9.829	100.0	S9	51.290	48.785	2.055	Open Manhole	1350
3.007	8.074#	100.0	Tank	51.290	48.704	2.136	Open Manhole	1350
7.000	1.062#	100.0	Tank	51.290	48.784	2.281	Open Manhole	1350
8.000	13.525	100.0	S8	51.320	50.235	0.860	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

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)
9.000	o	225	S7	51.320	50.370	0.725	Open Manhole	1200
8.001	o	225	S8	51.320	48.911	2.184	Open Manhole	1200
3.008	o	450	Tank	51.290	47.285	3.555	Open Manhole	1350
3.009	o	450	Tank Outlet	51.290	47.285	3.555	Open Manhole	1350
3.010	o	450	S4	51.280	46.908	3.922	Open Manhole	1350
3.011	o	450	S3	51.355	46.565	4.340	Open Manhole	1350

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)
9.000	23.110	100.0	S8	51.320	50.139	0.956	Open Manhole	1200
8.001	12.633#	100.0	Tank	51.290	48.785	2.280	Open Manhole	1350
3.008	1.000#	0.0	Tank Outlet	51.290	47.285	3.555	Open Manhole	1350
3.009	7.680#	100.0	S4	51.280	47.208	3.622	Open Manhole	1350
3.010	4.300	100.0	S3	51.355	46.865	4.040	Open Manhole	1350
3.011	4.537	100.0	S2 (FC 1)	51.430	46.520	4.460	Open Manhole	1500

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Innovyze	Network 2020.1.3							
<u>PIPELINE SCHEDULES for Storm</u>								
<u>Upstream Manhole</u>								
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.012	o	225	S2 (FC 1)	51.430	46.214	4.991	Open Manhole	1500
2.001	o	225	C01	51.899	46.072	5.602	Open Manhole	1200
10.000	o	525	S22	48.900	47.700	0.675	Open Manhole	1500
10.001	o	525	S23	48.900	47.618	0.757	Open Manhole	1500
10.002	o	150	S24 (FC2)	49.430	47.606	1.674	Open Manhole	1500
10.003	o	300	C02	49.430	46.484	2.646	Open Manhole	1200
<u>Downstream Manhole</u>								
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.012	6.389	45.0	C01	51.899	46.072	5.602	Open Manhole	1200
2.001	8.294	81.9		52.090	45.971	5.894	Open Manhole	1200
10.000	16.310	200.0	S23	48.900	47.618	0.757	Open Manhole	1500
10.001	2.328	200.0	S24 (FC2)	49.430	47.606	1.299	Open Manhole	1500
10.002	7.307	60.0	C02	49.430	47.484	1.796	Open Manhole	1200
10.003	6.592	50.0		50.560	46.352	3.908	Open Manhole	1200
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Innovyze				Network 2020.1.3		
Micro Drainage						
Area Summary for Storm						
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
2.000	-	-	100	0.018	0.018	0.018
3.000	-	-	100	0.016	0.016	0.016
3.001	-	-	100	0.047	0.047	0.047
3.002	-	-	100	0.040	0.040	0.040
4.000	-	-	100	0.010	0.010	0.010
5.000	-	-	100	0.012	0.012	0.012
5.001	-	-	100	0.015	0.015	0.015
4.001	-	-	100	0.019	0.019	0.019
3.003	-	-	100	0.015	0.015	0.015
3.004	-	-	100	0.007	0.007	0.007
6.000	-	-	100	0.021	0.021	0.021
3.005	-	-	100	0.021	0.021	0.021
3.006	-	-	100	0.009	0.009	0.009
3.007	-	-	100	0.006	0.006	0.006
7.000	-	-	100	0.015	0.015	0.015
8.000	-	-	100	0.013	0.013	0.013
9.000	-	-	100	0.015	0.015	0.015
8.001	-	-	100	0.027	0.027	0.027
3.008	-	-	100	0.031	0.031	0.031
3.009	-	-	100	0.000	0.000	0.000
3.010	-	-	100	0.000	0.000	0.000
3.011	-	-	100	0.024	0.024	0.024
3.012	-	-	100	0.000	0.000	0.000
2.001	-	-	100	0.016	0.016	0.016
10.000	-	-	100	0.016	0.016	0.016
10.001	-	-	100	0.018	0.018	0.018
10.002	-	-	100	0.000	0.000	0.000
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Network Classifications for Storm

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
10.001	S23	525	0.757	1.299	Unclassified	1500	0	0.757	Unclassified
10.002	S24 (FC2)	150	1.674	1.796	Unclassified	1500	0	1.674	Unclassified
10.003	C02	300	2.646	3.908	Unclassified	1200	0	2.646	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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2.001		52.090	45.971	0.000	1200	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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10.003		50.560	46.352	0.000	1200	0
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<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Manhole Headloss Coeff (Global) 0.500 Inlet Coefficient 0.800 Areal Reduction Factor 1.000 Foul Sewage per hectare (l/s) 0.000 Flow per Person per Day (l/per/day) 0.000 Hot Start (mins) 0 Additional Flow - % of Total Flow 45.000 Run Time (mins) 60 Hot Start Level (mm) 0 MADD Factor * 10m³/ha Storage 2.000 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 1 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR M5-60 (mm) 18.100 Cv (Summer) 0.750 Return Period (years) 100 Ratio R 0.357 Cv (Winter) 0.840 Region England and Wales Profile Type Summer Storm Duration (mins) 30		
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<u>Online Controls for Storm</u>																																																																										
<u>Hydro-Brake® Optimum Manhole: S2 (FC 1), DS/PN: 3.012, Volume (m³): 9.7</u>																																																																										
<table><tr><td>Unit Reference</td><td>MD-SHE-0170-1400-1000-1400</td><td>Sump Available</td><td>Yes</td></tr><tr><td>Design Head (m)</td><td>1.000</td><td>Diameter (mm)</td><td>170</td></tr><tr><td>Design Flow (l/s)</td><td>14.0</td><td>Invert Level (m)</td><td>46.214</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td><td>Minimum Outlet Pipe Diameter (mm)</td><td>225</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr><tr><td>Application</td><td>Surface</td><td></td><td></td></tr></table>			Unit Reference	MD-SHE-0170-1400-1000-1400	Sump Available	Yes	Design Head (m)	1.000	Diameter (mm)	170	Design Flow (l/s)	14.0	Invert Level (m)	46.214	Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225	Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200	Application	Surface																																																		
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Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200																																																																							
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<table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>6.0</td><td>0.600</td><td>13.0</td><td>1.600</td><td>17.5</td><td>2.600</td><td>22.1</td><td>5.000</td><td>30.2</td><td>7.500</td><td>36.7</td></tr><tr><td>0.200</td><td>13.4</td><td>0.800</td><td>12.6</td><td>1.800</td><td>18.5</td><td>3.000</td><td>23.6</td><td>5.500</td><td>31.6</td><td>8.000</td><td>37.9</td></tr><tr><td>0.300</td><td>13.9</td><td>1.000</td><td>14.0</td><td>2.000</td><td>19.5</td><td>3.500</td><td>25.4</td><td>6.000</td><td>33.0</td><td>8.500</td><td>39.0</td></tr><tr><td>0.400</td><td>13.8</td><td>1.200</td><td>15.3</td><td>2.200</td><td>20.4</td><td>4.000</td><td>27.1</td><td>6.500</td><td>34.3</td><td>9.000</td><td>40.1</td></tr><tr><td>0.500</td><td>13.5</td><td>1.400</td><td>16.4</td><td>2.400</td><td>21.2</td><td>4.500</td><td>28.7</td><td>7.000</td><td>35.5</td><td>9.500</td><td>41.2</td></tr></table>			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)	Depth (m)	Flow (l/s)	0.100	6.0	0.600	13.0	1.600	17.5	2.600	22.1	5.000	30.2	7.500	36.7	0.200	13.4	0.800	12.6	1.800	18.5	3.000	23.6	5.500	31.6	8.000	37.9	0.300	13.9	1.000	14.0	2.000	19.5	3.500	25.4	6.000	33.0	8.500	39.0	0.400	13.8	1.200	15.3	2.200	20.4	4.000	27.1	6.500	34.3	9.000	40.1	0.500	13.5	1.400	16.4	2.400	21.2	4.500	28.7	7.000	35.5	9.500	41.2
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)	Depth (m)	Flow (l/s)																																																															
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<u>Hydro-Brake® Optimum Manhole: S24 (FC2), DS/PN: 10.002, Volume (m³): 3.4</u>																																																																										
<table><tr><td>Unit Reference</td><td>MD-SHE-0101-4000-0600-4000</td><td>Sump Available</td><td>Yes</td></tr><tr><td>Design Head (m)</td><td>0.600</td><td>Diameter (mm)</td><td>101</td></tr><tr><td>Design Flow (l/s)</td><td>4.0</td><td>Invert Level (m)</td><td>47.606</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td><td>Minimum Outlet Pipe Diameter (mm)</td><td>150</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr><tr><td>Application</td><td>Surface</td><td></td><td></td></tr></table>			Unit Reference	MD-SHE-0101-4000-0600-4000	Sump Available	Yes	Design Head (m)	0.600	Diameter (mm)	101	Design Flow (l/s)	4.0	Invert Level (m)	47.606	Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150	Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200	Application	Surface																																																		
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PN	US/MH Name	Status	Level Exceeded										
2.000	S1	SURCHARGED											
3.000	S21	OK											
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10.002	S24 (FC2)		5.4	SURCHARGED											
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume	Flow /	Overflow	Half Drain	Pipe
PN	Name												Time	Flow
		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m ³)	Cap.	(l/s)	(mins)	(l/s)
10.003	C02 30 Winter	100	+40%					46.531	-0.253	0.000	0.06			5.4

US/MH		Level
PN	Name	
10.003	C02	OK