Billinghurst George & Partners		Page 1
Wellington House, Wellington Court Preston Farm Business Park Stockton on Tees TS18 3TA	LUF2 Surface Water Model LUF-BGP-XX-XX-T-C-00001	
Date 14/06/2026 15:25 File 2026.06.14 - SW MODEL - STAGE 5.MDX	Designed by JD Checked by JJH	
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)	100	PIMP (%)	100
M5-60 (mm)	16.000	Add Flow / Climate Change (%)	45
Ratio R	0.260	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.	1.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.759	4-8	1.113	8-12	0.007

Total Area Contributing (ha) = 1.879

Total Pipe Volume (m³) = 154.996

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	75.398	0.302	249.7	0.152	4.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	60.543	0.220	275.2	0.031	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	75.449	0.822	91.8	0.408	4.00	0.0	0.600	o	450	Pipe/Conduit	
S1.002	34.837	0.077	452.4	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
S3.000	2.862	0.285	10.0	0.257	4.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	13.916	0.215	64.7	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)
S1.000	50.00	5.27	81.950	0.152	0.0	0.0	12.3	0.99	70.0	39.8
S1.001	50.00	6.34	81.648	0.183	0.0	0.0	14.9	0.94	66.6	47.9
S2.000	50.00	4.59	82.100	0.408	0.0	0.0	33.1	2.12	337.6	106.8
S1.002	50.00	6.89	81.203	0.591	0.0	0.0	48.0	1.05	226.5	154.7
S3.000	50.00	4.01	82.825	0.257	0.0	0.0	20.9	4.99	352.7	67.3
S3.001	50.00	4.13	82.100	0.257	0.0	0.0	20.9	1.96	138.4	67.3

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
S4.000	20.327	0.240	84.7	0.077	4.00	0.0	0.600	o	225	Pipe/Conduit	
S3.002	27.984	0.225	124.4	0.079	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.003	14.756	0.179	82.4	0.017	0.00	0.0	0.600	o	375	Pipe/Conduit	
S5.000	47.078	0.214	220.0	0.128	4.00	0.0	0.600	o	300	Pipe/Conduit	
S6.000	16.654	0.669	24.9	0.012	4.00	0.0	0.600	o	150	Pipe/Conduit	
S5.001	24.319	0.100	243.2	0.018	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.004	50.834	0.205	248.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.005	25.194	0.100	251.9	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S3.006	3.330	0.050	66.6	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.003	9.433	0.024	393.0	0.015	0.00	0.0	0.600	o	675	Pipe/Conduit	
S7.000	57.271	0.363	157.8	0.053	4.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	84.895	0.212	400.4	0.097	0.00	0.0	0.600	o	675	Pipe/Conduit	
S8.000	50.523	0.168	300.7	0.047	4.00	0.0	0.600	o	600	Pipe/Conduit	
S8.001	75.879	0.253	299.9	0.319	0.00	0.0	0.600	o	600	Pipe/Conduit	
S8.002	50.998	0.170	300.0	0.019	0.00	0.0	0.600	o	600	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)
S4.000	50.00	4.24	82.200	0.077	0.0	0.0	6.3	1.42	56.5	20.2
S3.002	50.00	4.57	81.885	0.413	0.0	0.0	33.6	1.41	99.6«	108.1
S3.003	50.00	4.69	81.585	0.430	0.0	0.0	34.9	2.00	220.6	112.6
S5.000	50.00	4.74	81.795	0.128	0.0	0.0	10.4	1.06	74.6	33.5
S6.000	50.00	4.14	82.400	0.012	0.0	0.0	1.0	2.03	35.8	3.1
S5.001	50.00	5.15	81.581	0.158	0.0	0.0	12.8	1.00	71.0	41.4
S3.004	50.00	5.81	81.331	0.588	0.0	0.0	47.8	1.29	204.6	153.9
S3.005	50.00	6.06	81.126	0.588	0.0	0.0	47.8	1.65	589.2	153.9
S3.006	50.00	6.08	81.026	0.588	0.0	0.0	47.8	3.21	1150.4	153.9
S1.003	50.00	7.01	80.976	1.194	0.0	0.0	97.0	1.32	470.9	312.6
S7.000	50.00	4.92	81.765	0.053	0.0	0.0	4.3	1.04	41.3	13.9
S1.004	50.00	8.10	80.952	1.344	0.0	0.0	109.2	1.30	466.5	351.9
S8.000	50.00	4.60	81.516	0.047	0.0	0.0	3.8	1.40	395.6	12.3
S8.001	50.00	5.50	81.348	0.366	0.0	0.0	29.7	1.40	396.1	95.8
S8.002	50.00	6.11	81.095	0.385	0.0	0.0	31.3	1.40	396.0	100.8

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
S9.000	64.427	0.560	115.0	0.150	4.00	0.0	0.600	o	300	Pipe/Conduit	
S9.001	6.440	0.065	99.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.003	10.422	0.035	297.8	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.005	5.605	0.056	100.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	9.620	0.383	25.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S9.000	50.00	4.73	81.850	0.150	0.0	0.0	12.2	1.46	103.6	39.3
S9.001	50.00	4.80	81.290	0.150	0.0	0.0	12.2	1.58	111.7	39.3
S8.003	50.00	6.23	80.850	0.535	0.0	0.0	43.5	1.51	541.6	140.1
S1.005	50.00	8.15	80.740	1.879	0.0	0.0	152.7	1.81	200.0«	491.9
S1.006	50.00	8.19	80.684	1.879	0.0	0.0	152.7	3.63	400.7«	491.9

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
SS1	83.150	1.200	Open Manhole	1200	S1.000	81.950	300				
SS2	83.180	1.532	Open Manhole	1200	S1.001	81.648	300	S1.000	81.648	300	
SS8	83.750	1.650	Open Manhole	1500	S2.000	82.100	450				
SS3	83.680	2.477	Open Manhole	1800	S1.002	81.203	525	S1.001	81.428	300	
								S2.000	81.278	450	
SPP	83.300	0.475	Open Manhole	1200	S3.000	82.825	300				
SSH2	83.300	1.200	Open Manhole	1200	S3.001	82.100	300	S3.000	82.540	300	440
SSH6	83.125	0.925	Open Manhole	600	S4.000	82.200	225				
SSH3	83.125	1.240	Open Manhole	1350	S3.002	81.885	300	S3.001	81.885	300	
								S4.000	81.960	225	
SSH4	83.125	1.540	Open Manhole	1350	S3.003	81.585	375	S3.002	81.660	300	
SSH7	83.150	1.355	Open Manhole	1200	S5.000	81.795	300				
SSH13	83.350	0.950	Open Manhole	600	S6.000	82.400	150				
SSH8	83.275	1.694	Open Manhole	1200	S5.001	81.581	300	S5.000	81.581	300	
								S6.000	81.731	150	
SSH5	83.075	1.744	Open Manhole	1500	S3.004	81.331	450	S3.003	81.406	375	
								S5.001	81.481	300	
SS9	83.680	2.554	Open Manhole	1800	S3.005	81.126	675	S3.004	81.126	450	
SS10	83.680	2.654	Open Manhole	1800	S3.006	81.026	675	S3.005	81.026	675	
SS4	83.680	2.704	Open Manhole	2100	S1.003	80.976	675	S1.002	81.126	525	
								S3.006	80.976	675	
SS11	83.190	1.425	Open Manhole	1200	S7.000	81.765	225				
SS5	83.520	2.568	Open Manhole	1800	S1.004	80.952	675	S1.003	80.952	675	
								S7.000	81.402	225	
SS12	83.020	1.504	Open Manhole	1500	S8.000	81.516	600				
SS13	83.420	2.072	Open Manhole	1500	S8.001	81.348	600	S8.000	81.348	600	
SS14	83.350	2.255	Open Manhole	1500	S8.002	81.095	600	S8.001	81.095	600	
SS16	83.200	1.350	Open Manhole	1200	S9.000	81.850	300				
SS17	83.100	1.810	Open Manhole	1200	S9.001	81.290	300	S9.000	81.290	300	
SS15	83.150	2.300	Open Manhole	2100	S8.003	80.850	675	S8.002	80.925	600	
								S9.001	81.225	300	
SS6	83.100	2.360	Open Manhole	2100	S1.005	80.740	375	S1.004	80.740	675	
								S8.003	80.815	675	375
SS7	83.100	2.416	Open Manhole	2100	S1.006	80.684	375	S1.005	80.684	375	
SOutfall	83.040	2.739	Open Manhole	0		OUTFALL		S1.006	80.301	375	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SS1	301763.353	515452.576	301763.353	515452.576	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SS2	301709.613	515399.691	301709.613	515399.691	Required	
SS8	301720.901	515495.717	301720.901	515495.717	Required	
SS3	301667.112	515442.808	301667.112	515442.808	Required	
SPP	301742.136	515521.165	301742.136	515521.165	Required	
SSH2	301740.117	515523.201	301740.117	515523.201	Required	
SSH6	301744.086	515546.601	301744.086	515546.601	Required	
SSH3	301729.587	515532.355	301729.587	515532.355	Required	
SSH4	301709.625	515512.743	301709.625	515512.743	Required	
SSH7	301715.821	515573.610	301715.821	515573.610	Required	
SSH13	301670.360	515528.944	301670.360	515528.944	Required	
SSH8	301682.239	515540.616	301682.239	515540.616	Required	
SSH5	301699.283	515523.269	301699.283	515523.269	Required	
SS9	301663.027	515487.638	301663.027	515487.638	Required	
SS10	301645.057	515469.979	301645.057	515469.979	Required	
SS4	301642.683	515467.644	301642.683	515467.644	Required	
SS11	301676.119	515420.200	301676.119	515420.200	Required	
SS5	301635.958	515461.029	301635.958	515461.029	Required	

STATUS A3 - AUTHORISED (MSC) - no Comments

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SS12	301709.813	515581.056	301709.813	515581.056	Required	
SS13	301673.712	515545.711	301673.712	515545.711	Required	
SS14	301619.617	515492.501	301619.617	515492.501	Required	
SS16	301625.270	515578.630	301625.270	515578.630	Required	
SS17	301579.339	515533.450	301579.339	515533.450	Required	
SS15	301583.855	515528.859	301583.855	515528.859	Required	
SS6	301576.425	515521.551	301576.425	515521.551	Required	
SS7	301570.994	515520.164	301570.994	515520.164	Required	
SOutfall	301561.672	515517.787			No Entry	

STATUS A3 - AUTHORISED (MSC) - no Comments

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)
S1.000	o	300	SS1	83.150	81.950	0.900	Open Manhole	1200
S1.001	o	300	SS2	83.180	81.648	1.232	Open Manhole	1200
S2.000	o	450	SS8	83.750	82.100	1.200	Open Manhole	1500
S1.002	o	525	SS3	83.680	81.203	1.952	Open Manhole	1800
S3.000	o	300	SPP	83.300	82.825	0.175	Open Manhole	1200
S3.001	o	300	SSH2	83.300	82.100	0.900	Open Manhole	1200
S4.000	o	225	SSH6	83.125	82.200	0.700	Open Manhole	600
S3.002	o	300	SSH3	83.125	81.885	0.940	Open Manhole	1350
S3.003	o	375	SSH4	83.125	81.585	1.165	Open Manhole	1350
S5.000	o	300	SSH7	83.150	81.795	1.055	Open Manhole	1200
S6.000	o	150	SSH13	83.350	82.400	0.800	Open Manhole	600
S5.001	o	300	SSH8	83.275	81.581	1.394	Open Manhole	1200
S3.004	o	450	SSH5	83.075	81.331	1.294	Open Manhole	1500
S3.005	o	675	SS9	83.680	81.126	1.879	Open Manhole	1800
S3.006	o	675	SS10	83.680	81.026	1.979	Open Manhole	1800

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)
S1.000	75.398	249.7	SS2	83.180	81.648	1.232	Open Manhole	1200
S1.001	60.543	275.2	SS3	83.680	81.428	1.952	Open Manhole	1800
S2.000	75.449	91.8	SS3	83.680	81.278	1.952	Open Manhole	1800
S1.002	34.837	452.4	SS4	83.680	81.126	2.029	Open Manhole	2100
S3.000	2.862	10.0	SSH2	83.300	82.540	0.460	Open Manhole	1200
S3.001	13.916	64.7	SSH3	83.125	81.885	0.940	Open Manhole	1350
S4.000	20.327	84.7	SSH3	83.125	81.960	0.940	Open Manhole	1350
S3.002	27.984	124.4	SSH4	83.125	81.660	1.165	Open Manhole	1350
S3.003	14.756	82.4	SSH5	83.075	81.406	1.294	Open Manhole	1500
S5.000	47.078	220.0	SSH8	83.275	81.581	1.394	Open Manhole	1200
S6.000	16.654	24.9	SSH8	83.275	81.731	1.394	Open Manhole	1200
S5.001	24.319	243.2	SSH5	83.075	81.481	1.294	Open Manhole	1500
S3.004	50.834	248.0	SS9	83.680	81.126	2.104	Open Manhole	1800
S3.005	25.194	251.9	SS10	83.680	81.026	1.979	Open Manhole	1800
S3.006	3.330	66.6	SS4	83.680	80.976	2.029	Open Manhole	2100

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)
S1.003	o	675	SS4	83.680	80.976	2.029	Open Manhole	2100
S7.000	o	225	SS11	83.190	81.765	1.200	Open Manhole	1200
S1.004	o	675	SS5	83.520	80.952	1.893	Open Manhole	1800
S8.000	o	600	SS12	83.020	81.516	0.904	Open Manhole	1500
S8.001	o	600	SS13	83.420	81.348	1.472	Open Manhole	1500
S8.002	o	600	SS14	83.350	81.095	1.655	Open Manhole	1500
S9.000	o	300	SS16	83.200	81.850	1.050	Open Manhole	1200
S9.001	o	300	SS17	83.100	81.290	1.510	Open Manhole	1200
S8.003	o	675	SS15	83.150	80.850	1.625	Open Manhole	2100
S1.005	o	375	SS6	83.100	80.740	1.985	Open Manhole	2100
S1.006	o	375	SS7	83.100	80.684	2.041	Open Manhole	2100

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)
S1.003	9.433	393.0	SS5	83.520	80.952	1.893	Open Manhole	1800
S7.000	57.271	157.8	SS5	83.520	81.402	1.893	Open Manhole	1800
S1.004	84.895	400.4	SS6	83.100	80.740	1.685	Open Manhole	2100
S8.000	50.523	300.7	SS13	83.420	81.348	1.472	Open Manhole	1500
S8.001	75.879	299.9	SS14	83.350	81.095	1.655	Open Manhole	1500
S8.002	50.998	300.0	SS15	83.150	80.925	1.625	Open Manhole	2100
S9.000	64.427	115.0	SS17	83.100	81.290	1.510	Open Manhole	1200
S9.001	6.440	99.1	SS15	83.150	81.225	1.625	Open Manhole	2100
S8.003	10.422	297.8	SS6	83.100	80.815	1.610	Open Manhole	2100
S1.005	5.605	100.1	SS7	83.100	80.684	2.041	Open Manhole	2100
S1.006	9.620	25.1	SOutfall	83.040	80.301	2.364	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.152	0.152	0.152
1.001	-	-	100	0.031	0.031	0.031
2.000	-	-	100	0.408	0.408	0.408
1.002	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.257	0.257	0.257
3.001	-	-	100	0.000	0.000	0.000
4.000	-	-	100	0.077	0.077	0.077
3.002	-	-	100	0.079	0.079	0.079
3.003	-	-	100	0.017	0.017	0.017
5.000	-	-	100	0.128	0.128	0.128
6.000	-	-	100	0.012	0.012	0.012
5.001	-	-	100	0.018	0.018	0.018
3.004	-	-	100	0.000	0.000	0.000
3.005	-	-	100	0.000	0.000	0.000
3.006	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.015	0.015	0.015
7.000	-	-	100	0.053	0.053	0.053
1.004	-	-	100	0.097	0.097	0.097
8.000	-	-	100	0.047	0.047	0.047
8.001	-	-	100	0.319	0.319	0.319
8.002	-	-	100	0.019	0.019	0.019
9.000	-	-	100	0.150	0.150	0.150
9.001	-	-	100	0.000	0.000	0.000
8.003	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.879	1.879	1.879

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)
S1.006	SOutfall	83.040	80.301	80.301	0	0

Simulation Criteria for Storm

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

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 2	Number of Storage Structures 2	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
Return Period (years)	100	Summer Storms	Yes
FEH Rainfall Version	2013	Winter Storms	No
Site Location GB 301616 515503 NY 01616 15503		Cv (Summer)	1.000

Synthetic Rainfall Details

Cv (Winter) 1.000 Storm Duration (mins) 30

Online Controls for Storm

Orifice Manhole: SSH2, DS/PN: S3.001, Volume (m³): 1.5

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 82.100

Hydro-Brake® Optimum Manhole: SS6, DS/PN: S1.005, Volume (m³): 40.8

Unit Reference	MD-SHE-0361-8700-1935-8700
Design Head (m)	1.935
Design Flow (l/s)	87.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	361
Invert Level (m)	80.740
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.935	86.9	Kick-Flo®	1.365	73.4
Flush-Flo™	0.646	86.7	Mean Flow over Head Range	-	73.6

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.3	0.800	86.1	2.000	88.3	4.000	123.7	7.000	162.6
0.200	36.3	1.000	84.1	2.200	92.5	4.500	131.1	7.500	168.2
0.300	67.6	1.200	80.4	2.400	96.5	5.000	138.0	8.000	173.6
0.400	83.4	1.400	74.3	2.600	100.3	5.500	144.5	8.500	178.8
0.500	85.7	1.600	79.3	3.000	107.6	6.000	150.8	9.000	183.9
0.600	86.6	1.800	83.9	3.500	115.9	6.500	156.8	9.500	188.9

Storage Structures for Storm

Porous Car Park Manhole: SPP, DS/PN: S3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	35.2
Membrane Percolation (mm/hr)	1000	Length (m)	63.8
Max Percolation (l/s)	623.8	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	82.825	Membrane Depth (mm)	100

Tank or Pond Manhole: SS10, DS/PN: S3.006

Invert Level (m) 81.075

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	360.0	1.600	360.0	1.601	0.0

STATUS A3 - AUTHORISED (MSC) - no Comments

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FEH	Data Type Point
FEH Rainfall Version		2013	Cv (Summer) 1.000
Site Location	GB 301616 515503 NY 01616 15503		Cv (Winter) 1.000

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 50

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)
S1.000	SS1	15 Summer	2	+0%	100/15 Summer	100/15 Summer			82.089	-0.161	0.000
S1.001	SS2	15 Summer	2	+0%	100/15 Summer				81.795	-0.153	0.000
S2.000	SS8	15 Summer	2	+0%	100/15 Summer				82.253	-0.297	0.000
S1.002	SS3	15 Summer	2	+0%	100/15 Summer				81.477	-0.251	0.000
S3.000	SPP	120 Summer	2	+0%	100/60 Summer				82.935	-0.190	0.000
S3.001	SSH2	120 Summer	2	+0%	2/15 Summer				82.957	0.557	0.000
S4.000	SSH6	15 Summer	2	+0%	100/15 Summer				82.283	-0.142	0.000
S3.002	SSH3	30 Summer	2	+0%	100/15 Summer				82.006	-0.179	0.000
S3.003	SSH4	30 Summer	2	+0%	100/15 Summer				81.697	-0.263	0.000
S5.000	SSH7	15 Summer	2	+0%	100/15 Summer				81.919	-0.176	0.000
S6.000	SSH13	15 Summer	2	+0%	100/60 Summer				82.426	-0.124	0.000
S5.001	SSH8	15 Summer	2	+0%	100/15 Summer				81.723	-0.158	0.000
S3.004	SSH5	30 Summer	2	+0%	100/15 Summer				81.503	-0.278	0.000
S3.005	SS9	30 Summer	2	+0%	100/15 Summer				81.284	-0.517	0.000
S3.006	SS10	120 Summer	2	+0%	100/15 Summer				81.251	-0.450	0.000
S1.003	SS4	30 Summer	2	+0%	100/15 Summer				81.322	-0.329	0.000
S7.000	SS11	15 Summer	2	+0%	100/15 Summer				81.843	-0.147	0.000
S1.004	SS5	30 Summer	2	+0%	100/15 Summer				81.321	-0.306	0.000
S8.000	SS12	15 Summer	2	+0%	100/15 Summer				81.587	-0.529	0.000
S8.001	SS13	15 Summer	2	+0%	100/15 Summer				81.505	-0.443	0.000
S8.002	SS14	30 Summer	2	+0%	30/30 Summer				81.327	-0.368	0.000
S9.000	SS16	15 Summer	2	+0%	100/15 Summer	100/30 Summer			81.961	-0.189	0.000
S9.001	SS17	15 Summer	2	+0%	30/15 Summer				81.431	-0.159	0.000
S8.003	SS15	30 Summer	2	+0%	30/15 Summer				81.292	-0.233	0.000
S1.005	SS6	30 Summer	2	+0%	2/15 Summer				81.280	0.165	0.000
S1.006	SS7	30 Summer	2	+0%					80.836	-0.223	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SS1	0.40			26.7	OK	3
S1.001	SS2	0.46			29.4	OK	
S2.000	SS8	0.25			78.2	OK	
S1.002	SS3	0.52			100.1	OK	
S3.000	SPP	0.09		24	12.4	OK	
S3.001	SSH2	0.09			10.5	SURCHARGED	
S4.000	SSH6	0.29			15.1	OK	
S3.002	SSH3	0.33			30.1	OK	
S3.003	SSH4	0.19			32.2	OK	
S5.000	SSH7	0.34			24.0	OK	
S6.000	SSH13	0.07			2.4	OK	
S5.001	SSH8	0.45			28.7	OK	
S3.004	SSH5	0.31			57.2	OK	
S3.005	SS9	0.13			56.6	OK	
S3.006	SS10	0.09			41.6	OK	
S1.003	SS4	0.27			65.7	OK	
S7.000	SS11	0.26			10.4	OK	
S1.004	SS5	0.19			81.7	OK	
S8.000	SS12	0.03			8.9	OK	
S8.001	SS13	0.14			52.2	OK	
S8.002	SS14	0.14			47.8	OK	
S9.000	SS16	0.29			28.3	OK	1
S9.001	SS17	0.44			28.1	OK	
S8.003	SS15	0.15			47.9	OK	
S1.005	SS6	0.78			83.8	SURCHARGED	
S1.006	SS7	0.35			83.8	OK	

STATUS A3 - AUTHORISED (MSC) - no Comments

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 301616 515503 NY 01616 15503	Cv (Winter)	1.000

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 50

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)
S1.000	SS1	15 Summer	30	+0%	100/15 Summer	100/15 Summer			82.174	-0.076	0.000
S1.001	SS2	15 Summer	30	+0%	100/15 Summer				81.894	-0.054	0.000
S2.000	SS8	15 Summer	30	+0%	100/15 Summer				82.330	-0.220	0.000
S1.002	SS3	15 Summer	30	+0%	100/15 Summer				81.665	-0.063	0.000
S3.000	SPP	120 Summer	30	+0%	100/60 Summer				83.023	-0.102	0.000
S3.001	SSH2	120 Summer	30	+0%	2/15 Summer				83.060	0.660	0.000
S4.000	SSH6	15 Summer	30	+0%	100/15 Summer				82.326	-0.099	0.000
S3.002	SSH3	15 Summer	30	+0%	100/15 Summer				82.091	-0.094	0.000
S3.003	SSH4	15 Summer	30	+0%	100/15 Summer				81.767	-0.193	0.000
S5.000	SSH7	15 Summer	30	+0%	100/15 Summer				81.987	-0.108	0.000
S6.000	SSH13	15 Summer	30	+0%	100/60 Summer				82.438	-0.112	0.000
S5.001	SSH8	15 Summer	30	+0%	100/15 Summer				81.812	-0.069	0.000
S3.004	SSH5	120 Summer	30	+0%	100/15 Summer				81.668	-0.113	0.000
S3.005	SS9	120 Summer	30	+0%	100/15 Summer				81.608	-0.193	0.000
S3.006	SS10	120 Summer	30	+0%	100/15 Summer				81.580	-0.121	0.000
S1.003	SS4	120 Summer	30	+0%	100/15 Summer				81.577	-0.074	0.000
S7.000	SS11	15 Summer	30	+0%	100/15 Summer				81.882	-0.108	0.000
S1.004	SS5	30 Summer	30	+0%	100/15 Summer				81.584	-0.043	0.000
S8.000	SS12	30 Summer	30	+0%	100/15 Summer				81.761	-0.355	0.000
S8.001	SS13	30 Summer	30	+0%	100/15 Summer				81.760	-0.188	0.000
S8.002	SS14	30 Summer	30	+0%	30/30 Summer				81.698	0.003	0.000
S9.000	SS16	15 Summer	30	+0%	100/15 Summer	100/30 Summer			82.020	-0.130	0.000
S9.001	SS17	30 Summer	30	+0%	30/15 Summer				81.674	0.084	0.000
S8.003	SS15	30 Summer	30	+0%	30/15 Summer				81.620	0.095	0.000
S1.005	SS6	30 Summer	30	+0%	2/15 Summer				81.613	0.498	0.000
S1.006	SS7	30 Summer	30	+0%					80.839	-0.220	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SS1	0.82			55.0	OK	3
S1.001	SS2	0.95			60.3	OK	
S2.000	SS8	0.51			160.7	OK	
S1.002	SS3	0.98			190.4	OK	
S3.000	SPP	0.09		55	11.8	FLOOD RISK	
S3.001	SSH2	0.10			11.1	FLOOD RISK	
S4.000	SSH6	0.61			31.0	OK	
S3.002	SSH3	0.77			68.9	OK	
S3.003	SSH4	0.46			75.5	OK	
S5.000	SSH7	0.70			49.3	OK	
S6.000	SSH13	0.15			4.8	OK	
S5.001	SSH8	0.94			59.1	OK	
S3.004	SSH5	0.40			73.6	OK	
S3.005	SS9	0.15			66.4	OK	
S3.006	SS10	0.15			66.3	OK	
S1.003	SS4	0.31			74.7	OK	
S7.000	SS11	0.53			21.2	OK	
S1.004	SS5	0.25			105.7	OK	
S8.000	SS12	0.05			17.0	OK	
S8.001	SS13	0.35			125.7	OK	
S8.002	SS14	0.22			77.6	SURCHARGED	
S9.000	SS16	0.59			58.2	OK	1
S9.001	SS17	0.85			54.0	SURCHARGED	
S8.003	SS15	0.25			83.6	SURCHARGED	
S1.005	SS6	0.81			86.6	SURCHARGED	
S1.006	SS7	0.36			86.6	OK	

STATUS A3 - AUTHORISED (MSC) - no Comments

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model		FEH	Data Type Point
FEH Rainfall Version		2013	Cv (Summer) 1.000
Site Location	GB 301616 515503 NY 01616 15503		Cv (Winter) 1.000

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 50

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)
S1.000	SS1	30 Summer	100	+50%	100/15 Summer	100/15 Summer			83.153	0.903	3.412
S1.001	SS2	15 Summer	100	+50%	100/15 Summer				82.922	0.974	0.000
S2.000	SS8	30 Summer	100	+50%	100/15 Summer				82.985	0.435	0.000
S1.002	SS3	120 Summer	100	+50%	100/15 Summer				82.558	0.830	0.000
S3.000	SPP	120 Winter	100	+50%	100/60 Summer				83.162	0.037	0.000
S3.001	SSH2	120 Winter	100	+50%	2/15 Summer				83.189	0.789	0.000
S4.000	SSH6	15 Summer	100	+50%	100/15 Summer				82.766	0.341	0.000
S3.002	SSH3	120 Summer	100	+50%	100/15 Summer				82.686	0.501	0.000
S3.003	SSH4	120 Summer	100	+50%	100/15 Summer				82.647	0.687	0.000
S5.000	SSH7	120 Summer	100	+50%	100/15 Summer				82.660	0.565	0.000
S6.000	SSH13	120 Summer	100	+50%	100/60 Summer				82.652	0.102	0.000
S5.001	SSH8	120 Summer	100	+50%	100/15 Summer				82.648	0.767	0.000
S3.004	SSH5	120 Summer	100	+50%	100/15 Summer				82.637	0.856	0.000
S3.005	SS9	120 Summer	100	+50%	100/15 Summer				82.556	0.755	0.000
S3.006	SS10	120 Summer	100	+50%	100/15 Summer				82.552	0.851	0.000
S1.003	SS4	120 Summer	100	+50%	100/15 Summer				82.550	0.899	0.000
S7.000	SS11	15 Summer	100	+50%	100/15 Summer				82.560	0.570	0.000
S1.004	SS5	120 Summer	100	+50%	100/15 Summer				82.547	0.920	0.000
S8.000	SS12	15 Summer	100	+50%	100/15 Summer				82.848	0.732	0.000
S8.001	SS13	15 Summer	100	+50%	100/15 Summer				82.835	0.887	0.000
S8.002	SS14	15 Summer	100	+50%	30/30 Summer				82.727	1.032	0.000
S9.000	SS16	30 Summer	100	+50%	100/15 Summer	100/30 Summer			83.200	1.050	0.064
S9.001	SS17	15 Summer	100	+50%	30/15 Summer				82.764	1.174	0.000
S8.003	SS15	15 Summer	100	+50%	30/15 Summer				82.630	1.105	0.000
S1.005	SS6	15 Summer	100	+50%	2/15 Summer				82.578	1.463	0.000
S1.006	SS7	120 Summer	100	+50%					80.839	-0.220	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SS1	1.32			88.9	FLOOD	3
S1.001	SS2	1.49			94.3	FLOOD RISK	
S2.000	SS8	0.90			283.1	SURCHARGED	
S1.002	SS3	0.97			188.8	SURCHARGED	
S3.000	SPP	0.09		98	11.9	FLOOD RISK	
S3.001	SSH2	0.10			11.5	FLOOD RISK	
S4.000	SSH6	1.17			60.1	SURCHARGED	
S3.002	SSH3	0.78			70.1	SURCHARGED	
S3.003	SSH4	0.43			71.1	SURCHARGED	
S5.000	SSH7	0.68			47.6	SURCHARGED	
S6.000	SSH13	0.14			4.6	SURCHARGED	
S5.001	SSH8	0.86			54.1	SURCHARGED	
S3.004	SSH5	0.61			113.6	SURCHARGED	
S3.005	SS9	0.24			109.3	SURCHARGED	
S3.006	SS10	0.15			67.8	SURCHARGED	
S1.003	SS4	0.31			75.8	SURCHARGED	
S7.000	SS11	0.97			38.5	SURCHARGED	
S1.004	SS5	0.18			76.7	SURCHARGED	
S8.000	SS12	0.09			32.5	FLOOD RISK	
S8.001	SS13	0.61			219.0	SURCHARGED	
S8.002	SS14	0.52			180.3	SURCHARGED	
S9.000	SS16	0.98			96.5	FLOOD	1
S9.001	SS17	1.44			91.9	SURCHARGED	
S8.003	SS15	0.92			301.9	SURCHARGED	
S1.005	SS6	0.81			86.6	SURCHARGED	
S1.006	SS7	0.36			86.6	OK	

STATUS A3 - AUTHORISED (MSC) - no Comments