Land to the west of New Barn Lane, North Bersted West Sussex

Foul & Surface Water Statement

KTG/18:0047B/5529
Rev F 16th August 2019

1.1 Linden Homes is seeking planning permission for the development of 37,200m² (3.72ha) of greenfield land located at New Barn Lane, North Bersted, Bognor Regis. The site is centred on National Grid Reference SU 91570 01054.

1.2 MJA Consulting has been appointed to prepare a suitable strategy for the disposal of surface and foul water from the proposed development incorporating the principles of Sustainable Drainage Systems (SuDS) and in accordance with Environment Agency guidance, The Building Regulations (Document H 2002) and The National Planning Policy Framework (NPPF).

Surface Water

2.1 The National Planning Policy Framework (NPPF) requires that developments do not exacerbate flood risks both to the development site and to offsite parties and land, which means there is a need to manage surface water to ensure there are no increases in peak rates and volumes of runoff as a result of the development.

2.2 Environment Agency guidance and government legislation such as the Flood and Water Management Act (Defra 2010) requires surface water drainage strategies for new developments to be in accordance with the ideals of 'sustainable development' via the provision of Sustainable Drainage Systems (SuDS).

2.3 The Building Regulations Document H (2015) and The SuDS Manual CIRIA 753 (2015) details the appropriate hierarchy of potential methods for disposing of surface water from a development:

1. A soakaway or some other adequate infiltration system, or where that is not practicable;
2. A watercourse, or where that is not practicable;
3. A sewer.

2.4 Information published by the British Geological Society (BGS) indicates that the site is anticipated to be directly underlain by the River Terrace Deposits (sand, silt and clays) overlying the Lewis Nodular Chalk Formation (chalk).

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2.5 Onsite soakage tests using the BRE Digest 365 methodology showed the minimum infiltration rate to be 1 x 10^{-6}m/s. This is a very poor rate and therefore infiltration SuDs are deemed unsuitable to manage the storm water run-off from the proposed onsite development.

2.6 It is proposed that surface water runoff from roofs, driveways and roads will be collected by a conventional system of guttering, downpipes and drains where it will be discharged via a surface water pipe network to either an attenuation basin/swale or attenuation tank.

2.7 Surface water flows will be attenuated on site with a restricted discharge rate of circa 13 l/s to match the existing greenfield rate. There will be two discharge points taking surface water offsite: The attenuation tank to the north will discharge at 3 l/s to an existing watercourse; and the attenuation tank to the south will discharge to a Southern Water existing sewer in New Barn Lane at 10 l/s. The storm water attenuated in the tank to the south will first pass through an attenuation basin/swale which will discharge water to the attenuation tank at 2 l/s.

2.8 All SUDS are sized to manage the 1 in 100year (1% AEP) storm event, plus an extra allowance of 40% for the predicted potential increase in peak rainfall up to 2115.

2.9 The proposed surface water drainage strategy offers a sustainable, safe and robust system which will afford complete flood risk protection to the new property and to existing properties and land within adjacent to the site. This is achieved by attenuating all additional runoff from impermeable surfaces, incorporating the principles of a Sustainable Drainage System (SuDS). This strategy ensures that the peak rate and volume of surface water runoff will be no greater than the existing runoff rate for the site for all rainfall events up to the 100 year +40% rainfall event.

2.10 The procedure for surface water management in accordance within 'Rainfall runoff management for developments' (DEFRA/EA Report – SC030219 E, 2013) states;
For the range of annual flow rate probabilities up to and including the 1% (1 in 100 year) annual exceedance probability event including an appropriate allowance for climate change, the post-developed rate and volume of run-off into a watercourse, sewer, or other receiving water body, should be no greater than the existing pre-developed rate of run-off for the same event.

2.11 The development's storm water network will remain private onsite. Section SW26 to existing manhole 8051 will be adopted by Southern Water under a Section 104 agreement of the Water Industry Act 1991, as confirmed by Southern Water.

2.12 The length of storm sewer from manhole 7954 to 7952 and its connection to the existing network will be diverted to manhole 8051 as agreed under a Section 185 of the Water Industry Act 1991 by Southern Water.

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Foul Water

3.1 The foul water discharge from the development will drain via gravity to an existing public sewer system located beyond the east of the site boundary, within New Barn Lane. Within the site boundary there is a pumping station which will serve a number of the properties in order to connect to the foul drainage network.

3.2 The development's foul water network will remain private onsite. Section F4-F1 will be adopted by Southern Water under a Section 104 agreement of the Water Industry Act 1991.

3.3 Southern Water have confirmed a suitable point of connection within their network under a Section 106 agreement. However, it's been highlighted that some network reinforcement will be required. This will ensure that the proposed development has a 'no detriment' impact on the foul sewer system within the village of North Bersted and does not create a flood risk.

3.4 Since the introduction of the updated Water Authority infrastructure charging requirements for new connections; the way in which foul network reinforcement is provided and paid for has changed. Any upgrades within the public foul water network will be undertaken directly by Southern Water, with the upgrading work will include re-assessing the existing network, undertaking designs and construction works.

3.5 Liaison with Southern Water has been undertaken to ensure the projected site build program is in line with the upgrading work to prevent negatively impacting the developments upstream and downstream of the intended foul water connection point.

3.6 The predicted peak foul sewer discharge from the proposed properties to the existing foul sewer based on the Sewers for Adoption 7th figure (4000 l/dwelling/day) will be 4.6 l/s.

Statement prepared by

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FOR MJA CONSULTING

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Appendix A
Surface Water Attenuation Calculations

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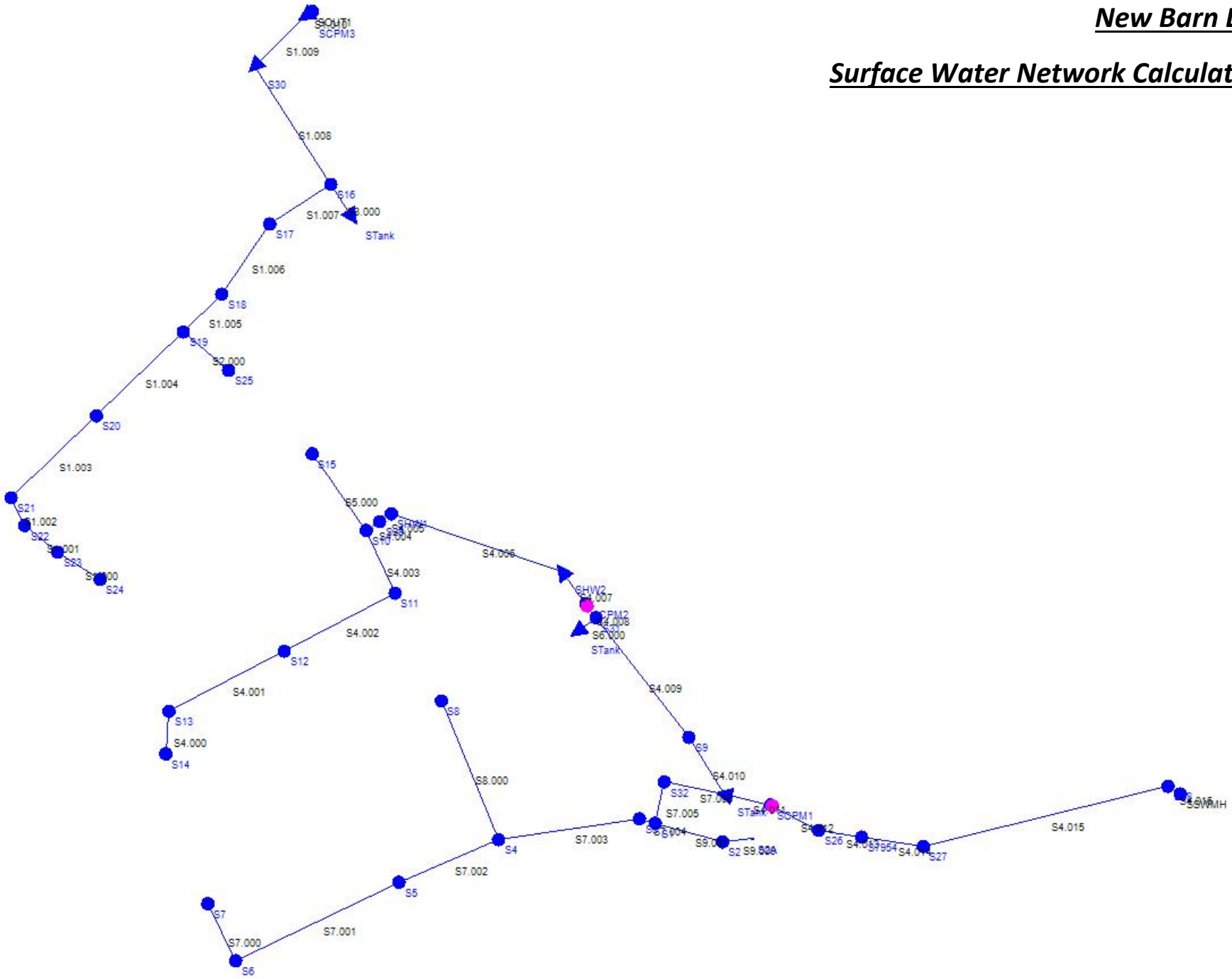
New Barn Lane

Surface Water Network Calculations



Time Area Diagram for Storm at outfall SOUT1 (pipe S1.010)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.226	4-8	0.379	8-12	0.009

Total Area Contributing (ha) = 0.614

Total Pipe Volume (m³) = 27.759

Time Area Diagram at outfall SSWMH (pipe S4.016)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.154	4-8	0.878	8-12	0.133

Total Area Contributing (ha) = 1.165

Total Pipe Volume (m³) = 61.008

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Existing Network Details 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
S1.000	14.272	0.098	145.6	0.056	5.00	0.0	0.600	o	225	Pipe/Conduit
S1.001	11.982	0.070	171.2	0.009	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.002	8.715	0.051	170.9	0.034	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.003	33.571	0.134	250.5	0.032	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.004	34.121	0.136	250.9	0.116	0.00	0.0	0.600	o	300	Pipe/Conduit
S2.000	16.790	0.101	166.2	0.109	5.00	0.0	0.600	o	225	Pipe/Conduit
S1.005	15.204	0.051	298.1	0.080	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.006	24.037	0.080	300.5	0.056	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.007	20.564	0.069	298.0	0.071	0.00	0.0	0.600	o	375	Pipe/Conduit
S3.000	11.124	0.160	69.5	0.051	5.00	0.0	0.600	[]	1	Pipe/Conduit
S1.008	39.685	0.090	440.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.009	20.096	0.055	365.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.010	2.455	0.025	98.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S4.000	12.033	0.070	171.9	0.052	5.00	0.0	0.600	o	225	Pipe/Conduit
S4.001	36.708	0.146	251.4	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.002	35.335	0.142	248.8	0.111	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.003	19.513	0.078	250.2	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	3.659	0.056	0.0	1.08	43.0
S1.001	3.561	0.065	0.0	1.00	39.6
S1.002	3.491	0.099	0.0	1.00	39.7
S1.003	3.365	0.131	0.0	0.99	69.9
S1.004	3.231	0.247	0.0	0.99	69.8
S2.000	3.271	0.109	0.0	1.01	40.2
S1.005	3.020	0.436	0.0	1.04	115.3
S1.006	2.969	0.492	0.0	1.04	114.9
S1.007	2.889	0.563	0.0	1.04	115.3
S3.000	2.980	0.051	0.0	3.59	2470.8
S1.008	2.820	0.614	0.0	0.86	94.6
S1.009	2.730	0.614	0.0	0.94	104.0
S1.010	2.625	0.614	0.0	1.01	17.9
S4.000	4.250	0.052	0.0	0.99	39.5
S4.001	4.105	0.076	0.0	0.99	69.8
S4.002	3.959	0.187	0.0	0.99	70.1
S4.003	3.817	0.246	0.0	0.99	69.9

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Existing Network Details 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
S5.000	26.630	0.156	170.7	0.024	5.00	0.0	0.600	o	225	Pipe/Conduit
S4.004	4.522	0.016	282.6	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.005	3.972	0.016	248.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.006	50.847	0.160	317.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.007	11.458	0.060	191.0	0.116	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.008	4.843	0.063	76.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S6.000	6.651	0.036	184.8	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit
S4.009	42.716	0.590	72.4	0.046	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.010	18.888	0.180	104.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S7.000	17.925	0.105	170.7	0.063	5.00	0.0	0.600	o	225	Pipe/Conduit
S7.001	51.183	0.204	250.9	0.096	0.00	0.0	0.600	o	300	Pipe/Conduit
S7.002	30.537	0.118	258.8	0.089	0.00	0.0	0.600	o	300	Pipe/Conduit
S8.000	42.349	0.250	169.4	0.088	5.00	0.0	0.600	o	225	Pipe/Conduit
S7.003	40.263	0.161	250.1	0.154	0.00	0.0	0.600	o	300	Pipe/Conduit
S7.004	4.642	0.027	171.9	0.134	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S5.000	3.970	0.024	0.0	1.00	39.7
S4.004	3.739	0.329	0.0	0.93	65.8
S4.005	3.723	0.329	0.0	0.99	70.2
S4.006	3.707	0.329	0.0	0.88	62.0
S4.007	3.547	0.445	0.0	1.13	80.2
S4.008	3.437	0.445	0.0	1.80	126.9
S6.000	3.410	0.000	0.0	1.15	81.5
S4.009	3.740	0.491	0.0	1.85	130.8
S4.010	3.150	0.491	0.0	1.53	108.5
S7.000	4.018	0.063	0.0	1.00	39.7
S7.001	3.838	0.159	0.0	0.99	69.8
S7.002	3.634	0.248	0.0	0.97	68.8
S8.000	3.841	0.088	0.0	1.00	39.8
S7.003	3.516	0.490	0.0	0.99	70.0
S7.004	3.355	0.624	0.0	1.20	84.5

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Existing Network Details 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
S9.000	8.367	0.052	160.9	0.014	5.00	0.0	0.600	o	225	Pipe/Conduit
S9.001	19.737	0.103	191.6	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit
S7.005	11.934	0.222	53.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S7.006	17.171	0.136	126.3	0.000	0.00	0.0	0.600	[]	1	Pipe/Conduit
S4.011	13.545	0.042	322.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.012	15.360	0.082	187.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.013	12.303	0.056	219.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.014	17.628	0.050	352.6	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
S4.015	71.169	0.180	395.4	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
S4.016	4.107	0.010	410.7	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S9.000	3.558	0.014	0.0	1.03	40.9
S9.001	3.506	0.050	0.0	0.94	37.4
S7.005	3.328	0.674	0.0	2.15	151.9
S7.006	3.106	0.674	0.0	2.66	1831.2
S4.011	2.970	1.165	0.0	0.87	61.5
S4.012	2.878	1.165	0.0	1.15	81.0
S4.013	2.796	1.165	0.0	1.06	74.7
S4.014	2.590	1.165	0.0	1.08	171.3
S4.015	2.540	1.165	0.0	1.02	161.6
S4.016	2.360	1.165	0.0	1.00	158.6

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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)
S1.000	o	225	S24	5.205	3.659	1.321	Open Manhole	1200
S1.001	o	225	S23	5.056	3.561	1.270	Open Manhole	1200
S1.002	o	225	S22	4.989	3.491	1.273	Open Manhole	1200
S1.003	o	300	S21	4.864	3.365	1.199	Open Manhole	1200
S1.004	o	300	S20	4.722	3.231	1.191	Open Manhole	1200
S2.000	o	225	S25	4.641	3.271	1.145	Open Manhole	1200
S1.005	o	375	S19	4.489	3.020	1.094	Open Manhole	1200
S1.006	o	375	S18	4.389	2.969	1.045	Open Manhole	1200
S1.007	o	375	S17	4.382	2.889	1.118	Open Manhole	1200
S3.000	[]	1	STank	4.500	2.980	0.920	Open Manhole	1
S1.008	o	375	S16	4.600	2.820	1.405	Open Manhole	1200
S1.009	o	375	S30	4.600	2.730	1.495	Open Manhole	1200
S1.010	o	150	SCPM3	4.600	2.625	1.825	Open Manhole	1200
S4.000	o	225	S14	5.393	4.250	0.918	Open Manhole	1200
S4.001	o	300	S13	5.410	4.105	1.005	Open Manhole	1200
S4.002	o	300	S12	5.160	3.959	0.901	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)
S1.000	14.272	145.6	S23	5.056	3.561	1.270	Open Manhole	1200
S1.001	11.982	171.2	S22	4.989	3.491	1.273	Open Manhole	1200
S1.002	8.715	170.9	S21	4.864	3.440	1.199	Open Manhole	1200
S1.003	33.571	250.5	S20	4.722	3.231	1.191	Open Manhole	1200
S1.004	34.121	250.9	S19	4.489	3.095	1.094	Open Manhole	1200
S2.000	16.790	166.2	S19	4.489	3.170	1.094	Open Manhole	1200
S1.005	15.204	298.1	S18	4.389	2.969	1.045	Open Manhole	1200
S1.006	24.037	300.5	S17	4.382	2.889	1.118	Open Manhole	1200
S1.007	20.564	298.0	S16	4.600	2.820	1.405	Open Manhole	1200
S3.000	11.124	69.5	S16	4.600	2.820	1.180	Open Manhole	1200
S1.008	39.685	440.9	S30	4.600	2.730	1.495	Open Manhole	1200
S1.009	20.096	365.4	SCPM3	4.600	2.675	1.550	Open Manhole	1200
S1.010	2.455	98.2	SOUT1	4.000	2.600	1.250	Open Manhole	600
S4.000	12.033	171.9	S13	5.410	4.180	1.005	Open Manhole	1200
S4.001	36.708	251.4	S12	5.160	3.959	0.901	Open Manhole	1200
S4.002	35.335	248.8	S11	5.323	3.817	1.206	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)
S4.003	o	300	S11	5.323	3.817	1.206	Open Manhole	1200
S5.000	o	225	S15	4.950	3.970	0.755	Open Manhole	1200
S4.004	o	300	S10	5.216	3.739	1.177	Open Manhole	1200
S4.005	o	300	S29	5.300	3.723	1.277	Open Manhole	1200
S4.006	o	300	SHW1	5.000	3.707	0.993	Open Manhole	600
S4.007	o	300	SHW2	4.840	3.547	0.993	Open Manhole	600
S4.008	o	300	SCPM2	5.150	3.437	1.413	Open Manhole	1250
S6.000	o	300	STank	5.150	3.410	1.440	Open Manhole	1
S4.009	o	300	S31	5.100	3.740	1.060	Open Manhole	1200
S4.010	o	300	S9	5.050	3.150	1.600	Open Manhole	1200
S7.000	o	225	S7	5.150	4.018	0.907	Open Manhole	1200
S7.001	o	300	S6	5.039	3.838	0.901	Open Manhole	1200
S7.002	o	300	S5	4.883	3.634	0.949	Open Manhole	1200
S8.000	o	225	S8	5.150	3.841	1.084	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)
S4.003	19.513	250.2	S10	5.216	3.739	1.177	Open Manhole	1200
S5.000	26.630	170.7	S10	5.216	3.814	1.177	Open Manhole	1200
S4.004	4.522	282.6	S29	5.300	3.723	1.277	Open Manhole	1200
S4.005	3.972	248.3	SHW1	5.000	3.707	0.993	Open Manhole	600
S4.006	50.847	317.8	SHW2	4.840	3.547	0.993	Open Manhole	600
S4.007	11.458	191.0	SCPM2	5.150	3.487	1.363	Open Manhole	1250
S4.008	4.843	76.9	S31	5.100	3.374	1.426	Open Manhole	1200
S6.000	6.651	184.8	S31	5.100	3.374	1.426	Open Manhole	1200
S4.009	42.716	72.4	S9	5.050	3.150	1.600	Open Manhole	1200
S4.010	18.888	104.9	STank	4.900	2.970	1.630	Open Manhole	1200
S7.000	17.925	170.7	S6	5.039	3.913	0.901	Open Manhole	1200
S7.001	51.183	250.9	S5	4.883	3.634	0.949	Open Manhole	1200
S7.002	30.537	258.8	S4	4.781	3.516	0.965	Open Manhole	1200
S8.000	42.349	169.4	S4	4.781	3.591	0.965	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)
S7.003	o	300	S4	4.781	3.516	0.965	Open Manhole	1200
S7.004	o	300	S3	4.848	3.355	1.193	Open Manhole	1200
S9.000	o	225	S2A	4.546	3.558	0.763	Open Manhole	975 x 675
S9.001	o	225	S2	4.640	3.506	0.909	Open Manhole	1200
S7.005	o	300	S1	4.934	3.328	1.306	Open Manhole	1200
S7.006	[]	1	S32	4.950	3.106	1.244	Open Manhole	1200
S4.011	o	300	STank	4.900	2.970	1.630	Open Manhole	1200
S4.012	o	300	SCPM1	4.700	2.878	1.522	Open Manhole	1200
S4.013	o	300	S26	4.229	2.796	1.133	Open Manhole	1500
S4.014	o	450	S7954	4.250	2.590	1.210	Open Manhole	1200
S4.015	o	450	S27	4.210	2.540	1.220	Open Manhole	1500
S4.016	o	450	S28	3.850	2.360	1.040	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S7.003	40.263	250.1	S3	4.848	3.355	1.193	Open Manhole	1200
S7.004	4.642	171.9	S1	4.934	3.328	1.306	Open Manhole	1200
S9.000	8.367	160.9	S2	4.640	3.506	0.909	Open Manhole	1200
S9.001	19.737	191.6	S1	4.934	3.403	1.306	Open Manhole	1200
S7.005	11.934	53.8	S32	4.950	3.106	1.544	Open Manhole	1200
S7.006	17.171	126.3	STank	4.900	2.970	1.330	Open Manhole	1200
S4.011	13.545	322.5	SCPM1	4.700	2.928	1.472	Open Manhole	1200
S4.012	15.360	187.3	S26	4.229	2.796	1.133	Open Manhole	1500
S4.013	12.303	219.7	S7954	4.250	2.740	1.210	Open Manhole	1200
S4.014	17.628	352.6	S27	4.210	2.540	1.220	Open Manhole	1500
S4.015	71.169	395.4	S28	3.850	2.360	1.040	Open Manhole	1500
S4.016	4.107	410.7	SSWMH	3.730	2.350	0.930	Open Manhole	1200

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)
S1.010	SOUT1	4.000	2.600	0.000	600	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)
S4.016	SSWMH	3.730	2.350	0.000	1200	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	10.000
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 Storage Structures	6
Number of Online Controls	3	Number of Time/Area Diagrams	10
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SCPM3, DS/PN: S1.010, Volume (m³): 4.3

Unit Reference	MD-SHE-0080-3000-1155-3000
Design Head (m)	1.155
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	80
Invert Level (m)	2.625
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.155	3.0
Flush-Flo™	0.354	3.0
Kick-Flo®	0.717	2.4
Mean Flow over Head Range	-	2.6

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)
0.100	2.3	1.200	3.1	3.000	4.7	7.000	6.9
0.200	2.8	1.400	3.3	3.500	5.0	7.500	7.2
0.300	3.0	1.600	3.5	4.000	5.3	8.000	7.4
0.400	3.0	1.800	3.7	4.500	5.6	8.500	7.6
0.500	2.9	2.000	3.9	5.000	5.9	9.000	7.8
0.600	2.8	2.200	4.0	5.500	6.2	9.500	8.0
0.800	2.5	2.400	4.2	6.000	6.5		
1.000	2.8	2.600	4.4	6.500	6.7		

Hydro-Brake® Optimum Manhole: SCPM2, DS/PN: S4.008, Volume (m³): 2.8

Unit Reference	MD-SHE-0077-2000-0300-2000
Design Head (m)	0.300
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	77
Invert Level (m)	3.487
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: SCPM2, DS/PN: S4.008, Volume (m³): 2.8

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.300	2.0
Flush-Flo™	0.113	2.0
Kick-Flo®	0.228	1.8
Mean Flow over Head Range	-	1.6

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)
0.100	2.0	1.200	3.8	3.000	5.8	7.000	8.8
0.200	1.9	1.400	4.1	3.500	6.2	7.500	9.1
0.300	2.0	1.600	4.3	4.000	6.7	8.000	9.4
0.400	2.3	1.800	4.6	4.500	7.1	8.500	9.7
0.500	2.5	2.000	4.8	5.000	7.4	9.000	10.0
0.600	2.7	2.200	5.0	5.500	7.8	9.500	10.3
0.800	3.1	2.400	5.2	6.000	8.2		
1.000	3.5	2.600	5.4	6.500	8.5		

Hydro-Brake® Optimum Manhole: SCPM1, DS/PN: S4.012, Volume (m³): 2.9

Unit Reference	MD-SHE-0142-1000-1270-1000
Design Head (m)	1.270
Design Flow (l/s)	10.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	142
Invert Level (m)	2.878
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.270	10.0
Flush-Flo™	0.372	10.0
Kick-Flo®	0.810	8.1
Mean Flow over Head Range	-	8.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.1	0.300	9.9	0.500	9.8	0.800	8.2
0.200	9.4	0.400	10.0	0.600	9.6	1.000	8.9

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Hydro-Brake® Optimum Manhole: SCPM1, DS/PN: S4.012, Volume (m³): 2.9

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.200	9.7	2.400	13.5	5.000	19.2	8.000	24.0
1.400	10.5	2.600	14.0	5.500	20.1	8.500	24.7
1.600	11.1	3.000	15.0	6.000	20.9	9.000	25.4
1.800	11.8	3.500	16.2	6.500	21.7	9.500	26.1
2.000	12.4	4.000	17.2	7.000	22.5		
2.200	13.0	4.500	18.2	7.500	23.3		

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Storage Structures for Storm

Cellular Storage Manhole: STank, DS/PN: S3.000

Invert Level (m) 2.830 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	318.0	318.0	0.801	0.0	384.9
0.800	318.0	384.9			

Cellular Storage Manhole: S30, DS/PN: S1.009

Invert Level (m) 2.730 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	72.0	72.0	0.801	0.0	99.5
0.800	72.0	99.5			

Cellular Storage Manhole: SCPM3, DS/PN: S1.010

Invert Level (m) 2.625 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	84.0	84.0	0.801	0.0	116.0
0.800	84.0	116.0			

Tank or Pond Manhole: SHW2, DS/PN: S4.007

Invert Level (m) 3.547

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	16.0	0.500	424.0	1.000	674.0	1.500	938.0
0.100	18.0	0.600	473.0	1.100	726.0	1.600	992.0
0.200	20.0	0.700	523.0	1.200	778.0	1.700	1048.0
0.300	22.0	0.800	572.0	1.300	830.0	1.800	1103.0
0.400	376.0	0.900	623.0	1.400	884.0	1.900	1159.0

Cellular Storage Manhole: STank, DS/PN: S6.000

Invert Level (m) 3.410 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

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Cellular Storage Manhole: STank, DS/PN: S6.000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	98.0	98.0	0.801	0.0	131.6
0.800	98.0	131.6			

Cellular Storage Manhole: STank, DS/PN: S4.011

Invert Level (m) 2.970 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	360.0	360.0	0.801	0.0	433.6
0.800	360.0	433.6			

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1 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 10.000
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 Storage Structures 6
Number of Online Controls 3 Number of Time/Area Diagrams 10
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.350
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S24	30 Winter	1	+0%	100/960 Winter			
S1.001	S23	30 Winter	1	+0%	100/600 Winter			
S1.002	S22	15 Winter	1	+0%	100/600 Winter			
S1.003	S21	15 Winter	1	+0%	100/480 Winter			
S1.004	S20	30 Winter	1	+0%	100/120 Summer			
S2.000	S25	60 Winter	1	+0%	100/60 Winter			
S1.005	S19	30 Winter	1	+0%	100/15 Winter			
S1.006	S18	30 Winter	1	+0%	100/30 Winter			
S1.007	S17	30 Winter	1	+0%	100/60 Summer			
S3.000	STank	4320 Winter	1	+0%	100/360 Winter			
S1.008	S16	240 Winter	1	+0%	100/60 Summer			
S1.009	S30	240 Winter	1	+0%	30/120 Winter			
S1.010	SCPM3	240 Winter	1	+0%	1/15 Summer			
S4.000	S14	15 Winter	1	+0%	100/15 Summer			
S4.001	S13	15 Winter	1	+0%	100/15 Summer			
S4.002	S12	15 Winter	1	+0%	100/15 Summer			
S4.003	S11	240 Winter	1	+0%	30/15 Winter			
S5.000	S15	15 Winter	1	+0%	100/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S24	3.701	-0.183	0.000	0.08		3.0	OK	
S1.001	S23	3.609	-0.177	0.000	0.10		3.4	OK	
S1.002	S22	3.559	-0.157	0.000	0.20		6.3	OK	
S1.003	S21	3.442	-0.223	0.000	0.15		9.5	OK	
S1.004	S20	3.317	-0.214	0.000	0.18		11.6	OK	
S2.000	S25	3.320	-0.176	0.000	0.11		3.8	OK	
S1.005	S19	3.133	-0.262	0.000	0.19		17.2	OK	
S1.006	S18	3.089	-0.255	0.000	0.21		20.5	OK	
S1.007	S17	3.020	-0.244	0.000	0.26		25.0	OK	
S3.000	STank	2.897	-0.683	0.000	0.00		0.0	OK	
S1.008	S16	3.003	-0.192	0.000	0.16		14.1	OK	
S1.009	S30	3.001	-0.104	0.000	0.11		9.6	OK	
S1.010	SCPM3	2.999	0.224	0.000	0.27		3.0	SURCHARGED	
S4.000	S14	4.317	-0.158	0.000	0.19		6.5	OK	
S4.001	S13	4.179	-0.226	0.000	0.14		8.8	OK	
S4.002	S12	4.036	-0.223	0.000	0.15		9.4	OK	
S4.003	S11	3.980	-0.137	0.000	0.08		5.2	OK	
S5.000	S15	4.013	-0.182	0.000	0.08		3.0	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S4.004	S10	240 Winter	1	+0%	30/15 Summer				3.978
S4.005	S29	240 Winter	1	+0%	30/15 Summer				3.978
S4.006	SHW1	360 Winter	1	+0%	30/15 Summer				3.977
S4.007	SHW2	360 Winter	1	+0%	1/15 Summer				3.975
S4.008	SCPM2	480 Summer	1	+0%	1/15 Summer				4.044
S6.000	STank	960 Winter	1	+0%	1/120 Summer				3.767
S4.009	S31	960 Winter	1	+0%	100/240 Winter				3.767
S4.010	S9	960 Winter	1	+0%	100/60 Summer				3.182
S7.000	S7	15 Winter	1	+0%					4.090
S7.001	S6	15 Winter	1	+0%	100/360 Winter				3.910
S7.002	S5	15 Winter	1	+0%	100/120 Winter				3.710
S8.000	S8	120 Winter	1	+0%	100/240 Winter				3.876
S7.003	S4	30 Winter	1	+0%	100/60 Winter				3.599
S7.004	S3	120 Winter	1	+0%	100/30 Winter				3.461
S9.000	S2A	15 Winter	1	+0%	100/120 Winter				3.593
S9.001	S2	15 Winter	1	+0%	100/120 Winter				3.567
S7.005	S1	30 Winter	1	+0%	100/60 Winter				3.402
S7.006	S32	30 Winter	1	+0%	100/120 Winter				3.122
S4.011	STank	180 Winter	1	+0%	30/120 Summer				3.092
S4.012	SCPM1	180 Winter	1	+0%	30/60 Summer				3.078
S4.013	S26	180 Winter	1	+0%					2.874
S4.014	S7954	180 Winter	1	+0%					2.668
S4.015	S27	180 Winter	1	+0%					2.612
S4.016	S28	180 Winter	1	+0%					2.444

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.004	S10	-0.061	0.000	0.15		6.9	OK	
S4.005	S29	-0.045	0.000	0.14		6.9	OK	
S4.006	SHW1	-0.030	0.000	0.10		5.7	OK	
S4.007	SHW2	0.128	0.000	0.07		4.0	SURCHARGED	
S4.008	SCPM2	0.307	0.000	0.03		2.0	SURCHARGED	
S6.000	STank	0.057	0.000	0.02		1.3	SURCHARGED	
S4.009	S31	-0.273	0.000	0.02		2.3	OK	
S4.010	S9	-0.268	0.000	0.02		2.3	OK	
S7.000	S7	-0.153	0.000	0.22		7.8	OK	
S7.001	S6	-0.228	0.000	0.13		8.3	OK	
S7.002	S5	-0.224	0.000	0.15		9.1	OK	
S8.000	S8	-0.190	0.000	0.06		2.3	OK	
S7.003	S4	-0.217	0.000	0.17		11.0	OK	
S7.004	S3	-0.194	0.000	0.27		14.8	OK	
S9.000	S2A	-0.190	0.000	0.05		1.7	OK	
S9.001	S2	-0.164	0.000	0.16		5.5	OK	
S7.005	S1	-0.226	0.000	0.14		16.4	OK	
S7.006	S32	-0.584	0.000	0.02		16.4	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.011	STank	-0.178	0.000	0.19		9.4	OK	
S4.012	SCPM1	-0.100	0.000	0.14		9.4	OK	
S4.013	S26	-0.222	0.000	0.15		9.4	OK	
S4.014	S7954	-0.372	0.000	0.07		9.4	OK	
S4.015	S27	-0.378	0.000	0.06		9.4	OK	
S4.016	S28	-0.366	0.000	0.08		9.4	OK	

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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 10.000
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 Storage Structures 6
Number of Online Controls 3 Number of Time/Area Diagrams 10
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.350
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S24	30 Winter	30	+0%	100/960 Winter				3.726
S1.001	S23	15 Winter	30	+0%	100/600 Winter				3.642
S1.002	S22	15 Winter	30	+0%	100/600 Winter				3.615
S1.003	S21	15 Winter	30	+0%	100/480 Winter				3.506
S1.004	S20	15 Winter	30	+0%	100/120 Summer				3.381
S2.000	S25	60 Winter	30	+0%	100/60 Winter				3.348
S1.005	S19	15 Winter	30	+0%	100/15 Winter				3.213
S1.006	S18	480 Winter	30	+0%	100/30 Winter				3.183
S1.007	S17	480 Winter	30	+0%	100/60 Summer				3.181
S3.000	STank	480 Winter	30	+0%	100/360 Winter				3.179
S1.008	S16	480 Winter	30	+0%	100/60 Summer				3.179
S1.009	S30	480 Winter	30	+0%	30/120 Winter				3.175
S1.010	SCPM3	480 Winter	30	+0%	1/15 Summer				3.173
S4.000	S14	15 Winter	30	+0%	100/15 Summer				4.360
S4.001	S13	15 Winter	30	+0%	100/15 Summer				4.231
S4.002	S12	30 Winter	30	+0%	100/15 Summer				4.186
S4.003	S11	480 Winter	30	+0%	30/15 Winter				4.169
S5.000	S15	480 Winter	30	+0%	100/15 Summer				4.168

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S24	-0.158	0.000	0.20		7.3	OK	
S1.001	S23	-0.144	0.000	0.23		7.7	OK	
S1.002	S22	-0.101	0.000	0.57		18.0	OK	
S1.003	S21	-0.159	0.000	0.43		27.8	OK	
S1.004	S20	-0.150	0.000	0.49		31.3	OK	
S2.000	S25	-0.148	0.000	0.26		9.3	OK	
S1.005	S19	-0.182	0.000	0.46		42.5	OK	
S1.006	S18	-0.161	0.000	0.19		18.3	OK	
S1.007	S17	-0.083	0.000	0.22		20.9	OK	
S3.000	STank	-0.401	0.000	0.00		2.5	OK	
S1.008	S16	-0.016	0.000	0.17		14.8	OK	
S1.009	S30	0.070	0.000	0.10		9.0	SURCHARGED	
S1.010	SCPM3	0.398	0.000	0.27		3.0	SURCHARGED	
S4.000	S14	-0.115	0.000	0.47		15.8	OK	
S4.001	S13	-0.174	0.000	0.36		23.1	OK	
S4.002	S12	-0.073	0.000	0.25		16.1	OK	
S4.003	S11	0.052	0.000	0.14		8.4	SURCHARGED	
S5.000	S15	-0.027	0.000	0.03		0.9	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S4.004	S10	480 Winter	30	+0%	30/15 Summer				4.168
S4.005	S29	480 Winter	30	+0%	30/15 Summer				4.167
S4.006	SHW1	480 Winter	30	+0%	30/15 Summer				4.166
S4.007	SHW2	480 Winter	30	+0%	1/15 Summer				4.164
S4.008	SCPM2	960 Winter	30	+0%	1/15 Summer				4.191
S6.000	STank	720 Summer	30	+0%	1/120 Summer				3.774
S4.009	S31	720 Summer	30	+0%	100/240 Winter				3.774
S4.010	S9	360 Winter	30	+0%	100/60 Summer				3.392
S7.000	S7	15 Winter	30	+0%					4.137
S7.001	S6	15 Winter	30	+0%	100/360 Winter				3.956
S7.002	S5	15 Winter	30	+0%	100/120 Winter				3.759
S8.000	S8	120 Winter	30	+0%	100/240 Winter				3.897
S7.003	S4	30 Winter	30	+0%	100/60 Winter				3.651
S7.004	S3	120 Winter	30	+0%	100/30 Winter				3.529
S9.000	S2A	15 Winter	30	+0%	100/120 Winter				3.627
S9.001	S2	15 Winter	30	+0%	100/120 Winter				3.615
S7.005	S1	30 Winter	30	+0%	100/60 Winter				3.447
S7.006	S32	360 Winter	30	+0%	100/120 Winter				3.390
S4.011	STank	360 Winter	30	+0%	30/120 Summer				3.390
S4.012	SCPM1	360 Winter	30	+0%	30/60 Summer				3.466
S4.013	S26	180 Winter	30	+0%					2.877
S4.014	S7954	240 Winter	30	+0%					2.671
S4.015	S27	960 Summer	30	+0%					2.615
S4.016	S28	960 Summer	30	+0%					2.447

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.004	S10	0.129	0.000	0.24		11.6	SURCHARGED	
S4.005	S29	0.144	0.000	0.24		11.5	SURCHARGED	
S4.006	SHW1	0.159	0.000	0.20		11.4	SURCHARGED	
S4.007	SHW2	0.317	0.000	0.07		4.1	SURCHARGED	
S4.008	SCPM2	0.454	0.000	0.04		2.2	SURCHARGED	
S6.000	STank	0.064	0.000	0.00		0.3	SURCHARGED	
S4.009	S31	-0.266	0.000	0.03		3.7	OK	
S4.010	S9	-0.058	0.000	0.03		2.9	OK	
S7.000	S7	-0.106	0.000	0.54		19.2	OK	
S7.001	S6	-0.182	0.000	0.31		20.7	OK	
S7.002	S5	-0.175	0.000	0.36		22.6	OK	
S8.000	S8	-0.169	0.000	0.14		5.3	OK	
S7.003	S4	-0.165	0.000	0.42		27.1	OK	
S7.004	S3	-0.126	0.000	0.63		34.8	OK	
S9.000	S2A	-0.156	0.000	0.13		4.3	OK	
S9.001	S2	-0.116	0.000	0.46		15.7	OK	
S7.005	S1	-0.181	0.000	0.33		39.2	OK	
S7.006	S32	-0.316	0.000	0.03		27.4	OK	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.011	STank	0.120	0.000	0.22		10.8	SURCHARGED	
S4.012	SCPM1	0.288	0.000	0.15		10.0	SURCHARGED	
S4.013	S26	-0.219	0.000	0.16		10.0	OK	
S4.014	S7954	-0.369	0.000	0.07		10.0	OK	
S4.015	S27	-0.375	0.000	0.07		10.0	OK	
S4.016	S28	-0.363	0.000	0.08		10.0	OK	

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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 10.000
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 Storage Structures 6
Number of Online Controls 3 Number of Time/Area Diagrams 10
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.350
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S24	960 Winter	100	+40%	100/960 Winter				3.894
S1.001	S23	960 Winter	100	+40%	100/600 Winter				3.893
S1.002	S22	960 Winter	100	+40%	100/600 Winter				3.893
S1.003	S21	960 Winter	100	+40%	100/480 Winter				3.892
S1.004	S20	960 Winter	100	+40%	100/120 Summer				3.891
S2.000	S25	960 Winter	100	+40%	100/60 Winter				3.891
S1.005	S19	960 Winter	100	+40%	100/15 Winter				3.890
S1.006	S18	960 Winter	100	+40%	100/30 Winter				3.889
S1.007	S17	960 Winter	100	+40%	100/60 Summer				3.887
S3.000	STank	720 Winter	100	+40%	100/360 Winter				3.962
S1.008	S16	720 Winter	100	+40%	100/60 Summer				3.918
S1.009	S30	960 Winter	100	+40%	30/120 Winter				4.082
S1.010	SCPM3	960 Winter	100	+40%	1/15 Summer				4.127
S4.000	S14	30 Winter	100	+40%	100/15 Summer				4.572
S4.001	S13	30 Winter	100	+40%	100/15 Summer				4.549
S4.002	S12	30 Winter	100	+40%	100/15 Summer				4.504
S4.003	S11	180 Winter	100	+40%	30/15 Winter				4.462
S5.000	S15	720 Winter	100	+40%	100/15 Summer				4.432

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S24	0.010	0.000	0.06		2.3	SURCHARGED	
S1.001	S23	0.107	0.000	0.08		2.7	SURCHARGED	
S1.002	S22	0.177	0.000	0.13		4.0	SURCHARGED	
S1.003	S21	0.227	0.000	0.08		5.4	SURCHARGED	
S1.004	S20	0.360	0.000	0.15		9.9	SURCHARGED	
S2.000	S25	0.395	0.000	0.33		11.8	SURCHARGED	
S1.005	S19	0.495	0.000	0.19		17.4	SURCHARGED	
S1.006	S18	0.545	0.000	0.20		19.6	SURCHARGED	
S1.007	S17	0.623	0.000	0.23		22.3	SURCHARGED	
S3.000	STank	0.382	0.000	0.04		41.5	SURCHARGED	
S1.008	S16	0.723	0.000	0.43		36.9	SURCHARGED	
S1.009	S30	0.977	0.000	0.21		18.5	SURCHARGED	
S1.010	SCPM3	1.352	0.000	0.29		3.1	SURCHARGED	
S4.000	S14	0.097	0.000	0.67		22.7	SURCHARGED	
S4.001	S13	0.144	0.000	0.45		28.7	SURCHARGED	
S4.002	S12	0.245	0.000	0.42		27.2	SURCHARGED	
S4.003	S11	0.345	0.000	0.37		22.5	SURCHARGED	
S5.000	S15	0.237	0.000	0.03		1.1	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S4.004	S10	720 Winter	100	+40%	30/15 Summer				4.432
S4.005	S29	720 Winter	100	+40%	30/15 Summer				4.432
S4.006	SHW1	720 Winter	100	+40%	30/15 Summer				4.431
S4.007	SHW2	720 Winter	100	+40%	1/15 Summer				4.428
S4.008	SCPM2	960 Winter	100	+40%	1/15 Summer				4.443
S6.000	STank	480 Winter	100	+40%	1/120 Summer				4.125
S4.009	S31	480 Winter	100	+40%	100/240 Winter				4.162
S4.010	S9	480 Winter	100	+40%	100/60 Summer				4.200
S7.000	S7	15 Winter	100	+40%					4.198
S7.001	S6	360 Winter	100	+40%	100/360 Winter				4.167
S7.002	S5	360 Winter	100	+40%	100/120 Winter				4.171
S8.000	S8	360 Winter	100	+40%	100/240 Winter				4.163
S7.003	S4	360 Winter	100	+40%	100/60 Winter				4.169
S7.004	S3	360 Winter	100	+40%	100/30 Winter				4.168
S9.000	S2A	480 Winter	100	+40%	100/120 Winter				4.150
S9.001	S2	480 Winter	100	+40%	100/120 Winter				4.148
S7.005	S1	360 Winter	100	+40%	100/60 Winter				4.168
S7.006	S32	480 Winter	100	+40%	100/120 Winter				4.201
S4.011	STank	480 Winter	100	+40%	30/120 Summer				4.204
S4.012	SCPM1	480 Winter	100	+40%	30/60 Summer				4.204
S4.013	S26	480 Winter	100	+40%					2.878
S4.014	S7954	480 Winter	100	+40%					2.671
S4.015	S27	480 Winter	100	+40%					2.615
S4.016	S28	480 Winter	100	+40%					2.447

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.004	S10	0.393	0.000	0.32		15.3	SURCHARGED	
S4.005	S29	0.409	0.000	0.31		15.3	SURCHARGED	
S4.006	SHW1	0.424	0.000	0.26		15.2	SURCHARGED	
S4.007	SHW2	0.581	0.000	0.07		4.1	SURCHARGED	
S4.008	SCPM2	0.706	0.000	0.04		2.8	SURCHARGED	
S6.000	STank	0.415	0.000	0.18		10.5	SURCHARGED	
S4.009	S31	0.122	0.000	0.07		8.3	SURCHARGED	
S4.010	S9	0.750	0.000	0.08		7.6	SURCHARGED	
S7.000	S7	-0.045	0.000	0.98		34.7	OK	
S7.001	S6	0.029	0.000	0.18		11.9	SURCHARGED	
S7.002	S5	0.237	0.000	0.30		18.6	SURCHARGED	
S8.000	S8	0.097	0.000	0.18		6.8	SURCHARGED	
S7.003	S4	0.353	0.000	0.55		35.7	SURCHARGED	
S7.004	S3	0.513	0.000	0.84		46.2	SURCHARGED	
S9.000	S2A	0.367	0.000	0.06		1.8	SURCHARGED	
S9.001	S2	0.417	0.000	0.10		3.5	SURCHARGED	
S7.005	S1	0.540	0.000	0.42		49.0	SURCHARGED	
S7.006	S32	0.495	0.000	0.04		41.3	SURCHARGED	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.011	STank	0.934	0.000	0.28		13.7	SURCHARGED	
S4.012	SCPM1	1.026	0.000	0.15		10.0	SURCHARGED	
S4.013	S26	-0.218	0.000	0.16		10.0	OK	
S4.014	S7954	-0.369	0.000	0.07		10.0	OK	
S4.015	S27	-0.375	0.000	0.07		10.0	OK	
S4.016	S28	-0.363	0.000	0.08		10.0	OK	

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