STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Parcel A

Pipe Sizes Standard Manhole Sizes Standard

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.200	Add Flow / Climate Change (%)	0
Ratio R	0.250	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	450

Designed with Level Soffits

Network Design Table for Parcel A

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	33.155	0.800	41.4	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	5.115	0.100	51.2	0.003	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	9.024	0.100	90.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	44.627	0.470	95.0	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	42.770	1.828	23.4	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	36.521	3.320	11.0	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	29.585	2.348	12.6	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	14.095	1.678	8.4	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	21.416	1.912	11.2	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	14.581	0.900	16.2	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.35	152.630	0.010	0.0	0.0	0.0	1.57	27.7	1.4
2.000	50.00	5.06	151.930	0.003	0.0	0.0	0.0	1.41	24.9	0.4
1.001	50.00	5.49	151.830	0.013	0.0	0.0	0.0	1.06	18.7	1.8
1.002	50.00	6.22	151.730	0.028	0.0	0.0	0.0	1.03	18.2	3.8
1.003	50.00	6.56	151.260	0.043	0.0	0.0	0.0	2.09	36.9	5.8
1.004	50.00	6.76	149.430	0.053	0.0	0.0	0.0	3.06	54.0	7.2
1.005	50.00	6.93	146.110	0.063	0.0	0.0	0.0	2.85	50.4	8.5
1.006	50.00	7.00	143.751	0.068	0.0	0.0	0.0	3.50	61.8	9.2
1.007	50.00	7.11	142.080	0.078	0.0	0.0	0.0	3.03	53.5	10.6
3.000	50.00	5.10	141.280	0.005	0.0	0.0	0.0	2.52	44.4	0.7

Network Design Table for Parcel A

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
3.001	10.867	0.220	49.3	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.000	10.000	0.080	125.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.008	10.906	0.086	126.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.009	11.149	0.074	150.7	0.000	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)
3.001	50.00	5.22	140.380	0.009	0.0	0.0	0.0	1.44	25.4	1.2
4.000	50.00	5.19	140.240	0.000	0.0	0.0	0.0	0.90	15.9	0.0
1.008	50.00	7.27	140.160	0.087	0.0	0.0	0.0	1.16	46.1	11.8
1.009	50.00	7.45	140.074	0.087	0.0	0.0	0.0	1.06	42.3	11.8

Trafford Wharf Road
Trafford Park
Manchester M17 1HH

Date 04/11/2020 15:42 | Designed by MOSSROOR.KHAN
File PARCEL A- RIMINGTON.MDX | Checked by
Micro Drainage | Network 2019.1

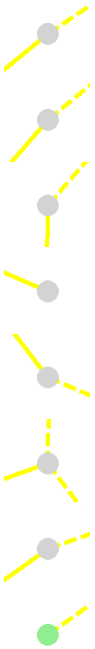
Manhole Schedules for Parcel A

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)
CP01	153.530	0.900	Open Manhole	500	1.000	152.630	150				
CP03	152.430	0.500	Open Manhole	500	2.000	151.930	150				
CP02	152.730	0.900	Open Manhole	500	1.001	151.830	150	1.000	151.830	150	
								2.000	151.830	150	
CP04	152.810	1.080	Open Manhole	500	1.002	151.730	150	1.001	151.730	150	
CP05	152.610	1.350	Open Manhole	500	1.003	151.260	150	1.002	151.260	150	
CP06	150.340	0.910	Open Manhole	500	1.004	149.430	150	1.003	149.432	150	2
CP07	147.010	0.900	Open Manhole	500	1.005	146.110	150	1.004	146.110	150	
CP08	144.951	1.200	Open Manhole	500	1.006	143.751	150	1.005	143.762	150	11
CP09	143.280	1.207	Open Manhole	500	1.007	142.080	150	1.006	142.073	150	
CP11	142.080	0.800	Open Manhole	500	3.000	141.280	150				
CP10	141.280	0.900	Open Manhole	500	3.001	140.380	150	3.000	140.380	150	
T1	142.080	1.840	Open Manhole	1200	4.000	140.240	150				
SW1	141.360	1.200	Open Manhole	1500	1.008	140.160	225	1.007	140.168	150	
								3.001	140.160	150	
								4.000	140.160	150	
SW2	141.420	1.346	Open Manhole	1500	1.009	140.074	225	1.008	140.074	225	
HW1	140.450	0.450	Open Manhole	0		OUTFALL		1.009	140.000	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
CP01	383448.326	447209.020			No Entry	
CP03	383445.103	447170.890			No Entry	
CP02	383445.350	447175.999			No Entry	
CP04	383437.081	447179.611			No Entry	
CP05	383399.964	447154.834			No Entry	
CP06	383364.370	447131.122			No Entry	

Manhole Schedules for Parcel A

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
CP07	383334.015	447110.813			No Entry	
CP08	383311.125	447092.071			No Entry	
CP09	383301.927	447081.390			No Entry	
CP11	383321.626	447045.584			No Entry	
CP10	383308.222	447051.325	383308.222	447051.325	Required	
SW1	383301.645	447059.976	383301.645	447059.976	Required	
SW2	383291.347	447056.386	383291.347	447056.386	Required	
HW1	383282.276	447049.904			No Entry	



PIPELINE SCHEDULES for Parcel A

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	CP01	153.530	152.630	0.750	Open Manhole	500
2.000	o	150	CP03	152.430	151.930	0.350	Open Manhole	500
1.001	o	150	CP02	152.730	151.830	0.750	Open Manhole	500
1.002	o	150	CP04	152.810	151.730	0.930	Open Manhole	500
1.003	o	150	CP05	152.610	151.260	1.200	Open Manhole	500
1.004	o	150	CP06	150.340	149.430	0.760	Open Manhole	500
1.005	o	150	CP07	147.010	146.110	0.750	Open Manhole	500
1.006	o	150	CP08	144.951	143.751	1.050	Open Manhole	500
1.007	o	150	CP09	143.280	142.080	1.050	Open Manhole	500
3.000	o	150	CP11	142.080	141.280	0.650	Open Manhole	500
3.001	o	150	CP10	141.280	140.380	0.750	Open Manhole	500
4.000	o	150	T1	142.080	140.240	1.690	Open Manhole	1200
1.008	o	225	SW1	141.360	140.160	0.975	Open Manhole	1500
1.009	o	225	SW2	141.420	140.074	1.121	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)
1.000	33.155	41.4	CP02	152.730	151.830	0.750	Open Manhole	500
2.000	5.115	51.2	CP02	152.730	151.830	0.750	Open Manhole	500
1.001	9.024	90.2	CP04	152.810	151.730	0.930	Open Manhole	500
1.002	44.627	95.0	CP05	152.610	151.260	1.200	Open Manhole	500
1.003	42.770	23.4	CP06	150.340	149.432	0.758	Open Manhole	500
1.004	36.521	11.0	CP07	147.010	146.110	0.750	Open Manhole	500
1.005	29.585	12.6	CP08	144.951	143.762	1.039	Open Manhole	500
1.006	14.095	8.4	CP09	143.280	142.073	1.057	Open Manhole	500
1.007	21.416	11.2	SW1	141.360	140.168	1.042	Open Manhole	1500
3.000	14.581	16.2	CP10	141.280	140.380	0.750	Open Manhole	500
3.001	10.867	49.3	SW1	141.360	140.160	1.050	Open Manhole	1500
4.000	10.000	125.0	SW1	141.360	140.160	1.050	Open Manhole	1500
1.008	10.906	126.8	SW2	141.420	140.074	1.121	Open Manhole	1500
1.009	11.149	150.7	HW1	140.450	140.000	0.225	Open Manhole	0

Surcharged Outfall Details for Parcel A

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009	HW1	140.450	140.000	0.000	0	0

Datum (m) 140.000 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
15	1.000	630	1.000	1245	1.000	1860	1.000	2475	1.000	3090	1.000
30	1.000	645	1.000	1260	1.000	1875	1.000	2490	1.000	3105	1.000
45	1.000	660	1.000	1275	1.000	1890	1.000	2505	1.000	3120	1.000
60	1.000	675	1.000	1290	1.000	1905	1.000	2520	1.000	3135	1.000
75	1.000	690	1.000	1305	1.000	1920	1.000	2535	1.000	3150	1.000
90	1.000	705	1.000	1320	1.000	1935	1.000	2550	1.000	3165	1.000
105	1.000	720	1.000	1335	1.000	1950	1.000	2565	1.000	3180	1.000
120	1.000	735	1.000	1350	1.000	1965	1.000	2580	1.000	3195	1.000
135	1.000	750	1.000	1365	1.000	1980	1.000	2595	1.000	3210	1.000
150	1.000	765	1.000	1380	1.000	1995	1.000	2610	1.000	3225	1.000
165	1.000	780	1.000	1395	1.000	2010	1.000	2625	1.000	3240	1.000
180	1.000	795	1.000	1410	1.000	2025	1.000	2640	1.000	3255	1.000
195	1.000	810	1.000	1425	1.000	2040	1.000	2655	1.000	3270	1.000
210	1.000	825	1.000	1440	1.000	2055	1.000	2670	1.000	3285	1.000
225	1.000	840	1.000	1455	1.000	2070	1.000	2685	1.000	3300	1.000
240	1.000	855	1.000	1470	1.000	2085	1.000	2700	1.000	3315	1.000
255	1.000	870	1.000	1485	1.000	2100	1.000	2715	1.000	3330	1.000
270	1.000	885	1.000	1500	1.000	2115	1.000	2730	1.000	3345	1.000
285	1.000	900	1.000	1515	1.000	2130	1.000	2745	1.000	3360	1.000
300	1.000	915	1.000	1530	1.000	2145	1.000	2760	1.000	3375	1.000
315	1.000	930	1.000	1545	1.000	2160	1.000	2775	1.000	3390	1.000
330	1.000	945	1.000	1560	1.000	2175	1.000	2790	1.000	3405	1.000
345	1.000	960	1.000	1575	1.000	2190	1.000	2805	1.000	3420	1.000
360	1.000	975	1.000	1590	1.000	2205	1.000	2820	1.000	3435	1.000
375	1.000	990	1.000	1605	1.000	2220	1.000	2835	1.000	3450	1.000
390	1.000	1005	1.000	1620	1.000	2235	1.000	2850	1.000	3465	1.000
405	1.000	1020	1.000	1635	1.000	2250	1.000	2865	1.000	3480	1.000
420	1.000	1035	1.000	1650	1.000	2265	1.000	2880	1.000	3495	1.000
435	1.000	1050	1.000	1665	1.000	2280	1.000	2895	1.000	3510	1.000
450	1.000	1065	1.000	1680	1.000	2295	1.000	2910	1.000	3525	1.000
465	1.000	1080	1.000	1695	1.000	2310	1.000	2925	1.000	3540	1.000
480	1.000	1095	1.000	1710	1.000	2325	1.000	2940	1.000	3555	1.000
495	1.000	1110	1.000	1725	1.000	2340	1.000	2955	1.000	3570	1.000
510	1.000	1125	1.000	1740	1.000	2355	1.000	2970	1.000	3585	1.000
525	1.000	1140	1.000	1755	1.000	2370	1.000	2985	1.000	3600	1.000
540	1.000	1155	1.000	1770	1.000	2385	1.000	3000	1.000	3615	1.000
555	1.000	1170	1.000	1785	1.000	2400	1.000	3015	1.000	3630	1.000
570	1.000	1185	1.000	1800	1.000	2415	1.000	3030	1.000	3645	1.000
585	1.000	1200	1.000	1815	1.000	2430	1.000	3045	1.000	3660	1.000
600	1.000	1215	1.000	1830	1.000	2445	1.000	3060	1.000	3675	1.000
615	1.000	1230	1.000	1845	1.000	2460	1.000	3075	1.000	3690	1.000

Surcharged Outfall Details for Parcel A

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
3705	1.000	4455	1.000	5205	1.000	5955	1.000	6705	1.000	7455	1.000
3720	1.000	4470	1.000	5220	1.000	5970	1.000	6720	1.000	7470	1.000
3735	1.000	4485	1.000	5235	1.000	5985	1.000	6735	1.000	7485	1.000
3750	1.000	4500	1.000	5250	1.000	6000	1.000	6750	1.000	7500	1.000
3765	1.000	4515	1.000	5265	1.000	6015	1.000	6765	1.000	7515	1.000
3780	1.000	4530	1.000	5280	1.000	6030	1.000	6780	1.000	7530	1.000
3795	1.000	4545	1.000	5295	1.000	6045	1.000	6795	1.000	7545	1.000
3810	1.000	4560	1.000	5310	1.000	6060	1.000	6810	1.000	7560	1.000
3825	1.000	4575	1.000	5325	1.000	6075	1.000	6825	1.000	7575	1.000
3840	1.000	4590	1.000	5340	1.000	6090	1.000	6840	1.000	7590	1.000
3855	1.000	4605	1.000	5355	1.000	6105	1.000	6855	1.000	7605	1.000
3870	1.000	4620	1.000	5370	1.000	6120	1.000	6870	1.000	7620	1.000
3885	1.000	4635	1.000	5385	1.000	6135	1.000	6885	1.000	7635	1.000
3900	1.000	4650	1.000	5400	1.000	6150	1.000	6900	1.000	7650	1.000
3915	1.000	4665	1.000	5415	1.000	6165	1.000	6915	1.000	7665	1.000
3930	1.000	4680	1.000	5430	1.000	6180	1.000	6930	1.000	7680	1.000
3945	1.000	4695	1.000	5445	1.000	6195	1.000	6945	1.000	7695	1.000
3960	1.000	4710	1.000	5460	1.000	6210	1.000	6960	1.000	7710	1.000
3975	1.000	4725	1.000	5475	1.000	6225	1.000	6975	1.000	7725	1.000
3990	1.000	4740	1.000	5490	1.000	6240	1.000	6990	1.000	7740	1.000
4005	1.000	4755	1.000	5505	1.000	6255	1.000	7005	1.000	7755	1.000
4020	1.000	4770	1.000	5520	1.000	6270	1.000	7020	1.000	7770	1.000
4035	1.000	4785	1.000	5535	1.000	6285	1.000	7035	1.000	7785	1.000
4050	1.000	4800	1.000	5550	1.000	6300	1.000	7050	1.000	7800	1.000
4065	1.000	4815	1.000	5565	1.000	6315	1.000	7065	1.000	7815	1.000
4080	1.000	4830	1.000	5580	1.000	6330	1.000	7080	1.000	7830	1.000
4095	1.000	4845	1.000	5595	1.000	6345	1.000	7095	1.000	7845	1.000
4110	1.000	4860	1.000	5610	1.000	6360	1.000	7110	1.000	7860	1.000
4125	1.000	4875	1.000	5625	1.000	6375	1.000	7125	1.000	7875	1.000
4140	1.000	4890	1.000	5640	1.000	6390	1.000	7140	1.000	7890	1.000
4155	1.000	4905	1.000	5655	1.000	6405	1.000	7155	1.000	7905	1.000
4170	1.000	4920	1.000	5670	1.000	6420	1.000	7170	1.000	7920	1.000
4185	1.000	4935	1.000	5685	1.000	6435	1.000	7185	1.000	7935	1.000
4200	1.000	4950	1.000	5700	1.000	6450	1.000	7200	1.000	7950	1.000
4215	1.000	4965	1.000	5715	1.000	6465	1.000	7215	1.000	7965	1.000
4230	1.000	4980	1.000	5730	1.000	6480	1.000	7230	1.000	7980	1.000
4245	1.000	4995	1.000	5745	1.000	6495	1.000	7245	1.000	7995	1.000
4260	1.000	5010	1.000	5760	1.000	6510	1.000	7260	1.000	8010	1.000
4275	1.000	5025	1.000	5775	1.000	6525	1.000	7275	1.000	8025	1.000
4290	1.000	5040	1.000	5790	1.000	6540	1.000	7290	1.000	8040	1.000
4305	1.000	5055	1.000	5805	1.000	6555	1.000	7305	1.000	8055	1.000
4320	1.000	5070	1.000	5820	1.000	6570	1.000	7320	1.000	8070	1.000
4335	1.000	5085	1.000	5835	1.000	6585	1.000	7335	1.000	8085	1.000
4350	1.000	5100	1.000	5850	1.000	6600	1.000	7350	1.000	8100	1.000
4365	1.000	5115	1.000	5865	1.000	6615	1.000	7365	1.000	8115	1.000
4380	1.000	5130	1.000	5880	1.000	6630	1.000	7380	1.000	8130	1.000
4395	1.000	5145	1.000	5895	1.000	6645	1.000	7395	1.000	8145	1.000
4410	1.000	5160	1.000	5910	1.000	6660	1.000	7410	1.000	8160	1.000
4425	1.000	5175	1.000	5925	1.000	6675	1.000	7425	1.000	8175	1.000
4440	1.000	5190	1.000	5940	1.000	6690	1.000	7440	1.000	8190	1.000

Surcharged Outfall Details for Parcel A

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
8205	1.000	8640	1.000	9075	1.000	9510	1.000	9945	1.000	10380	1.000
8220	1.000	8655	1.000	9090	1.000	9525	1.000	9960	1.000	10395	1.000
8235	1.000	8670	1.000	9105	1.000	9540	1.000	9975	1.000	10410	1.000
8250	1.000	8685	1.000	9120	1.000	9555	1.000	9990	1.000	10425	1.000
8265	1.000	8700	1.000	9135	1.000	9570	1.000	10005	1.000	10440	1.000
8280	1.000	8715	1.000	9150	1.000	9585	1.000	10020	1.000	10455	1.000
8295	1.000	8730	1.000	9165	1.000	9600	1.000	10035	1.000	10470	1.000
8310	1.000	8745	1.000	9180	1.000	9615	1.000	10050	1.000	10485	1.000
8325	1.000	8760	1.000	9195	1.000	9630	1.000	10065	1.000	10500	1.000
8340	1.000	8775	1.000	9210	1.000	9645	1.000	10080	1.000	10515	1.000
8355	1.000	8790	1.000	9225	1.000	9660	1.000	10095	1.000	10530	1.000
8370	1.000	8805	1.000	9240	1.000	9675	1.000	10110	1.000	10545	1.000
8385	1.000	8820	1.000	9255	1.000	9690	1.000	10125	1.000	10560	1.000
8400	1.000	8835	1.000	9270	1.000	9705	1.000	10140	1.000	10575	1.000
8415	1.000	8850	1.000	9285	1.000	9720	1.000	10155	1.000	10590	1.000
8430	1.000	8865	1.000	9300	1.000	9735	1.000	10170	1.000	10605	1.000
8445	1.000	8880	1.000	9315	1.000	9750	1.000	10185	1.000	10620	1.000
8460	1.000	8895	1.000	9330	1.000	9765	1.000	10200	1.000	10635	1.000
8475	1.000	8910	1.000	9345	1.000	9780	1.000	10215	1.000	10650	1.000
8490	1.000	8925	1.000	9360	1.000	9795	1.000	10230	1.000	10665	1.000
8505	1.000	8940	1.000	9375	1.000	9810	1.000	10245	1.000	10680	1.000
8520	1.000	8955	1.000	9390	1.000	9825	1.000	10260	1.000	10695	1.000
8535	1.000	8970	1.000	9405	1.000	9840	1.000	10275	1.000	10710	1.000
8550	1.000	8985	1.000	9420	1.000	9855	1.000	10290	1.000	10725	1.000
8565	1.000	9000	1.000	9435	1.000	9870	1.000	10305	1.000	10740	1.000
8580	1.000	9015	1.000	9450	1.000	9885	1.000	10320	1.000	10755	1.000
8595	1.000	9030	1.000	9465	1.000	9900	1.000	10335	1.000	10770	1.000
8610	1.000	9045	1.000	9480	1.000	9915	1.000	10350	1.000	10785	1.000
8625	1.000	9060	1.000	9495	1.000	9930	1.000	10365	1.000	10800	1.000

Simulation Criteria for Parcel A

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
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	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.250
Return Period (years)	100	Profile Type	Summer
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.200	Cv (Winter)	0.840

Synthetic Rainfall Details

Storm Duration (mins) 30

Online Controls for Parcel A

Hydro-Brake® Optimum Manhole: SW1, DS/PN: 1.008, Volume (m³): 2.8

Unit Reference	MD-SHE-0107-5000-0900-5000
Design Head (m)	0.900
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	107
Invert Level (m)	140.160
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	5.0
Flush-Flo™	0.271	5.0
Kick-Flo®	0.590	4.1
Mean Flow over Head Range	-	4.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.6	1.200	5.7	3.000	8.8	7.000	13.1
0.200	4.9	1.400	6.1	3.500	9.4	7.500	13.6
0.300	5.0	1.600	6.5	4.000	10.1	8.000	14.0
0.400	4.9	1.800	6.9	4.500	10.6	8.500	14.4
0.500	4.6	2.000	7.2	5.000	11.2	9.000	14.8
0.600	4.1	2.200	7.6	5.500	11.7	9.500	15.2
0.800	4.7	2.400	7.9	6.000	12.2		
1.000	5.2	2.600	8.2	6.500	12.7		

Storage Structures for Parcel A

Filter Drain Manhole: CP08, DS/PN: 1.006

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.150
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.900
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	125.0
Invert Level (m)	143.751	Cap Volume Depth (m)	0.800
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.600
Trench Length (m)	207.0		

Filter Drain Manhole: CP10, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.150
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.700
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	100.0
Invert Level (m)	140.380	Cap Volume Depth (m)	0.500
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.400
Trench Length (m)	32.0		

Tank or Pond Manhole: T1, DS/PN: 4.000

Invert Level (m) 140.240

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	50.0	0.400	50.0	0.800	50.0	0.801	0.0

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.225
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.600	Cv (Winter)	0.840

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)	1, 30, 100
Climate Change (%)	0, 0, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	CP01	15 Winter	1	+0%					152.649
2.000	CP03	15 Winter	1	+0%					151.942
1.001	CP02	15 Winter	1	+0%					151.859
1.002	CP04	15 Winter	1	+0%					151.769
1.003	CP05	15 Winter	1	+0%					151.293
1.004	CP06	15 Winter	1	+0%					149.461
1.005	CP07	15 Winter	1	+0%					146.144
1.006	CP08	15 Winter	1	+0%					143.784
1.007	CP09	15 Winter	1	+0%					142.117
3.000	CP11	15 Winter	1	+0%					141.289
3.001	CP10	1440 Winter	1	+0%	1/360 Summer				140.847
4.000	T1	1440 Winter	1	+0%	1/120 Summer				140.847
1.008	SW1	1440 Winter	1	+0%	1/15 Summer				140.847
1.009	SW2	1440 Winter	1	+0%	1/15 Summer				140.847

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	CP01	-0.131	0.000	0.04		1.1	OK	
2.000	CP03	-0.138	0.000	0.02		0.3	OK	
1.001	CP02	-0.121	0.000	0.08		1.4	OK	
1.002	CP04	-0.111	0.000	0.15		2.7	OK	
1.003	CP05	-0.117	0.000	0.11		4.0	OK	
1.004	CP06	-0.119	0.000	0.09		4.8	OK	
1.005	CP07	-0.116	0.000	0.12		5.7	OK	
1.006	CP08	-0.117	0.000	0.11		6.1	OK	
1.007	CP09	-0.113	0.000	0.14		6.9	OK	
3.000	CP11	-0.141	0.000	0.01		0.5	OK	
3.001	CP10	0.317	0.000	0.00		0.1	SURCHARGED	
4.000	T1	0.457	0.000	0.00		0.0	SURCHARGED	
1.008	SW1	0.462	0.000	0.01		0.3	SURCHARGED	
1.009	SW2	0.548	0.000	0.00		0.0	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.225
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.600	Cv (Winter)	0.840

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)	1, 30, 100
Climate Change (%)	0, 0, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	CP01	15 Winter	30	+0%					152.661
2.000	CP03	15 Winter	30	+0%					151.949
1.001	CP02	15 Winter	30	+0%					151.876
1.002	CP04	15 Winter	30	+0%					151.798
1.003	CP05	15 Winter	30	+0%					151.318
1.004	CP06	15 Winter	30	+0%					149.483
1.005	CP07	15 Winter	30	+0%					146.171
1.006	CP08	15 Winter	30	+0%					143.809
1.007	CP09	15 Winter	30	+0%					142.147
3.000	CP11	15 Winter	30	+0%					141.297
3.001	CP10	1440 Winter	30	+0%	1/360 Summer				141.036
4.000	T1	1440 Winter	30	+0%	1/120 Summer				141.036
1.008	SW1	1440 Winter	30	+0%	1/15 Summer				141.036
1.009	SW2	1440 Winter	30	+0%	1/15 Summer				141.002

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	CP01	-0.119	0.000	0.10		2.6	OK	
2.000	CP03	-0.131	0.000	0.04		0.8	OK	
1.001	CP02	-0.104	0.000	0.20		3.3	OK	
1.002	CP04	-0.082	0.000	0.41		7.2	OK	
1.003	CP05	-0.092	0.000	0.31		11.0	OK	
1.004	CP06	-0.097	0.000	0.26		13.5	OK	
1.005	CP07	-0.089	0.000	0.33		16.1	OK	
1.006	CP08	-0.092	0.000	0.31		17.5	OK	
1.007	CP09	-0.083	0.000	0.40		20.0	OK	
3.000	CP11	-0.133	0.000	0.03		1.3	OK	
3.001	CP10	0.506	0.000	0.01		0.1	FLOOD RISK	
4.000	T1	0.646	0.000	0.01		0.1	SURCHARGED	
1.008	SW1	0.651	0.000	0.03		1.2	SURCHARGED	
1.009	SW2	0.703	0.000	0.03		1.2	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet 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	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.225
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.600	Cv (Winter)	0.840

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)	1, 30, 100
Climate Change (%)	0, 0, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	CP01	15 Winter	100	+20%					152.669
2.000	CP03	15 Winter	100	+20%					151.954
1.001	CP02	15 Winter	100	+20%					151.888
1.002	CP04	15 Winter	100	+20%					151.819
1.003	CP05	15 Winter	100	+20%					151.334
1.004	CP06	15 Winter	100	+20%					149.497
1.005	CP07	15 Winter	100	+20%					146.188
1.006	CP08	15 Winter	100	+20%					143.825
1.007	CP09	15 Winter	100	+20%					142.167
3.000	CP11	15 Winter	100	+20%					141.301
3.001	CP10	480 Winter	100	+20%	1/360 Summer				141.154
4.000	T1	480 Winter	100	+20%	1/120 Summer				141.152
1.008	SW1	480 Winter	100	+20%	1/15 Summer				141.153
1.009	SW2	480 Winter	100	+20%	1/15 Summer				141.006

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	CP01	-0.111	0.000	0.15		4.0	OK	
2.000	CP03	-0.126	0.000	0.06		1.2	OK	
1.001	CP02	-0.092	0.000	0.31		5.1	OK	
1.002	CP04	-0.061	0.000	0.63		11.1	OK	
1.003	CP05	-0.076	0.000	0.47		17.0	OK	
1.004	CP06	-0.083	0.000	0.40		20.9	OK	
1.005	CP07	-0.072	0.000	0.51		24.8	OK	
1.006	CP08	-0.076	0.000	0.47		26.9	OK	
1.007	CP09	-0.063	0.000	0.61		30.9	OK	
3.000	CP11	-0.129	0.000	0.05		2.0	OK	
3.001	CP10	0.624	0.000	0.02		0.5	FLOOD RISK	
4.000	T1	0.762	0.000	0.04		0.6	SURCHARGED	
1.008	SW1	0.768	0.000	0.11		4.2	FLOOD RISK	
1.009	SW2	0.707	0.000	0.12		4.2	SURCHARGED	