



Job N° 4199

Outline Planning Application
Former Landfill Site, Brockhampton West,
Harts Farm Way
DRAINAGE STRATEGY

1. Introduction

- The planning application is an outline not a full detailed application. The drainage strategy detailed is for illustrative purposes only to demonstrate that a suitable drainage approach can be accommodated at the site using principles of sustainable drainage, significant level difference across the site and discharge to a tidal stream.
- The discharge to the Hermitage Stream will be via a tumble manhole, as shown on drawing 4199/50 P2 so that discharge can occur from the site at all times and during high tides.
- The discharge from the site will be via a culvert with shallow falls and a 300mm stilling basin to minimise discharge velocities to below 1.2m/s.
- The route and location of the outfall and details of the headwall will be as illustrated on drawing 4199/50 P2, but will be confirmed in due course for approval.

2. Drainage Details

- Site Location at 470201 E, 105706 N between Harts Farm Way & A27
- The Surface water discharge will be into the directly through a culvert headwall into the Hermitage Stream before discharging into the Solent basin.
- The drainage has been designed for 1:30 year events with no flooding and for 1:100 year events + 40% Climate change using FEH 2013 rainfall figures.
- Foul water discharge is to be via suitably sized separate treatment works to each plot, with the final discharge to be into the surface water system.
- Discharge and surface water drainage is to be agreed with Southern Water Authority.
- The underlying soil strata is made ground with contaminated landfill material therefore infiltration will not be allowed.
- At present the existing and proposed site levels are between 11.000-14.000 AOD which is approx. 8M above the stream level and therefore is not prone to any fluvial flooding from rivers, lakes or any other water courses.
- There are 2 levels of treatment incorporated to the SUDS treatment train (Sediment Sumps and Class 1 Interceptors)
- Microdrainage Simulation Calculations for the pipe network as attached.
- Tumble manholes to be utilised to prevent high water levels in Hermitage Stream restricting discharge.

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Rochester House 275 Baddow Road Chelmsford CM2 7QA	Broadmarsh Development Havant PO9 1HS	
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Micro Drainage	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 470201 105706 SU 70201 05706
Data Type	Point
Maximum Rainfall (mm/hr)	75
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

- Indicates pipe length does not match coordinates

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	37.757	0.185	204.1	0.114	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	39.277	0.190	206.7	0.223	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.002	44.181	0.725	60.9	0.114	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.003	8.868	0.175	50.7	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	28.751	0.160	179.7	0.265	0.00	0.0	0.600	o	600	Pipe/Conduit	
2.000	36.367	1.135	32.0	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	75.00	5.57	12.750	0.114	0.0	0.0	0.0	1.10	77.5	23.2
1.001	75.00	6.04	12.415	0.337	0.0	0.0	0.0	1.41	224.3	68.5
1.002	75.00	6.32	12.225	0.451	0.0	0.0	0.0	2.61	414.8	91.6
1.003	75.00	6.37	11.500	0.451	0.0	0.0	0.0	2.86	455.1	91.6
1.004	75.00	6.64	11.325	0.716	0.0	0.0	0.0	1.81	512.8	145.4
2.000	75.00	5.34	12.600	0.021	0.0	0.0	0.0	1.78	31.5	4.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.005	28.752	0.135	213.0	0.516	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.006	26.790	0.125	214.3	0.516	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.007	51.221	3.215	15.9	0.265	0.00	0.0	0.600	o	900	Pipe/Conduit	
3.000	28.577	0.270	105.8	0.435	5.00	0.0	0.600	o	375	Pipe/Conduit	
3.001	55.303	0.270	204.8	0.000	0.00	2.0	0.600	o	375	Pipe/Conduit	
3.002	25.571	0.120	213.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.003	43.152	0.210	205.5	0.294	0.00	0.0	0.600	o	525	Pipe/Conduit	
3.004	57.680	0.285	202.4	0.143	0.00	0.0	0.600	o	600	Pipe/Conduit	
3.005	12.381	0.150	82.5	0.294	0.00	0.0	0.600	o	750	Pipe/Conduit	
3.006	16.769	0.075	223.6	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
4.000	32.355	0.165	196.1	0.035	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.001	31.701	0.150	211.3	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.002	48.816	0.240	203.4	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.003	75.204	0.370	203.3	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.004	14.229	0.520	27.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	25.947	0.125	207.6	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
5.000	26.230	0.140	187.4	0.337	5.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.005	75.00	6.89	10.865	1.253	0.0	0.0	0.0	1.91	845.4	254.5
1.006	75.00	7.10	10.580	1.769	0.0	0.0	0.0	2.14	1359.1	359.3
1.007	75.00	7.20	10.455	2.034	0.0	0.0	0.0	7.87	5007.0	413.1
3.000	75.00	5.27	9.145	0.435	0.0	0.0	0.0	1.76	194.5	88.4
3.001	75.00	6.00	8.875	0.435	2.0	0.0	0.0	1.26	139.4	90.4
3.002	75.00	6.35	8.605	0.435	2.0	0.0	0.0	1.24	136.7	90.4
3.003	75.00	6.81	8.335	0.729	2.0	0.0	0.0	1.56	337.4	150.1
3.004	75.00	7.37	8.050	0.872	2.0	0.0	0.0	1.71	483.0	179.1
3.005	75.00	7.44	7.615	1.166	2.0	0.0	0.0	3.08	1361.5	238.8
3.006	75.00	7.59	7.465	1.166	2.0	0.0	0.0	1.87	825.0	238.8
4.000	75.00	5.48	9.285	0.035	0.0	0.0	0.0	1.12	79.1	7.1
4.001	75.00	5.97	9.120	0.070	0.0	0.0	0.0	1.08	76.2	14.2
4.002	75.00	6.71	8.970	0.105	0.0	0.0	0.0	1.10	77.7	21.3
4.003	75.00	7.85	8.730	0.140	0.0	0.0	0.0	1.10	77.7	28.4
4.004	75.00	7.93	8.360	0.140	0.0	0.0	0.0	3.02	213.3	28.4
1.008	75.00	8.10	6.940	3.340	2.0	0.0	0.0	2.59	2932.7	680.4
5.000	75.00	5.33	11.510	0.337	0.0	0.0	0.0	1.32	145.8	68.5

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.001	18.237	0.085	214.6	0.000	0.00	2.0	0.600	o	375	Pipe/Conduit	
5.002	24.619	0.120	205.2	0.246	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.003	10.745	0.050	214.9	0.037	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.004	29.348	3.175	9.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.005	11.728	0.300	39.1	0.317	0.00	2.0	0.600	o	600	Pipe/Conduit	
1.009	24.789	0.125	198.3	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
6.000	32.699	0.950	34.4	0.123	5.00	0.0	0.600	o	300	Pipe/Conduit	
6.001	35.518	1.030	34.5	0.234	0.00	0.0	0.600	o	450	Pipe/Conduit	
6.002	17.455	2.880	6.1	0.123	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	74.393	1.390	53.5	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.011	28.509	0.300	95.0	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
7.000	60.000	1.700	35.3	0.064	5.00	0.0	0.600	o	300	Pipe/Conduit	
7.001	56.587	1.800	31.4	0.064	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.002	22.771	0.500	45.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.003	8.420	0.200	42.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
8.000	43.225	1.100	39.3	0.065	5.00	0.0	0.600	o	300	Pipe/Conduit	
8.001	30.805#	0.700	44.0	0.065	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)
5.001	75.00	5.58	11.370	0.337	2.0	0.0	0.0	1.23	136.2	70.5
5.002	75.00	5.87	11.210	0.583	2.0	0.0	0.0	1.42	225.1	120.4
5.003	75.00	6.00	11.090	0.620	2.0	0.0	0.0	1.38	219.9	127.9
5.004	75.00	6.07	11.040	0.620	2.0	0.0	0.0	6.72	1068.3	127.9
5.005	75.00	6.12	7.715	0.937	4.0	0.0	0.0	3.90	1103.5	194.3
1.009	75.00	8.25	6.815	4.277	6.0	0.0	0.0	2.65	3000.7	874.7
6.000	75.00	5.20	12.450	0.123	0.0	0.0	0.0	2.69	190.1	25.0
6.001	75.00	5.37	11.350	0.357	0.0	0.0	0.0	3.47	552.1	72.5
6.002	75.00	5.41	10.320	0.480	0.0	0.0	0.0	8.30	1319.8	97.5
1.010	75.00	8.50	6.690	4.757	6.0	0.0	0.0	5.12	5789.8	972.2
1.011	75.00	8.62	5.300	4.757	6.0	0.0	0.0	3.84	4341.3	972.2
7.000	75.00	5.38	10.100	0.064	0.0	0.0	0.0	2.66	187.7	13.0
7.001	75.00	5.71	8.400	0.128	0.0	0.0	0.0	2.81	198.9	26.0
7.002	75.00	5.87	6.600	0.128	0.0	0.0	0.0	2.34	165.1	26.0
7.003	75.00	5.92	6.025	0.128	0.0	0.0	0.0	2.80	309.2	26.0
8.000	75.00	5.29	5.700	0.065	0.0	0.0	0.0	2.52	177.8	13.2
8.001	75.00	5.50	4.600	0.130	0.0	0.0	0.0	2.38	168.0	26.4

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Micro Drainage		Network 2020.1						
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>								
<u>Simulation Criteria</u>								
Areal Reduction Factor 1.000		Additional Flow - % of Total Flow 0.000						
Hot Start (mins) 0		MADD Factor * 10m³/ha Storage 2.000						
Hot Start Level (mm) 0		Inlet Coefficient 0.800						
Manhole Headloss Coeff (Global) 0.500		Flow per Person per Day (l/per/day) 0.000						
Foul Sewage per hectare (l/s) 0.000								
Number of Input Hydrographs 0		Number of Storage Structures 0						
Number of Online Controls 0		Number of Time/Area Diagrams 0						
Number of Offline Controls 0		Number of Real Time Controls 0						
<u>Synthetic Rainfall Details</u>								
Rainfall Model		FEH						
FEH Rainfall Version		2013						
Site Location		GB 470201 105706 SU 70201 05706						
Data Type		Point						
Cv (Summer)		0.750						
Cv (Winter)		0.840						
Margin for Flood Risk Warning (mm) 100.0		DVD Status OFF						
Analysis Timestep		Fine Inertia Status OFF						
DTS Status		ON						
Profile(s)		Winter						
Duration(s) (mins)		15, 30, 60, 120, 240, 360, 480, 960, 1440						
Return Period(s) (years)		2, 30, 100						
Climate Change (%)		0, 0, 40						
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	SSW 1	15 Winter	100	+40%				
1.001	SSW 2	15 Winter	100	+40%				
1.002	SSW 3	15 Winter	100	+40%				
1.003	SSW 4	15 Winter	100	+40%	100/15 Winter			
1.004	SSW 5	15 Winter	100	+40%				
2.000	SSW 6	15 Winter	100	+40%				
1.005	SSW 7	15 Winter	100	+40%	100/15 Winter			
1.006	SSW 8	15 Winter	100	+40%				
1.007	SSW 9	15 Winter	100	+40%				
3.000	SDSW 10	15 Winter	100	+40%	100/15 Winter	100/15 Winter		
3.001	SDSW 11	15 Winter	100	+40%	30/15 Winter			
3.002	SDSW 12	15 Winter	100	+40%	30/15 Winter			
3.003	SDSW 13	15 Winter	100	+40%	100/15 Winter			
3.004	SDSW 14	15 Winter	100	+40%				
3.005	SDSW 15	15 Winter	100	+40%				
3.006	SSW 16	15 Winter	100	+40%	100/15 Winter			
4.000	SDSW 17	15 Winter	100	+40%				
4.001	SDSW 18	15 Winter	100	+40%				
4.002	SDSW 19	15 Winter	100	+40%				
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Micro Drainage

Network 2020.1

Micro Drainage

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

PN	US/MH Name	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
		Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
1.000	SSW 1	13.015	-0.035	0.000	0.95			67.9	OK
1.001	SSW 2	12.851	-0.014	0.000	1.00			198.8	OK
1.002	SSW 3	12.512	-0.163	0.000	0.72			267.4	OK
1.003	SSW 4	12.135	0.185	0.000	1.16			274.3	SURCHARGED
1.004	SSW 5	11.925	0.000	0.000	1.00			401.8	OK
2.000	SSW 6	12.669	-0.081	0.000	0.42			12.8	OK
1.005	SSW 7	11.630	0.015	0.000	1.10			665.0	SURCHARGED
1.006	SSW 8	11.288	-0.192	0.000	0.96			919.6	OK
1.007	SSW 9	10.769	-0.586	0.000	0.26			1040.5	OK
3.000	SDSW 10	10.486	0.966	0.944	1.29			219.8	FLOOD
3.001	SDSW 11	10.068	0.818	0.000	1.67			217.1	SURCHARGED
3.002	SDSW 12	9.307	0.327	0.000	1.83			217.3	SURCHARGED
3.003	SDSW 13	8.933	0.073	0.000	1.16			342.6	SURCHARGED
3.004	SDSW 14	8.548	-0.102	0.000	0.92			397.0	OK
3.005	SDSW 15	8.308	-0.057	0.000	0.85			517.4	OK
3.006	SSW 16	8.251	0.036	0.000	0.94			523.3	SURCHARGED
4.000	SDSW 17	9.397	-0.188	0.000	0.29			21.1	OK
4.001	SDSW 18	9.294	-0.126	0.000	0.61			42.7	OK
4.002	SDSW 19	9.188	-0.082	0.000	0.84			61.3	OK

PN	US/MH Name	Level Exceeded
1.000	SSW 1	
1.001	SSW 2	
1.002	SSW 3	
1.003	SSW 4	
1.004	SSW 5	
2.000	SSW 6	
1.005	SSW 7	
1.006	SSW 8	
1.007	SSW 9	
3.000	SDSW 10	1
3.001	SDSW 11	
3.002	SDSW 12	
3.003	SDSW 13	
3.004	SDSW 14	
3.005	SDSW 15	
3.006	SSW 16	
4.000	SDSW 17	
4.001	SDSW 18	
4.002	SDSW 19	

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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)
4.003	SDSW 20	15 Winter	100	+40%					9.010
4.004	SDSW 21	15 Winter	100	+40%					8.495
1.008	SSW 22	15 Winter	100	+40%	100/15 Winter				8.187
5.000	SDSW 23	15 Winter	100	+40%	30/15 Winter				12.777
5.001	SDSW 24	15 Winter	100	+40%	30/15 Winter				12.454
5.002	SDSW 25	15 Winter	100	+40%	30/15 Winter				12.205
5.003	SDSW 26	15 Winter	100	+40%	30/15 Winter				11.843
5.004	SDSW 27	15 Winter	100	+40%					11.230
5.005	SDSW 28	15 Winter	100	+40%	100/15 Winter				8.363
1.009	SSW 29	15 Winter	100	+40%	100/15 Winter				8.097
6.000	SSW 30	15 Winter	100	+40%					12.589
6.001	SSW 31	15 Winter	100	+40%					11.569
6.002	SSW 32	15 Winter	100	+40%					10.496
1.010	SSW 33	15 Winter	100	+40%					7.276
1.011	SSW 34	15 Winter	100	+40%					6.411
7.000	SDSW 35	15 Winter	100	+40%					10.196
7.001	SDSW 36	15 Winter	100	+40%					8.538
7.002	SDSW 37	15 Winter	100	+40%					6.760
7.003	SDSW 38	15 Winter	100	+40%					6.204
8.000	SDSW 39	15 Winter	100	+40%					5.800
8.001	SDSW 40	15 Winter	100	+40%	100/15 Winter				5.113
8.002	SDSW 41	15 Winter	100	+40%	30/15 Winter				4.978
8.003	SPump	15 Winter	100	+40%	30/15 Winter				4.909
1.012	SSW 42	15 Winter	100	+40%	100/15 Winter				4.844
1.013	SSW 43	30 Winter	100	+40%					1.235

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)						
4.003	SDSW 20	-0.020	0.000	0.98			73.4	OK	
4.004	SDSW 21	-0.165	0.000	0.41			73.0	OK	
1.008	SSW 22	0.047	0.000	0.83			1584.8	SURCHARGED	
5.000	SDSW 23	0.892	0.000	1.49			189.0	SURCHARGED	
5.001	SDSW 24	0.709	0.000	1.73			195.0	SURCHARGED	
5.002	SDSW 25	0.545	0.000	1.71			321.2	SURCHARGED	
5.003	SDSW 26	0.303	0.000	2.18			340.5	SURCHARGED	
5.004	SDSW 27	-0.260	0.000	0.37			338.5	OK	
5.005	SDSW 28	0.048	0.000	0.93			509.9	SURCHARGED	
1.009	SSW 29	0.082	0.000	1.07			2058.3	SURCHARGED	
6.000	SSW 30	-0.161	0.000	0.44			75.8	OK	
6.001	SSW 31	-0.231	0.000	0.47			229.3	OK	
6.002	SSW 32	-0.274	0.000	0.32			309.8	OK	
1.010	SSW 33	-0.614	0.000	0.48			2274.0	OK	
1.011	SSW 34	-0.089	0.000	1.00			2195.4	OK	
7.000	SDSW 35	-0.204	0.000	0.22			38.7	OK	
7.001	SDSW 36	-0.162	0.000	0.42			79.6	OK	
7.002	SDSW 37	-0.140	0.000	0.54			78.8	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 470201 105706 SU 70201 05706
Data Type	Point
Maximum Rainfall (mm/hr)	75
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

- Indicates pipe length does not match coordinates

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	37.757	0.185	204.1	0.114	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	39.277	0.190	206.7	0.223	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.002	44.181	0.725	60.9	0.114	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.003	8.868	0.175	50.7	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	28.751	0.160	179.7	0.265	0.00	0.0	0.600	o	600	Pipe/Conduit	
2.000	36.367	1.135	32.0	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	75.00	5.57	12.750	0.114	0.0	0.0	0.0	1.10	77.5	23.2
1.001	75.00	6.04	12.415	0.337	0.0	0.0	0.0	1.41	224.3	68.5
1.002	75.00	6.32	12.225	0.451	0.0	0.0	0.0	2.61	414.8	91.6
1.003	75.00	6.37	11.500	0.451	0.0	0.0	0.0	2.86	455.1	91.6
1.004	75.00	6.64	11.325	0.716	0.0	0.0	0.0	1.81	512.8	145.4
2.000	75.00	5.34	12.600	0.021	0.0	0.0	0.0	1.78	31.5	4.3

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
1.005	28.752	0.135	213.0	0.516	0.00	0.0	0.600	o	750	Pipe/Conduit		
1.006	26.790	0.125	214.3	0.516	0.00	0.0	0.600	o	900	Pipe/Conduit		
1.007	51.221	3.215	15.9	0.265	0.00	0.0	0.600	o	900	Pipe/Conduit		
3.000	28.577	0.270	105.8	0.435	5.00	0.0	0.600	o	375	Pipe/Conduit		
3.001	55.303	0.270	204.8	0.000	0.00	2.0	0.600	o	375	Pipe/Conduit		
3.002	25.571	0.120	213.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit		
3.003	43.152	0.210	205.5	0.294	0.00	0.0	0.600	o	525	Pipe/Conduit		
3.004	57.680	0.285	202.4	0.143	0.00	0.0	0.600	o	600	Pipe/Conduit		
3.005	12.381	0.150	82.5	0.294	0.00	0.0	0.600	o	750	Pipe/Conduit		
3.006	16.769	0.075	223.6	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit		
4.000	32.355	0.165	196.1	0.035	5.00	0.0	0.600	o	300	Pipe/Conduit		
4.001	31.701	0.150	211.3	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit		
4.002	48.816	0.240	203.4	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit		
4.003	75.204	0.370	203.3	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit		
4.004	14.229	0.520	27.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
1.008	25.947	0.125	207.6	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit		
5.000	26.230	0.140	187.4	0.337	5.00	0.0	0.600	o	375	Pipe/Conduit		

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.005	75.00	6.89	10.865	1.253	0.0	0.0	0.0	1.91	845.4	254.5
1.006	75.00	7.10	10.580	1.769	0.0	0.0	0.0	2.14	1359.1	359.3
1.007	75.00	7.20	10.455	2.034	0.0	0.0	0.0	7.87	5007.0	413.1
3.000	75.00	5.27	9.145	0.435	0.0	0.0	0.0	1.76	194.5	88.4
3.001	75.00	6.00	8.875	0.435	2.0	0.0	0.0	1.26	139.4	90.4
3.002	75.00	6.35	8.605	0.435	2.0	0.0	0.0	1.24	136.7	90.4
3.003	75.00	6.81	8.335	0.729	2.0	0.0	0.0	1.56	337.4	150.1
3.004	75.00	7.37	8.050	0.872	2.0	0.0	0.0	1.71	483.0	179.1
3.005	75.00	7.44	7.615	1.166	2.0	0.0	0.0	3.08	1361.5	238.8
3.006	75.00	7.59	7.465	1.166	2.0	0.0	0.0	1.87	825.0	238.8
4.000	75.00	5.48	9.285	0.035	0.0	0.0	0.0	1.12	79.1	7.1
4.001	75.00	5.97	9.120	0.070	0.0	0.0	0.0	1.08	76.2	14.2
4.002	75.00	6.71	8.970	0.105	0.0	0.0	0.0	1.10	77.7	21.3
4.003	75.00	7.85	8.730	0.140	0.0	0.0	0.0	1.10	77.7	28.4
4.004	75.00	7.93	8.360	0.140	0.0	0.0	0.0	3.02	213.3	28.4
1.008	75.00	8.10	6.940	3.340	2.0	0.0	0.0	2.59	2932.7	680.4
5.000	75.00	5.33	11.510	0.337	0.0	0.0	0.0	1.32	145.8	68.5

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.001	18.237	0.085	214.6	0.000	0.00	2.0	0.600	o	375	Pipe/Conduit	
5.002	24.619	0.120	205.2	0.246	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.003	10.745	0.050	214.9	0.037	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.004	29.348	3.175	9.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.005	11.728	0.300	39.1	0.317	0.00	2.0	0.600	o	600	Pipe/Conduit	
1.009	24.789	0.125	198.3	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
6.000	32.699	0.950	34.4	0.123	5.00	0.0	0.600	o	300	Pipe/Conduit	
6.001	35.518	1.030	34.5	0.234	0.00	0.0	0.600	o	450	Pipe/Conduit	
6.002	17.455	2.880	6.1	0.123	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	74.393	1.390	53.5	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.011	28.509	0.300	95.0	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
7.000	60.000	1.700	35.3	0.064	5.00	0.0	0.600	o	300	Pipe/Conduit	
7.001	56.587	1.800	31.4	0.064	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.002	22.771	0.500	45.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.003	8.420	0.200	42.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
8.000	43.225	1.100	39.3	0.065	5.00	0.0	0.600	o	300	Pipe/Conduit	
8.001	30.805#	0.700	44.0	0.065	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)
5.001	75.00	5.58	11.370	0.337	2.0	0.0	0.0	1.23	136.2	70.5
5.002	75.00	5.87	11.210	0.583	2.0	0.0	0.0	1.42	225.1	120.4
5.003	75.00	6.00	11.090	0.620	2.0	0.0	0.0	1.38	219.9	127.9
5.004	75.00	6.07	11.040	0.620	2.0	0.0	0.0	6.72	1068.3	127.9
5.005	75.00	6.12	7.715	0.937	4.0	0.0	0.0	3.90	1103.5	194.3
1.009	75.00	8.25	6.815	4.277	6.0	0.0	0.0	2.65	3000.7	874.7
6.000	75.00	5.20	12.450	0.123	0.0	0.0	0.0	2.69	190.1	25.0
6.001	75.00	5.37	11.350	0.357	0.0	0.0	0.0	3.47	552.1	72.5
6.002	75.00	5.41	10.320	0.480	0.0	0.0	0.0	8.30	1319.8	97.5
1.010	75.00	8.50	6.690	4.757	6.0	0.0	0.0	5.12	5789.8	972.2
1.011	75.00	8.62	5.300	4.757	6.0	0.0	0.0	3.84	4341.3	972.2
7.000	75.00	5.38	10.100	0.064	0.0	0.0	0.0	2.66	187.7	13.0
7.001	75.00	5.71	8.400	0.128	0.0	0.0	0.0	2.81	198.9	26.0
7.002	75.00	5.87	6.600	0.128	0.0	0.0	0.0	2.34	165.1	26.0
7.003	75.00	5.92	6.025	0.128	0.0	0.0	0.0	2.80	309.2	26.0
8.000	75.00	5.29	5.700	0.065	0.0	0.0	0.0	2.52	177.8	13.2
8.001	75.00	5.50	4.600	0.130	0.0	0.0	0.0	2.38	168.0	26.4

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
8.002	5.000#	0.200	25.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.003	7.218#	0.200	36.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.012	13.268	0.110	120.6	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.013	17.686	0.020	884.3	0.000	0.00	0.0	0.600	[]	10	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
8.002	75.00	5.53	3.900	0.130	0.0	0.0	0.0	3.16	223.2	26.4
8.003	75.00	5.57	3.700	0.130	0.0	0.0	0.0	2.63	185.6	26.4
1.012	75.00	8.68	3.475	5.015	6.0	0.0	0.0	3.41	3851.8	1024.6
1.013	75.00	8.91	0.235	5.015	6.0	0.0	0.0	1.34	2327.0	1024.6

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)
1.013	S	3.500	0.215	0.000	0	2400

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

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

Synthetic Rainfall Details

Rainfall Model FEH
 FEH Rainfall Version 2013
 Site Location GB 470201 105706 SU 70201 05706
 Data Type Point
 Cv (Summer) 0.750
 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 100.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s) Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 2, 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.
1.000	SSW 1	15 Winter	100	+40%				
1.001	SSW 2	15 Winter	100	+40%				
1.002	SSW 3	15 Winter	100	+40%				
1.003	SSW 4	15 Winter	100	+40%	100/15 Winter			
1.004	SSW 5	15 Winter	100	+40%				
2.000	SSW 6	15 Winter	100	+40%				
1.005	SSW 7	15 Winter	100	+40%	100/15 Winter			
1.006	SSW 8	15 Winter	100	+40%				
1.007	SSW 9	15 Winter	100	+40%				
3.000	SDSW 10	15 Winter	100	+40%	100/15 Winter	100/15 Winter		
3.001	SDSW 11	15 Winter	100	+40%	30/15 Winter			
3.002	SDSW 12	15 Winter	100	+40%	30/15 Winter			
3.003	SDSW 13	15 Winter	100	+40%	100/15 Winter			
3.004	SDSW 14	15 Winter	100	+40%				
3.005	SDSW 15	15 Winter	100	+40%				
3.006	SSW 16	15 Winter	100	+40%	100/15 Winter			
4.000	SDSW 17	15 Winter	100	+40%				
4.001	SDSW 18	15 Winter	100	+40%				
4.002	SDSW 19	15 Winter	100	+40%				

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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 / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	SSW 1	13.015	-0.035	0.000	0.95		67.9	OK
1.001	SSW 2	12.851	-0.014	0.000	1.00		198.8	OK
1.002	SSW 3	12.512	-0.163	0.000	0.72		267.4	OK
1.003	SSW 4	12.135	0.185	0.000	1.16		274.3	SURCHARGED
1.004	SSW 5	11.925	0.000	0.000	1.00		401.8	OK
2.000	SSW 6	12.669	-0.081	0.000	0.42		12.8	OK
1.005	SSW 7	11.630	0.015	0.000	1.10		665.0	SURCHARGED
1.006	SSW 8	11.288	-0.192	0.000	0.96		919.6	OK
1.007	SSW 9	10.769	-0.586	0.000	0.26		1040.5	OK
3.000	SDSW 10	10.486	0.966	0.944	1.29		219.8	FLOOD
3.001	SDSW 11	10.068	0.818	0.000	1.67		217.1	SURCHARGED
3.002	SDSW 12	9.307	0.327	0.000	1.83		217.3	SURCHARGED
3.003	SDSW 13	8.933	0.073	0.000	1.16		342.6	SURCHARGED
3.004	SDSW 14	8.548	-0.102	0.000	0.92		397.0	OK
3.005	SDSW 15	8.308	-0.057	0.000	0.85		517.4	OK
3.006	SSW 16	8.251	0.036	0.000	0.94		523.3	SURCHARGED
4.000	SDSW 17	9.397	-0.188	0.000	0.29		21.1	OK
4.001	SDSW 18	9.294	-0.126	0.000	0.61		42.7	OK
4.002	SDSW 19	9.188	-0.082	0.000	0.84		61.3	OK

PN	US/MH Name	Level Exceeded
1.000	SSW 1	
1.001	SSW 2	
1.002	SSW 3	
1.003	SSW 4	
1.004	SSW 5	
2.000	SSW 6	
1.005	SSW 7	
1.006	SSW 8	
1.007	SSW 9	
3.000	SDSW 10	1
3.001	SDSW 11	
3.002	SDSW 12	
3.003	SDSW 13	
3.004	SDSW 14	
3.005	SDSW 15	
3.006	SSW 16	
4.000	SDSW 17	
4.001	SDSW 18	
4.002	SDSW 19	

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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)
4.003	SDSW 20	15 Winter	100	+40%					9.010
4.004	SDSW 21	15 Winter	100	+40%					8.495
1.008	SSW 22	15 Winter	100	+40%	100/15 Winter				8.187
5.000	SDSW 23	15 Winter	100	+40%	30/15 Winter				12.777
5.001	SDSW 24	15 Winter	100	+40%	30/15 Winter				12.454
5.002	SDSW 25	15 Winter	100	+40%	30/15 Winter				12.205
5.003	SDSW 26	15 Winter	100	+40%	30/15 Winter				11.843
5.004	SDSW 27	15 Winter	100	+40%					11.230
5.005	SDSW 28	15 Winter	100	+40%	100/15 Winter				8.363
1.009	SSW 29	15 Winter	100	+40%	100/15 Winter				8.097
6.000	SSW 30	15 Winter	100	+40%					12.589
6.001	SSW 31	15 Winter	100	+40%					11.569
6.002	SSW 32	15 Winter	100	+40%					10.496
1.010	SSW 33	15 Winter	100	+40%					7.276
1.011	SSW 34	15 Winter	100	+40%					6.411
7.000	SDSW 35	15 Winter	100	+40%					10.196
7.001	SDSW 36	15 Winter	100	+40%					8.538
7.002	SDSW 37	15 Winter	100	+40%					6.760
7.003	SDSW 38	15 Winter	100	+40%					6.204
8.000	SDSW 39	15 Winter	100	+40%					5.800
8.001	SDSW 40	15 Winter	100	+40%	100/15 Winter				5.113
8.002	SDSW 41	15 Winter	100	+40%	30/15 Winter				4.978
8.003	SPump	15 Winter	100	+40%	30/15 Winter				4.909
1.012	SSW 42	15 Winter	100	+40%	100/15 Winter				4.844
1.013	SSW 43	30 Winter	100	+40%					1.235

PN	US/MH Name	Surcharged		Flooded		Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)				
4.003	SDSW 20	-0.020	0.000	0.98			73.4	OK	
4.004	SDSW 21	-0.165	0.000	0.41			73.0	OK	
1.008	SSW 22	0.047	0.000	0.83			1584.8	SURCHARGED	
5.000	SDSW 23	0.892	0.000	1.49			189.0	SURCHARGED	
5.001	SDSW 24	0.709	0.000	1.73			195.0	SURCHARGED	
5.002	SDSW 25	0.545	0.000	1.71			321.2	SURCHARGED	
5.003	SDSW 26	0.303	0.000	2.18			340.5	SURCHARGED	
5.004	SDSW 27	-0.260	0.000	0.37			338.5	OK	
5.005	SDSW 28	0.048	0.000	0.93			509.9	SURCHARGED	
1.009	SSW 29	0.082	0.000	1.07			2058.3	SURCHARGED	
6.000	SSW 30	-0.161	0.000	0.44			75.8	OK	
6.001	SSW 31	-0.231	0.000	0.47			229.3	OK	
6.002	SSW 32	-0.274	0.000	0.32			309.8	OK	
1.010	SSW 33	-0.614	0.000	0.48			2274.0	OK	
1.011	SSW 34	-0.089	0.000	1.00			2195.4	OK	
7.000	SDSW 35	-0.204	0.000	0.22			38.7	OK	
7.001	SDSW 36	-0.162	0.000	0.42			79.6	OK	
7.002	SDSW 37	-0.140	0.000	0.54			78.8	OK	

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Rochester House 275 Baddow Road Chelmsford CM2 7QA	Broadmarsh Development Havant PO9 1HS	
Date 10/02/2021 15:30	Designed by CE	
File 4199.MDX	Checked by CL	
Micro Drainage	Network 2020.1	

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

PN	US/MH Name	Surcharged Flooded			Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)				
7.003	SDSW 38	-0.196	0.000	0.45		79.5	OK	
8.000	SDSW 39	-0.200	0.000	0.24		39.7	OK	
8.001	SDSW 40	0.213	0.000	0.50		76.1	SURCHARGED	
8.002	SDSW 41	0.778	0.000	0.58		64.8	SURCHARGED	
8.003	SPump	0.909	0.000	0.58		64.5	SURCHARGED	
1.012	SSW 42	0.169	0.000	1.19		2331.4	SURCHARGED	
1.013	SSW 43	0.000	0.000	2.74		2212.7	OK	