


Woods Hardwick		Page 1
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm



Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	2
Site Location GB 450500 225250 SP 50500 25250	
C (1km)	-0.023
D1 (1km)	0.328
D2 (1km)	0.309
D3 (1km)	0.264
E (1km)	0.292
F (1km)	2.461
Maximum Rainfall (mm/hr)	0
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
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)	Auto Design
1.000	9.050	0.650	13.9	0.026	5.00	0.0	0.600	\	-1	
1.001	9.000	0.500	18.0	0.016	0.00	0.0	0.600	\	-1	

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	0.00	5.01	123.850	0.026	0.0	0.0	0.0	14.05	50669.7	0.0
1.001	0.00	5.02	123.200	0.042	0.0	0.0	0.0	12.36	44557.7	0.0


Woods Hardwick		Page 2
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
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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)	Auto Design
1.002	7.527	0.250	30.1	0.024	0.00	0.0	0.600	\/	-1	
1.003	12.654	0.287	44.1	0.000	0.00	0.0	0.600	o	150	
1.004	45.169	0.115	392.8	0.053	0.00	0.0	0.600	o	450	
2.000	24.880	0.130	191.4	0.076	5.00	0.0	0.600	o	375	
2.001	6.893	0.027	255.3	0.000	0.00	0.0	0.600	o	375	
1.005	28.960	0.050	579.2	0.008	0.00	0.0	0.600	o	600	
3.000	25.800	0.112	230.4	0.028	5.00	0.0	0.600	oo	41	
1.006	10.020	0.017	589.4	0.049	0.00	0.0	0.600	o	600	
1.007	21.048	0.156	134.9	0.000	0.00	0.0	0.600	o	150	
1.008	16.030	0.300	53.4	0.000	0.00	0.0	0.600	o	150	
1.009	71.700	0.910	78.8	0.000	0.00	0.0	0.600	o	225	
4.000	21.492	0.116	185.0	0.500	5.00	0.0	0.600	o	225	
4.001	21.492	0.052	413.3	0.000	0.00	0.0	0.600	o	450	

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)
1.002	0.00	5.04	122.700	0.066	0.0	0.0	0.0	9.55	34441.1	0.0
1.003	0.00	5.17	122.450	0.066	0.0	0.0	0.0	1.52	26.9	0.0
1.004	0.00	5.91	121.863	0.119	0.0	0.0	0.0	1.02	162.2	0.0
2.000	0.00	5.32	121.980	0.076	0.0	0.0	0.0	1.31	144.3	0.0
2.001	0.00	5.42	121.850	0.076	0.0	0.0	0.0	1.13	124.7	0.0
1.005	0.00	6.39	121.598	0.203	0.0	0.0	0.0	1.00	284.1	0.0
3.000	0.00	5.42	121.660	0.028	0.0	0.0	0.0	1.03	145.2	0.0
1.006	0.00	6.56	121.548	0.280	0.0	0.0	0.0	1.00	281.6	0.0
1.007	0.00	6.97	121.531	0.280	0.0	0.0	0.0	0.86	15.3	0.0
1.008	0.00	7.16	121.375	0.280	0.0	0.0	0.0	1.38	24.4	0.0
1.009	0.00	7.97	121.000	0.280	0.0	0.0	0.0	1.47	58.6	0.0
4.000	0.00	5.37	121.507	0.500	0.0	0.0	0.0	0.96	38.1	0.0
4.001	0.00	5.73	121.391	0.500	0.0	0.0	0.0	0.99	158.0	0.0


Woods Hardwick		Page 3
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24 File SW PH9 & PH10 west Propo...	Designed by a.tew Checked by	
XP Solutions		Network 2014.1.1

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)	Auto Design
5.000	8.295	0.322	25.8	0.050	5.00	0.0	0.600	o	150	
4.002	41.345	0.085	486.4	0.000	0.00	0.0	0.600	o	450	
6.000	17.870	0.182	98.2	0.250	5.00	0.0	0.600	o	375	
6.001	19.554	0.200	97.8	0.000	0.00	0.0	0.600	o	375	
6.002	25.372	0.246	103.1	0.000	0.00	0.0	0.600	o	375	
4.003	16.460	0.049	335.9	0.020	0.00	0.0	0.600	o	450	
4.004	27.573	0.085	324.4	0.000	0.00	0.0	0.600	o	450	
4.005	16.074	0.050	321.5	0.000	0.00	0.0	0.600	o	450	
4.006	40.510	0.130	311.6	0.000	0.00	0.0	0.600	o	450	
7.000	66.464	1.600	41.5	0.157	5.00	0.0	0.600	o	300	
7.001	24.115	0.220	109.6	0.198	0.00	0.0	0.600	o	375	
7.002	28.765	0.260	110.6	0.040	0.00	0.0	0.600	o	375	
7.003	7.679#	0.100	76.8	0.040	0.00	0.0	0.600	o	450	
7.004	11.675#	0.060	194.6	0.023	0.00	0.0	0.600	o	450	

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)
5.000	0.00	5.07	121.961	0.050	0.0	0.0	0.0	1.99	35.2	0.0
4.002	0.00	6.49	121.339	0.550	0.0	0.0	0.0	0.92	145.5	0.0
6.000	0.00	5.16	121.882	0.250	0.0	0.0	0.0	1.83	202.0	0.0
6.001	0.00	5.34	121.700	0.250	0.0	0.0	0.0	1.83	202.4	0.0
6.002	0.00	5.58	121.500	0.250	0.0	0.0	0.0	1.78	197.0	0.0
4.003	0.00	6.74	121.254	0.820	0.0	0.0	0.0	1.10	175.5	0.0
4.004	0.00	7.15	121.205	0.820	0.0	0.0	0.0	1.12	178.6	0.0
4.005	0.00	7.38	121.120	0.820	0.0	0.0	0.0	1.13	179.5	0.0
4.006	0.00	7.97	121.070	0.820	0.0	0.0	0.0	1.15	182.3	0.0
7.000	0.00	5.45	123.780	0.157	0.0	0.0	0.0	2.45	172.9	0.0
7.001	0.00	5.69	122.105	0.355	0.0	0.0	0.0	1.73	191.1	0.0
7.002	0.00	5.96	121.885	0.395	0.0	0.0	0.0	1.72	190.2	0.0
7.003	0.00	6.02	121.550	0.435	0.0	0.0	0.0	2.32	369.3	0.0
7.004	0.00	6.15	121.400	0.458	0.0	0.0	0.0	1.45	231.2	0.0

Woods Hardwick		Page 4
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24 File SW PH9 & PH10 west Propo...	Designed by a.tew Checked by	
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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)	Auto Design
8.000	32.103	0.340	94.4	0.016	5.00	0.0	0.600	o	300	
8.001	17.305	0.130	133.1	0.097	0.00	0.0	0.600	o	300	
8.002	13.694	0.110	124.5	0.051	0.00	0.0	0.600	o	300	
7.005	9.673#	0.050	193.5	0.032	0.00	0.0	0.600	o	450	
9.000	42.482	0.520	81.7	0.074	5.00	0.0	0.600	o	300	
9.001	43.239	1.200	36.0	0.041	0.00	0.0	0.600	o	375	
9.002	46.307	0.430	107.7	0.166	0.00	0.0	0.600	o	375	
9.003	11.632	0.180	64.6	0.056	0.00	0.0	0.600	o	375	
9.004	36.628	0.190	192.8	0.033	0.00	0.0	0.600	o	450	
9.005	7.190#	0.050	143.8	0.207	0.00	0.0	0.600	o	450	
7.006	3.663	0.030	122.1	0.070	0.00	0.0	0.600	o	450	
10.000	1.000	0.010	100.0	0.131	5.00	0.0	0.600	o	300	
7.007	2.191	0.080	27.4	0.000	0.00	0.0	0.600	o	300	

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)
8.000	0.00	5.33	122.070	0.016	0.0	0.0	0.0	1.62	114.4	0.0
8.001	0.00	5.54	121.730	0.113	0.0	0.0	0.0	1.36	96.2	0.0
8.002	0.00	5.70	121.600	0.164	0.0	0.0	0.0	1.41	99.5	0.0
7.005	0.00	6.26	121.340	0.654	0.0	0.0	0.0	1.46	231.9	0.0
9.000	0.00	5.41	123.920	0.074	0.0	0.0	0.0	1.74	123.1	0.0
9.001	0.00	5.64	123.325	0.115	0.0	0.0	0.0	3.03	334.3	0.0
9.002	0.00	6.09	122.125	0.281	0.0	0.0	0.0	1.75	192.8	0.0
9.003	0.00	6.17	121.695	0.337	0.0	0.0	0.0	2.26	249.3	0.0
9.004	0.00	6.59	121.440	0.370	0.0	0.0	0.0	1.46	232.3	0.0
9.005	0.00	6.66	121.250	0.577	0.0	0.0	0.0	1.69	269.3	0.0
7.006	0.00	6.69	121.200	1.301	0.0	0.0	0.0	1.84	292.4	0.0
10.000	0.00	5.01	121.280	0.131	0.0	0.0	0.0	1.57	111.1	0.0
7.007	0.00	6.71	121.170	1.432	0.0	0.0	0.0	3.02	213.2	0.0














Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
4.007	7.445	0.035	212.7	0.000	0.00	0.0	0.600	o	450	
11.000	17.914	0.241	74.3	0.020	5.00	0.0	0.600	o	100	
11.001	32.522	0.601	54.1	0.022	0.00	0.0	0.600	o	150	
12.000	9.469	0.090	105.2	0.019	5.00	0.0	0.600	o	300	
12.001	2.518#	0.045	56.0	0.000	0.00	0.0	0.600	o	150	
11.002	54.826	0.620	88.4	0.000	0.00	0.0	0.600	o	225	
11.003	43.038	0.315	136.6	0.000	0.00	0.0	0.600	o	300	
4.008	5.470	0.025	218.8	0.000	0.00	0.0	0.600	o	450	
4.009	15.678	0.050	313.6	0.000	0.00	0.0	0.600	o	450	
4.010	10.454	0.040	261.4	0.000	0.00	0.0	0.600	o	450	
4.011	17.440	0.150	116.3	0.000	0.00	0.0	0.600	oo	42	
4.012	36.660	0.120	305.5	0.000	0.00	0.0	0.600	o	525	
4.013	64.888	0.210	309.0	0.000	0.00	0.0	0.600	o	525	
4.014	49.402	0.160	308.8	0.000	0.00	0.0	0.600	o	525	

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)
4.007	0.00	8.06	120.940	2.252	0.0	0.0	0.0	1.39	221.1	0.0
11.000	0.00	5.33	123.132	0.020	0.0	0.0	0.0	0.89	7.0	0.0
11.001	0.00	5.73	122.891	0.042	0.0	0.0	0.0	1.37	24.2	0.0
12.000	0.00	5.10	122.620	0.019	0.0	0.0	0.0	1.53	108.3	0.0
12.001	0.00	5.13	122.530	0.019	0.0	0.0	0.0	1.35	23.8	0.0
11.002	0.00	6.39	122.215	0.061	0.0	0.0	0.0	1.39	55.3	0.0
11.003	0.00	6.92	121.520	0.061	0.0	0.0	0.0	1.34	95.0	0.0
4.008	0.00	8.13	120.905	2.313	0.0	0.0	0.0	1.37	218.0	0.0
4.009	0.00	8.36	120.780	2.313	0.0	0.0	0.0	1.14	181.7	0.0
4.010	0.00	8.50	120.730	2.313	0.0	0.0	0.0	1.25	199.3	0.0
4.011	0.00	8.67	120.690	2.313	0.0	0.0	0.0	1.68	371.3	0.0
4.012	0.00	9.15	120.540	2.313	0.0	0.0	0.0	1.28	276.3	0.0
4.013	0.00	10.00	120.420	2.313	0.0	0.0	0.0	1.27	274.7	0.0
4.014	0.00	10.65	120.210	2.313	0.0	0.0	0.0	1.27	274.8	0.0













Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
13.000	1.000	0.100	10.0	0.000	5.00	0.0	0.600	o	100	
14.000	30.130	0.690	43.7	0.221	5.00	0.0	0.600	o	300	
14.001	14.283	0.250	57.1	0.048	0.00	0.0	0.600	o	375	
14.002	39.587	0.900	44.0	0.055	0.00	0.0	0.600	o	375	
15.000	58.183	0.265	219.6	0.339	5.00	0.0	0.600	o	450	
14.003	43.381	0.280	154.9	0.137	0.00	0.0	0.600	o	525	
14.004	10.311	0.170	60.7	0.000	0.00	0.0	0.600	o	525	
13.001	61.528	0.170	361.9	0.151	0.00	0.0	0.600	o	750	
16.000	49.643	0.380	130.6	0.098	5.00	0.0	0.600	o	300	
16.001	29.531	0.150	196.9	0.171	0.00	0.0	0.600	o	450	
16.002	56.417	0.325	173.6	0.314	0.00	0.0	0.600	o	525	
16.003	8.196	0.240	34.2	0.107	0.00	0.0	0.600	o	600	
17.000	24.053	0.555	43.3	0.000	5.00	0.0	0.600	o	750	

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)
13.000	0.00	5.01	120.605	0.000	0.0	0.0	0.0	2.46	19.3	0.0
14.000	0.00	5.21	123.520	0.221	0.0	0.0	0.0	2.39	168.6	0.0
14.001	0.00	5.31	122.755	0.269	0.0	0.0	0.0	2.40	265.2	0.0
14.002	0.00	5.55	122.505	0.324	0.0	0.0	0.0	2.74	302.5	0.0
15.000	0.00	5.71	121.305	0.339	0.0	0.0	0.0	1.37	217.6	0.0
14.003	0.00	6.11	120.965	0.800	0.0	0.0	0.0	1.80	389.0	0.0
14.004	0.00	6.17	120.685	0.800	0.0	0.0	0.0	2.88	623.4	0.0
13.001	0.00	6.87	120.505	0.951	0.0	0.0	0.0	1.47	647.3	0.0
16.000	0.00	5.60	121.730	0.098	0.0	0.0	0.0	1.37	97.1	0.0
16.001	0.00	5.94	121.200	0.269	0.0	0.0	0.0	1.45	229.9	0.0
16.002	0.00	6.50	120.975	0.583	0.0	0.0	0.0	1.70	367.4	0.0
16.003	0.00	6.53	120.575	0.690	0.0	0.0	0.0	4.18	1180.9	0.0
17.000	0.00	5.09	120.890	0.000	0.0	0.0	0.0	4.26	1881.1	0.0













Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
13.002	2.406	0.060	40.1	0.000	0.00	0.0	0.600	o	300	
4.015	36.168	0.120	301.4	0.000	0.00	0.0	0.600	o	525	
18.000	24.393	0.110	221.8	0.020	5.00	0.0	0.600	o	450	
18.001	40.256	0.150	268.4	0.067	0.00	0.0	0.600	o	600	
19.000	13.311	0.925	14.4	0.060	5.00	0.0	0.600	o	225	
18.002	8.528	0.145	58.8	0.000	0.00	0.0	0.600	o	150	
4.016	28.200	0.140	201.4	0.000	0.00	0.0	0.600	o	525	
1.010	50.410	0.120	420.1	0.000	0.00	0.0	0.600	o	525	
1.011	10.500	0.030	350.0	0.000	0.00	0.0	0.600	o	525	
1.012	37.570	0.090	417.4	0.000	0.00	0.0	0.600	o	525	
1.013	9.819	0.032	305.0	0.000	0.00	0.0	0.600	o	525	
1.014	13.878	0.038	365.2	0.000	0.00	0.0	0.600	o	525	

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)
13.002	0.00	6.89	120.335	1.641	0.0	0.0	0.0	2.49	176.0	0.0
4.015	0.00	11.12	120.050	3.954	0.0	0.0	0.0	1.28	278.2	0.0
18.000	0.00	5.30	120.860	0.020	0.0	0.0	0.0	1.36	216.5	0.0
18.001	0.00	5.75	120.600	0.087	0.0	0.0	0.0	1.48	418.9	0.0
19.000	0.00	5.06	121.375	0.060	0.0	0.0	0.0	3.47	137.9	0.0
18.002	0.00	5.86	120.450	0.147	0.0	0.0	0.0	1.31	23.2	0.0
4.016	0.00	11.42	119.930	4.101	0.0	0.0	0.0	1.57	340.9	0.0
1.010	0.00	12.19	119.790	4.381	0.0	0.0	0.0	1.09	235.2	0.0
1.011	0.00	12.34	119.670	4.381	0.0	0.0	0.0	1.19	257.9	0.0
1.012	0.00	12.91	119.640	4.381	0.0	0.0	0.0	1.09	236.0	0.0
1.013	0.00	13.04	119.550	4.381	0.0	0.0	0.0	1.28	276.5	0.0
1.014	0.00	13.24	119.518	4.381	0.0	0.0	0.0	1.17	252.4	0.0

Network Design Table for Storm















PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
1.015	42.621	0.510	83.6	0.000	0.00	0.0	0.600	o	525	
20.000	53.163	0.360	147.7	0.213	5.00	0.0	0.600	o	375	
21.000	15.820	0.210	75.3	0.064	5.00	0.0	0.600	o	150	
21.001	38.537	0.810	47.6	0.061	0.00	0.0	0.600	o	300	
20.001	7.739	0.290	26.7	0.009	0.00	0.0	0.600	o	375	
22.000	30.705	0.190	161.6	0.133	5.00	0.0	0.600	o	300	
20.002	40.050	0.200	200.3	0.105	0.00	0.0	0.600	o	450	
20.003	12.752	0.070	182.2	0.052	0.00	0.0	0.600	o	525	
23.000	54.226	0.860	63.1	0.152	5.00	0.0	0.600	o	300	
20.004	19.449	0.300	64.8	0.069	0.00	0.0	0.600	o	525	
20.005	11.031	0.060	183.9	0.012	0.00	0.0	0.600	o	600	
20.006	60.371	0.300	201.2	0.087	0.00	0.0	0.600	o	750	

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)
1.015	0.00	13.53	119.480	4.381	0.0	0.0	0.0	2.45	530.7	0.0
20.000	0.00	5.60	123.005	0.213	0.0	0.0	0.0	1.49	164.4	0.0
21.000	0.00	5.23	123.890	0.064	0.0	0.0	0.0	1.16	20.5	0.0
21.001	0.00	5.51	123.530	0.125	0.0	0.0	0.0	2.29	161.5	0.0
20.001	0.00	5.63	122.645	0.347	0.0	0.0	0.0	3.52	388.7	0.0
22.000	0.00	5.41	122.620	0.133	0.0	0.0	0.0	1.23	87.2	0.0
20.002	0.00	6.10	122.280	0.585	0.0	0.0	0.0	1.43	227.9	0.0
20.003	0.00	6.23	122.005	0.637	0.0	0.0	0.0	1.66	358.6	0.0
23.000	0.00	5.46	123.020	0.152	0.0	0.0	0.0	1.98	140.2	0.0
20.004	0.00	6.34	121.935	0.858	0.0	0.0	0.0	2.79	602.9	0.0
20.005	0.00	6.44	121.560	0.870	0.0	0.0	0.0	1.79	506.9	0.0
20.006	0.00	6.96	121.350	0.957	0.0	0.0	0.0	1.97	869.9	0.0


Woods Hardwick		Page 9
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
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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)	Auto Design
24.000	19.311	0.130	148.5	0.045	5.00	0.0	0.600	o	150	
24.001	7.717	0.060	128.6	0.000	0.00	0.0	0.600	o	225	
24.002	36.223	0.250	144.9	0.040	0.00	0.0	0.600	o	300	
24.003	14.362	0.100	143.6	0.035	0.00	0.0	0.600	o	375	
24.004	26.956	0.130	207.4	0.031	0.00	0.0	0.600	o	750	
24.005	50.007	0.340	147.1	0.045	0.00	0.0	0.600	o	750	
20.007	21.961	0.320	68.6	0.190	0.00	0.0	0.600	o	750	
25.000	24.657	0.170	145.0	0.059	5.00	0.0	0.600	o	300	
25.001	11.150	0.050	223.0	0.000	0.00	0.0	0.600	o	375	
25.002	57.319	0.250	229.3	0.100	0.00	0.0	0.600	o	375	
25.003	57.682	0.250	230.7	0.209	0.00	0.0	0.600	o	525	
20.008	53.514	0.270	198.2	0.060	0.00	0.0	0.600	o	750	
26.000	26.369	1.060	24.9	0.100	5.00	0.0	0.600	o	225	
26.001	26.368	1.360	19.4	0.032	0.00	0.0	0.600	o	225	

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)
24.000	0.00	5.39	122.660	0.045	0.0	0.0	0.0	0.82	14.5	0.0
24.001	0.00	5.50	122.455	0.045	0.0	0.0	0.0	1.15	45.8	0.0
24.002	0.00	5.97	122.320	0.085	0.0	0.0	0.0	1.30	92.2	0.0
24.003	0.00	6.12	121.995	0.120	0.0	0.0	0.0	1.51	166.8	0.0
24.004	0.00	6.36	121.520	0.151	0.0	0.0	0.0	1.94	856.9	0.0
24.005	0.00	6.72	121.390	0.196	0.0	0.0	0.0	2.31	1018.5	0.0
20.007	0.00	7.06	121.050	1.343	0.0	0.0	0.0	3.38	1493.7	0.0
25.000	0.00	5.32	121.900	0.059	0.0	0.0	0.0	1.30	92.1	0.0
25.001	0.00	5.47	121.655	0.059	0.0	0.0	0.0	1.21	133.6	0.0
25.002	0.00	6.27	121.605	0.159	0.0	0.0	0.0	1.19	131.7	0.0
25.003	0.00	6.92	121.205	0.368	0.0	0.0	0.0	1.47	318.3	0.0
20.008	0.00	7.51	120.730	1.771	0.0	0.0	0.0	1.98	876.6	0.0
26.000	0.00	5.17	123.405	0.100	0.0	0.0	0.0	2.63	104.7	0.0
26.001	0.00	5.31	122.345	0.132	0.0	0.0	0.0	2.99	118.7	0.0

Woods Hardwick		Page 10
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24 File SW PH9 & PH10 west Propo...	Designed by a.tew Checked by	
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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)	Auto Design
20.009	47.191	0.440	107.3	0.110	0.00	0.0	0.600	o	750	
20.010	41.163	0.210	196.0	0.238	0.00	0.0	0.600	o	900	
27.000	39.777	0.370	107.5	0.211	5.00	0.0	0.600	o	300	
27.001	55.655	2.340	23.8	0.079	0.00	0.0	0.600	o	375	
20.011	26.994	0.153	176.4	0.045	0.00	0.0	0.600	o	900	
20.012	26.010	0.147	176.9	0.040	0.00	0.0	0.600	o	900	
28.000	22.710	0.560	40.6	0.235	5.00	0.0	0.600	o	300	
28.001	10.044	0.070	143.5	0.000	0.00	0.0	0.600	o	300	
28.002	67.567	0.770	87.7	0.109	0.00	0.0	0.600	o	375	
28.003	55.711	0.190	293.2	0.119	0.00	0.0	0.600	o	375	
28.004	55.725	1.555	35.8	0.050	0.00	0.0	0.600	o	375	
20.013	19.547	0.035	558.5	0.145	0.00	0.0	0.600	o	1050	
20.014	25.868	0.045	574.8	0.027	0.00	0.0	0.600	o	1050	

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)
20.009	0.00	7.80	120.460	2.013	0.0	0.0	0.0	2.70	1193.7	0.0
20.010	0.00	8.11	119.870	2.251	0.0	0.0	0.0	2.23	1421.5	0.0
27.000	0.00	5.44	122.970	0.211	0.0	0.0	0.0	1.52	107.2	0.0
27.001	0.00	5.69	122.525	0.290	0.0	0.0	0.0	3.73	411.8	0.0
20.011	0.00	8.30	119.660	2.586	0.0	0.0	0.0	2.36	1498.8	0.0
20.012	0.00	8.49	119.507	2.626	0.0	0.0	0.0	2.35	1496.6	0.0
28.000	0.00	5.15	123.105	0.235	0.0	0.0	0.0	2.48	175.0	0.0
28.001	0.00	5.28	122.545	0.235	0.0	0.0	0.0	1.31	92.6	0.0
28.002	0.00	5.86	122.400	0.344	0.0	0.0	0.0	1.94	213.7	0.0
28.003	0.00	6.74	121.630	0.463	0.0	0.0	0.0	1.05	116.3	0.0
28.004	0.00	7.05	121.440	0.513	0.0	0.0	0.0	3.04	335.2	0.0
20.013	0.00	8.71	119.210	3.284	0.0	0.0	0.0	1.45	1256.5	0.0
20.014	0.00	9.01	119.175	3.311	0.0	0.0	0.0	1.43	1238.3	0.0




Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
29.000	21.406	0.680	31.5	0.164	5.00	0.0	0.600	o	225	
29.001	36.607	0.250	146.4	0.019	0.00	0.0	0.600	o	300	
29.002	21.558	0.400	53.9	0.056	0.00	0.0	0.600	o	300	
29.003	29.650	1.840	16.1	0.076	0.00	0.0	0.600	o	300	
20.015	31.235#	0.100	312.4	0.100	0.00	0.0	0.600	o	1050	
20.016	3.234	0.020	161.7	0.000	0.00	0.0	0.600	o	225	
30.000	12.438	1.200	10.4	0.142	5.00	0.0	0.600	o	225	
1.016	12.868	0.040	321.7	0.000	0.00	0.0	0.600	o	525	
1.017	4.635	0.020	231.8	0.000	0.00	0.0	0.600	o	525	
1.018	7.557	0.040	188.9	0.000	0.00	0.0	0.600	o	525	
1.019	3.323	0.030	110.8	0.000	0.00	0.0	0.600	o	525	
1.020	43.797	0.490	89.4	0.000	0.00	0.0	0.600	\	-1	
1.021	49.124	0.300	163.7	0.000	0.00	0.0	0.600	\	-1	
1.022	15.633	0.400	39.1	0.000	0.00	0.0	0.600	o	600	
1.023	110.199	0.700	157.4	0.000	0.00	0.0	0.600	\	-1	

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)
29.000	0.00	5.15	123.125	0.164	0.0	0.0	0.0	2.34	93.0	0.0
29.001	0.00	5.62	122.370	0.183	0.0	0.0	0.0	1.30	91.7	0.0
29.002	0.00	5.79	122.120	0.239	0.0	0.0	0.0	2.15	151.7	0.0
29.003	0.00	5.92	121.720	0.315	0.0	0.0	0.0	3.94	278.2	0.0
20.015	0.00	9.28	119.130	3.726	0.0	0.0	0.0	1.94	1683.8	0.0
20.016	0.00	9.33	118.990	3.726	0.0	0.0	0.0	1.03	40.8	0.0
30.000	0.00	5.05	120.470	0.142	0.0	0.0	0.0	4.09	162.5	0.0
1.016	0.00	13.70	118.970	8.249	0.0	0.0	0.0	1.24	269.1	0.0
1.017	0.00	13.75	118.930	8.249	0.0	0.0	0.0	1.47	317.6	0.0
1.018	0.00	13.83	118.710	8.249	0.0	0.0	0.0	1.63	352.0	0.0
1.019	0.00	13.85	118.670	8.249	0.0	0.0	0.0	2.13	460.6	0.0
1.020	0.00	13.99	118.590	8.249	0.0	0.0	0.0	5.54	19969.3	0.0
1.021	0.00	14.19	118.100	8.249	0.0	0.0	0.0	4.09	14741.4	0.0
1.022	0.00	14.25	117.800	8.249	0.0	0.0	0.0	3.90	1103.7	0.0
1.023	0.00	14.69	117.400	8.249	0.0	0.0	0.0	4.17	15035.3	0.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Auto Design
31.000	219.023	0.500	438.0	1.070	5.00	0.0	0.600	o	600	
31.001	13.850	0.180	76.9	4.000	0.00	0.0	0.600	o	225	
1.024	8.191	0.050	163.8	0.000	0.00	0.0	0.600	\/	-1	

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)
31.000	0.00	8.15	117.430	1.070	0.0	0.0	0.0	1.16	327.1	0.0
31.001	0.00	8.31	116.930	5.070	0.0	0.0	0.0	1.49	59.3	0.0
1.024	0.00	14.73	116.700	13.319	0.0	0.0	0.0	4.09	14738.1	0.0

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)
1.024		0.000	116.650	0.000	0	0


Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	1.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 8 Number of Storage Structures 7 Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	GB 450500 225250 SP 50500 25250
C (1km)	-0.023
D1 (1km)	0.328

Woods Hardwick		Page 13
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24 File SW PH9 & PH10 west Propo...	Designed by a.tew Checked by	
XP Solutions	Network 2014.1.1	

Synthetic Rainfall Details

D2 (1km) 0.309
 D3 (1km) 0.264
 E (1km) 0.292
 F (1km) 2.461
 Summer Storms No
 Winter Storms Yes
 Cv (Summer) 0.750
 Cv (Winter) 0.840
 Storm Duration (mins) 15

Woods Hardwick		Page 14
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

Online Controls for Storm

Orifice Manhole: Swale, DS/PN: 1.001, Volume (m³): 32.6

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 123.200

Orifice Manhole: Swale, DS/PN: 1.002, Volume (m³): 32.5

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 122.700

Hydro-Brake® Manhole: Bl- 9, DS/PN: 1.007, Volume (m³): 5.6

Design Head (m) 1.200 Hydro-Brake® Type Md5 SW Only Invert Level (m) 121.531
Design Flow (l/s) 15.0 Diameter (mm) 150


Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0	1.200	14.8	3.000	23.5	7.000	35.8
0.200	9.8	1.400	16.0	3.500	25.3	7.500	37.1
0.300	10.9	1.600	17.1	4.000	27.1	8.000	38.3
0.400	10.8	1.800	18.2	4.500	28.7	8.500	39.5
0.500	10.8	2.000	19.2	5.000	30.3	9.000	40.6
0.600	11.1	2.200	20.1	5.500	31.8	9.500	41.7
0.800	12.3	2.400	21.0	6.000	33.2		
1.000	13.6	2.600	21.8	6.500	34.5		

Hydro-Brake Optimum® Manhole: 310 (HB), DS/PN: 7.007, Volume (m³): 4.2

Unit Reference MD-SHE-0104-5500-1400-5500
Design Head (m) 1.400
Design Flow (l/s) 5.5
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 104
Invert Level (m) 121.170
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	5.5	Kick-Flo®	0.857	4.4
Flush-Flo™	0.416	5.5	Mean Flow over Head Range	-	4.8

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

Woods Hardwick		Page 15
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

Hydro-Brake Optimum® Manhole: 310 (HB), DS/PN: 7.007, Volume (m³): 4.2

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.5	1.200	5.1	3.000	7.8	7.000	11.7
0.200	5.0	1.400	5.5	3.500	8.4	7.500	12.1
0.300	5.4	1.600	5.8	4.000	9.0	8.000	12.5
0.400	5.5	1.800	6.2	4.500	9.5	8.500	12.8
0.500	5.4	2.000	6.5	5.000	10.0	9.000	13.2
0.600	5.3	2.200	6.8	5.500	10.4	9.500	13.5
0.800	4.7	2.400	7.1	6.000	10.9		
1.000	4.7	2.600	7.3	6.500	11.3		

Complex Manhole: 243a (HB), DS/PN: 13.002, Volume (m³): 49.5


Hydro-Brake Optimum®

Unit Reference MD-SHE-0045-1400-2400-1400
Design Head (m) 2.400
Design Flow (l/s) 1.4
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 45
Invert Level (m) 120.335
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.400	1.4	Kick-Flo®	0.404	0.6
Flush-Flo™	0.200	0.8	Mean Flow over Head Range	-	1.0

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	0.7	1.200	1.0	3.000	1.5	7.000	2.3
0.200	0.8	1.400	1.1	3.500	1.7	7.500	2.4
0.300	0.7	1.600	1.2	4.000	1.8	8.000	2.4
0.400	0.6	1.800	1.2	4.500	1.9	8.500	2.5
0.500	0.7	2.000	1.3	5.000	2.0	9.000	2.6
0.600	0.8	2.200	1.3	5.500	2.0	9.500	2.6
0.800	0.9	2.400	1.4	6.000	2.1		
1.000	0.9	2.600	1.4	6.500	2.2		

Woods Hardwick		Page 16
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

Hydro-Brake Optimum®

Unit Reference MD-SHE-0070-2100-0900-2100
Design Head (m) 0.900
Design Flow (l/s) 2.1
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 70
Invert Level (m) 121.835
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	2.1	Kick-Flo®	0.564	1.7
Flush-Flo™	0.273	2.1	Mean Flow over Head Range	-	1.8

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	1.8	1.200	2.4	3.000	3.7	7.000	5.4
0.200	2.1	1.400	2.6	3.500	3.9	7.500	5.6
0.300	2.1	1.600	2.7	4.000	4.2	8.000	5.8
0.400	2.0	1.800	2.9	4.500	4.4	8.500	6.0
0.500	1.9	2.000	3.0	5.000	4.6	9.000	6.1
0.600	1.7	2.200	3.2	5.500	4.8	9.500	6.3
0.800	2.0	2.400	3.3	6.000	5.1		
1.000	2.2	2.600	3.4	6.500	5.2		

Hydro-Brake Optimum® Manhole: 234 (HB), DS/PN: 18.002, Volume (m³): 18.0

Unit Reference MD-SHE-0074-3000-1600-3000
Design Head (m) 1.600
Design Flow (l/s) 3.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Diameter (mm) 74
Invert Level (m) 120.450
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	3.0	Kick-Flo®	0.661	2.0
Flush-Flo™	0.323	2.5	Mean Flow over Head Range	-	2.4

The hydrological calculations have been based on the Head/Discharge relationship for the

Woods Hardwick		Page 17
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

Hydro-Brake Optimum® Manhole: 234 (HB), DS/PN: 18.002, Volume (m³): 18.0

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	2.6	3.000	4.0	7.000	6.0
0.200	2.4	1.400	2.8	3.500	4.3	7.500	6.2
0.300	2.5	1.600	3.0	4.000	4.6	8.000	6.4
0.400	2.5	1.800	3.2	4.500	4.9	8.500	6.5
0.500	2.4	2.000	3.3	5.000	5.1	9.000	6.7
0.600	2.2	2.200	3.5	5.500	5.3	9.500	6.9
0.800	2.2	2.400	3.6	6.000	5.6		
1.000	2.4	2.600	3.8	6.500	5.8		

Complex Manhole: 256 (HB), DS/PN: 20.016, Volume (m³): 38.0


Hydro-Brake Optimum®

Unit Reference	MD-SCL-0042-1300-2400-1300
Design Head (m)	2.400
Design Flow (l/s)	1.3
Flush-Flo™	Calculated
Objective	Minimise blockage risk
Diameter (mm)	42
Invert Level (m)	118.990
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.400	1.3	Kick-Flo®	0.372	0.6
Flush-Flo™	0.170	0.7	Mean Flow over Head Range	-	0.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.7	0.800	0.8	2.000	1.2	4.000	1.6
0.200	0.7	1.000	0.9	2.200	1.2	4.500	1.7
0.300	0.7	1.200	1.0	2.400	1.3	5.000	1.8
0.400	0.6	1.400	1.0	2.600	1.3	5.500	1.9
0.500	0.7	1.600	1.1	3.000	1.4	6.000	2.0
0.600	0.7	1.800	1.1	3.500	1.5	6.500	2.0

Woods Hardwick		Page 18
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

Hydro-Brake Optimum®

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
7.000	2.1	8.000	2.2	9.000	2.4		
7.500	2.2	8.500	2.3	9.500	2.4		

Hydro-Brake Optimum®

Unit Reference	MD-SHE-0107-4900-0820-4900
Design Head (m)	0.820
Design Flow (l/s)	4.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	107
Invert Level (m)	120.560
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200


Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.820	4.9	Kick-Flo®	0.545	4.1
Flush-Flo™	0.245	4.9	Mean Flow over Head Range	-	4.2

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	3.7	1.200	5.8	3.000	9.0	7.000	13.5
0.200	4.9	1.400	6.3	3.500	9.7	7.500	13.9
0.300	4.9	1.600	6.7	4.000	10.3	8.000	14.3
0.400	4.7	1.800	7.1	4.500	10.9	8.500	14.7
0.500	4.4	2.000	7.4	5.000	11.5	9.000	15.2
0.600	4.2	2.200	7.8	5.500	12.0	9.500	15.6
0.800	4.8	2.400	8.1	6.000	12.5		
1.000	5.4	2.600	8.4	6.500	13.0		

Hydro-Brake Optimum® Manhole: Future PH16, DS/PN: 31.001, Volume (m³): 63.4

Unit Reference	MD-SHE-0205-2180-1000-2180
Design Head (m)	1.000
Design Flow (l/s)	21.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	205
Invert Level (m)	116.930

Woods Hardwick		Page 19
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	


Hydro-Brake Optimum® Manhole: Future PH16, DS/PN: 31.001, Volume (m³): 63.4

Minimum Outlet Pipe Diameter (mm) 225
Suggested Manhole Diameter (mm) 1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	21.4	Kick-Flo®	0.723	18.4
Flush-Flo™	0.346	21.4	Mean Flow over Head Range	-	17.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.0	1.200	23.4	3.000	36.2	7.000	54.6
0.200	19.5	1.400	25.1	3.500	39.0	7.500	56.5
0.300	21.3	1.600	26.8	4.000	41.6	8.000	58.3
0.400	21.3	1.800	28.4	4.500	44.1	8.500	60.0
0.500	20.9	2.000	29.8	5.000	46.4	9.000	61.7
0.600	20.3	2.200	31.2	5.500	48.6	9.500	63.4
0.800	19.3	2.400	32.6	6.000	50.7		
1.000	21.4	2.600	33.8	6.500	52.7		

Woods Hardwick		Page 20
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

Storage Structures for Storm

Complex Manhole: SW MH, DS/PN: 2.001

Tank or Pond

Invert Level (m) 121.840

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	69.0	0.401	0.0	0.403	7.0	0.704	0.0
0.400	69.0	0.402	0.0	0.703	7.0		

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.7
Membrane Percolation (mm/hr)	1000	Length (m)	60.0
Max Percolation (l/s)	145.0	Slope (1:X)	80.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	5
Invert Level (m)	122.630	Cap Volume Depth (m)	0.000

Tank or Pond Manhole: PH10 Pond2, DS/PN: 7.004

Invert Level (m) 121.400


Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	318.4	1.300	925.6

Tank or Pond Manhole: PH10 Pond3, DS/PN: 7.006

Invert Level (m) 121.200

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	109.1	1.400	468.9

Complex Manhole: Pond, DS/PN: 17.000

Woods Hardwick		Page 21
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24 File SW PH9 & PH10 west Propo...	Designed by a.tew Checked by	
XP Solutions	Network 2014.1.1	

Tank or Pond

Invert Level (m) 120.890

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	337.7	2.200	1044.5

Trench Soakaway

Infiltration Coefficient Base (m/hr)	0.12564	Trench Width (m)	10.0
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	22.0
Safety Factor	1.0	Slope (1:X)	0.0
Porosity	0.30	Cap Volume Depth (m)	0.000
Invert Level (m)	120.890	Cap Infiltration Depth (m)	0.000

Tank or Pond Manhole: 232, DS/PN: 18.000

Invert Level (m) 120.860

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	60.0	0.500	60.0	0.501	0.0

Tank or Pond Manhole: 256 (HB), DS/PN: 20.016


Invert Level (m) 118.990

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	632.9	2.800	2195.0	2.801	0.0

Tank or Pond Manhole: Future PH16, DS/PN: 31.001

Invert Level (m) 116.930

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	4454.0	1.000	5311.0

Woods Hardwick		Page 22
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

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 1.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 8 Number of Storage Structures 7 Number of Real Time Controls 0


Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.264
Site Location GB 450500 225250 SP 50500 25250 E (1km) 0.292
C (1km) -0.023 F (1km) 2.461
D1 (1km) 0.328 Cv (Summer) 0.750
D2 (1km) 0.309 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, 240, 360, 480, 960, 1440
Return Period(s) (years) 1
Climate Change (%) 0

PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	1	0%					
1.001	15 Winter	1	0%					
1.002	30 Winter	1	0%					
1.003	30 Winter	1	0%					
1.004	15 Winter	1	0%					
2.000	15 Winter	1	0%					
2.001	60 Winter	1	0%					
1.005	30 Winter	1	0%					
3.000	30 Winter	1	0%					
1.006	30 Winter	1	0%					
1.007	30 Winter	1	0%	1/15 Summer				
1.008	30 Winter	1	0%					
1.009	30 Winter	1	0%					
4.000	15 Winter	1	0%	1/15 Summer				
4.001	15 Winter	1	0%					

Woods Hardwick		Page 23
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	


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

PN	Storm	Return Climate Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
5.000	15 Winter	1	0%					
4.002	15 Winter	1	0%					
6.000	15 Winter	1	0%					
6.001	15 Winter	1	0%					
6.002	15 Winter	1	0%					
4.003	15 Winter	1	0%					
4.004	15 Winter	1	0%					
4.005	15 Winter	1	0%					
4.006	15 Winter	1	0%					
7.000	15 Winter	1	0%					
7.001	15 Winter	1	0%					
7.002	15 Winter	1	0%					
7.003	15 Winter	1	0%					
7.004	360 Winter	1	0%					
8.000	15 Winter	1	0%					
8.001	15 Winter	1	0%					
8.002	15 Winter	1	0%					
7.005	360 Winter	1	0%					
9.000	15 Winter	1	0%					
9.001	15 Winter	1	0%					
9.002	15 Winter	1	0%					
9.003	15 Winter	1	0%					
9.004	360 Winter	1	0%					
9.005	360 Winter	1	0%					
7.006	360 Winter	1	0%					
10.000	480 Winter	1	0%	1/60 Winter				
7.007	480 Winter	1	0%	1/15 Summer				
4.007	15 Winter	1	0%					
11.000	15 Winter	1	0%					
11.001	15 Winter	1	0%					
12.000	15 Winter	1	0%					
12.001	15 Winter	1	0%					
11.002	15 Winter	1	0%					
11.003	15 Winter	1	0%					
4.008	15 Winter	1	0%					
4.009	15 Winter	1	0%					
4.010	15 Winter	1	0%					
4.011	15 Winter	1	0%					
4.012	15 Winter	1	0%					
4.013	15 Winter	1	0%					
4.014	15 Winter	1	0%					
13.000	60 Winter	1	0%					
14.000	15 Winter	1	0%					
14.001	15 Winter	1	0%					
14.002	15 Winter	1	0%					

Woods Hardwick		Page 24
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24 File SW PH9 & PH10 west Propo...	Designed by a.tew Checked by	
XP Solutions		Network 2014.1.1

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


PN	Storm	Return Climate Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
15.000	30 Winter	1	0%					
14.003	30 Winter	1	0%	1/30 Winter				
14.004	30 Winter	1	0%	1/15 Summer				
13.001	120 Winter	1	0%					
16.000	15 Winter	1	0%					
16.001	30 Winter	1	0%					
16.002	30 Winter	1	0%					
16.003	30 Winter	1	0%	1/15 Summer				
17.000	360 Winter	1	0%					
13.002	30 Winter	1	0%	1/15 Summer				
4.015	15 Winter	1	0%					
18.000	15 Winter	1	0%					
18.001	60 Winter	1	0%					
19.000	15 Winter	1	0%					
18.002	60 Winter	1	0%	1/15 Summer				
4.016	15 Winter	1	0%					
1.010	15 Winter	1	0%					
1.011	15 Winter	1	0%					
1.012	15 Winter	1	0%					
1.013	15 Winter	1	0%					
1.014	15 Winter	1	0%					
1.015	15 Winter	1	0%					
20.000	15 Winter	1	0%					
21.000	15 Winter	1	0%					
21.001	15 Winter	1	0%					
20.001	15 Winter	1	0%					
22.000	15 Winter	1	0%					
20.002	15 Winter	1	0%					
20.003	15 Winter	1	0%					
23.000	15 Winter	1	0%					
20.004	15 Winter	1	0%					
20.005	15 Winter	1	0%					
20.006	15 Winter	1	0%					
24.000	15 Winter	1	0%					
24.001	15 Winter	1	0%					
24.002	15 Winter	1	0%					
24.003	15 Winter	1	0%					
24.004	15 Winter	1	0%					
24.005	15 Winter	1	0%					
20.007	15 Winter	1	0%					
25.000	15 Winter	1	0%					
25.001	15 Winter	1	0%					
25.002	15 Winter	1	0%					
25.003	15 Winter	1	0%					
20.008	15 Winter	1	0%					

Woods Hardwick		Page 25
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24	Designed by a.tew	
File SW PH9 & PH10 west Propo...	Checked by	
XP Solutions	Network 2014.1.1	

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

PN	Storm	Return Climate Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
26.000	15 Winter	1	0%					
26.001	15 Winter	1	0%					
20.009	15 Winter	1	0%					
20.010	15 Winter	1	0%					
27.000	15 Winter	1	0%					
27.001	15 Winter	1	0%					
20.011	1440 Winter	1	0%					
20.012	1440 Winter	1	0%					
28.000	15 Winter	1	0%					
28.001	15 Winter	1	0%					
28.002	15 Winter	1	0%					
28.003	15 Winter	1	0%					
28.004	15 Winter	1	0%					
20.013	1440 Winter	1	0%					
20.014	1440 Winter	1	0%					
29.000	15 Winter	1	0%					
29.001	15 Winter	1	0%					
29.002	15 Winter	1	0%					
29.003	15 Winter	1	0%					
20.015	1440 Winter	1	0%					
20.016	1440 Winter	1	0% 1/15 Summer					
30.000	15 Winter	1	0%					
1.016	15 Winter	1	0%					
1.017	15 Winter	1	0%					
1.018	15 Winter	1	0%					
1.019	15 Winter	1	0%					
1.020	15 Winter	1	0%					
1.021	15 Winter	1	0%					
1.022	15 Winter	1	0%					
1.023	15 Winter	1	0%					
31.000	15 Winter	1	0%					
31.001	1440 Winter	1	0%					
1.024	15 Winter	1	0%					

PN	US/MH Name	Water	Flooded			Pipe		Status
		Level (m)	Surch'ed Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	O'flow (l/s)	Flow (l/s)	
1.000	Swale	123.851	-0.999	0.000	0.00	0.0	3.5	OK
1.001	Swale	123.513	-0.687	0.000	0.00	0.0	2.8	OK
1.002	Swale	123.033	-0.667	0.000	0.00	0.0	2.9	OK
1.003	Swale	122.484	-0.116	0.000	0.12	0.0	2.9	OK
1.004	B1- 5	121.932	-0.381	0.000	0.06	0.0	8.3	OK
2.000	SW MH	122.052	-0.303	0.000	0.08	0.0	10.0	OK
2.001	SW MH	121.896	-0.329	0.000	0.04	0.0	3.0	OK

Woods Hardwick		Page 26
15-17 Goldington Road Bedford Bedfordshire MK40 3NH		
Date 17/01/2023 12:24 File SW PH9 & PH10 west Propo...	Designed by a.tew Checked by	
XP Solutions		Network 2014.1.1

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

PN	US/MH Name	Water	Flooded		Pipe		Status	
		Level (m)	Surch'd Depth (m)	Volume (m ³)	Flow / Cap.	O'flow (l/s)		Flow (l/s)
1.005	B1- 6	121.762	-0.436	0.000	0.04	0.0	9.6	OK
3.000	B1- 13	121.758	-0.202	0.000	0.02	0.0	2.6	OK
1.006	B1- 8	121.758	-0.390	0.000	0.07	0.0	10.8	OK
1.007	B1- 9	121.755	0.074	0.000	0.71	0.0	10.2	SURCHARGED
1.008	Ex MH	121.446	-0.079	0.000	0.45	0.0	10.2	OK
1.009	Ex MH	121.064	-0.161	0.000	0.18	0.0	10.2	OK
4.000	Ex MH 1113	122.017	0.285	0.000	1.79	0.0	62.3	SURCHARGED
4.001	281 (div)	121.638	-0.203	0.000	0.48	0.0	61.5	OK
5.000	Ex MH 1109	122.009	-0.102	0.000	0.22	0.0	6.7	OK
4.002	282 (div)	121.594	-0.195	0.000	0.50	0.0	64.4	OK
6.000	283 (div)	121.996	-0.261	0.000	0.20	0.0	33.3	OK
6.001	284 (div)	121.814	-0.261	0.000	0.20	0.0	33.1	OK
6.002	285 (div)	121.613	-0.262	0.000	0.20	0.0	33.5	OK
4.003	286 (div)	121.528	-0.176	0.000	0.68	0.0	92.4	OK
4.004	286a (div)	121.465	-0.190	0.000	0.60	0.0	90.6	OK
4.005	287 (div)	121.384	-0.186	0.000	0.64	0.0	89.4	OK
4.006	288 (div)	121.310	-0.210	0.000	0.54	0.0	88.1	OK
7.000	296	123.851	-0.229	0.000	0.12	0.0	20.5	OK
7.001	297	122.236	-0.244	0.000	0.26	0.0	43.0	OK
7.002	298	122.021	-0.239	0.000	0.28	0.0	47.5	OK
7.003	299	121.715	-0.285	0.000	0.29	0.0	51.7	OK
7.004	PH10 Pond2	121.634	-0.216	0.000	0.03	0.0	4.5	OK
8.000	300	122.099	-0.271	0.000	0.02	0.0	2.1	OK
8.001	301	121.810	-0.220	0.000	0.16	0.0	13.0	OK
8.002	302	121.698	-0.202	0.000	0.23	0.0	18.8	OK
7.005	303	121.635	-0.155	0.000	0.03	0.0	5.2	OK
9.000	304	123.979	-0.241	0.000	0.08	0.0	9.7	OK
9.001	305	123.378	-0.322	0.000	0.05	0.0	14.5	OK
9.002	306	122.235	-0.265	0.000	0.19	0.0	33.0	OK
9.003	307	121.818	-0.252	0.000	0.24	0.0	39.1	OK
9.004	308	121.636	-0.254	0.000	0.04	0.0	7.6	OK
9.005	309	121.635	-0.065	0.000	0.06	0.0	11.0	OK
7.006	PH10 Pond3	121.634	-0.016	0.000	0.08	0.0	12.2	OK
10.000	PH10 UC	121.640	0.060	0.000	0.05	0.0	3.1	SURCHARGED
7.007	310 (HB)	121.653	0.183	0.000	0.08	0.0	5.5	SURCHARGED
4.007	289 (div)	121.221	-0.169	0.000	0.65	0.0	92.0	OK
11.000	Ex MH 1097	123.176	-0.056	0.000	0.39	0.0	2.6	OK
11.001	Ex MH 1115	122.939	-0.102	0.000	0.22	0.0	5.2	OK
12.000	Carpark	122.656	-0.264	0.000	0.03	0.0	2.5	OK
12.001	Carpark	122.574	-0.106	0.000	0.19	0.0	2.5	OK
11.002	290 (div)	122.271	-0.169	0.000	0.14	0.0	7.6	OK
11.003	291 (div)	121.579	-0.241	0.000	0.09	0.0	7.6	OK
4.008	292 (div)	121.200	-0.155	0.000	0.76	0.0	96.5	OK
4.009	293 (PI)	121.056	-0.174	0.000	0.68	0.0	95.5	OK

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

PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'ed Depth (m)	Volume (m ³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	
4.010	294 (div)	121.004	-0.176	0.000	0.68	0.0	96.0	OK
4.011	295 (div)	120.830	-0.235	0.000	0.32	0.0	96.0	OK
4.012	Ex MH	120.771	-0.294	0.000	0.40	0.0	95.2	OK
4.013	100 (D)	120.643	-0.302	0.000	0.37	0.0	92.7	OK
4.014	101 (D)	120.432	-0.303	0.000	0.37	0.0	90.5	OK
13.000	Dummy	120.705	0.000	0.000	0.03	0.0	0.3	SURCHARGED*
14.000	237	123.609	-0.211	0.000	0.19	0.0	29.5	OK
14.001	238	122.862	-0.268	0.000	0.18	0.0	34.6	OK
14.002	239	122.602	-0.278	0.000	0.15	0.0	41.0	OK
15.000	240	121.504	-0.251	0.000	0.17	0.0	33.5	OK
14.003	241	121.494	0.004	0.000	0.21	0.0	70.4	SURCHARGED
14.004	242	121.380	0.170	0.000	0.13	0.0	39.8	SURCHARGED
13.001	243	121.255	0.000	0.000	0.07	0.0	39.6	OK
16.000	229	121.806	-0.224	0.000	0.14	0.0	13.1	OK
16.001	230	121.325	-0.325	0.000	0.13	0.0	25.6	OK
16.002	231	121.303	-0.197	0.000	0.15	0.0	50.8	OK
16.003	235	121.254	0.079	0.000	0.08	0.0	38.8	SURCHARGED
17.000	Pond	121.170	-0.470	0.000	0.00	0.0	0.3	OK
13.002	243a (HB)	121.229	0.594	0.000	0.01	0.0	0.9	SURCHARGED
4.015	102 (D)	120.274	-0.301	0.000	0.38	0.0	90.3	OK
18.000	232	120.873	-0.437	0.000	0.01	0.0	1.1	OK
18.001	233	120.828	-0.372	0.000	0.01	0.0	4.4	OK
19.000	234a	121.413	-0.187	0.000	0.07	0.0	8.0	OK
18.002	234 (HB)	120.828	0.228	0.000	0.12	0.0	2.5	SURCHARGED
4.016	103 (D)	120.142	-0.313	0.000	0.32	0.0	91.8	OK
1.010	Ex MH	120.060	-0.255	0.000	0.47	0.0	98.8	OK
1.011	Ex MH	119.967	-0.228	0.000	0.61	0.0	97.8	OK
1.012	Ex MH	119.916	-0.249	0.000	0.48	0.0	96.8	OK
1.013	Ex MH	119.833	-0.242	0.000	0.53	0.0	95.7	OK
1.014	104 (D)	119.805	-0.238	0.000	0.58	0.0	95.3	OK
1.015	105 (D)	119.641	-0.364	0.000	0.20	0.0	95.3	OK
20.000	200	123.115	-0.265	0.000	0.18	0.0	27.9	OK
21.000	201	123.961	-0.079	0.000	0.45	0.0	8.5	OK
21.001	202	123.595	-0.235	0.000	0.10	0.0	15.3	OK
20.001	203	122.762	-0.258	0.000	0.21	0.0	44.5	OK
22.000	204	122.716	-0.204	0.000	0.22	0.0	17.5	OK
20.002	205	122.467	-0.263	0.000	0.36	0.0	72.7	OK
20.003	206	122.208	-0.322	0.000	0.31	0.0	77.9	OK
23.000	207	123.098	-0.222	0.000	0.15	0.0	20.1	OK
20.004	208	122.113	-0.347	0.000	0.25	0.0	104.4	OK
20.005	209	121.795	-0.365	0.000	0.32	0.0	106.6	OK
20.006	210	121.546	-0.554	0.000	0.15	0.0	113.9	OK
24.000	211	122.730	-0.080	0.000	0.44	0.0	5.9	OK
24.001	212	122.518	-0.162	0.000	0.17	0.0	6.0	OK

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

PN	US/MH Name	Water		Flooded		Pipe		Status
		Level (m)	Surch'd Depth (m)	Volume (m³)	Flow / Cap.	O'flow (l/s)	Flow (l/s)	
24.002	213	122.390	-0.230	0.000	0.12	0.0	10.5	OK
24.003	214	122.080	-0.290	0.000	0.12	0.0	14.3	OK
24.004	215	121.604	-0.666	0.000	0.03	0.0	17.6	OK
24.005	216	121.471	-0.669	0.000	0.03	0.0	22.3	OK
20.007	217	121.260	-0.540	0.000	0.17	0.0	153.7	OK
25.000	218	121.962	-0.238	0.000	0.09	0.0	7.8	OK
25.001	219	121.731	-0.299	0.000	0.08	0.0	7.8	OK
25.002	220	121.704	-0.276	0.000	0.15	0.0	19.0	OK
25.003	221	121.339	-0.391	0.000	0.15	0.0	41.8	OK
20.008	222	120.994	-0.486	0.000	0.27	0.0	199.6	OK
26.000	223	123.461	-0.169	0.000	0.14	0.0	13.4	OK
26.001	223a	122.404	-0.166	0.000	0.15	0.0	16.8	OK
20.009	224	120.698	-0.512	0.000	0.22	0.0	220.7	OK
20.010	225	120.164	-0.606	0.000	0.23	0.0	239.0	OK
27.000	226	123.079	-0.191	0.000	0.28	0.0	27.8	OK
27.001	227	122.603	-0.297	0.000	0.10	0.0	37.2	OK
20.011	228	120.022	-0.538	0.000	0.02	0.0	20.9	OK
20.012	228a	120.022	-0.385	0.000	0.02	0.0	21.0	OK
28.000	244	123.197	-0.208	0.000	0.20	0.0	31.4	OK
28.001	245	122.692	-0.153	0.000	0.47	0.0	31.0	OK
28.002	246	122.519	-0.256	0.000	0.21	0.0	43.2	OK
28.003	247	121.822	-0.183	0.000	0.50	0.0	54.3	OK
28.004	248	121.550	-0.265	0.000	0.19	0.0	58.9	OK
20.013	249	120.022	-0.238	0.000	0.04	0.0	25.8	OK
20.014	250	120.022	-0.203	0.000	0.03	0.0	25.4	OK
29.000	251	123.203	-0.147	0.000	0.26	0.0	21.9	OK
29.001	252	122.479	-0.191	0.000	0.28	0.0	23.8	OK
29.002	253	122.217	-0.203	0.000	0.23	0.0	30.1	OK
29.003	254	121.798	-0.222	0.000	0.15	0.0	38.7	OK
20.015	255	120.022	-0.158	0.000	0.02	0.0	27.9	OK
20.016	256 (HB)	120.022	0.807	0.000	0.03	0.0	0.9	SURCHARGED
30.000	Tennis courts	120.525	-0.170	0.000	0.14	0.0	19.0	OK
1.016	106 (D)	119.255	-0.240	0.000	0.52	0.0	95.5	OK
1.017	107 (D)	119.220	-0.235	0.000	0.58	0.0	95.3	OK
1.018	108 (PI)	118.956	-0.279	0.000	0.45	0.0	95.5	OK
1.019	109	118.919	-0.276	0.000	0.46	0.0	95.5	OK
1.020	HW01	118.659	-0.931	0.000	0.01	0.0	95.2	OK
1.021	Ditch (TBC)	118.193	-0.907	0.000	0.01	0.0	95.3	OK
1.022	PH10 crossing	117.954	-0.446	0.000	0.15	0.0	94.7	OK
1.023	Ditch (TBC)	117.488	-0.912	0.000	0.01	0.0	94.7	OK
31.000	Future PH16	117.714	-0.316	0.000	0.45	0.0	142.0	OK
31.001	Future PH16	117.111	-0.044	0.000	0.34	0.0	17.6	OK
1.024	Ditch (TBC)	116.808	-0.892	0.000	0.02	0.0	98.0	OK