Dean Court
85 Adllington Road
Wilmslow SK9 1BT

Date 22/06/2026 16:02 | Designed by dmann
File SURFACE WATER DESIGN 22.06.26.MDX | Checked by
Elstree Computing Ltd | Network 2020.1.3

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.600	Add Flow / Climate Change (%)	0
Ratio R	0.400	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)	500

Designed with Level Soffits

Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	40.491	0.110	368.1	0.185	5.00	0.0	0.600	o	450	Pipe/Conduit	
1.001	22.743	0.060	379.0	0.076	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.002	28.867	0.080	360.8	0.087	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.003	27.608	0.080	345.1	0.114	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	17.643	0.055	320.8	0.029	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	34.209	0.090	380.1	0.191	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.006	32.435	0.080	405.4	0.114	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.007	51.386	0.120	428.2	0.127	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.008	25.589	0.060	426.5	0.097	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.009	55.135	0.000	0.0	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
2.000	25.082	0.165	152.0	0.128	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	41.002	0.185	221.6	0.120	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	36.354	0.193	188.8	0.043	5.00	0.0	0.600	o	300	Pipe/Conduit	
2.002	21.131	0.063	334.3	0.112	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.64	100.560	0.185	0.0	0.0	0.0	1.05	167.6	25.1
1.001	50.00	6.01	100.450	0.261	0.0	0.0	0.0	1.04	165.1	35.3
1.002	50.00	6.46	100.390	0.347	0.0	0.0	0.0	1.06	169.3	47.0
1.003	50.00	6.88	100.310	0.462	0.0	0.0	0.0	1.09	173.1	62.5
1.004	50.00	7.14	100.230	0.490	0.0	0.0	0.0	1.13	179.7	66.4
1.005	50.00	7.64	100.100	0.681	0.0	0.0	0.0	1.14	247.4	92.2
1.006	50.00	8.13	100.010	0.795	0.0	0.0	0.0	1.11	239.5	107.7
1.007	50.00	8.92	99.930	0.923	0.0	0.0	0.0	1.08	232.9	125.0
1.008	50.00	9.32	99.810	1.020	0.0	0.0	0.0	1.08	233.4	138.1
1.009	44.94	11.83	99.750	1.020	0.0	0.0	0.0	0.37	413.6	138.1
2.000	50.00	5.40	100.730	0.128	0.0	0.0	0.0	1.06	42.1	17.3
2.001	50.00	5.96	100.415	0.248	0.0	0.0	0.0	1.21	134.0	33.6
3.000	50.00	5.53	100.498	0.043	0.0	0.0	0.0	1.14	80.7	5.8
2.002	50.00	6.32	100.230	0.403	0.0	0.0	0.0	0.99	108.8	54.6

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Network Design Table for Surface Network 1

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
4.000	55.516	0.184	302.1	0.274	5.00	0.0	0.600	o	450	Pipe/Conduit	
2.003	24.361	0.112	217.9	0.006	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.004	24.075	0.070	343.9	0.105	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.005	41.026	0.110	373.0	0.151	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.006	13.444	0.050	268.9	0.082	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.007	49.475	0.000	0.0	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.010	10.201	0.050	204.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.011	17.046	0.100	170.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	50.00	5.79	100.276	0.274	0.0	0.0	0.0	1.16	185.2	37.1
2.003	50.00	6.61	100.092	0.683	0.0	0.0	0.0	1.37	218.4	92.4
2.004	50.00	6.98	99.980	0.787	0.0	0.0	0.0	1.09	173.4	106.6
2.005	50.00	7.63	99.910	0.938	0.0	0.0	0.0	1.05	166.5	127.0
2.006	50.00	7.81	99.800	1.020	0.0	0.0	0.0	1.23	196.4	138.1
2.007	49.07	10.07	99.750	1.020	0.0	0.0	0.0	0.37	413.6	138.1
1.010	44.73	11.93	99.750	2.040	0.0	0.0	0.0	1.70	481.0	247.1
1.011	44.24	12.17	99.700	2.040	0.0	0.0	0.0	1.20	84.9«	247.1

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Manhole Schedules for Surface Network 1

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)
S1	102.426	1.866	Open Manhole	1350	1.000	100.560	450				
S2	102.103	1.653	Open Manhole	1350	1.001	100.450	450	1.000	100.450	450	
S3	102.247	1.857	Open Manhole	1350	1.002	100.390	450	1.001	100.390	450	
S4	102.065	1.755	Open Manhole	1350	1.003	100.310	450	1.002	100.310	450	
S5	102.198	1.968	Open Manhole	1350	1.004	100.230	450	1.003	100.230	450	
S6	101.833	1.733	Open Manhole	1500	1.005	100.100	525	1.004	100.175	450	
S7	101.507	1.497	Open Manhole	1500	1.006	100.010	525	1.005	100.010	525	
S8	101.354	1.424	Open Manhole	1500	1.007	99.930	525	1.006	99.930	525	
S9	101.104	1.294	Open Manhole	1500	1.008	99.810	525	1.007	99.810	525	
S10HW	101.050	1.300	Junction		1.009	99.750	1200	1.008	99.750	525	
S11	102.229	1.499	Open Manhole	1200	2.000	100.730	225				
S12	102.036	1.621	Open Manhole	1200	2.001	100.415	375	2.000	100.565	225	
S13	101.998	1.500	Open Manhole	1350	3.000	100.498	300				
S14	102.130	1.900	Open Manhole	1350	2.002	100.230	375	2.001	100.230	375	
								3.000	100.305	300	
S15	101.924	1.648	Open Manhole	1350	4.000	100.276	450				
S16	101.994	1.902	Open Manhole	1350	2.003	100.092	450	2.002	100.167	375	
								4.000	100.092	450	
S17	101.921	1.941	Open Manhole	1350	2.004	99.980	450	2.003	99.980	450	
S18	101.898	1.988	Open Manhole	1350	2.005	99.910	450	2.004	99.910	450	
S19	101.564	1.764	Open Manhole	1350	2.006	99.800	450	2.005	99.800	450	
S20HW	101.050	1.300	Junction		2.007	99.750	1200	2.006	99.750	450	
S21HW	101.050	1.300	Junction		1.010	99.750	600	1.009	99.750	1200	
								2.007	99.750	1200	
S22 FC (DH0.9 - DF7ls)	101.300	1.600	Open Manhole	3000	1.011	99.700	300	1.010	99.700	600	
S23	100.400	0.800	Junction			OUTFALL		1.011	99.600	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	445141.730	293418.964	445141.730	293418.964	Required	
S2	445169.244	293448.671	445169.244	293448.671	Required	
S3	445183.511	293466.381	445183.511	293466.381	Required	
S4	445196.776	293492.020	445196.776	293492.020	Required	
S5	445174.679	293508.569	445174.679	293508.569	Required	
S6	445164.875	293523.237	445164.875	293523.237	Required	
S7	445191.043	293545.271	445191.043	293545.271	Required	

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Manhole Schedules for Surface Network 1

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S8	445219.377	293561.058	445219.377	293561.058	Required	
S9	445263.770	293586.938	445263.770	293586.938	Required	
S10HW	445289.299	293588.687			No Entry	
S11	445220.258	293404.530	445220.258	293404.530	Required	
S12	445229.778	293427.735	445229.778	293427.735	Required	
S13	445215.925	293479.521	445215.925	293479.521	Required	
S14	445248.821	293464.046	445248.821	293464.046	Required	
S15	445306.174	293454.166	445306.174	293454.166	Required	
S16	445258.600	293482.778	445258.600	293482.778	Required	
S17	445270.008	293504.303	445270.008	293504.303	Required	
S18	445285.101	293523.060	445285.101	293523.060	Required	
S19	445302.905	293560.021	445302.905	293560.021	Required	
S20HW	445302.465	293573.458			No Entry	
S21HW	445342.763	293602.160			No Entry	
S22 FC (DH0.9 - DF7ls)	445348.362	293610.687	445348.362	293610.687	Required	

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PIPELINE SCHEDULES for Surface Network 1

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	450	S1	102.426	100.560	1.416	Open Manhole	1350
1.001	o	450	S2	102.103	100.450	1.203	Open Manhole	1350
1.002	o	450	S3	102.247	100.390	1.407	Open Manhole	1350
1.003	o	450	S4	102.065	100.310	1.305	Open Manhole	1350
1.004	o	450	S5	102.198	100.230	1.518	Open Manhole	1350
1.005	o	525	S6	101.833	100.100	1.208	Open Manhole	1500
1.006	o	525	S7	101.507	100.010	0.972	Open Manhole	1500
1.007	o	525	S8	101.354	99.930	0.899	Open Manhole	1500
1.008	o	525	S9	101.104	99.810	0.769	Open Manhole	1500
1.009	o	1200	S10HW	101.050	99.750	0.100	Junction	
2.000	o	225	S11	102.229	100.730	1.274	Open Manhole	1200
2.001	o	375	S12	102.036	100.415	1.246	Open Manhole	1200
3.000	o	300	S13	101.998	100.498	1.200	Open Manhole	1350
2.002	o	375	S14	102.130	100.230	1.525	Open Manhole	1350
4.000	o	450	S15	101.924	100.276	1.198	Open Manhole	1350
2.003	o	450	S16	101.994	100.092	1.452	Open Manhole	1350
2.004	o	450	S17	101.921	99.980	1.491	Open Manhole	1350
2.005	o	450	S18	101.898	99.910	1.538	Open Manhole	1350
2.006	o	450	S19	101.564	99.800	1.314	Open Manhole	1350
2.007	o	1200	S20HW	101.050	99.750	0.100	Junction	
1.010	o	600	S21HW	101.050	99.750	0.700	Junction	
1.011	o	300	S22 FC (DH0.9 - DF71s)	101.300	99.700	1.300	Open Manhole	3000

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	40.491	368.1	S2	102.103	100.450	1.203	Open Manhole	1350
1.001	22.743	379.0	S3	102.247	100.390	1.407	Open Manhole	1350
1.002	28.867	360.8	S4	102.065	100.310	1.305	Open Manhole	1350
1.003	27.608	345.1	S5	102.198	100.230	1.518	Open Manhole	1350
1.004	17.643	320.8	S6	101.833	100.175	1.208	Open Manhole	1500
1.005	34.209	380.1	S7	101.507	100.010	0.972	Open Manhole	1500
1.006	32.435	405.4	S8	101.354	99.930	0.899	Open Manhole	1500
1.007	51.386	428.2	S9	101.104	99.810	0.769	Open Manhole	1500
1.008	25.589	426.5	S10HW	101.050	99.750	0.775	Junction	
1.009	55.135	0.0	S21HW	101.050	99.750	0.100	Junction	
2.000	25.082	152.0	S12	102.036	100.565	1.246	Open Manhole	1200
2.001	41.002	221.6	S14	102.130	100.230	1.525	Open Manhole	1350
3.000	36.354	188.8	S14	102.130	100.305	1.525	Open Manhole	1350
2.002	21.131	334.3	S16	101.994	100.167	1.452	Open Manhole	1350
4.000	55.516	302.1	S16	101.994	100.092	1.452	Open Manhole	1350
2.003	24.361	217.9	S17	101.921	99.980	1.491	Open Manhole	1350
2.004	24.075	343.9	S18	101.898	99.910	1.538	Open Manhole	1350
2.005	41.026	373.0	S19	101.564	99.800	1.314	Open Manhole	1350
2.006	13.444	268.9	S20HW	101.050	99.750	0.850	Junction	
2.007	49.475	0.0	S21HW	101.050	99.750	0.100	Junction	
1.010	10.201	204.0	S22 FC (DH0.9 - DF71s)	101.300	99.700	1.000	Open Manhole	3000
1.011	17.046	170.5	S23	100.400	99.600	0.500	Junction	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.600 Cv (Summer) 0.750
Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Winter	100	+40%	100/15 Summer				102.159
1.001	S2	15 Winter	100	+40%	100/15 Summer	100/15 Winter			102.104
1.002	S3	15 Winter	100	+40%	100/15 Summer				102.068
1.003	S4	15 Winter	100	+40%	100/15 Summer				101.991
1.004	S5	15 Winter	100	+40%	100/15 Summer				101.837
1.005	S6	15 Winter	100	+40%	100/15 Summer				101.686
1.006	S7	15 Winter	100	+40%	100/15 Summer	100/15 Winter			101.507
1.007	S8	15 Winter	100	+40%	30/15 Winter				101.287
1.008	S9	15 Winter	100	+40%	30/15 Winter				100.927
1.009	S10HW	1440 Winter	100	+40%					100.790
2.000	S11	15 Winter	100	+40%	30/15 Summer	100/15 Summer			102.235
2.001	S12	15 Winter	100	+40%	30/15 Summer	100/15 Summer			102.046
3.000	S13	15 Winter	100	+40%	30/15 Summer	100/15 Summer			102.000
2.002	S14	15 Summer	100	+40%	30/15 Summer				102.081
4.000	S15	15 Winter	100	+40%	30/15 Summer	100/15 Summer			101.937
2.003	S16	15 Summer	100	+40%	30/15 Summer				101.981
2.004	S17	15 Winter	100	+40%	30/15 Summer				101.876
2.005	S18	15 Winter	100	+40%	30/15 Summer				101.598
2.006	S19	30 Winter	100	+40%	30/15 Summer				101.029
2.007	S20HW	1440 Winter	100	+40%					100.790
1.010	S21HW	1440 Winter	100	+40%	100/15 Summer				100.791
1.011	S22 FC (DH0.9 - DF7ls)	1440 Winter	100	+40%	1/600 Winter				100.790

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	1.149	0.000	0.65			96.5	FLOOD RISK	
1.001	S2	1.204	0.709	0.94			128.7	FLOOD	1
1.002	S3	1.228	0.000	1.13			164.3	FLOOD RISK	
1.003	S4	1.231	0.000	1.45			214.0	FLOOD RISK	
1.004	S5	1.157	0.000	1.58			224.7	SURCHARGED	
1.005	S6	1.061	0.000	1.44			303.7	FLOOD RISK	
1.006	S7	0.972	0.028	1.71			347.5	FLOOD	1
1.007	S8	0.832	0.000	1.84			382.7	FLOOD RISK	
1.008	S9	0.592	0.000	2.16			412.3	FLOOD RISK	
1.009	S10HW	-0.160	0.000	0.02			26.0	FLOOD RISK*	

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
2.000	S11	1.280	5.647	1.28			49.7	FLOOD	4
2.001	S12	1.256	9.890	0.96			116.9	FLOOD	4
3.000	S13	1.203	2.696	0.35			26.4	FLOOD	4
2.002	S14	1.476	0.000	1.67			153.9	FLOOD RISK	
4.000	S15	1.211	12.970	0.70			119.3	FLOOD	4
2.003	S16	1.439	0.000	1.43			260.4	FLOOD RISK	
2.004	S17	1.446	0.000	2.01			290.5	FLOOD RISK	
2.005	S18	1.238	0.000	2.44			362.2	SURCHARGED	
2.006	S19	0.779	0.000	2.55			374.5	SURCHARGED	
2.007	S20HW	-0.160	0.000	0.02			26.3	FLOOD RISK*	
1.010	S21HW	0.441	0.000	0.14			48.1	FLOOD RISK*	
1.011	S22 FC (DH0.9 - DF7ls)	0.790	0.000	0.11			7.7	SURCHARGED	

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