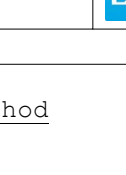


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Micro Drainage		Network 2020.1.3

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SN1 SEP 24.SWS

Pipe Sizes SN1 SEP 24 Manhole Sizes SN1 SEP 24

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.356	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	250	Maximum Backdrop Height (m)	0.000
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.	1.000	Min Slope for Optimisation (1:X)	400

Designed with Level Soffits

Network Design Table for SN1 SEP 24.SWS

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
S1.000	41.936	0.419	100.1	0.129	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	12.378	0.124	99.8	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	13.983	0.140	99.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	70.349	0.997	70.6	0.149	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	30.207	2.822	10.7	0.167	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	62.173	0.414	150.2	0.308	5.00	0.0	0.600	o	375	Pipe/Conduit	
S1.005	30.206	0.302	100.0	0.057	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.006	32.425	0.324	100.1	0.077	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)
S1.000	57.49	5.44	166.349	0.129	0.0	0.0	0.0	1.57	111.1	26.8
S1.001	56.91	5.58	165.930	0.153	0.0	0.0	0.0	1.57	111.2	31.4
S1.002	56.28	5.72	165.806	0.153	0.0	0.0	0.0	1.57	111.2	31.4
S1.003	53.77	6.35	165.666	0.302	0.0	0.0	0.0	1.87	132.5	58.6
S1.004	53.38	6.45	164.669	0.469	0.0	0.0	0.0	4.83	341.6	90.4
S2.000	56.37	5.70	162.186	0.308	0.0	0.0	0.0	1.48	163.0	62.7
S1.005	52.37	6.73	161.772	0.834	0.0	0.0	0.0	1.81	200.1	157.7
S1.006	51.33	7.03	161.470	0.911	0.0	0.0	0.0	1.81	200.0	168.9

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Micro Drainage

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Network Design Table for SN1 SEP 24.SWS

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
S1.007	13.673	0.212	64.5	0.060	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.000	29.113	0.614	47.4	0.083	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	35.764	0.894	40.0	0.130	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.002	16.898	0.347	48.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.003	35.718	0.855	41.8	0.143	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.008	29.825	0.786	37.9	0.042	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.009	23.921	0.060	398.7	0.000	0.00	0.0	0.600	o	1500	Pipe/Conduit	
S1.010	11.488	0.029	396.1	0.000	0.00	0.0	0.600	o	1500	Pipe/Conduit	
S4.000	51.952	0.129	402.7	0.155	5.00	0.0	0.600	o	1500	Pipe/Conduit	
S5.000	34.800	0.087	400.0	0.185	5.00	0.0	0.600	o	1500	Pipe/Conduit	
S5.001	34.038	0.085	400.4	0.024	0.00	0.0	0.600	o	1500	Pipe/Conduit	
S6.000	55.173	0.138	399.8	0.149	5.00	0.0	0.600	o	1500	Pipe/Conduit	
S5.002	42.961	0.107	401.5	0.066	0.00	0.0	0.600	o	1500	Pipe/Conduit	
S5.003	26.922	0.067	401.8	0.156	0.00	0.0	0.600	o	1500	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)
S1.007	51.03	7.12	161.071	0.971	0.0	0.0	0.0	2.53	403.1	178.9
S3.000	58.35	5.25	165.294	0.083	0.0	0.0	0.0	1.90	75.7	17.5
S3.001	57.27	5.49	164.605	0.213	0.0	0.0	0.0	2.49	176.2	44.0
S3.002	56.73	5.62	163.711	0.213	0.0	0.0	0.0	2.26	159.7	44.0
S3.003	55.70	5.86	163.364	0.356	0.0	0.0	0.0	2.44	172.4	71.6
S1.008	50.53	7.27	160.859	1.369	0.0	0.0	0.0	3.31	526.2	249.8
S1.009	49.93	7.46	159.023	1.369	0.0	0.0	0.0	2.14	3785.4	249.8
S1.010	49.65	7.55	158.963	1.369	0.0	0.0	0.0	2.15	3797.6	249.8
S4.000	57.66	5.41	159.064	0.155	0.0	0.0	0.0	2.13	3766.2	32.3
S5.000	58.27	5.27	159.282	0.185	0.0	0.0	0.0	2.14	3779.1	38.9
S5.001	57.08	5.54	159.195	0.209	0.0	0.0	0.0	2.14	3777.0	43.1
S6.000	57.55	5.43	159.248	0.149	0.0	0.0	0.0	2.14	3780.0	31.0
S5.002	55.66	5.87	159.110	0.424	0.0	0.0	0.0	2.13	3772.0	85.2
S5.003	54.81	6.08	159.003	0.580	0.0	0.0	0.0	2.13	3770.5	114.8

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Micro Drainage					Network 2020.1.3				
1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SN1 SEP 24.SWS									
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 Offline Controls 0 Number of Time/Area Diagrams 0									
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0									
Synthetic Rainfall Details									
Rainfall Model FSR Ratio R 0.356									
Region England and Wales Cv (Summer) 1.000									
M5-60 (mm) 18.000 Cv (Winter) 1.000									
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, 2, 30, 100									
Climate Change (%) 0, 0, 0, 40									
Water									
PN	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)
S1.000	S1	15 Summer	1	+0%	100/15 Summer				166.438
S1.001	S2	15 Summer	1	+0%	100/15 Summer				166.033
S1.002	S3	15 Summer	1	+0%	100/15 Summer				165.906
S1.003	S4	15 Summer	1	+0%	100/15 Summer				165.784
S1.004	S5	15 Summer	1	+0%	100/15 Summer				164.759
S2.000	S6	15 Summer	1	+0%	30/15 Summer				162.329
S1.005	S7	15 Summer	1	+0%	30/15 Summer				161.991
S1.006	S8	15 Summer	1	+0%	30/15 Summer				161.699
S1.007	S9	15 Summer	1	+0%	30/15 Summer				161.295
S3.000	S10	15 Summer	1	+0%	100/15 Summer				165.358
S3.001	S11	15 Summer	1	+0%	100/15 Summer				164.691
S3.002	S12	15 Summer	1	+0%	100/15 Summer				163.806
S3.003	S13	15 Summer	1	+0%	100/15 Summer				163.477
S1.008	S14	15 Summer	1	+0%	100/15 Summer				161.055
S1.009	S15	240 Summer	1	+0%	100/30 Summer				159.743
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for

SN1 SEP 24.SWS

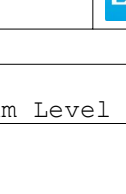
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.010	S16	240 Summer	1	+0%	30/360 Winter				159.742
S4.000	S17	240 Summer	1	+0%	100/30 Summer				159.742
S5.000	S18	240 Summer	1	+0%	100/60 Summer				159.742
S5.001	S19	240 Summer	1	+0%	100/60 Summer				159.742
S6.000	S20	240 Summer	1	+0%	100/60 Summer				159.742
S5.002	S21	240 Summer	1	+0%	100/60 Summer				159.742
S5.003	S22	240 Summer	1	+0%	100/30 Summer				159.742
S1.011	S23	240 Summer	1	+0%	30/240 Summer				159.742
S1.012	S24	240 Summer	1	+0%	30/240 Summer				159.739
S1.013	S25	240 Summer	1	+0%	1/15 Summer				159.737

Surcharged Flooded					Half Drain		Pipe		
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
S1.010	S16	-0.721	0.000	0.04			55.8	OK	
S4.000	S17	-0.822	0.000	0.00			5.7	OK	
S5.000	S18	-1.040	0.000	0.00			7.1	OK	
S5.001	S19	-0.953	0.000	0.00			4.0	OK	
S6.000	S20	-1.006	0.000	0.00			5.4	OK	
S5.002	S21	-0.868	0.000	0.00			5.6	OK	
S5.003	S22	-0.761	0.000	0.00			7.2	OK	
S1.011	S23	-0.692	0.000	0.01			19.6	OK	
S1.012	S24	-0.626	0.000	0.01			16.3	OK	
S1.013	S25	0.702	0.000	0.20			16.0	SURCHARGED	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for <u>SN1 SEP 24.SWS</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 Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Ratio R 0.356 Region England and Wales Cv (Summer) 1.000 M5-60 (mm) 18.000 Cv (Winter) 1.000 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, 2, 30, 100 Climate Change (%) 0, 0, 0, 40																																																																																																																																																																		
<table border="1"> <thead> <tr> <th>PN</th> <th>US/MH Name</th> <th>Storm</th> <th>Return Period</th> <th>Climate Change</th> <th>First (X) Surcharge</th> <th>First (Y) Flood</th> <th>First (Z) Overflow</th> <th>Overflow Act.</th> <th>Water Level (m)</th> </tr> </thead> <tbody> <tr><td>S1.000</td><td>S1</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>166.450</td></tr> <tr><td>S1.001</td><td>S2</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>166.049</td></tr> <tr><td>S1.002</td><td>S3</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>165.921</td></tr> <tr><td>S1.003</td><td>S4</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>165.802</td></tr> <tr><td>S1.004</td><td>S5</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>164.771</td></tr> <tr><td>S2.000</td><td>S6</td><td>15 Summer</td><td>2</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>162.351</td></tr> <tr><td>S1.005</td><td>S7</td><td>15 Summer</td><td>2</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>162.033</td></tr> <tr><td>S1.006</td><td>S8</td><td>15 Summer</td><td>2</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>161.744</td></tr> <tr><td>S1.007</td><td>S9</td><td>15 Summer</td><td>2</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>161.332</td></tr> <tr><td>S3.000</td><td>S10</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>165.368</td></tr> <tr><td>S3.001</td><td>S11</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>164.704</td></tr> <tr><td>S3.002</td><td>S12</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>163.819</td></tr> <tr><td>S3.003</td><td>S13</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>163.494</td></tr> <tr><td>S1.008</td><td>S14</td><td>15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>161.086</td></tr> <tr><td>S1.009</td><td>S15</td><td>240 Winter</td><td>2</td><td>+0%</td><td>100/30 Summer</td><td></td><td></td><td></td><td>159.914</td></tr> </tbody> </table>			PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	S1.000	S1	15 Summer	2	+0%	100/15 Summer				166.450	S1.001	S2	15 Summer	2	+0%	100/15 Summer				166.049	S1.002	S3	15 Summer	2	+0%	100/15 Summer				165.921	S1.003	S4	15 Summer	2	+0%	100/15 Summer				165.802	S1.004	S5	15 Summer	2	+0%	100/15 Summer				164.771	S2.000	S6	15 Summer	2	+0%	30/15 Summer				162.351	S1.005	S7	15 Summer	2	+0%	30/15 Summer				162.033	S1.006	S8	15 Summer	2	+0%	30/15 Summer				161.744	S1.007	S9	15 Summer	2	+0%	30/15 Summer				161.332	S3.000	S10	15 Summer	2	+0%	100/15 Summer				165.368	S3.001	S11	15 Summer	2	+0%	100/15 Summer				164.704	S3.002	S12	15 Summer	2	+0%	100/15 Summer				163.819	S3.003	S13	15 Summer	2	+0%	100/15 Summer				163.494	S1.008	S14	15 Summer	2	+0%	100/15 Summer				161.086	S1.009	S15	240 Winter	2	+0%	100/30 Summer				159.914
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S1.007	S9	15 Summer	2	+0%	30/15 Summer				161.332																																																																																																																																																									
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S3.001	S11	15 Summer	2	+0%	100/15 Summer				164.704																																																																																																																																																									
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RSK LDE		Page 12
Spring Lodge 172 Chester Road Helsby Cheshire WA6 0AR		
Date 01/01/0001 File SN1 - Detailed Design.MDX		
Designed by mrayner Checked by		
Micro Drainage		Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for SN1 SEP 24.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.356
Region England and Wales Cv (Summer)	1.000		
M5-60 (mm)	18.000	Cv (Winter)	1.000

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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Summer	100	+40%	100/15 Summer				167.257
S1.001	S2	15 Summer	100	+40%	100/15 Summer				167.047
S1.002	S3	15 Summer	100	+40%	100/15 Summer				166.932
S1.003	S4	15 Summer	100	+40%	100/15 Summer				166.810
S1.004	S5	15 Summer	100	+40%	100/15 Summer				165.313
S2.000	S6	30 Summer	100	+40%	30/15 Summer				163.572
S1.005	S7	15 Summer	100	+40%	30/15 Summer				163.578
S1.006	S8	15 Summer	100	+40%	30/15 Summer				163.084
S1.007	S9	15 Summer	100	+40%	30/15 Summer				162.228
S3.000	S10	15 Summer	100	+40%	100/15 Summer				165.580
S3.001	S11	15 Summer	100	+40%	100/15 Summer				165.253
S3.002	S12	15 Summer	100	+40%	100/15 Summer				164.679
S3.003	S13	15 Summer	100	+40%	100/15 Summer				164.383
S1.008	S14	15 Summer	100	+40%	100/15 Summer				161.864
S1.009	S15	480 Winter	100	+40%	100/30 Summer				161.427

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