

The Civil Engineering Practice		Page 1
11 Tungsten Building George Street Fishersgate BN41 1RA	Manor Nursery Angmering West Sussex	
Date 28/06/2019 File Planning Network File.MDX	Designed by S Burgess Checked by SRD	
Innovyze	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for NETWORK 6.SWS

Pipe Sizes NETWORK 9 Manhole Sizes NETWORK 9

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.600	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.500
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.000
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)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for NETWORK 6.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
1.000	13.024	0.127	103.0	0.000	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	10.052	0.098	103.0	0.004	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.000	14.867	0.224	66.3	0.004	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.002	1.369	0.013	103.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
3.000	15.130	0.237	63.7	0.003	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.003	5.348	0.052	103.0	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.004	5.497	0.053	102.9	0.001	0.00	0.0	0.600	o	100	Pipe/Conduit	
4.000	7.128	0.343	20.8	0.003	5.00	0.0	0.600	o	100	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	50.00	5.29	15.650	0.000	0.0	0.0	0.0	0.76	5.9	0.0
1.001	50.00	5.51	15.524	0.004	0.0	0.0	0.0	0.76	5.9	0.5
2.000	50.00	5.26	15.650	0.004	0.0	0.0	0.0	0.95	7.4	0.5
1.002	50.00	5.54	15.426	0.008	0.0	0.0	0.0	0.76	5.9	1.1
3.000	50.00	5.26	15.650	0.003	0.0	0.0	0.0	0.97	7.6	0.4
1.003	50.00	5.66	15.413	0.014	0.0	0.0	0.0	0.76	5.9	1.9
1.004	50.00	5.78	15.361	0.015	0.0	0.0	0.0	0.76	6.0	2.0
4.000	50.00	5.07	15.556	0.003	0.0	0.0	0.0	1.70	13.4	0.4

©1982-2017 XP Solutions

The Civil Engineering Practice											Page 2																																																																						
11 Tungsten Building George Street Fishersgate BN41 1RA					Manor Nursery Angmering West Sussex																																																																												
Date 28/06/2019					Designed by S Burgess																																																																												
File Planning Network File.MDX					Checked by SRD																																																																												
Innovyze					Network 2017.1.2																																																																												
<u>Network Design Table for NETWORK 6.SWS</u> <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section Type</th><th>Auto Design</th></tr><tr><td>5.000</td><td>7.444</td><td>0.343</td><td>21.7</td><td>0.001</td><td>5.60</td><td>0.0</td><td>0.600</td><td>o</td><td>100</td><td>Pipe/Conduit</td><td></td></tr><tr><td>1.005</td><td>9.975</td><td>0.097</td><td>102.9</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>100</td><td>Pipe/Conduit</td><td></td></tr></table> <u>Network Results Table</u> <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>5.000</td><td>50.00</td><td>5.07</td><td>15.650</td><td>0.001</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.66</td><td>13.1</td><td>0.1</td></tr><tr><td>1.005</td><td>50.00</td><td>6.00</td><td>15.307</td><td>0.019</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.76</td><td>6.0</td><td>2.6</td></tr></table>													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	5.000	7.444	0.343	21.7	0.001	5.60	0.0	0.600	o	100	Pipe/Conduit		1.005	9.975	0.097	102.9	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit		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	50.00	5.07	15.650	0.001	0.0	0.0	0.0	1.66	13.1	0.1	1.005	50.00	6.00	15.307	0.019	0.0	0.0	0.0	0.76	6.0	2.6
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																																																																						
5.000	7.444	0.343	21.7	0.001	5.60	0.0	0.600	o	100	Pipe/Conduit																																																																							
1.005	9.975	0.097	102.9	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit																																																																							
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	50.00	5.07	15.650	0.001	0.0	0.0	0.0	1.66	13.1	0.1																																																																							
1.005	50.00	6.00	15.307	0.019	0.0	0.0	0.0	0.76	6.0	2.6																																																																							
©1982-2017 XP Solutions																																																																																	

The Civil Engineering Practice		Page 3
11 Tungsten Building George Street Fishersgate BN41 1RA	Manor Nursery Angmering West Sussex	
Date 28/06/2019 File Planning Network File.MDX	Designed by S Burgess Checked by SRD	
Innovyze	Network 2017.1.2	

PIPELINE SCHEDULES for NETWORK 6.SWS

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	100	1	16.250	15.650	0.500	Open Manhole	1200
1.001	o	100	2	16.250	15.524	0.627	Open Manhole	1200
2.000	o	100	8	16.250	15.650	0.500	Open Manhole	1200
1.002	o	100	3	16.250	15.426	0.724	Open Manhole	1200
3.000	o	100	9	16.250	15.650	0.500	Open Manhole	1200
1.003	o	100	4	16.250	15.413	0.737	Open Manhole	1200
1.004	o	100	5	16.250	15.361	0.789	Open Manhole	1200
4.000	o	100	10	16.250	15.650	0.500	Open Manhole	1200
5.000	o	100	11	16.250	15.650	0.500	Open Manhole	1200
1.005	o	100	6	16.250	15.307	0.843	Open Manhole	1200

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	13.024	103.0	2	16.250	15.524	0.627	Open Manhole	1200
1.001	10.052	103.0	3	16.250	15.426	0.724	Open Manhole	1200
2.000	14.867	66.3	3	16.250	15.426	0.724	Open Manhole	1200
1.002	1.369	103.0	4	16.250	15.413	0.737	Open Manhole	1200
3.000	15.130	63.7	4	16.250	15.413	0.737	Open Manhole	1200
1.003	5.348	103.0	5	16.250	15.361	0.789	Open Manhole	1200
1.004	5.497	102.9	6	16.250	15.307	0.843	Open Manhole	1200
4.000	7.128	20.8	6	16.250	15.307	0.843	Open Manhole	1200
5.000	7.444	21.7	6	16.250	15.307	0.843	Open Manhole	1200
1.005	9.975	102.9	7	16.300	15.210	0.990	Open Manhole	0

The Civil Engineering Practice				Page 4	
11 Tungsten Building George Street Fishersgate BN41 1RA		Manor Nursery Angmering West Sussex			
Date 28/06/2019		Designed by S Burgess			
File Planning Network File.MDX		Checked by SRD			
Innovyze		Network 2017.1.2			

Summary of Critical Results by Maximum Level (Rank 1) for NETWORK 6.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 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 FSR Ratio R 0.350
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.500 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, 240, 360, 480, 960, 1440
 Return Period(s) (years) 100
 Climate Change (%) 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	1	60 Winter	100	+40%					15.650
1.001	2	15 Winter	100	+40%	100/15 Winter				15.633
2.000	8	15 Winter	100	+40%					15.689
1.002	3	15 Winter	100	+40%	100/15 Summer				15.622
3.000	9	15 Winter	100	+40%					15.683
1.003	4	15 Winter	100	+40%	100/15 Summer				15.614
1.004	5	15 Winter	100	+40%	100/15 Summer				15.556
4.000	10	15 Winter	100	+40%					15.675
5.000	11	15 Winter	100	+40%					15.664
1.005	6	15 Winter	100	+40%	100/15 Summer				15.483

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
1.000	1	-0.100	0.000	0.00	0.0	OK	
1.001	2	0.010	0.000	0.42	2.3	SURCHARGED	
2.000	8	-0.061	0.000	0.32	2.3	OK	
1.002	3	0.096	0.000	0.82	3.2	SURCHARGED	
3.000	9	-0.067	0.000	0.23	1.7	OK	
1.003	4	0.102	0.000	1.06	5.5	SURCHARGED	

©1982-2017 XP Solutions

The Civil Engineering Practice		Page 5
11 Tungsten Building George Street Fishersgate BN41 1RA	Manor Nursery Angmering West Sussex	
Date 28/06/2019 File Planning Network File.MDX	Designed by S Burgess Checked by SRD	
Innovyze	Network 2017.1.2	

Summary of Critical Results by Maximum Level (Rank 1) for NETWORK 6.SWS

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	Flow (l/s)		
1.004	9	0.036	0.000	1.12		5.9	SURCHARGED	
4.000	10	-0.075	0.000	0.14		1.7	OK	
5.000	11	-0.086	0.000	0.05		0.6	OK	
1.005	6	0.082	0.000	1.37		7.6	SURCHARGED	