



File SW Drainage - 600 dia -...
Innovyze

Designed by Stefan.Zalega
Checked by
Network 2020.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for STORM PRIVATE.SWS

Pipe Sizes STORM PRIVATE Manhole Sizes STORM PRIVATE

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	19.300	Add Flow / Climate Change (%)	0
Ratio R	0.297	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	75	Maximum Backdrop Height (m)	1.200
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.600
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 Inverts

Time Area Diagram for STORM PRIVATE.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.045	4-8	0.014

Total Area Contributing (ha) = 0.059

Total Pipe Volume (m³) = 10.920

Network Design Table for STORM PRIVATE.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	16.000	0.275	58.2	0.007	5.00	0.0	0.600	o	100	Pipe/Conduit	
S1.001	19.048	0.225	84.7	0.052	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	34.643	0.100	346.4	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.003	13.678	0.245	55.8	0.000	0.00	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)
S1.000	44.56	5.26	243.650	0.007	0.0	0.0	0.0	1.01	7.9	0.8
S1.001	43.82	5.49	243.375	0.059	0.0	0.0	0.0	1.42	56.5	7.0
S1.002	42.43	5.93	243.200	0.059	0.0	0.0	0.0	1.30	368.3	7.0
S1.003	41.93	6.10	243.100	0.059	0.0	0.0	0.0	1.35	23.8	7.0



File SW Drainage - 600 dia -...
 Designed by Stefan.Zalega
 Checked by
 Innovyze Network 2020.1

Manhole Schedules for STORM PRIVATE.SWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	244.550	0.900	Open Manhole	300	S1.000	243.650	100				
S2	244.800	1.425	Open Manhole	450	S1.001	243.375	225	S1.000	243.375	100	
S3	245.300	2.150	Open Manhole	1800	S1.002	243.200	600	S1.001	243.150	225	
S4	245.100	2.000	Open Manhole	1800	S1.003	243.100	150	S1.002	243.100	600	
S5	243.980	1.125	Open Manhole	225		OUTFALL		S1.003	242.855	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	413143.860	408170.060	413143.860	408170.060	Required	
S2	413159.190	408165.490	413159.190	408165.490	Required	
S3	413178.186	408164.080	413178.186	408164.080	Required	
S4	413212.828	408163.855	413212.828	408163.855	Required	
S5	413226.442	408165.175			No Entry	



File SW Drainage - 600 dia -...
Innovyze

Designed by Stefan.Zalega
Checked by
Network 2020.1

PIPELINE SCHEDULES for STORM PRIVATE.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)
S1.000	o	100	S1	244.550	243.650	0.800	Open Manhole	300
S1.001	o	225	S2	244.800	243.375	1.200	Open Manhole	450
S1.002	o	600	S3	245.300	243.200	1.500	Open Manhole	1800
S1.003	o	150	S4	245.100	243.100	1.850	Open Manhole	1800

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)
S1.000	16.000	58.2	S2	244.800	243.375	1.325	Open Manhole	450
S1.001	19.048	84.7	S3	245.300	243.150	1.925	Open Manhole	1800
S1.002	34.643	346.4	S4	245.100	243.100	1.400	Open Manhole	1800
S1.003	13.678	55.8	S5	243.980	242.855	0.975	Open Manhole	225



File SW Drainage - 600 dia -...
Innovyze

Designed by Stefan.Zalega
Checked by
Network 2020.1

Area Summary for STORM PRIVATE.SWS

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.007	0.007	0.007
1.001	-	-	100	0.052	0.052	0.052
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.059	0.059	0.059

Free Flowing Outfall Details for STORM PRIVATE.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.003	S5	243.980	242.855	242.855	225	0

Simulation Criteria for STORM PRIVATE.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
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 Storage Structures	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Storm Duration (mins)	30
Ratio R	0.297		



File SW Drainage - 600 dia -...
Innovyze

Designed by Stefan.Zalega
Checked by
Network 2020.1

Online Controls for STORM PRIVATE.SWS

Hydro-Brake® Optimum Manhole: S4, DS/PN: S1.003, Volume (m³): 14.4

Unit Reference MD-SHE-0079-3000-1200-3000
 Design Head (m) 1.200
 Design Flow (l/s) 3.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 79
 Invert Level (m) 243.100
 Minimum Outlet Pipe Diameter (mm) 100
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.0
Flush-Flo™	0.348	2.9
Kick-Flo®	0.707	2.4
Mean Flow over Head Range	-	2.6

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)						
0.100	2.3	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.8	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.9	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.9	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.8	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.7	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
S1.000	S1	0.064	0.123	0.000	0.186
S1.001	S2	0.227	0.713	0.000	0.939
S1.002	S3	5.344	9.286	0.000	14.630
S1.003	S4	5.089	0.224	0.000	5.313
Total		10.723	10.345	0.000	21.069

