STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 5022 SW Network 7.sws

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.394	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	0	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.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for 5022 SW Network 7.sws

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.067	4-8	0.005

Total Area Contributing (ha) = 0.072

Total Pipe Volume (m³) = 29.115

Network Design Table for 5022 SW Network 7.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	13.051	0.250	52.2	0.072	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	2.000	0.350	5.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	11.999	0.050	240.0	0.000	0.00	0.0	0.600	[]	-1	Pipe/Conduit	
1.003	1.060	0.050	21.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	1.844	0.135	13.7	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)	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	4.16	61.550	0.072	0.0	0.0	0.0	1.40	24.7	0.0
1.001	0.00	4.16	61.300	0.072	0.0	0.0	0.0	4.24	75.0	0.0
1.002	0.00	4.24	60.550	0.072	0.0	0.0	0.0	2.49	5971.2	0.0
1.003	0.00	4.25	60.500	0.072	0.0	0.0	0.0	2.20	38.8	0.0
1.004	0.00	4.26	60.450	0.072	0.0	0.0	0.0	2.74	48.4	0.0

Conduit Sections for 5022 SW Network 7.sws

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m²)
-1	[]	3000	800	90.0		1.263	2.400

Manhole Schedules for 5022 SW Network 7.sws

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	62.200	0.650	Open Manhole	450	1.000	61.550	150				
S2	62.100	0.800	Open Manhole	450	1.001	61.300	150	1.000	61.300	150	
S3	62.060	1.510	Open Manhole	450	1.002	60.550	-1	1.001	60.950	150	150
S4	61.900	1.400	Open Manhole	450	1.003	60.500	150	1.002	60.500	-1	
S5	61.895	1.445	Open Manhole	1050	1.004	60.450	150	1.003	60.450	150	
S6	61.845	1.530	Open Manhole	450		OUTFALL		1.004	60.315	150	

Free Flowing Outfall Details for 5022 SW Network 7.sws

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004	S6	61.845	60.315	1.900	450	0

Simulation Criteria for 5022 SW Network 7.sws

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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 1 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.394		

Online Controls for 5022 SW Network 7.sws

Orifice Manhole: S5, DS/PN: 1.004, Volume (m^3): 1.3

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Diameter (m) 0.035 Discharge Coefficient 0.600 Invert Level (m) 60.450
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 5022 SW Network 7.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 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.394 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 100
Climate Change (%) 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	S1	15 Winter	100	+30%	100/15 Summer				62.175	0.475
1.001	S2	15 Winter	100	+30%	100/15 Winter				61.453	0.003
1.002	S3	120 Winter	100	+30%					61.289	-0.061
1.003	S4	120 Winter	100	+30%	100/15 Summer				61.288	0.638
1.004	S5	120 Winter	100	+30%	100/15 Summer				61.293	0.693

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.000	1.68		37.8	FLOOD RISK	
1.001	S2	0.000	1.01		37.4	SURCHARGED	
1.002	S3	0.000	0.00		12.8	OK	
1.003	S4	0.000	0.18		2.5	SURCHARGED	
1.004	S5	0.000	0.10		2.3	SURCHARGED	