

Topping Engineers Ltd		Page 1
Aire House 12 Victoria Avenue Harrogate, HG1 1ED	Woodcock Road, Flamborough SW Network	
Date 03/12/2019 File 230721 ALTERATIONS OF P...	Designed by TM Checked by	
Innovyze	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.700	Add Flow / Climate Change (%)	0
Ratio R	0.355	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

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.257	4-8	0.062

Total Area Contributing (ha) = 0.319

Total Pipe Volume (m³) = 142.816

Network Design Table for Storm

« - 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	11.000	0.022	500.0	0.092	5.00	0.0	0.600	o	1800	Pipe/Conduit	
2.000	9.000	0.346	26.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	44.900	0.086	522.1	0.227	0.00	0.0	0.600	o	1800	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	5.09	95.971	0.092	0.0	0.0	0.0	2.14	5438.4	12.5
2.000	50.00	5.06	97.307	0.000	0.0	0.0	0.0	2.58	102.4	0.0
1.001	50.00	5.44	95.949	0.319	0.0	0.0	0.0	2.09	5321.4	43.2

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Micro Drainage

Network Design Table for Storm

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
1.002	11.900	0.120	99.2	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)
1.002	50.00	5.64	95.810	0.319	0.0	0.0	0.0	1.01	17.8«	43.2

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PIPELINE SCHEDULES for Storm

Upstream Manhole

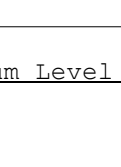
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	1800	1	102.500	95.971	4.729	Open Manhole	2700
2.000	o	225	2	102.500	97.307	4.968	Open Manhole	1200
1.001	o	1800	4	101.700	95.949	3.951	Open Manhole	3000
1.002	o	150	5	98.250	95.810	2.290	Open Manhole	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	11.000	500.0	4	101.700	95.949	3.951	Open Manhole	3000
2.000	9.000	26.0	4	101.700	96.961	4.514	Open Manhole	3000
1.001	44.900	522.1	5	98.250	95.863	0.587	Open Manhole	3000
1.002	11.900	99.2		97.800	95.690	1.960	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		97.800	95.690	0.000	0	0

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

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 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 1
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	Ratio R 0.355
Region England and Wales Cv (Summer)	0.750	
M5-60 (mm)	19.700 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	ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	360 Winter	30	+0%	100/240 Winter				97.059
2.000	2	15 Summer	30	+0%	100/120 Winter				97.307
1.001	4	360 Winter	30	+0%	100/240 Winter				97.059
1.002	5	360 Winter	30	+0%	30/15 Summer				97.059

PN	US/MH Name	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.712	0.000	0.00			3.7	OK	
2.000	2	-0.225	0.000	0.00			0.0	OK	
1.001	4	-0.690	0.000	0.00			12.2	OK	
1.002	5	1.099	0.000	0.13			2.1	SURCHARGED	

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