

Adept Consulting Engineers		Page 1
14 Festoon Rooms Sunny Bank Mills Town Street Farsley Leeds LS28 5UJ		
Date 16/04/2018 16:37 File 2018 04 16 to foul.mdx	Designed by Robert.Marshall Checked by	
Micro Drainage Network 2017.1.2		

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)	100	PIMP (%)	100
M5-60 (mm)	19.500	Add Flow / Climate Change (%)	30
Ratio R	0.350	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

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
S1.000	22.200	0.250	88.8	0.046	2.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	29.300	0.480	61.0	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	12.600	0.200	63.0	0.021	0.00	0.0	1.500	o	150	Pipe/Conduit	
S1.003	6.900	0.200	34.5	0.000	0.00	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL Σ (m)	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	50.00	2.35	6.780	0.046	0.0	0.0	1.9	1.07	18.9	8.1
S1.001	50.00	2.73	6.530	0.055	0.0	0.0	2.2	1.29	22.8	9.7
S1.002	50.00	2.92	6.050	0.076	0.0	0.0	3.1	1.10	19.5	13.4
S1.003	50.00	2.99	5.850	0.076	0.0	0.0	3.1	1.49	26.4	13.4

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Adept Consulting Engineers								Page 2			
14 Festoon Rooms Sunny Bank Mills Town Street Farsley Leeds LS28 5UJ											
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<u>Manhole Schedules for Storm</u>											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	
SFW1	7.490	0.710	Open Manhole	1200	S1.000	6.780	150				
SFW2	7.500	0.970	Open Manhole	1200	S1.001	6.530	150	S1.000	6.530		
SFW3	7.480	1.430	Open Manhole	1200	S1.002	6.050	150	S1.001	6.050		
SFW4	7.460	1.610	Open Manhole	600	S1.003	5.850	150	S1.002	5.850		
S	7.410	1.760	Open Manhole	1050		OUTFALL		S1.003	5.650		
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Adept Consulting Engineers		Page 3
14 Festoon Rooms Sunny Bank Mills Town Street Farsley Leeds LS28 5UJ		
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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.046	0.046	0.046
1.001	-	-	100	0.009	0.009	0.009
1.002	-	-	100	0.021	0.021	0.021
1.003	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.076	0.076	0.076

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)
S1.003	S	7.410	5.650	5.000	1050	0

Simulation Criteria for Storm

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 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
Number of Online Controls		0	Number of Time/Area Diagrams
Number of Offline Controls		0	Number of Real Time Controls

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.500	Storm Duration (mins)	30
Ratio R	0.350		

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Adept Consulting Engineers		Page 4
14 Festoon Rooms Sunny Bank Mills Town Street Farsley Leeds LS28 5UJ		
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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	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, 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) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	SFW1	15 Winter	100	+30%	100/15	Summer			7.422
S1.001	SFW2	15 Winter	100	+30%	100/15	Summer			7.180
S1.002	SFW3	15 Winter	100	+30%	100/15	Summer			6.723
S1.003	SFW4	15 Winter	100	+30%	100/15	Summer			6.139

PN	US/MH Name	Surcharged		Flooded	Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S1.000	SFW1	0.492	0.000	1.21	21.6	FLOOD RISK		
S1.001	SFW2	0.500	0.000	1.00	21.8	SURCHARGED		
S1.002	SFW3	0.523	0.000	1.68	30.5	SURCHARGED		
S1.003	SFW4	0.139	0.000	1.32	30.6	SURCHARGED		

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