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3rd Floor, Marlborough House 48 Holly Walk Leamington Spa CV32 4XP		Winscott Farm Brownfield Run-Off Assessment
Date 03/07/2023		
File SURFACE WATER NETWORK		
Micro Drainage	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Water Network - 1 BF

Pipe Sizes Standard Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.422	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 Surface Water Network - 1 BF

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.313	4-8	0.055

Total Area Contributing (ha) = 0.368

Total Pipe Volume (m<sup>3</sup>) = 7.141

Network Design Table for Surface Water Network - 1 BF

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	27.889	0.872	32.0	0.000	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	28.230	0.188	150.2	0.077	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	14.081	0.094	149.8	0.157	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	30.822	0.205	150.4	0.134	0.00	0.0	0.600	o	300	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	5.17	139.270	0.000	0.0	0.0	0.0	2.79	197.2	0.0
1.001	50.00	5.53	138.398	0.077	0.0	0.0	0.0	1.28	90.5	10.4
1.002	50.00	5.72	138.210	0.234	0.0	0.0	0.0	1.28	90.6	31.7
1.003	50.00	6.12	138.116	0.368	0.0	0.0	0.0	1.28	90.5	49.8

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Manhole Schedules for Surface Water Network - 1 BF

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out		Pipes In			Backdrop (mm)
						Invert Level (m)	Diameter (mm)	PN	Invert Level (m)	Diameter (mm)	
S1	140.470	1.200	Open Manhole	1200	1.000	139.270	300				
S2	139.590	1.192	Open Manhole	1200	1.001	138.398	300	1.000	138.398	300	
S3	139.520	1.310	Open Manhole	1200	1.002	138.210	300	1.001	138.210	300	
S4	140.000	1.884	Open Manhole	1200	1.003	138.116	300	1.002	138.116	300	
S5	139.350	1.439	Open Manhole	0		OUTFALL		1.003	137.911	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	487283.448	226392.418	487283.448	226392.418	Required	
S2	487301.725	226371.352	487301.725	226371.352	Required	
S3	487302.712	226343.140	487302.712	226343.140	Required	
S4	487295.667	226330.949	487295.667	226330.949	Required	
S5	487326.489	226330.949			No Entry	



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PIPELINE SCHEDULES for Surface Water Network - 1 BF

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	300	S1	140.470	139.270	0.900	Open Manhole	1200
1.001	o	300	S2	139.590	138.398	0.892	Open Manhole	1200
1.002	o	300	S3	139.520	138.210	1.010	Open Manhole	1200
1.003	o	300	S4	140.000	138.116	1.584	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	27.889	32.0	S2	139.590	138.398	0.892	Open Manhole	1200
1.001	28.230	150.2	S3	139.520	138.210	1.010	Open Manhole	1200
1.002	14.081	149.8	S4	140.000	138.116	1.584	Open Manhole	1200
1.003	30.822	150.4	S5	139.350	137.911	1.139	Open Manhole	0

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Area Summary for Surface Water Network - 1 BF

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.077	0.077	0.077
1.002	-	-	100	0.157	0.157	0.157
1.003	-	-	100	0.134	0.134	0.134
				Total	Total	Total
				0.368	0.368	0.368

Free Flowing Outfall Details for Surface Water Network - 1 BF

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	S5	139.350	137.911	0.000	0	0

Simulation Criteria for Surface Water Network - 1 BF

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m <sup>3</sup> /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	0	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)	20.000	Storm Duration (mins)	30
Ratio R	0.422		

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for Surface Water Network - 1 BF

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0 MADD Factor \* 10m<sup>3</sup>/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 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 0.419  
Region England and Wales Cv (Summer) 1.000  
M5-60 (mm) 20.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF  
Analysis Timestep Fine Inertia Status OFF  
DTS Status ON

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440  
Return Period(s) (years) 1, 30, 100  
Climate Change (%) 0, 0, 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	S1	15 Summer	1	+0%	100/15 Summer				139.270
1.001	S2	15 Summer	1	+0%	30/15 Summer	100/15 Summer			138.474
1.002	S3	15 Summer	1	+0%	30/15 Summer	100/15 Summer			138.356
1.003	S4	15 Summer	1	+0%	30/15 Summer				138.298

PN	US/MH Name	Surcharged		Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )	Flow / Cap.	Overflow (l/s)					
1.000	S1	-0.300	0.000	0.00	0.00				0.0	OK
1.001	S2	-0.224	0.000	0.14	0.14				11.6	OK 3
1.002	S3	-0.154	0.000	0.47	0.47				35.1	OK 5
1.003	S4	-0.118	0.000	0.67	0.67				55.2	OK

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Water Network - 1 BF

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0 MADD Factor \* 10m<sup>3</sup>/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 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 0.419  
Region England and Wales Cv (Summer) 1.000  
M5-60 (mm) 20.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF  
Analysis Timestep Fine Inertia Status OFF  
DTS Status ON

Profile(s)

Profile(s) Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440  
Return Period(s) (years) 1, 30, 100  
Climate Change (%) 0, 0, 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	S1	15 Summer	30	+0%	100/15 Summer				139.270
1.001	S2	15 Summer	30	+0%	30/15 Summer	100/15 Summer			139.241
1.002	S3	15 Summer	30	+0%	30/15 Summer	100/15 Summer			139.204
1.003	S4	15 Summer	30	+0%	30/15 Summer				139.026

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Time (mins)	Pipe Flow (l/s)		
1.000	S1	-0.300	0.000	0.00		0.0	OK	
1.001	S2	0.543	0.000	0.50		41.2	SURCHARGED	3
1.002	S3	0.694	0.000	1.36		102.4	SURCHARGED	5
1.003	S4	0.610	0.000	1.95		160.6	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Water Network - 1 BF

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0 MADD Factor \* 10m<sup>3</sup>/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 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 0.419  
Region England and Wales Cv (Summer) 1.000  
M5-60 (mm) 20.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF  
Analysis Timestep Fine Inertia Status OFF  
DTS Status ON

Profile(s)

Profile(s) Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440  
Return Period(s) (years) 1, 30, 100  
Climate Change (%) 0, 0, 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	S1	15 Summer	100	+40%	100/15 Summer				139.593
1.001	S2	15 Summer	100	+40%	30/15 Summer	100/15 Summer			139.593
1.002	S3	15 Summer	100	+40%	30/15 Summer	100/15 Summer			139.537
1.003	S4	15 Summer	100	+40%	30/15 Summer				139.424

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Time (mins)	Pipe Flow (l/s)		
1.000	S1	0.023	0.000	0.03		6.0	SURCHARGED	
1.001	S2	0.895	3.149	0.58		47.3	FLOOD	3
1.002	S3	1.027	17.219	2.05		153.9	FLOOD	5
1.003	S4	1.008	0.000	2.44		200.9	SURCHARGED	