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The Stables Aske Hall, Richmond N Yorkshire DL10 5HG	Brunswick Street Thurnscoe Network 5	
Date 19/08/2019 File 5022 SW Network 5.MDX	Designed by D.Lamb Checked by	
XP Solutions	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 5022 SW Network 5.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 5.sws

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.020	4-8	0.001

Total Area Contributing (ha) = 0.021

Total Pipe Volume (m³) = 7.357

Network Design Table for 5022 SW Network 5.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	3.101	0.450	6.9	0.021	4.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	9.000	0.050	180.0	0.000	0.00	0.0	0.600	[]	-1	Pipe/Conduit	
1.002	1.344	0.250	5.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	4.420	0.074	59.7	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	4.01	63.900	0.021	0.0	0.0	0.0	3.86	68.3	0.0
1.001	0.00	4.09	63.450	0.021	0.0	0.0	0.0	1.94	1548.3	0.0
1.002	0.00	4.10	63.400	0.021	0.0	0.0	0.0	4.38	77.3	0.0
1.003	0.00	4.15	63.150	0.021	0.0	0.0	0.0	1.30	23.0	0.0

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Conduit Sections for 5022 SW Network 5.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, 0 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 (m ²)
-1	[]	2000	400	90.0		0.667	0.800

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)	Backdrop (mm)
S1	64.565	0.665	Open Manhole	450	1.000	63.900	150				
S2	64.545	1.095	Open Manhole	450	1.001	63.450	-1	1.000	63.450	150	
S3	64.390	0.990	Open Manhole	450	1.002	63.400	150	1.001	63.400	-1	
S4	64.380	1.230	Open Manhole	1050	1.003	63.150	150	1.002	63.150	150	
S5	64.325	1.249	Open Manhole	450		OUTFALL		1.003	63.076	150	

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.003	S5	64.325	63.076	1.900	450	0
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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

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		

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<u>Online Controls for 5022 SW Network 5.sws</u> <u>Orifice Manhole: S4, DS/PN: 1.003, Volume (m³): 1.1</u> Diameter (m) 0.024 Discharge Coefficient 0.600 Invert Level (m) 63.150		
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 5022 SW Network 5.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 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 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) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	S1	15 Winter	100	+30%					63.955	-0.095
1.001	S2	60 Winter	100	+30%					63.771	-0.079
1.002	S3	60 Winter	100	+30%	100/15 Summer				63.771	0.221
1.003	S4	60 Winter	100	+30%	100/15 Summer				63.772	0.472

PN	US/MH Name	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.000	0.29		12.2	OK	
1.001	S2	0.000	0.01		6.0	OK	
1.002	S3	0.000	0.04		1.1	SURCHARGED	
1.003	S4	0.000	0.06		0.9	SURCHARGED	