

Align Property Partners		Page 1
Morgan House, Mount View Standard Way Northallerton DL6 2YD	Parkmount Road Manchester	
Date 19/07/2023 File Storm Network Calculati...	Designed by ZS Checked by BD	
Innovyze	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm (North) - lin30

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.300	Add Flow / Climate Change (%)	0
Ratio R	0.344	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 (North) - lin30

« - 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
S1.000	14.046	0.450	31.2	0.034	5.00	0.0	0.600	o	600	Pipe/Conduit	
S1.001	46.718	0.118	395.9	0.080	0.00	0.0	0.600	o	875	Pipe/Conduit	
S1.002	4.156	0.065	63.9	0.053	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)
S1.000	50.00	5.05	79.300	0.034	0.0	0.0	0.0	4.37	1235.4	4.6
S1.001	50.00	5.56	78.575	0.114	0.0	0.0	0.0	1.54	926.8	15.4
S1.002	50.00	5.61	78.457	0.167	0.0	0.0	0.0	1.26	22.3«	22.6

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Manhole Schedules for Storm (North) - 1in30

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)
S1	82.304	3.004	Open Manhole	1500	S1.000	79.300	600			
S2	82.420	3.845	Open Manhole	1800	S1.001	78.575	875	S1.000	78.850	600
S3 - HB	81.800	3.343	Open Manhole	2100	S1.002	78.457	150	S1.001	78.457	875
SNew Combined MH	81.350	2.958	Open Manhole	1500		OUTFALL		S1.002	78.392	150

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	386015.283	402207.474	386015.283	402207.474	Required	
S2	386017.908	402193.694	386017.908	402193.694	Required	
S3 - HB	386026.648	402147.801	386026.648	402147.801	Required	
SNew Combined MH	386023.956	402144.635			No Entry	

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PIPELINE SCHEDULES for Storm (North) - lin30

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
S1.000	o	600	S1	82.304	79.300	2.404	Open Manhole	1500
S1.001	o	875	S2	82.420	78.575	2.970	Open Manhole	1800
S1.002	o	150	S3 - HB	81.800	78.457	3.193	Open Manhole	2100

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
S1.000	14.046	31.2	S2	82.420	78.850	2.970	Open Manhole	1800
S1.001	46.718	395.9	S3 - HB	81.800	78.457	2.468	Open Manhole	2100
S1.002	4.156	63.9	SNew Combined MH	81.350	78.392	2.808	Open Manhole	1500

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Area Summary for Storm (North) - lin30

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.034	0.034	0.034
1.001	-	-	100	0.080	0.080	0.080
1.002	-	-	100	0.053	0.053	0.053
				Total	Total	Total
				0.167	0.167	0.167

Free Flowing Outfall Details for Storm (North) - lin30

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S1.002	SNew Combined MH	81.350	78.392	0.000	1500	0
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Simulation Criteria for Storm (North) - lin30

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /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	0
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	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.300	Storm Duration (mins)	30
Ratio R	0.344		

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Online Controls for Storm (North) - 1in30

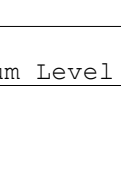
Hydro-Brake® Optimum Manhole: S3 - HB, DS/PN: S1.002, Volume (m³): 38.5

Unit Reference	MD-SHE-0073-3500-2400-3500
Design Head (m)	2.400
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	73
Invert Level (m)	78.457
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.400	3.5
Flush-Flo™	0.316	2.4
Kick-Flo®	0.651	1.9
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0	1.200	2.5	3.000	3.9	7.000	5.8
0.200	2.3	1.400	2.7	3.500	4.2	7.500	6.0
0.300	2.4	1.600	2.9	4.000	4.4	8.000	6.1
0.400	2.4	1.800	3.1	4.500	4.7	8.500	6.3
0.500	2.3	2.000	3.2	5.000	4.9	9.000	6.5
0.600	2.1	2.200	3.4	5.500	5.2	9.500	6.7
0.800	2.1	2.400	3.5	6.000	5.4		
1.000	2.3	2.600	3.6	6.500	5.6		

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm (North) - lin30

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	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	0.344
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	18.300	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	Summer and Winter
Return Period(s) (years)		1, 30
Climate Change (%)		0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	120 Winter	30	+0%	30/120 Summer			
S1.001	S2	120 Winter	30	+0%	30/60 Summer			
S1.002	S3 - HB	120 Winter	30	+0%	1/15 Summer			

PN	US/MH Name	Water	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Half Drain	Pipe	Status
		Level (m)	Depth (m)	Volume (m³)			Time (mins)	Flow (l/s)	
S1.000	S1	80.019	0.119	0.000	0.01			4.1	SURCHARGED
S1.001	S2	80.019	0.569	0.000	0.02			11.7	SURCHARGED
S1.002	S3 - HB	80.019	1.412	0.000	0.18			2.9	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3 - HB	

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