

Align Property Partners		Page 1
Morgan House, Mount View Standard Way Northallerton, DL6 2YD	Parkmount Road Manchester 1in100+45CC Calcs	
Date 18/09/2023 File PV2310-APP-92-XX-CA-C-1...	Designed by LF Checked by ZS	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

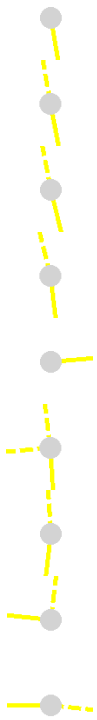
« - Indicates pipe capacity < flow

Network Results Table

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Innovyze	Network 2020.1.3	

Manhole Schedules for SW lin100+45CC

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)	Dia (mm)
S1	82.289	2.989	Open Manhole	2400	S1.000	79.300	875			
S2	82.407	3.368	Open Manhole	2400	S1.001	79.039	875	S1.000	79.039	
S3	81.900	2.947	Open Manhole	2400	S1.002	78.953	150	S1.001	78.953	
S4	81.435	3.995	Open Manhole	2400	S1.003	77.440	875	S1.002	78.165	
S5	81.019	3.629	Open Manhole	2400	S2.000	77.390	875			
S6	81.429	4.154	Open Manhole	2400	S1.004	77.275	875	S1.003	77.275	
								S2.000	77.275	
S7	80.528	3.336	Open Manhole	2400	S1.005	77.192	875	S1.004	77.192	
S8 - HB	80.068	2.906	Open Manhole	2700	S1.006	77.162	150	S1.005	77.162	
S9- Combined	79.664	2.753	Open Manhole	1500	S1.007	76.911	150	S1.006	76.911	
SExisting Combined MH	79.300	2.488	Open Manhole	1500		OUTFALL		S1.007	76.812	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	386015.567	402207.720	386015.567	402207.720	Required	
S2	386017.935	402193.805	386017.935	402193.805	Required	
S3	386026.072	402151.822	386026.072	402151.822	Required	
S4	386030.846	402132.187	386030.846	402132.187	Required	
S5	386023.393	402098.887	386023.393	402098.887	Required	
S6	386034.847	402099.888	386034.847	402099.888	Required	
S7	386036.880	402066.686	386036.880	402066.686	Required	
S8 - HB	386035.463	402054.736	386035.463	402054.736	Required	
S9- Combined	386010.478	402057.389	386010.478	402057.389	Required	

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PIPELINE SCHEDULES for SW lin100+45CC

Upstream Manhole

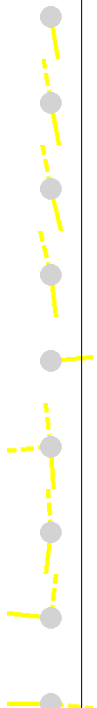
PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
S1.000	o	875	S1	82.289	79.300	2.114	Open Manhole	2400
S1.001	o	875	S2	82.407	79.039	2.493	Open Manhole	2400
S1.002	o	150	S3	81.900	78.953	2.797	Open Manhole	2400
S1.003	o	875	S4	81.435	77.440	3.120	Open Manhole	2400
S2.000	o	875	S5	81.019	77.390	2.754	Open Manhole	2400
S1.004	o	875	S6	81.429	77.275	3.279	Open Manhole	2400
S1.005	o	875	S7	80.528	77.192	2.461	Open Manhole	2400
S1.006	o	150	S8 - HB	80.068	77.162	2.756	Open Manhole	2700
S1.007	o	150	S9- Combined	79.664	76.911	2.603	Open Manhole	1500

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	14.115	54.1	S2	82.407	79.039	2.493	Open Manhole	2400
S1.001	42.764	497.3	S3	81.900	78.953	2.072	Open Manhole	2400
S1.002	20.207	25.6	S4	81.435	78.165	3.120	Open Manhole	2400
S1.003	32.546	197.2	S6	81.429	77.275	3.279	Open Manhole	2400
S2.000	11.498	100.0	S6	81.429	77.275	3.279	Open Manhole	2400
S1.004	33.264	400.8	S7	80.528	77.192	2.461	Open Manhole	2400
S1.005	12.034	401.1	S8 - HB	80.068	77.162	2.031	Open Manhole	2700
S1.006	25.125	100.1	S9- Combined	79.664	76.911	2.603	Open Manhole	1500
S1.007	9.682	97.8	SExisting Combined MH	79.300	76.812	2.338	Open Manhole	1500

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Setting Out Information - True Coordinates (SW lin100+45CC)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S1.000	S1	2400		386015.567	402207.720	386015.567	402207.720	
S1.001	S2	2400		386017.935	402193.805	386017.935	402193.805	
S1.002	S3	2400		386026.072	402151.822	386026.072	402151.822	
S1.003	S4	2400		386030.846	402132.187	386030.846	402132.187	
S2.000	S5	2400		386023.393	402098.887	386023.393	402098.887	
S1.004	S6	2400		386034.847	402099.888	386034.847	402099.888	
S1.005	S7	2400		386036.880	402066.686	386036.880	402066.686	
S1.006	S8 - HB	2700		386035.463	402054.736	386035.463	402054.736	
S1.007	S9- Combined	1500		386010.478	402057.389	386010.478	402057.389	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S1.007	SExisting Combined MH	1500		386000.796	402057.309	

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Area Summary for SW lin100+45CC

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.035	0.035	0.035
1.001	-	-	100	0.066	0.066	0.066
1.002	-	-	100	0.050	0.050	0.050
1.003	-	-	100	0.050	0.050	0.050
2.000	-	-	100	0.034	0.034	0.034
1.004	-	-	100	0.032	0.032	0.032
1.005	-	-	100	0.045	0.045	0.045
1.006	-	-	100	0.077	0.077	0.077
1.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.389	0.389	0.389

Free Flowing Outfall Details for SW lin100+45CC

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.007	SExisting Combined MH	79.300	76.812	0.000	1500	0

Simulation Criteria for SW lin100+45CC

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /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	2
Number of Online Controls	2	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 SW lin100+45CC

Hydro-Brake® Optimum Manhole: S3, DS/PN: S1.002, Volume (m³): 37.6

Unit Reference	MD-SHE-0075-3100-1600-3100
Design Head (m)	1.600
Design Flow (l/s)	3.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	78.953
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	3.1
Flush-Flo™	0.332	2.6
Kick-Flo®	0.673	2.1
Mean Flow over Head Range	-	2.5

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	2.1	1.200	2.7	3.000	4.1	7.000	6.2
0.200	2.5	1.400	2.9	3.500	4.4	7.500	6.4
0.300	2.6	1.600	3.1	4.000	4.7	8.000	6.6
0.400	2.6	1.800	3.3	4.500	5.0	8.500	6.8
0.500	2.5	2.000	3.4	5.000	5.3	9.000	6.9
0.600	2.3	2.200	3.6	5.500	5.5	9.500	7.1
0.800	2.3	2.400	3.7	6.000	5.7		
1.000	2.5	2.600	3.9	6.500	6.0		

Hydro-Brake® Optimum Manhole: S8 - HB, DS/PN: S1.006, Volume (m³): 22.3

Unit Reference	MD-SHE-0088-5000-2400-5000
Design Head (m)	2.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	88
Invert Level (m)	77.162
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

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<table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>2.400</td><td>5.0</td></tr><tr><td>Flush-Flo™</td><td>0.381</td><td>3.7</td></tr><tr><td>Kick-Flo®</td><td>0.784</td><td>3.0</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>3.8</td></tr></table>			Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	2.400	5.0	Flush-Flo™	0.381	3.7	Kick-Flo®	0.784	3.0	Mean Flow over Head Range	-	3.8																																																									
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Storage Structures for SW lin100+45CC

Cellular Storage Manhole: S3, DS/PN: S1.002

Invert Level (m) 79.830 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	40.0	0.0	0.801	0.0	0.0
0.800	40.0	0.0			

Cellular Storage Manhole: S8 - HB, DS/PN: S1.006

Invert Level (m) 78.900 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	110.0	0.0	0.810	0.0	0.0
0.800	110.0	0.0			

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for SW lin100+45CC

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 2
 Number of Online Controls 2 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 ON
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

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, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	1	+0%	100/60 Summer			
S1.001	S2	60 Summer	1	+0%	100/30 Summer			
S1.002	S3	60 Summer	1	+0%	1/15 Summer			
S1.003	S4	240 Winter	1	+0%	30/120 Summer			
S2.000	S5	240 Winter	1	+0%	30/120 Summer			
S1.004	S6	240 Winter	1	+0%	30/120 Summer			
S1.005	S7	240 Winter	1	+0%	30/60 Summer			
S1.006	S8 - HB	240 Winter	1	+0%	1/15 Summer			
S1.007	S9- Combined	15 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	79.321	-0.854	0.000	0.00			5.3	OK
S1.001	S2	79.319	-0.595	0.000	0.01			7.8	OK
S1.002	S3	79.319	0.216	0.000	0.08		48	2.6	SURCHARGED
S1.003	S4	77.699	-0.616	0.000	0.00			3.8	OK
S2.000	S5	77.699	-0.566	0.000	0.00			0.7	OK
S1.004	S6	77.699	-0.451	0.000	0.00			3.5	OK

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for SW 1in100+45CC

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.005	S7	77.699	-0.368	0.000	0.01		3.1	OK
S1.006	S8 - HB	77.699	0.387	0.000	0.22	108	3.7	SURCHARGED
S1.007	S9- Combined	76.960	-0.101	0.000	0.23		3.7	OK

PN	US/MH Name	Level Exceeded
S1.000		S1
S1.001		S2
S1.002		S3
S1.003		S4
S2.000		S5
S1.004		S6
S1.005		S7
S1.006	S8 - HB	
S1.007	S9- Combined	

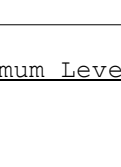
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Innovyze			Network 2020.1.3						
<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for SW 1in100+45CC</u>									
<u>Simulation Criteria</u>									
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 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 2									
Number of Online Controls 2 Number of Time/Area Diagrams 0									
Number of Offline Controls 0 Number of Real Time Controls 0									
<u>Synthetic Rainfall Details</u>									
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 ON									
Analysis Timestep Fine Inertia Status OFF									
DTS Status ON									
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, 45									
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%	100/60 Summer				
S1.001	S2	120 Winter	30	+0%	100/30 Summer				
S1.002	S3	120 Winter	30	+0%	1/15 Summer				
S1.003	S4	360 Winter	30	+0%	30/120 Summer				
S2.000	S5	360 Winter	30	+0%	30/120 Summer				
S1.004	S6	360 Winter	30	+0%	30/120 Summer				
S1.005	S7	360 Winter	30	+0%	30/60 Summer				
S1.006	S8 - HB	360 Winter	30	+0%	1/15 Summer				
S1.007	S9- Combined	360 Winter	30	+0%					
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	79.808	-0.367	0.000	0.00			3.0	OK
S1.001	S2	79.808	-0.106	0.000	0.01			7.1	OK
S1.002	S3	79.808	0.705	0.000	0.08			2.6	SURCHARGED
S1.003	S4	78.735	0.420	0.000	0.01			4.7	SURCHARGED
S2.000	S5	78.735	0.470	0.000	0.00			1.3	SURCHARGED
S1.004	S6	78.735	0.585	0.000	0.01			4.1	SURCHARGED
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Morgan House, Mount View Standard Way Northallerton, DL6 2YD	Parkmount Road Manchester 1in100+45CC Calcs	
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Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for SW 1in100+45CC

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.005	S7	78.736	0.669	0.000	0.01		4.2	SURCHARGED
S1.006	S8 - HB	78.736	1.424	0.000	0.24	372	4.1	SURCHARGED
S1.007	S9- Combined	76.962	-0.099	0.000	0.26		4.1	OK

PN	US/MH Name	Level Exceeded
S1.000		S1
S1.001		S2
S1.002		S3
S1.003		S4
S2.000		S5
S1.004		S6
S1.005		S7
S1.006	S8 - HB	
S1.007	S9- Combined	

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Morgan House, Mount View Standard Way Northallerton, DL6 2YD	Parkmount Road Manchester lin100+45CC Calcs	
Date 18/09/2023 File PV2310-APP-92-XX-CA-C-1...	Designed by LF Checked by ZS	
Innovyze Network 2020.1.3		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW lin100+45CC

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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	2
Number of Online Controls	2	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	ON
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

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, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	240 Winter	100	+45%	100/60 Summer			
S1.001	S2	240 Winter	100	+45%	100/30 Summer			
S1.002	S3	240 Winter	100	+45%	1/15 Summer			
S1.003	S4	480 Winter	100	+45%	30/120 Summer			
S2.000	S5	480 Winter	100	+45%	30/120 Summer			
S1.004	S6	480 Winter	100	+45%	30/120 Summer			
S1.005	S7	480 Winter	100	+45%	30/60 Summer			
S1.006	S8 - HB	480 Winter	100	+45%	1/15 Summer			
S1.007	S9- Combined	480 Winter	100	+45%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	80.923	0.748	0.000	0.00		3.9	SURCHARGED
S1.001	S2	80.923	1.009	0.000	0.02		10.6	SURCHARGED
S1.002	S3	80.923	1.820	0.000	0.09		2.9	SURCHARGED
S1.003	S4	79.605	1.290	0.000	0.01		6.0	SURCHARGED
S2.000	S5	79.605	1.340	0.000	0.00		2.2	SURCHARGED
S1.004	S6	79.605	1.455	0.000	0.01		10.2	SURCHARGED

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