

Surface Water Drainage Calculations

For a site referred to as

Manchester Communication Academy,
Year 7

Undertaken on behalf of

Lancaster Maloney Martin Ltd.

WML Job No: 11258

Document No: 11258-WML-Y7-XX-CA-C-0001

Date: January 2025

Project No. & Name:	11258 – MCA	Status:	Prepared by:	Rev:	Date:
Document Ref:	11258-WML-Y7-XX-CA-C-0001	Preliminary	Daniel Baker	P01	January 2025

General Notes

1. The calculations within this document have been undertaken using MicroDrainage Software version 2020.
2. This document is to be read in conjunction with the following documents;
 - a. 11258-WML-Y7-XX-DR-C-2001 – Proposed Drainage GA

Summary of Results

1. The following summary demonstrates that the outgoing flow rates for the new development works are less than or equal to the existing greenfield runoff rate.

Greenfield Runoff Rate (l/s)*	Proposed Site Runoff Rate – Manhole S7 (l/s)
1: 2.0	1: 1.8
30: 3.4	30: 3.0
100+45%: 3.7	100+45%: 3.6

*An urban factor of 0.75 has been applied to the existing greenfield runoff rate to account for the extent of existing impermeable hardstanding.

Existing Greenfield Runoff Rates

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No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL		
Date 21/03/2024 11:04 File	Designed by DBaker Checked by	
Innovyze		
Source Control 2020.1.3		
ICP SUDS Mean Annual Flood Input Return Period (years) 1 Soil 0.450 Area (ha) 0.167 Urban 0.750 SAAR (mm) 864 Region Number Region 10 Results 1/s QBAR Rural 0.9 QBAR Urban 2.3 Q1 year 2.0 Q1 year 2.0 Q30 years 3.4 Q100 years 3.7		
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Proposed Surface Water Network Calculation

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No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL		
Date 04/02/2025 14:13 File 11258 - Surface Water 0...	Designed by DBaker Checked by	
Innovyze	Network 2020.1.3	

Manhole Schedules for Storm

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)	Backdrop (mm)
S1	64.775	0.775	Open Manhole	600	S1.000	64.000	225				
S2	64.765	1.215	Open Manhole	600	S1.001	63.550	225	S1.000	63.550	225	
S3	64.765	1.615	Open Manhole	600	S1.002	63.150	225	S1.001	63.150	225	
S4	64.765	0.765	Open Manhole	600	S2.000	64.000	225				
S5	64.770	0.970	Open Manhole	600	S2.001	63.800	225	S2.000	63.800	225	
S4	64.770	1.895	Open Manhole	600	S1.003	62.875	225	S1.002	62.875	225	
								S2.001	63.600	225	725
S7	64.550	2.500	Junction		S3.000	62.050	300				
S5	64.700	2.650	Open Manhole	1350	S1.004	62.050	150	S1.003	62.850	225	875
								S3.000	62.050	300	
S	64.350	2.830	Open Manhole	0		OUTFALL		S1.004	61.520	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	385929.159	400865.593	385929.159	400865.593	Required	
S2	385962.636	400895.664	385962.636	400895.664	Required	
S3	385989.366	400865.906	385989.366	400865.906	Required	
S4	385942.516	400849.974	385942.516	400849.974	Required	
S5	385955.907	400862.003	385955.907	400862.003	Required	
S4	385968.938	400847.496	385968.938	400847.496	Required	
S7	385971.594	400844.539			No Entry	
S5	385970.592	400845.655	385970.592	400845.655	Required	
S	385959.715	400835.885			No Entry	

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PIPELINE SCHEDULES for Storm Upstream Manhole <table><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr><tr><td>S1.000</td><td>o</td><td>225</td><td>S1</td><td>64.775</td><td>64.000</td><td>0.550</td><td>Open Manhole</td><td>600</td></tr><tr><td>S1.001</td><td>o</td><td>225</td><td>S2</td><td>64.765</td><td>63.550</td><td>0.990</td><td>Open Manhole</td><td>600</td></tr><tr><td>S1.002</td><td>o</td><td>225</td><td>S3</td><td>64.765</td><td>63.150</td><td>1.390</td><td>Open Manhole</td><td>600</td></tr><tr><td>S2.000</td><td>o</td><td>225</td><td>S4</td><td>64.765</td><td>64.000</td><td>0.540</td><td>Open Manhole</td><td>600</td></tr><tr><td>S2.001</td><td>o</td><td>225</td><td>S5</td><td>64.770</td><td>63.800</td><td>0.745</td><td>Open Manhole</td><td>600</td></tr><tr><td>S1.003</td><td>o</td><td>225</td><td>S4</td><td>64.770</td><td>62.875</td><td>1.670</td><td>Open Manhole</td><td>600</td></tr><tr><td>S3.000</td><td>o</td><td>300</td><td>S7</td><td>64.550</td><td>62.050</td><td>2.200</td><td>Junction</td><td></td></tr><tr><td>S1.004</td><td>o</td><td>150</td><td>S5</td><td>64.700</td><td>62.050</td><td>2.500</td><td>Open Manhole</td><td>1350</td></tr></table> Downstream Manhole <table><tr><th>PN</th><th>Length (m)</th><th>Slope (1:X)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr><tr><td>S1.000</td><td>45.000</td><td>100.0</td><td>S2</td><td>64.765</td><td>63.550</td><td>0.990</td><td>Open Manhole</td><td>600</td></tr><tr><td>S1.001</td><td>40.000</td><td>100.0</td><td>S3</td><td>64.765</td><td>63.150</td><td>1.390</td><td>Open Manhole</td><td>600</td></tr><tr><td>S1.002</td><td>27.500</td><td>100.0</td><td>S4</td><td>64.770</td><td>62.875</td><td>1.670</td><td>Open Manhole</td><td>600</td></tr><tr><td>S2.000</td><td>18.000</td><td>90.0</td><td>S5</td><td>64.770</td><td>63.800</td><td>0.745</td><td>Open Manhole</td><td>600</td></tr><tr><td>S2.001</td><td>19.500</td><td>97.5</td><td>S4</td><td>64.770</td><td>63.600</td><td>0.945</td><td>Open Manhole</td><td>600</td></tr><tr><td>S1.003</td><td>2.475</td><td>99.0</td><td>S5</td><td>64.700</td><td>62.850</td><td>1.625</td><td>Open Manhole</td><td>1350</td></tr><tr><td>S3.000</td><td>1.500</td><td>0.0</td><td>S5</td><td>64.700</td><td>62.050</td><td>2.350</td><td>Open Manhole</td><td>1350</td></tr><tr><td>S1.004</td><td>14.620</td><td>27.6</td><td>S</td><td>64.350</td><td>61.520</td><td>2.680</td><td>Open Manhole</td><td>0</td></tr></table> Free Flowing Outfall Details for Storm <table><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. Level (m)</th><th>D, L (mm)</th><th>W (mm)</th></tr><tr><td>S1.004</td><td>S</td><td>64.350</td><td>61.520</td><td>0.000</td><td>0</td><td>0</td></tr></table>			PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	S1.000	o	225	S1	64.775	64.000	0.550	Open Manhole	600	S1.001	o	225	S2	64.765	63.550	0.990	Open Manhole	600	S1.002	o	225	S3	64.765	63.150	1.390	Open Manhole	600	S2.000	o	225	S4	64.765	64.000	0.540	Open Manhole	600	S2.001	o	225	S5	64.770	63.800	0.745	Open Manhole	600	S1.003	o	225	S4	64.770	62.875	1.670	Open Manhole	600	S3.000	o	300	S7	64.550	62.050	2.200	Junction		S1.004	o	150	S5	64.700	62.050	2.500	Open Manhole	1350	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	S1.000	45.000	100.0	S2	64.765	63.550	0.990	Open Manhole	600	S1.001	40.000	100.0	S3	64.765	63.150	1.390	Open Manhole	600	S1.002	27.500	100.0	S4	64.770	62.875	1.670	Open Manhole	600	S2.000	18.000	90.0	S5	64.770	63.800	0.745	Open Manhole	600	S2.001	19.500	97.5	S4	64.770	63.600	0.945	Open Manhole	600	S1.003	2.475	99.0	S5	64.700	62.850	1.625	Open Manhole	1350	S3.000	1.500	0.0	S5	64.700	62.050	2.350	Open Manhole	1350	S1.004	14.620	27.6	S	64.350	61.520	2.680	Open Manhole	0	Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)	S1.004	S	64.350	61.520	0.000	0	0
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Simulation Criteria for Storm

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	1
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)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.360		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S5, DS/PN: S1.004, Volume (m³): 3.9

Unit Reference	MD-SCU-0069-5000-1000-5000
Design Head (m)	1.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Linear discharge profile
Application	Surface
Sump Available	Yes
Diameter (mm)	69
Invert Level (m)	62.050
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	5.0
Flush-Flo™	0.092	1.8
Kick-Flo®	0.104	1.8
Mean Flow over Head Range	-	3.4

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	1.8	1.200	5.4	3.000	8.4	7.000	12.6
0.200	2.4	1.400	5.9	3.500	9.0	7.500	13.0
0.300	2.9	1.600	6.2	4.000	9.6	8.000	13.4
0.400	3.3	1.800	6.6	4.500	10.2	8.500	13.8
0.500	3.6	2.000	6.9	5.000	10.7	9.000	14.2
0.600	3.9	2.200	7.2	5.500	11.2	9.500	14.6
0.800	4.5	2.400	7.5	6.000	11.7		
1.000	5.0	2.600	7.8	6.500	12.1		

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Storage Structures for Storm

Cellular Storage Manhole: S7, DS/PN: S3.000

Invert Level (m) 62.050 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	125.0	125.0	2.600	0.0	165.2
0.200	125.0	133.9	2.800	0.0	165.2
0.400	125.0	142.9	3.000	0.0	165.2
0.600	125.0	151.8	3.200	0.0	165.2
0.800	125.0	160.8	3.400	0.0	165.2
1.000	0.0	165.2	3.600	0.0	165.2
1.200	0.0	165.2	3.800	0.0	165.2
1.400	0.0	165.2	4.000	0.0	165.2
1.600	0.0	165.2	4.200	0.0	165.2
1.800	0.0	165.2	4.400	0.0	165.2
2.000	0.0	165.2	4.600	0.0	165.2
2.200	0.0	165.2	4.800	0.0	165.2
2.400	0.0	165.2	5.000	0.0	165.2

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Micro Drainage

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

Simulation Criteria

Areal Reduction Factor 1.000
Hot Start (mins) 0
Hot Start Level (mm) 0
Manhole Headloss Coeff (Global) 0.500
Foul Sewage per hectare (l/s) 0.000
Additional Flow - % of Total Flow 0.000
MADD Factor * 10m³/ha Storage 2.000
Inlet Coefficient 0.800
Flow per Person per Day (l/per/day) 0.000
Number of Input Hydrographs 0
Number of Online Controls 1
Number of Offline Controls 0
Number of Storage Structures 1
Number of Time/Area Diagrams 0
Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR
Region England and Wales Cv (Summer)
M5-60 (mm) 18.000 Cv (Winter)
Ratio R 0.360
0.750
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 ON

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

Summer and Winter

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	1	+0%					64.030
S1.001	S2	15 Winter	1	+0%	100/15 Winter				63.609
S1.002	S3	15 Winter	1	+0%	100/15 Summer				63.219
S2.000	S4	15 Winter	1	+0%					64.030
S2.001	S5	15 Winter	1	+0%					63.839
S1.003	S4	15 Winter	1	+0%	30/15 Summer				62.984
S3.000	S7	180 Winter	1	+0%	100/30 Summer				62.129
S1.004	S5	15 Winter	1	+0%	30/15 Summer				62.151

Surcharged Flooded

Half Drain Pipe

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Pipe Flow (l/s)	Level Exceeded
S1.000	S1	-0.195	0.000	0.04			2.1	OK
S1.001	S2	-0.166	0.000	0.15			7.5	OK
S1.002	S3	-0.156	0.000	0.20			9.8	OK
S2.000	S4	-0.195	0.000	0.04			2.1	OK

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Micro Drainage

30 year Return Period 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 1

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 0.360

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.000 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 ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 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) Surge

First (Y) Flood

First (Z) Overflow

Overflow Act.

Water Level (m)

S1.000

S1

15 Winter

30

+0%

64.049

S1.001

S2

15 Winter

30

+0%

100/15 Winter

63.656

S1.002

S3

15 Winter

30

+0%

100/15 Summer

63.276

S2.000

S4

15 Winter

30

+0%

64.049

S2.001

S5

15 Winter

30

+0%

63.865

S1.003

S4

15 Winter

30

+0%

30/15 Summer

63.151

S3.000

S7

180 Winter

30

+0%

100/30 Summer

62.274

S1.004

S5

15 Winter

30

+0%

30/15 Summer

62.426

Surcharged Flooded

Half Drain Pipe

US/MH Name

Depth (m)

Volume (m³)

Flow / Overflow Cap. (l/s)

Time (mins)

Flow (l/s)

Status

Level Exceeded

PN

S1.000

S1

-0.176

0.000

0.10

5.1

OK

S1.001

S2

-0.119

0.000

0.43

21.4

OK

S1.002

S3

-0.099

0.000

0.59

28.3

OK

S2.000

S4

-0.176

0.000

0.11

5.2

OK

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
PN	US/MH Name	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S2.001	S5	-0.160	0.000	0.18			8.7	OK	
S1.003	S4	0.051	0.000	1.37			40.9	SURCHARGED	
S3.000	S7	-0.076	0.000	0.05		135	2.8	OK*	
S1.004	S5	0.226	0.000	0.10			3.0	SURCHARGED	
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100 year Return Period 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 1

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 0.360

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.000

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 ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 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) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	100	+45%					64.068
S1.001	S2	15 Winter	100	+45%	100/15 Winter				63.789
S1.002	S3	15 Winter	100	+45%	100/15 Summer				63.572
S2.000	S4	15 Winter	100	+45%					64.068
S2.001	S5	15 Winter	100	+45%					63.891
S1.003	S4	15 Winter	100	+45%	30/15 Summer				63.308
S3.000	S7	240 Winter	100	+45%	100/30 Summer				62.528
S1.004	S5	240 Winter	100	+45%	30/15 Summer				62.545

Surcharged Flooded

Half Drain Pipe

US/MH Name

Depth (m)

Volume (m³)

Flow / Cap.

Overflow (l/s)

Time (mins)

Flow (l/s)

Status

Level Exceeded

S1.000	S1	-0.157	0.000	0.19		9.6		OK
S1.001	S2	0.014	0.000	0.75		37.0	SURCHARGED	
S1.002	S3	0.197	0.000	0.99		47.8	SURCHARGED	
S2.000	S4	-0.157	0.000	0.20		9.8		OK

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No. 8 Oak Green Stanley Green Business Park Earl Rd, Cheadle Hulme, SK8 6QL									
Date 04/02/2025 14:13									
File 11258 - Surface Water 0...									
Designed by DBaker									
Checked by									
Innovyze					Network 2020.1.3				
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									