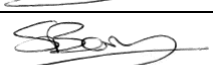




BELL MUNRO CONSULTING LTD.

**816 Stockport Road
Levenshulme**

**Hydraulic Calculations
January 2026**

	Initials	Signature	Date
Prepared by:	R.C		01/26
Checked by:	S.J.B		01/26
Approved by:	S.J.B		01/26

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Ref: J8728



Micro
Drainage

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.006	0.006	0.006
1.001	User	-	100	0.006	0.006	0.006
	User	-	100	0.003	0.003	0.009
2.000	User	-	100	0.015	0.015	0.015
2.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.002	0.002	0.002
	User	-	100	0.007	0.007	0.009
				Total	Total	Total
				0.039	0.039	0.039

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		54.300	52.760	52.400	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/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 Offline Controls 0
 Number of Time/Area Diagrams 0
 Number of Online Controls 1
 Number of Storage Structures 1
 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)	18.000	Storm Duration (mins)	30
Ratio R	0.360		

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Turing House 5 Archway Manchester M15 5RL																																																																																															
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XP Solutions	Network 2020.1.3																																																																																														
<div>Online Controls for Storm</div> <div>Hydro-Brake® Optimum Manhole: S04, DS/PN: 1.002, Volume (m³): 2.0</div> <div><div>Unit Reference MD-SHE-0066-2100-1200-2100</div><div>Design Head (m)1.200</div><div>Design Flow (l/s)2.1</div><div>Flush-Flo™Calculated</div><div>ObjectiveMinimise upstream storage</div><div>ApplicationSurface</div><div>Sump AvailableYes</div><div>Diameter (mm)66</div><div>Invert Level (m)52.800</div><div>Minimum Outlet Pipe Diameter (mm)100</div><div>Suggested Manhole Diameter (mm)1200</div></div> <div><table><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr><tr><td>Design Point (Calculated)</td><td>1.200</td><td>2.1</td><td>Kick-Flo®</td><td>0.587</td><td>1.5</td></tr><tr><td>Flush-Flo™</td><td>0.288</td><td>1.9</td><td>Mean Flow over Head Range</td><td>-</td><td>1.7</td></tr></table></div> <div>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</div> <div><table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>0.100</td><td>1.6</td><td>1.200</td><td>2.1</td><td>3.000</td><td>3.2</td><td>7.000</td><td>4.7</td></tr><tr><td>0.200</td><td>1.8</td><td>1.400</td><td>2.2</td><td>3.500</td><td>3.4</td><td>7.500</td><td>4.9</td></tr><tr><td>0.300</td><td>1.9</td><td>1.600</td><td>2.4</td><td>4.000</td><td>3.6</td><td>8.000</td><td>5.0</td></tr><tr><td>0.400</td><td>1.8</td><td>1.800</td><td>2.5</td><td>4.500</td><td>3.9</td><td>8.500</td><td>5.2</td></tr><tr><td>0.500</td><td>1.7</td><td>2.000</td><td>2.6</td><td>5.000</td><td>4.0</td><td>9.000</td><td>5.3</td></tr><tr><td>0.600</td><td>1.5</td><td>2.200</td><td>2.8</td><td>5.500</td><td>4.2</td><td>9.500</td><td>5.5</td></tr><tr><td>0.800</td><td>1.7</td><td>2.400</td><td>2.9</td><td>6.000</td><td>4.4</td><td></td><td></td></tr><tr><td>1.000</td><td>1.9</td><td>2.600</td><td>3.0</td><td>6.500</td><td>4.6</td><td></td><td></td></tr></table></div> <tr><td colspan="3">©1982-2020 Innovyze</td></tr>			Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.200	2.1	Kick-Flo®	0.587	1.5	Flush-Flo™	0.288	1.9	Mean Flow over Head Range	-	1.7	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	1.6	1.200	2.1	3.000	3.2	7.000	4.7	0.200	1.8	1.400	2.2	3.500	3.4	7.500	4.9	0.300	1.9	1.600	2.4	4.000	3.6	8.000	5.0	0.400	1.8	1.800	2.5	4.500	3.9	8.500	5.2	0.500	1.7	2.000	2.6	5.000	4.0	9.000	5.3	0.600	1.5	2.200	2.8	5.500	4.2	9.500	5.5	0.800	1.7	2.400	2.9	6.000	4.4			1.000	1.9	2.600	3.0	6.500	4.6			©1982-2020 Innovyze		
Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)																																																																																										
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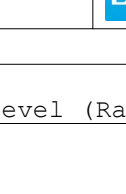
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Storage Structures for Storm

Cellular Storage Manhole: S04, DS/PN: 1.002

Invert Level (m) 52.800 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	12.8	12.8	0.900	0.0	24.3
0.800	12.8	24.3			

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1 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 * 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 Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

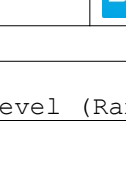
Rainfall Model	FSR	Ratio R	0.360
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
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, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2
Climate Change (%)	0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE	15 Winter	1	+0%					54.123
1.001	S01	15 Winter	1	+0%					53.839
2.000	S02	15 Winter	1	+0%					53.730
2.001	S03	15 Winter	1	+0%					53.519
1.002	S04	30 Winter	1	+0%	2/30 Winter				52.914

PN	US/MH Name	Depth (m)	Volume (m ³)	Flow / Cap. (l/s)	Surcharged	Flooded	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE	-0.077	0.000	0.12				0.8	OK	
1.001	S01	-0.118	0.000	0.11				1.7	OK	

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2 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	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 Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	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	ON
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, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 2
Climate Change (%)	0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	RE	15 Winter	2	+0%					54.126
1.001	S01	15 Winter	2	+0%					53.843
2.000	S02	15 Winter	2	+0%					53.734
2.001	S03	15 Winter	2	+0%					53.523
1.002	S04	30 Winter	2	+0%	2/30 Winter				52.956

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	RE	-0.074	0.000	0.15			1.0	OK	
1.001	S01	-0.113	0.000	0.14			2.2	OK	

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Page 1

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5 Archway
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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 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 Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 1

Number of Storage Structures 1

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 ON

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, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 30, 100

Climate Change (%) 0, 45

									Water
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	RE	15 Winter	30	+0%					54.136
1.001	S01	15 Winter	30	+0%					53.862
2.000	S02	15 Winter	30	+0%	100/60 Winter				53.747
2.001	S03	15 Winter	30	+0%	100/60 Winter				53.535
1.002	S04	60 Winter	30	+0%	30/15 Summer				53.164

Surcharged Flooded

Half Drain

Pipe

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	RE	-0.064	0.000	0.28			1.9	OK	
1.001	S01	-0.094	0.000	0.30			4.8	OK	

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

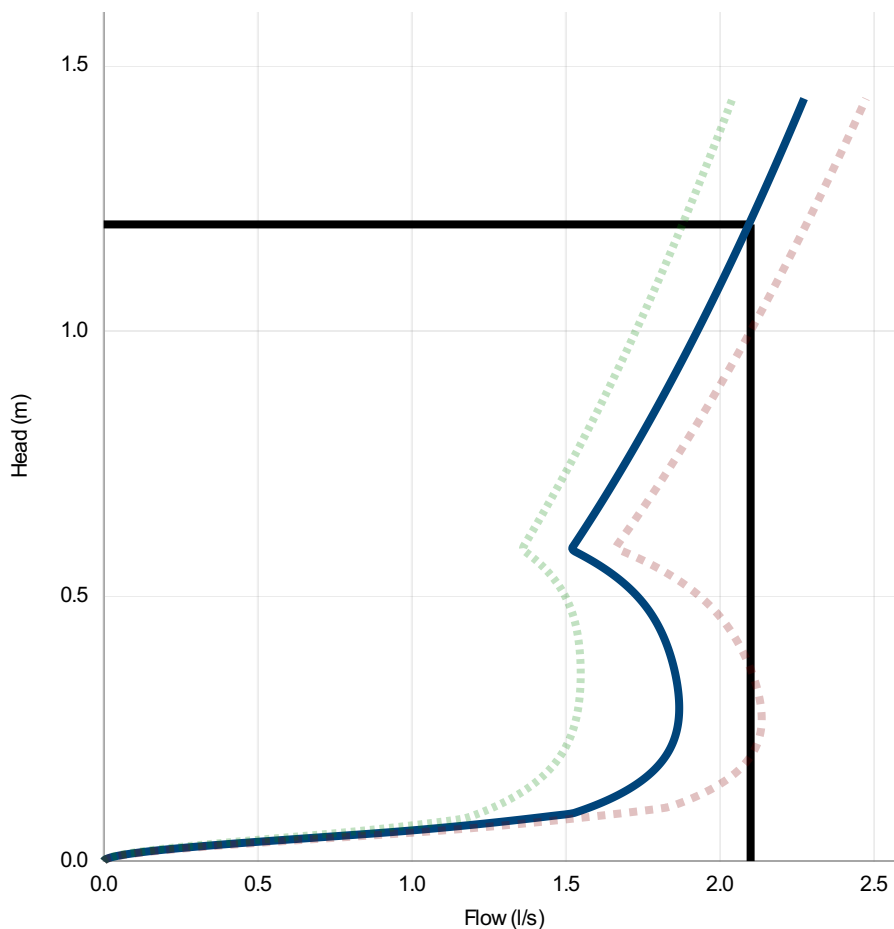
PN	US/MH Name	Surcharged		Flooded		Half Drain		Pipe	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Flow		
2.000	S02	-0.103	0.000	0.22			4.8		OK	
2.001	S03	-0.107	0.000	0.18			4.8		OK	
1.002	S04	0.214	0.000	0.15		32	1.9	SURCHARGED		

Technical Specification

	Original Setting		Minimum Setting		Maximum Setting	
Control Point	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
Primary Design	1.200	2.100	1.200	1.879	1.200	2.281
Flush-Flo™	0.288	1.868	0.353	1.548	0.268	2.136
Kick-Flo®	0.587	1.516	0.587	1.357	0.589	1.659
Mean Flow		1.721		1.495		1.910



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Head (m)	Flow (l/s)
0.000	0.000
0.041	0.618
0.083	1.420
0.124	1.668
0.166	1.775
0.207	1.834
0.248	1.861
0.290	1.868
0.331	1.862
0.372	1.847
0.414	1.824
0.455	1.789
0.497	1.736
0.538	1.658
0.579	1.544
0.621	1.555
0.662	1.601
0.703	1.645
0.745	1.688
0.786	1.729
0.828	1.770
0.869	1.809
0.910	1.848
0.952	1.885
0.993	1.922
1.034	1.958
1.076	1.993
1.117	2.027
1.159	2.061
1.200	2.094

DESIGN ADVICE



The head/flow characteristics of this SHE-0066-2100-1200-2100 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International
A CRH COMPANY

DATE 16/01/2026 11:15

Site 816 Stockport Road

DESIGNER Charlotte Richards

Ref HB

SHE-0066-2100-1200-2100

Hydro-Brake® Optimum