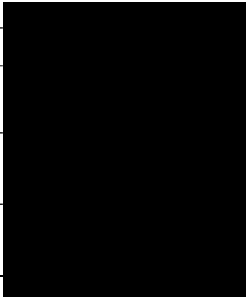




BELL MUNRO CONSULTING LTD.

**816 Stockport Road
Levenshulme**

**Hydraulic Calculations
January 2026**

	Initials		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 * 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 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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Online Controls for Storm																																																																												
Hydro-Brake® Optimum Manhole: S04, DS/PN: 1.002, Volume (m³): 2.0																																																																												
Unit Reference MD-SHE-0066-2100-1200-2100 Design Head (m)1.200 Design Flow (l/s)2.1 Flush-Flo™Calculated ObjectiveMinimise upstream storage ApplicationSurface Sump AvailableYes Diameter (mm)66 Invert Level (m)52.800 Minimum Outlet Pipe Diameter (mm)100 Suggested Manhole Diameter (mm)1200																																																																												
<table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></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>					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																																																						
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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																																																																												
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Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																					
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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			

Storm

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 Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

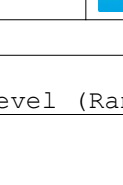
Rainfall Model	FSR	Ratio R	0.360
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Time Period(s) (years)	1, 2
Climate Change (%)	0, 0

									Water
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(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	Surcharged	Flooded			Half Drain	Pipe		
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	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

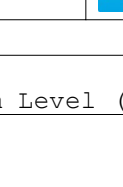
Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

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. (l/s)	Surcharged	Flooded	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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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

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	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

PN	US/MH Name	Depth (m)	Surcharged Flooded		Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
			Volume (m³)	Flow (l/s)					
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		

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

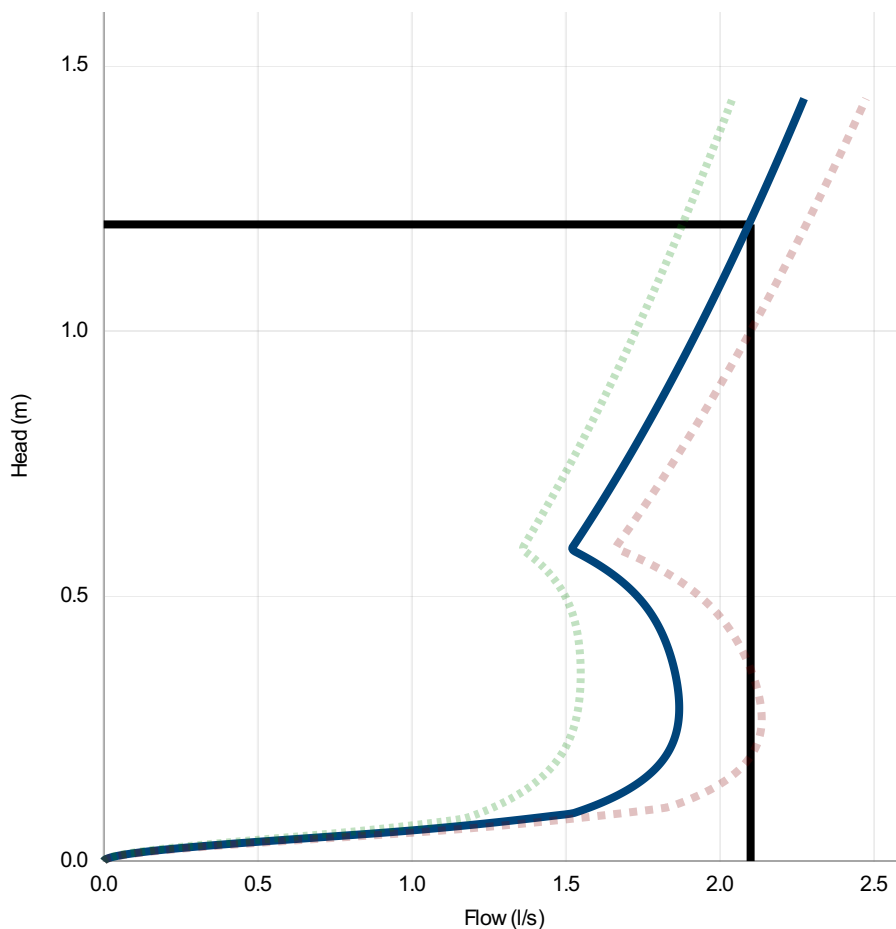
PN	US/MH Name	Surcharged		Flooded		Half Drain		Pipe	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Flow		
1.000	RE	-0.048	0.000	0.53			3.5		OK	
1.001	S01	-0.070	0.000	0.55			8.9		OK	
2.000	S02	0.005	0.000	0.21			4.6		SURCHARGED	
2.001	S03	0.210	0.000	0.17			4.6		SURCHARGED	
1.002	S04	0.900	0.000	0.16			2.0		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



hydro-int.com/patents



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

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Hydro-Brake® Optimum