

Flo Consult UK Ltd		Page 1																							
4 Market Square Old Amersham Buckinghamshire, HP7 0DQ	Levenshulme Road Surface Water Network Calculations																								
Date 16/05/2024	Designed by MDS																								
File SW Network Calcualtions ...	Checked by MDS																								
Innovyze	Network 2020.1.3																								
STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Storm Pipe Sizes STANDARD Manhole Sizes STANDARD FEH Rainfall Model Return Period (years) FEH Rainfall Version Site Location GB 388687 395445 SJ 88687 95445 Data Type Maximum Rainfall (mm/hr) Maximum Time of Concentration (mins) Foul Sewage (l/s/ha) Volumetric Runoff Coeff. PIMP (%) Add Flow / Climate Change (%) Minimum Backdrop Height (m) Maximum Backdrop Height (m) Min Design Depth for Optimisation (m) Min Vel for Auto Design only (m/s) Min Slope for Optimisation (1:X) Designed with Level Soffits Time Area Diagram for Storm <table><tr><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th></tr><tr><td>0-4</td><td>0.238</td><td>4-8</td><td>0.062</td></tr></table> Total Area Contributing (ha) = 0.300 Total Pipe Volume (m³) = 17.706			Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.238	4-8	0.062															
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Network Design Table for Storm <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section Type</th><th>Auto Design</th></tr></table> Network Results Table <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr></table>			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	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)
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Flo Consult UK Ltd										Page 6	
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<u>Manhole Schedules for Storm</u>											
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)	Diameter (mm)	Backdrop (mm)
S26	65.750	1.540	Open Manhole	1500		OUTFALL		1.009	64.210	375	
No coordinates have been specified, layout information cannot be produced.											
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Flo Consult UK Ltd		Page 9	
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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
8.004	o	375	S23	66.400	64.385	1.640	Open Manhole	1500
1.008	o	375	S24	66.750	64.280	2.095	Open Manhole	1500
1.009	o	375	S25/FC	66.200	64.260	1.565	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
8.004	16.050	152.9	S24	66.750	64.280	2.095	Open Manhole	1500
1.008	3.000	150.0	S25/FC	66.200	64.260	1.565	Open Manhole	1500
1.009	5.000	100.0	S26	65.750	64.210	1.165	Open Manhole	1500

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)
1.009	S26	65.750	64.210	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.950	Additional Flow - % of Total Flow	45.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/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)	4320
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	FEH
Return Period (years)	100

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Flo Consult UK Ltd		Page 10
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Synthetic Rainfall Details FEH Rainfall Version 2013 Site Location GB 388687 395445 SJ 88687 95445 Point Data Type No Summer Storms Yes Winter Storms 0.750 Cv (Summer) 0.950 Cv (Winter) 15 Storm Duration (mins)		
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Flo Consult UK Ltd		Page 11																																																																								
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Hydro-Brake® Optimum Manhole: S25/FC, DS/PN: 1.009, Volume (m³): 3.6																																																																										
Unit Reference MD-SHE-0103-5000-1200-5000 Design Head (m)1.200 Design Flow (l/s)5.0 Flush-Flo™Calculated ObjectiveMinimise upstream storage ApplicationSurface Sump AvailableYes Diameter (mm)103 Invert Level (m)64.260 Minimum Outlet Pipe Diameter (mm)150 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>5.0</td><td>Kick-Flo®</td><td>0.745</td><td>4.0</td></tr><tr><td>Flush-Flo™</td><td>0.354</td><td>5.0</td><td>Mean Flow over Head Range</td><td>-</td><td>4.4</td></tr></table>			Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.200	5.0	Kick-Flo®	0.745	4.0	Flush-Flo™	0.354	5.0	Mean Flow over Head Range	-	4.4																																																						
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Flo Consult UK Ltd		Page 12																																																																																				
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Storage Structures for Storm Cellular Storage Manhole: S25/FC, DS/PN: 1.009 Invert Level (m) 64.270 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>157.5</td><td>0.0</td><td>2.600</td><td>0.0</td><td>0.0</td></tr><tr><td>0.200</td><td>157.5</td><td>0.0</td><td>2.800</td><td>0.0</td><td>0.0</td></tr><tr><td>0.400</td><td>157.5</td><td>0.0</td><td>3.000</td><td>0.0</td><td>0.0</td></tr><tr><td>0.600</td><td>157.5</td><td>0.0</td><td>3.200</td><td>0.0</td><td>0.0</td></tr><tr><td>0.800</td><td>157.5</td><td>0.0</td><td>3.400</td><td>0.0</td><td>0.0</td></tr><tr><td>1.000</td><td>157.5</td><td>0.0</td><td>3.600</td><td>0.0</td><td>0.0</td></tr><tr><td>1.200</td><td>157.5</td><td>0.0</td><td>3.800</td><td>0.0</td><td>0.0</td></tr><tr><td>1.400</td><td>0.0</td><td>0.0</td><td>4.000</td><td>0.0</td><td>0.0</td></tr><tr><td>1.600</td><td>0.0</td><td>0.0</td><td>4.200</td><td>0.0</td><td>0.0</td></tr><tr><td>1.800</td><td>0.0</td><td>0.0</td><td>4.400</td><td>0.0</td><td>0.0</td></tr><tr><td>2.000</td><td>0.0</td><td>0.0</td><td>4.600</td><td>0.0</td><td>0.0</td></tr><tr><td>2.200</td><td>0.0</td><td>0.0</td><td>4.800</td><td>0.0</td><td>0.0</td></tr><tr><td>2.400</td><td>0.0</td><td>0.0</td><td>5.000</td><td>0.0</td><td>0.0</td></tr></tbody></table>			Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	0.000	157.5	0.0	2.600	0.0	0.0	0.200	157.5	0.0	2.800	0.0	0.0	0.400	157.5	0.0	3.000	0.0	0.0	0.600	157.5	0.0	3.200	0.0	0.0	0.800	157.5	0.0	3.400	0.0	0.0	1.000	157.5	0.0	3.600	0.0	0.0	1.200	157.5	0.0	3.800	0.0	0.0	1.400	0.0	0.0	4.000	0.0	0.0	1.600	0.0	0.0	4.200	0.0	0.0	1.800	0.0	0.0	4.400	0.0	0.0	2.000	0.0	0.0	4.600	0.0	0.0	2.200	0.0	0.0	4.800	0.0	0.0	2.400	0.0	0.0	5.000	0.0	0.0
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Flo Consult UK Ltd				Page 13																																																																																																																																																																									
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<u>Volume Summary (Static)</u> Length Calculations based on Centre-Centre <table><thead><tr><th>Pipe Number</th><th>USMH Name</th><th>Manhole Volume (m³)</th><th>Pipe Volume (m³)</th><th>Storage Structure Volume (m³)</th><th>Total Volume (m³)</th></tr></thead><tbody><tr><td>1.000</td><td>S1</td><td>0.013</td><td>0.166</td><td>0.000</td><td>0.179</td></tr><tr><td>1.001</td><td>S2</td><td>0.145</td><td>0.194</td><td>0.000</td><td>0.339</td></tr><tr><td>2.000</td><td>S3</td><td>0.013</td><td>0.166</td><td>0.000</td><td>0.179</td></tr><tr><td>1.002</td><td>S4</td><td>0.168</td><td>0.286</td><td>0.000</td><td>0.454</td></tr><tr><td>3.000</td><td>S5</td><td>0.013</td><td>0.168</td><td>0.000</td><td>0.181</td></tr><tr><td>1.003</td><td>S6</td><td>0.259</td><td>0.262</td><td>0.000</td><td>0.521</td></tr><tr><td>4.000</td><td>S7</td><td>0.015</td><td>0.168</td><td>0.000</td><td>0.182</td></tr><tr><td>5.000</td><td>S8</td><td>0.125</td><td>0.168</td><td>0.000</td><td>0.293</td></tr><tr><td>5.001</td><td>S9</td><td>0.145</td><td>0.261</td><td>0.000</td><td>0.406</td></tr><tr><td>1.004</td><td>S10</td><td>2.819</td><td>0.110</td><td>0.000</td><td>2.929</td></tr><tr><td>6.000</td><td>S11</td><td>2.271</td><td>3.485</td><td>0.000</td><td>5.755</td></tr><tr><td>1.005</td><td>S12</td><td>3.358</td><td>2.010</td><td>0.000</td><td>5.368</td></tr><tr><td>7.000</td><td>S13</td><td>0.125</td><td>0.277</td><td>0.000</td><td>0.402</td></tr><tr><td>7.001</td><td>S14</td><td>0.157</td><td>0.316</td><td>0.000</td><td>0.473</td></tr><tr><td>7.002</td><td>S15</td><td>0.337</td><td>0.098</td><td>0.000</td><td>0.435</td></tr><tr><td>1.006</td><td>JCT</td><td>0.000</td><td>1.872</td><td>0.000</td><td>1.872</td></tr><tr><td>1.007</td><td>S16</td><td>4.126</td><td>0.503</td><td>0.000</td><td>4.629</td></tr><tr><td>8.000</td><td>S17</td><td>0.125</td><td>0.350</td><td>0.000</td><td>0.475</td></tr><tr><td>8.001</td><td>S18</td><td>0.166</td><td>0.260</td><td>0.000</td><td>0.426</td></tr><tr><td>8.002</td><td>S19</td><td>2.925</td><td>1.933</td><td>0.000</td><td>4.857</td></tr><tr><td>8.003</td><td>S20</td><td>3.216</td><td>1.585</td><td>0.000</td><td>4.801</td></tr><tr><td>9.000</td><td>S21</td><td>0.241</td><td>0.352</td><td>0.000</td><td>0.593</td></tr><tr><td>9.001</td><td>S22</td><td>0.283</td><td>0.060</td><td>0.000</td><td>0.343</td></tr><tr><td>8.004</td><td>S23</td><td>3.561</td><td>1.773</td><td>0.000</td><td>5.333</td></tr><tr><td>1.008</td><td>S24</td><td>4.365</td><td>0.331</td><td>0.000</td><td>4.696</td></tr><tr><td>1.009</td><td>S25/FC</td><td>3.428</td><td>0.552</td><td>189.525</td><td>193.505</td></tr><tr><td colspan="2">Total</td><td>32.397</td><td>17.706</td><td>189.525</td><td>239.627</td></tr></tbody></table>						Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)	1.000	S1	0.013	0.166	0.000	0.179	1.001	S2	0.145	0.194	0.000	0.339	2.000	S3	0.013	0.166	0.000	0.179	1.002	S4	0.168	0.286	0.000	0.454	3.000	S5	0.013	0.168	0.000	0.181	1.003	S6	0.259	0.262	0.000	0.521	4.000	S7	0.015	0.168	0.000	0.182	5.000	S8	0.125	0.168	0.000	0.293	5.001	S9	0.145	0.261	0.000	0.406	1.004	S10	2.819	0.110	0.000	2.929	6.000	S11	2.271	3.485	0.000	5.755	1.005	S12	3.358	2.010	0.000	5.368	7.000	S13	0.125	0.277	0.000	0.402	7.001	S14	0.157	0.316	0.000	0.473	7.002	S15	0.337	0.098	0.000	0.435	1.006	JCT	0.000	1.872	0.000	1.872	1.007	S16	4.126	0.503	0.000	4.629	8.000	S17	0.125	0.350	0.000	0.475	8.001	S18	0.166	0.260	0.000	0.426	8.002	S19	2.925	1.933	0.000	4.857	8.003	S20	3.216	1.585	0.000	4.801	9.000	S21	0.241	0.352	0.000	0.593	9.001	S22	0.283	0.060	0.000	0.343	8.004	S23	3.561	1.773	0.000	5.333	1.008	S24	4.365	0.331	0.000	4.696	1.009	S25/FC	3.428	0.552	189.525	193.505	Total		32.397	17.706	189.525	239.627
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