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Ipsium Court, 24 The Quadrant Abingdon Science Park Abingdon, OX14 3YS	Project 629- Johnson drive Finchampstead	
Date 13/02/2025 17:37 File 629-Johnson drive_FEH d...	Designed by mcshane Checked by	
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)	100
FEH Rainfall Version	2013
Site Location	GB 480850 165550 SU 80850 65550
Data Type	Catchment
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	5
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.950
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.241	4-8	0.119

Total Area Contributing (ha) = 0.360

Total Pipe Volume (m³) = 3.093

Network Design Table for Storm

« - Indicates pipe capacity < flow

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
1.000	13.900	0.093	149.5	0.083	5.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

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)
1.000	50.00	5.00	63.725	0.083	0.0	0.0	0.0	1.28	90.7	14.2

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Network Design Table for Storm

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
2.000	1.000	0.010	100.0	0.014	5.00	0.0	0.600	o	100	Pipe/Conduit	
2.001	1.000	0.010	100.0	0.014	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.002	1.000	0.010	100.0	0.013	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.003	1.000	0.010	100.0	0.013	0.00	0.0	0.600	o	100	Pipe/Conduit	
2.004	5.900	0.350	16.9	0.030	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	4.500	0.905	5.0	0.118	5.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	2.000	0.230	8.7	0.021	5.00	0.0	0.600	o	100	Pipe/Conduit	
5.000	2.500	0.880	2.8	0.038	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.000	3.700	0.046	80.4	0.016	5.00	0.0	0.600	o	100	Pipe/Conduit	
6.001	4.300	0.920	4.7	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	1.000	0.000	0.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	40.300	0.269	149.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

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)
2.000	50.00	5.00	66.210	0.014	0.0	0.0	0.0	0.77	6.0	2.4
2.001	50.00	5.00	65.730	0.028	0.0	0.0	0.0	0.77	6.0	4.8
2.002	50.00	5.00	65.400	0.041	0.0	0.0	0.0	0.77	6.0«	7.0
2.003	50.00	5.00	64.950	0.054	0.0	0.0	0.0	0.77	6.0«	9.3
2.004	50.00	5.00	64.270	0.084	0.0	0.0	0.0	2.47	43.6	14.4
3.000	50.00	5.00	64.750	0.118	0.0	0.0	0.0	5.91	234.9	20.2
4.000	50.00	5.00	64.200	0.021	0.0	0.0	0.0	2.64	20.7	3.6
5.000	50.00	5.00	64.800	0.038	0.0	0.0	0.0	6.02	106.5	6.5
6.000	50.00	5.00	64.940	0.016	0.0	0.0	0.0	0.86	6.7	2.7
6.001	50.00	5.00	64.890	0.016	0.0	0.0	0.0	3.60	28.3	2.7
1.001	50.00	5.00	63.270	0.360	0.0	0.0	0.0	0.15	10.5«	61.7
1.002	50.00	5.00	63.270	0.360	0.0	0.0	0.0	1.07	42.4«	61.7

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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)
1.000	o	300	1	64.650	63.725	0.625	Open Manhole	1200
2.000	o	100	2	66.760	66.210	0.450	Open Manhole	1200
2.001	o	100	3	66.320	65.730	0.490	Open Manhole	1200
2.002	o	100	4	65.950	65.400	0.450	Open Manhole	1200
2.003	o	100	5	65.500	64.950	0.450	Open Manhole	1200
2.004	o	150	6	65.100	64.270	0.680	Open Manhole	1200
3.000	o	225	7	65.700	64.750	0.725	Open Manhole	1200
4.000	o	100	8	64.770	64.200	0.470	Open Manhole	1200
5.000	o	150	9	65.620	64.800	0.670	Open Manhole	1200
6.000	o	100	10	65.490	64.940	0.450	Open Manhole	1200
6.001	o	100	11	65.570	64.890	0.580	Open Manhole	1200
1.001	o	300	12	64.650	63.270	1.080	Open Manhole	1200
1.002	o	225	13	64.650	63.270	1.155	Open Manhole	1200

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)
1.000	13.900	149.5	12	64.650	63.632	0.718	Open Manhole	1200
2.000	1.000	100.0	3	66.320	66.200	0.020	Open Manhole	1200
2.001	1.000	100.0	4	65.950	65.720	0.130	Open Manhole	1200
2.002	1.000	100.0	5	65.500	65.390	0.010	Open Manhole	1200
2.003	1.000	100.0	6	65.100	64.940	0.060	Open Manhole	1200
2.004	5.900	16.9	12	64.650	63.920	0.580	Open Manhole	1200
3.000	4.500	5.0	12	64.650	63.845	0.580	Open Manhole	1200
4.000	2.000	8.7	12	64.650	63.970	0.580	Open Manhole	1200
5.000	2.500	2.8	12	64.650	63.920	0.580	Open Manhole	1200
6.000	3.700	80.4	11	65.570	64.894	0.576	Open Manhole	1200
6.001	4.300	4.7	12	64.650	63.970	0.580	Open Manhole	1200
1.001	1.000	0.0	13	64.650	63.270	1.080	Open Manhole	1200
1.002	40.300	149.8		63.420	63.001	0.194	Open Manhole	0

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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	-	-	100	0.083	0.083	0.083
2.000	-	-	100	0.014	0.014	0.014
2.001	-	-	100	0.014	0.014	0.014
2.002	-	-	100	0.013	0.013	0.013
2.003	-	-	100	0.013	0.013	0.013
2.004	-	-	100	0.030	0.030	0.030
3.000	-	-	100	0.118	0.118	0.118
4.000	-	-	100	0.021	0.021	0.021
5.000	-	-	100	0.038	0.038	0.038
6.000	-	-	100	0.016	0.016	0.016
6.001	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.360	0.360	0.360

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)
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1.002		63.420	63.001	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 * 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)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	3	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)	18.900	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for Storm

Orifice Manhole: 11, DS/PN: 6.001, Volume (m³): 0.8

Diameter (m) 0.035 Discharge Coefficient 0.600 Invert Level (m) 64.890

Complex Manhole: 12, DS/PN: 1.001, Volume (m³): 2.7

Orifice

Diameter (m) 0.120 Discharge Coefficient 0.600 Invert Level (m) 63.270

Weir

Discharge Coef 0.544 Width (m) 0.700 Invert Level (m) 63.720

Hydro-Brake® Optimum Manhole: 13, DS/PN: 1.002, Volume (m³): 1.5

Unit Reference	MD-SHE-0194-1850-0800-1850
Design Head (m)	0.800
Design Flow (l/s)	18.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	194
Invert Level (m)	63.270
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	18.5
Flush-Flo™	0.309	18.5
Kick-Flo®	0.602	16.2
Mean Flow over Head Range	-	15.2

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	6.7	1.000	20.6	2.400	31.3	5.500	46.7
0.200	17.9	1.200	22.4	2.600	32.5	6.000	48.7
0.300	18.5	1.400	24.2	3.000	34.8	6.500	50.6
0.400	18.3	1.600	25.7	3.500	37.5	7.000	52.5
0.500	17.7	1.800	27.2	4.000	40.0	7.500	54.3
0.600	16.2	2.000	28.7	4.500	42.4	8.000	56.0
0.800	18.5	2.200	30.0	5.000	44.6	8.500	57.4

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<u>Hydro-Brake® Optimum Manhole: 13, DS/PN: 1.002, Volume (m³): 1.5</u>							
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
9.000	59.1	9.500	60.7				
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Storage Structures for Storm Porous Car Park Manhole: 2, DS/PN: 2.000 <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>4.8</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>23.7</td></tr><tr><td>Max Percolation (l/s)</td><td>31.6</td><td>Slope (1:X)</td><td>25.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>66.210</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> Porous Car Park Manhole: 3, DS/PN: 2.001 <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>4.8</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>19.5</td></tr><tr><td>Max Percolation (l/s)</td><td>26.0</td><td>Slope (1:X)</td><td>45.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>65.730</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> Porous Car Park Manhole: 4, DS/PN: 2.002 <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>4.8</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>20.2</td></tr><tr><td>Max Percolation (l/s)</td><td>26.9</td><td>Slope (1:X)</td><td>55.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>65.400</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> Porous Car Park Manhole: 5, DS/PN: 2.003 <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>4.8</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>19.2</td></tr><tr><td>Max Percolation (l/s)</td><td>25.6</td><td>Slope (1:X)</td><td>35.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>64.950</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> Porous Car Park Manhole: 6, DS/PN: 2.004 <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>4.8</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>17.7</td></tr><tr><td>Max Percolation (l/s)</td><td>23.6</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>64.270</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> Porous Car Park Manhole: 8, DS/PN: 4.000 <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Max Percolation (l/s)</td><td>43.5</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Safety Factor</td><td>2.0</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8	Membrane Percolation (mm/hr)	1000	Length (m)	23.7	Max Percolation (l/s)	31.6	Slope (1:X)	25.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	66.210	Cap Volume Depth (m)	0.350	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8	Membrane Percolation (mm/hr)	1000	Length (m)	19.5	Max Percolation (l/s)	26.0	Slope (1:X)	45.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	65.730	Cap Volume Depth (m)	0.350	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8	Membrane Percolation (mm/hr)	1000	Length (m)	20.2	Max Percolation (l/s)	26.9	Slope (1:X)	55.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	65.400	Cap Volume Depth (m)	0.350	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8	Membrane Percolation (mm/hr)	1000	Length (m)	19.2	Max Percolation (l/s)	25.6	Slope (1:X)	35.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	64.950	Cap Volume Depth (m)	0.350	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8	Membrane Percolation (mm/hr)	1000	Length (m)	17.7	Max Percolation (l/s)	23.6	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	64.270	Cap Volume Depth (m)	0.350	Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	43.5	Membrane Percolation (mm/hr)	1000	Safety Factor	2.0
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Invert Level (m)	65.400	Cap Volume Depth (m)	0.350																																																																																																																															
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Porosity	0.30	Evaporation (mm/day)	3																																																																																																																															
Invert Level (m)	64.950	Cap Volume Depth (m)	0.350																																																																																																																															
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Membrane Percolation (mm/hr)	1000	Length (m)	17.7																																																																																																																															
Max Percolation (l/s)	23.6	Slope (1:X)	0.0																																																																																																																															
Safety Factor	2.0	Depression Storage (mm)	5																																																																																																																															
Porosity	0.30	Evaporation (mm/day)	3																																																																																																																															
Invert Level (m)	64.270	Cap Volume Depth (m)	0.350																																																																																																																															
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<u>Porous Car Park Manhole: 8, DS/PN: 4.000</u> <table><tr><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Invert Level (m)</td><td>64.200</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Width (m)</td><td>4.1</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Length (m)</td><td>38.2</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> <u>Porous Car Park Manhole: 10, DS/PN: 6.000</u> <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>4.1</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>20.0</td></tr><tr><td>Max Percolation (l/s)</td><td>22.8</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>64.940</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table> <u>Cellular Storage Manhole: 12, DS/PN: 1.001</u> <table><tr><td>Invert Level (m)</td><td>63.270</td><td>Safety Factor</td><td>2.0</td></tr><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.95</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.00000</td><td></td><td></td></tr></table><table><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><tr><td>0.000</td><td>285.0</td><td>285.0</td><td>0.801</td><td>0.0</td><td>285.0</td></tr><tr><td>0.800</td><td>285.0</td><td>285.0</td><td></td><td></td><td></td></tr></table>			Porosity	0.30	Slope (1:X)	0.0	Invert Level (m)	64.200	Depression Storage (mm)	5	Width (m)	4.1	Evaporation (mm/day)	3	Length (m)	38.2	Cap Volume Depth (m)	0.350	Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.1	Membrane Percolation (mm/hr)	1000	Length (m)	20.0	Max Percolation (l/s)	22.8	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	64.940	Cap Volume Depth (m)	0.350	Invert Level (m)	63.270	Safety Factor	2.0	Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95	Infiltration Coefficient Side (m/hr)	0.00000			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	285.0	285.0	0.801	0.0	285.0	0.800	285.0	285.0			
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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	2.000
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	8
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 480850 165550 SU 80850 65550
Data Type	Catchment
Cv (Summer)	0.950
Cv (Winter)	0.950

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

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)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Summer	2	+0%					63.820
2.000	2	30 Summer	2	+0%	30/15 Summer				66.266
2.001	3	30 Summer	2	+0%	30/15 Summer				65.810
2.002	4	30 Summer	2	+0%	2/30 Summer				65.509
2.003	5	30 Summer	2	+0%	2/15 Summer				65.070
2.004	6	60 Summer	2	+0%					64.317
3.000	7	15 Summer	2	+0%					64.813
4.000	8	120 Summer	2	+0%					64.222
5.000	9	15 Summer	2	+0%					64.836
6.000	10	120 Summer	2	+0%	30/30 Summer				64.980
6.001	11	120 Summer	2	+0%	30/15 Summer				64.977
1.001	12	360 Summer	2	+0%	30/60 Summer				63.475
1.002	13	360 Summer	2	+0%					63.360

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Half Drain	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)	Cap.	(l/s)	Time (mins)	Flow (l/s)		
1.000	1	-0.205	0.000	0.22			16.3	OK	
2.000	2	-0.044	0.000	0.59		6	2.3	OK	
2.001	3	-0.020	0.000	0.99		5	3.9	OK	
2.002	4	0.009	0.000	1.09		6	4.3	SURCHARGED	
2.003	5	0.020	0.000	1.31		8	5.1	SURCHARGED	
2.004	6	-0.103	0.000	0.21		17	7.7	OK	
3.000	7	-0.162	0.000	0.17			23.2	OK	
4.000	8	-0.078	0.000	0.11		33	1.4	OK	
5.000	9	-0.114	0.000	0.13			7.5	OK	
6.000	10	-0.060	0.000	0.12		31	0.7	OK	
6.001	11	-0.013	0.000	0.03			0.7	OK	
1.001	12	-0.095	0.000	0.10		226	5.6	OK	
1.002	13	-0.135	0.000	0.14			5.6	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	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	8
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 480850 165550 SU 80850 65550
Data Type	Catchment
Cv (Summer)	0.950
Cv (Winter)	0.950

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

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)	2, 30, 100
Climate Change (%)	0, 0, 40

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	1	15 Summer	30	+0%					63.877
2.000	2	15 Summer	30	+0%	30/15 Summer				66.337
2.001	3	15 Summer	30	+0%	30/15 Summer				65.908
2.002	4	30 Summer	30	+0%	2/30 Summer				65.605
2.003	5	30 Summer	30	+0%	2/15 Summer				65.188
2.004	6	15 Summer	30	+0%					64.352
3.000	7	15 Summer	30	+0%					64.849
4.000	8	30 Summer	30	+0%					64.244
5.000	9	15 Summer	30	+0%					64.856
6.000	10	60 Summer	30	+0%	30/30 Summer				65.051
6.001	11	60 Summer	30	+0%	30/15 Summer				65.047
1.001	12	180 Summer	30	+0%	30/60 Summer				63.630
1.002	13	180 Summer	30	+0%					63.412

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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 (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Flow		
1.000	1	-0.148	0.000	0.50			37.8		OK	
2.000	2	0.027	0.000	1.42		4	5.6		SURCHARGED	
2.001	3	0.078	0.000	2.13		6	8.4		SURCHARGED	
2.002	4	0.105	0.000	2.45		8	9.7		SURCHARGED	
2.003	5	0.138	0.000	2.76		10	10.9		SURCHARGED	
2.004	6	-0.068	0.000	0.56		14	20.2		OK	
3.000	7	-0.126	0.000	0.40			53.9		OK	
4.000	8	-0.056	0.000	0.40		14	5.4		OK	
5.000	9	-0.094	0.000	0.30			17.4		OK	
6.000	10	0.011	0.000	0.18		44	1.0		SURCHARGED	
6.001	11	0.057	0.000	0.04			1.0		SURCHARGED	
1.001	12	0.060	0.000	0.21		146	12.0		SURCHARGED	
1.002	13	-0.083	0.000	0.30			12.0		OK	

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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	8
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 480850 165550 SU 80850 65550
Data Type	Catchment
Cv (Summer)	0.950
Cv (Winter)	0.950

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

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)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Summer	100	+40%					63.949
2.000	2	15 Summer	100	+40%	30/15 Summer				66.411
2.001	3	30 Summer	100	+40%	30/15 Summer				66.019
2.002	4	30 Summer	100	+40%	2/30 Summer				65.718
2.003	5	30 Summer	100	+40%	2/15 Summer				65.317
2.004	6	15 Summer	100	+40%					64.388
3.000	7	15 Summer	100	+40%					64.892
4.000	8	30 Summer	100	+40%					64.271
5.000	9	15 Summer	100	+40%					64.878
6.000	10	60 Summer	100	+40%	30/30 Summer				65.166
6.001	11	60 Summer	100	+40%	30/15 Summer				65.161
1.001	12	180 Summer	100	+40%	30/60 Summer				63.907
1.002	13	180 Summer	100	+40%					63.486

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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 (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Flow		
1.000	1	-0.076	0.000	0.90			67.5		OK	
2.000	2	0.101	0.000	2.39		5	9.4		SURCHARGED	
2.001	3	0.189	0.000	3.19		7	12.6		SURCHARGED	
2.002	4	0.218	0.000	3.41		11	13.4		FLOOD RISK	
2.003	5	0.267	0.000	3.75		13	14.8		FLOOD RISK	
2.004	6	-0.032	0.000	0.97		18	35.1		OK	
3.000	7	-0.083	0.000	0.72			96.1		OK	
4.000	8	-0.029	0.000	0.85		11	11.4		OK	
5.000	9	-0.072	0.000	0.53			31.0		OK	
6.000	10	0.126	0.000	0.25		59	1.4		SURCHARGED	
6.001	11	0.171	0.000	0.05			1.3		SURCHARGED	
1.001	12	0.337	0.000	0.31		143	18.1		SURCHARGED	
1.002	13	-0.009	0.000	0.45			18.1		OK	