## STORM SEWER DESIGN by the Modified Rational Method

### Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

| | | | |
|---|---|---|---|
| Return Period (years) | 2 | PIMP (%) | 100 |
| M5-60 (mm) | 20.000 | Add Flow / Climate Change (%) | 0 |
| Ratio R | 0.400 | Minimum Backdrop Height (m) | 0.200 |
| Maximum Rainfall (mm/hr) | 50 | Maximum Backdrop Height (m) | 1.500 |
| Maximum Time of Concentration (mins) | 30 | Min Design Depth for Optimisation (m) | 1.200 |
| Foul Sewage (l/s/ha) | 0.000 | Min Vel for Auto Design only (m/s) | 1.00 |
| Volumetric Runoff Coeff. | 0.750 | 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 | 0.114 | 4-8 | 0.048 |

Total Area Contributing (ha) = 0.162

Total Pipe Volume (m³) = 4.408

### 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 | 12.735 | 0.160 | 79.6 | 0.010 | 5.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| 1.001 | 16.375 | 0.205 | 79.9 | 0.004 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| 1.002 | 6.075 | 0.075 | 81.0 | 0.002 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| 1.003 | 5.855 | 0.040 | 146.4 | 0.006 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 1.004 | 10.170 | 0.080 | 127.1 | 0.002 | 0.00 | 0.0 | 0.600 | o | 150 | 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 | 5.25 | 119.100 | 0.010 | 0.0 | 0.0 | 0.0 | 0.86 | 6.8 | 1.4 |
| 1.001 | 50.00 | 5.56 | 118.940 | 0.014 | 0.0 | 0.0 | 0.0 | 0.86 | 6.8 | 1.9 |
| 1.002 | 50.00 | 5.68 | 118.735 | 0.016 | 0.0 | 0.0 | 0.0 | 0.86 | 6.7 | 2.2 |
| 1.003 | 50.00 | 5.80 | 118.610 | 0.022 | 0.0 | 0.0 | 0.0 | 0.83 | 14.6 | 3.0 |
| 1.004 | 50.00 | 5.99 | 118.570 | 0.024 | 0.0 | 0.0 | 0.0 | 0.89 | 15.7 | 3.2 |

©1982-2018 Innovyze

## 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 | 16.195 | 0.260 | 62.3 | 0.020 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 1.005 | 17.555 | 0.430 | 40.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 3.000 | 15.565 | 0.105 | 148.2 | 0.008 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 3.001 | 8.530 | 0.060 | 142.2 | 0.004 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 4.000 | 7.690 | 0.100 | 76.9 | 0.004 | 5.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| 4.001 | 22.575 | 0.270 | 83.6 | 0.003 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| 4.002 | 3.130 | 0.040 | 78.3 | 0.006 | 0.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| 3.002 | 19.625 | 0.130 | 151.0 | 0.007 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 5.000 | 21.305 | 0.270 | 78.9 | 0.006 | 5.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| 5.001 | 4.570 | 0.030 | 152.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 5.002 | 11.680 | 0.080 | 146.0 | 0.015 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 5.003 | 15.105 | 0.210 | 71.9 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 3.003 | 12.840 | 0.085 | 151.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 6.000 | 8.035 | 0.525 | 15.3 | 0.008 | 5.00 | 0.0 | 0.600 | o | 100 | 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 | 5.21 | 118.750 | 0.020 | 0.0 | 0.0 | 0.0 | 1.28 | 22.6 | 2.7 |
| 1.005 | 50.00 | 6.17 | 118.490 | 0.044 | 0.0 | 0.0 | 0.0 | 1.58 | 27.9 | 6.0 |
| 3.000 | 50.00 | 5.32 | 118.805 | 0.008 | 0.0 | 0.0 | 0.0 | 0.82 | 14.5 | 1.1 |
| 3.001 | 50.00 | 5.48 | 118.700 | 0.012 | 0.0 | 0.0 | 0.0 | 0.84 | 14.9 | 1.6 |
| 4.000 | 50.00 | 5.15 | 119.100 | 0.004 | 0.0 | 0.0 | 0.0 | 0.88 | 6.9 | 0.5 |
| 4.001 | 50.00 | 5.59 | 119.000 | 0.007 | 0.0 | 0.0 | 0.0 | 0.84 | 6.6 | 0.9 |
| 4.002 | 50.00 | 5.65 | 118.730 | 0.013 | 0.0 | 0.0 | 0.0 | 0.87 | 6.8 | 1.8 |
| 3.002 | 50.00 | 6.05 | 118.640 | 0.032 | 0.0 | 0.0 | 0.0 | 0.82 | 14.4 | 4.3 |
| 5.000 | 50.00 | 5.41 | 119.150 | 0.006 | 0.0 | 0.0 | 0.0 | 0.87 | 6.8 | 0.8 |
| 5.001 | 50.00 | 5.50 | 118.830 | 0.006 | 0.0 | 0.0 | 0.0 | 0.81 | 14.3 | 0.8 |
| 5.002 | 50.00 | 5.74 | 118.800 | 0.021 | 0.0 | 0.0 | 0.0 | 0.83 | 14.7 | 2.8 |
| 5.003 | 50.00 | 5.95 | 118.720 | 0.021 | 0.0 | 0.0 | 0.0 | 1.19 | 21.0 | 2.8 |
| 3.003 | 50.00 | 6.32 | 118.510 | 0.053 | 0.0 | 0.0 | 0.0 | 0.82 | 14.4 | 7.2 |
| 6.000 | 50.00 | 5.07 | 119.000 | 0.008 | 0.0 | 0.0 | 0.0 | 1.98 | 15.6 | 1.1 |

©1982-2018 Innovyze

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.004 | 22.595 | 0.295 | 76.6 | 0.008 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 7.000 | 1.545 | 0.020 | 77.3 | 0.015 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 7.001 | 4.895 | 0.470 | 10.4 | 0.010 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 1.006 | 6.500 | 0.045 | 144.4 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 8.000 | 2.785 | 0.020 | 139.3 | 0.020 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 8.001 | 21.435 | 0.145 | 147.8 | 0.004 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 8.002 | 4.580 | 0.380 | 12.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 1.007 | 1.730 | 0.015 | 115.3 | 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.004 | 50.00 | 6.64 | 118.425 | 0.069 | 0.0 | 0.0 | 0.0 | 1.15 | 20.3 | 9.3 |
| 7.000 | 50.00 | 5.02 | 118.550 | 0.015 | 0.0 | 0.0 | 0.0 | 1.14 | 20.2 | 2.0 |
| 7.001 | 50.00 | 5.05 | 118.530 | 0.025 | 0.0 | 0.0 | 0.0 | 3.14 | 55.5 | 3.4 |
| 1.006 | 50.00 | 6.77 | 118.060 | 0.138 | 0.0 | 0.0 | 0.0 | 0.83 | 14.7« | 18.7 |
| 8.000 | 50.00 | 5.05 | 118.560 | 0.020 | 0.0 | 0.0 | 0.0 | 0.85 | 15.0 | 2.7 |
| 8.001 | 50.00 | 5.49 | 118.540 | 0.024 | 0.0 | 0.0 | 0.0 | 0.82 | 14.6 | 3.2 |
| 8.002 | 50.00 | 5.51 | 118.395 | 0.024 | 0.0 | 0.0 | 0.0 | 2.92 | 51.6 | 3.2 |
| 1.007 | 50.00 | 6.80 | 118.015 | 0.162 | 0.0 | 0.0 | 0.0 | 1.22 | 48.4 | 21.9 |

©1982-2018 Innovyze

## Manhole Schedules for Storm

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam.,L*W (mm) | Pipe Out PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 119.600 | 0.500 | Open Manhole | 1200 | 1.000 | 119.100 | 100 | | | | |
| 2 | 119.550 | 0.610 | Open Manhole | 1200 | 1.001 | 118.940 | 100 | 1.000 | 118.940 | 100 | |
| 3 | 119.600 | 0.865 | Open Manhole | 1200 | 1.002 | 118.735 | 100 | 1.001 | 118.735 | 100 | |
| 4 | 119.700 | 1.090 | Open Manhole | 1200 | 1.003 | 118.610 | 150 | 1.002 | 118.660 | 100 | |
| 5 | 119.500 | 0.930 | Open Manhole | 1200 | 1.004 | 118.570 | 150 | 1.003 | 118.570 | 150 | |
| 6 | 119.650 | 0.900 | Open Manhole | 1200 | 2.000 | 118.750 | 150 | | | | |
| 6 | 119.450 | 0.960 | Open Manhole | 1200 | 1.005 | 118.490 | 150 | 1.004 | 118.490 | 150 | |
| | | | | | | | | 2.000 | 118.490 | 150 | |
| 8 | 119.700 | 0.895 | Open Manhole | 1200 | 3.000 | 118.805 | 150 | | | | |
| 8 | 119.650 | 0.950 | Open Manhole | 1200 | 3.001 | 118.700 | 150 | 3.000 | 118.700 | 150 | |
| 12 | 119.700 | 0.600 | Open Manhole | 1200 | 4.000 | 119.100 | 100 | | | | |
| 12 | 119.650 | 0.650 | Open Manhole | 1200 | 4.001 | 119.000 | 100 | 4.000 | 119.000 | 100 | |
| 12 | 119.650 | 0.920 | Open Manhole | 1200 | 4.002 | 118.730 | 100 | 4.001 | 118.730 | 100 | |
| 8 | 119.700 | 1.060 | Open Manhole | 1200 | 3.002 | 118.640 | 150 | 3.001 | 118.640 | 150 | |
| | | | | | | | | 4.002 | 118.690 | 100 | |
| 14 | 119.650 | 0.500 | Open Manhole | 1200 | 5.000 | 119.150 | 100 | | | | |
| 14 | 119.700 | 0.870 | Open Manhole | 1200 | 5.001 | 118.830 | 150 | 5.000 | 118.880 | 100 | |
| 16 | 119.800 | 1.000 | Open Manhole | 1200 | 5.002 | 118.800 | 150 | 5.001 | 118.800 | 150 | |
| 16 | 119.650 | 0.930 | Open Manhole | 1200 | 5.003 | 118.720 | 150 | 5.002 | 118.720 | 150 | |
| 8 | 119.500 | 0.990 | Open Manhole | 1200 | 3.003 | 118.510 | 150 | 3.002 | 118.510 | 150 | |
| | | | | | | | | 5.003 | 118.510 | 150 | |
| 19 | 119.500 | 0.500 | Open Manhole | 1200 | 6.000 | 119.000 | 100 | | | | |
| 8 | 119.400 | 0.975 | Open Manhole | 1200 | 3.004 | 118.425 | 150 | 3.003 | 118.425 | 150 | |
| | | | | | | | | 6.000 | 118.475 | 100 | |
| 21 | 119.200 | 0.650 | Open Manhole | 1200 | 7.000 | 118.550 | 150 | | | | |
| 21 | 119.200 | 0.670 | Open Manhole | 1200 | 7.001 | 118.530 | 150 | 7.000 | 118.530 | 150 | |
| 8 | 119.250 | 1.190 | Open Manhole | 1200 | 1.006 | 118.060 | 150 | 1.005 | 118.060 | 150 | |
| | | | | | | | | 3.004 | 118.130 | 150 | 70 |
| | | | | | | | | 7.001 | 118.060 | 150 | |
| 24 | 119.300 | 0.740 | Open Manhole | 1200 | 8.000 | 118.560 | 150 | | | | |
| 21 | 119.300 | 0.760 | Open Manhole | 1200 | 8.001 | 118.540 | 150 | 8.000 | 118.540 | 150 | |
| 26 | 119.150 | 0.755 | Open Manhole | 1200 | 8.002 | 118.395 | 150 | 8.001 | 118.395 | 150 | |
| 9 | 119.150 | 1.135 | Open Manhole | 1200 | 1.007 | 118.015 | 225 | 1.006 | 118.015 | 150 | |
| | | | | | | | | 8.002 | 118.015 | 150 | |
| | 119.100 | 1.100 | Open Manhole | 0 | | OUTFALL | | 1.007 | 118.000 | 225 | |

©1982-2018 Innovyze

## 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 | 100 | 1 | 119.600 | 119.100 | 0.400 | Open Manhole | 1200 |
| 1.001 | o | 100 | 2 | 119.550 | 118.940 | 0.510 | Open Manhole | 1200 |
| 1.002 | o | 100 | 3 | 119.600 | 118.735 | 0.765 | Open Manhole | 1200 |
| 1.003 | o | 150 | 4 | 119.700 | 118.610 | 0.940 | Open Manhole | 1200 |
| 1.004 | o | 150 | 5 | 119.500 | 118.570 | 0.780 | Open Manhole | 1200 |
| 2.000 | o | 150 | 6 | 119.650 | 118.750 | 0.750 | Open Manhole | 1200 |
| 1.005 | o | 150 | 6 | 119.450 | 118.490 | 0.810 | Open Manhole | 1200 |
| 3.000 | o | 150 | 8 | 119.700 | 118.805 | 0.745 | Open Manhole | 1200 |
| 3.001 | o | 150 | 8 | 119.650 | 118.700 | 0.800 | Open Manhole | 1200 |
| 4.000 | o | 100 | 12 | 119.700 | 119.100 | 0.500 | Open Manhole | 1200 |
| 4.001 | o | 100 | 12 | 119.650 | 119.000 | 0.550 | Open Manhole | 1200 |
| 4.002 | o | 100 | 12 | 119.650 | 118.730 | 0.820 | Open Manhole | 1200 |
| 3.002 | o | 150 | 8 | 119.700 | 118.640 | 0.910 | Open Manhole | 1200 |
| 5.000 | o | 100 | 14 | 119.650 | 119.150 | 0.400 | Open Manhole | 1200 |
| 5.001 | o | 150 | 14 | 119.700 | 118.830 | 0.720 | 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 | 12.735 | 79.6 | 2 | 119.550 | 118.940 | 0.510 | Open Manhole | 1200 |
| 1.001 | 16.375 | 79.9 | 3 | 119.600 | 118.735 | 0.765 | Open Manhole | 1200 |
| 1.002 | 6.075 | 81.0 | 4 | 119.700 | 118.660 | 0.940 | Open Manhole | 1200 |
| 1.003 | 5.855 | 146.4 | 5 | 119.500 | 118.570 | 0.780 | Open Manhole | 1200 |
| 1.004 | 10.170 | 127.1 | 6 | 119.450 | 118.490 | 0.810 | Open Manhole | 1200 |
| 2.000 | 16.195 | 62.3 | 6 | 119.450 | 118.490 | 0.810 | Open Manhole | 1200 |
| 1.005 | 17.555 | 40.8 | 8 | 119.250 | 118.060 | 1.040 | Open Manhole | 1200 |
| 3.000 | 15.565 | 148.2 | 8 | 119.650 | 118.700 | 0.800 | Open Manhole | 1200 |
| 3.001 | 8.530 | 142.2 | 8 | 119.700 | 118.640 | 0.910 | Open Manhole | 1200 |
| 4.000 | 7.690 | 76.9 | 12 | 119.650 | 119.000 | 0.550 | Open Manhole | 1200 |
| 4.001 | 22.575 | 83.6 | 12 | 119.650 | 118.730 | 0.820 | Open Manhole | 1200 |
| 4.002 | 3.130 | 78.3 | 8 | 119.700 | 118.690 | 0.910 | Open Manhole | 1200 |
| 3.002 | 19.625 | 151.0 | 8 | 119.500 | 118.510 | 0.840 | Open Manhole | 1200 |
| 5.000 | 21.305 | 78.9 | 14 | 119.700 | 118.880 | 0.720 | Open Manhole | 1200 |
| 5.001 | 4.570 | 152.3 | 16 | 119.800 | 118.800 | 0.850 | Open Manhole | 1200 |

©1982-2018 Innovyze

## 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) |
|---|---|---|---|---|---|---|---|---|
| 5.002 | o | 150 | 16 | 119.800 | 118.800 | 0.850 | Open Manhole | 1200 |
| 5.003 | o | 150 | 16 | 119.650 | 118.720 | 0.780 | Open Manhole | 1200 |
| 3.003 | o | 150 | 8 | 119.500 | 118.510 | 0.840 | Open Manhole | 1200 |
| 6.000 | o | 100 | 19 | 119.500 | 119.000 | 0.400 | Open Manhole | 1200 |
| 3.004 | o | 150 | 8 | 119.400 | 118.425 | 0.825 | Open Manhole | 1200 |
| 7.000 | o | 150 | 21 | 119.200 | 118.550 | 0.500 | Open Manhole | 1200 |
| 7.001 | o | 150 | 21 | 119.200 | 118.530 | 0.520 | Open Manhole | 1200 |
| 1.006 | o | 150 | 8 | 119.250 | 118.060 | 1.040 | Open Manhole | 1200 |
| 8.000 | o | 150 | 24 | 119.300 | 118.560 | 0.590 | Open Manhole | 1200 |
| 8.001 | o | 150 | 21 | 119.300 | 118.540 | 0.610 | Open Manhole | 1200 |
| 8.002 | o | 150 | 26 | 119.150 | 118.395 | 0.605 | Open Manhole | 1200 |
| 1.007 | o | 225 | 9 | 119.150 | 118.015 | 0.910 | 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) |
|---|---|---|---|---|---|---|---|---|
| 5.002 | 11.680 | 146.0 | 16 | 119.650 | 118.720 | 0.780 | Open Manhole | 1200 |
| 5.003 | 15.105 | 71.9 | 8 | 119.500 | 118.510 | 0.840 | Open Manhole | 1200 |
| 3.003 | 12.840 | 151.1 | 8 | 119.400 | 118.425 | 0.825 | Open Manhole | 1200 |
| 6.000 | 8.035 | 15.3 | 8 | 119.400 | 118.475 | 0.825 | Open Manhole | 1200 |
| 3.004 | 22.595 | 76.6 | 8 | 119.250 | 118.130 | 0.970 | Open Manhole | 1200 |
| 7.000 | 1.545 | 77.3 | 21 | 119.200 | 118.530 | 0.520 | Open Manhole | 1200 |
| 7.001 | 4.895 | 10.4 | 8 | 119.250 | 118.060 | 1.040 | Open Manhole | 1200 |
| 1.006 | 6.500 | 144.4 | 9 | 119.150 | 118.015 | 0.985 | Open Manhole | 1200 |
| 8.000 | 2.785 | 139.3 | 21 | 119.300 | 118.540 | 0.610 | Open Manhole | 1200 |
| 8.001 | 21.435 | 147.8 | 26 | 119.150 | 118.395 | 0.605 | Open Manhole | 1200 |
| 8.002 | 4.580 | 12.1 | 9 | 119.150 | 118.015 | 0.985 | Open Manhole | 1200 |
| 1.007 | 1.730 | 115.3 | | 119.100 | 118.000 | 0.875 | Open Manhole | 0 |

©1982-2018 Innovyze

## 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) |
|---|---|---|---|---|---|---|
| 1.007 | | 119.100 | 118.000 | 0.000 | 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 | 2.000 |
| Hot Start (mins) | 0 | Inlet Coeffiecient | 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 | 6 |
| 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) | 2 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Storm Duration (mins) | 30 |
| Ratio R | 0.400 | | |

©1982-2018 Innovyze

## Online Controls for Storm

### Orifice Manhole: 6, DS/PN: 1.005, Volume (m³): 1.5

Diameter (m) 0.028 Discharge Coefficient 0.600 Invert Level (m) 118.490

### Orifice Manhole: 8, DS/PN: 3.003, Volume (m³): 1.7

Diameter (m) 0.017 Discharge Coefficient 0.600 Invert Level (m) 118.510

### Hydro-Brake® Optimum Manhole: 9, DS/PN: 1.007, Volume (m³): 1.4

| | |
|---|---|
| Unit Reference | MD-SHE-0095-4000-1000-4000 |
| Design Head (m) | 1.000 |
| Design Flow (l/s) | 4.0 |
| Flush-Flo™ | Calculated |
| Objective | Minimise upstream storage |
| Application | Surface |
| Sump Available | Yes |
| Diameter (mm) | 95 |
| Invert Level (m) | 118.015 |
| Minimum Outlet Pipe Diameter (mm) | 150 |
| Suggested Manhole Diameter (mm) | 1200 |

| **Control Points** | **Head (m)** | **Flow (l/s)** |
|---|---|---|
| Design Point (Calculated) | 1.000 | 4.0 |
| Flush-Flo™ | 0.294 | 4.0 |
| Kick-Flo® | 0.629 | 3.2 |
| Mean Flow over Head Range | - | 3.5 |

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 | 3.0 | 1.200 | 4.3 | 3.000 | 6.7 | 7.000 | 10.0 |
| 0.200 | 3.9 | 1.400 | 4.7 | 3.500 | 7.2 | 7.500 | 10.3 |
| 0.300 | 4.0 | 1.600 | 5.0 | 4.000 | 7.6 | 8.000 | 10.6 |
| 0.400 | 3.9 | 1.800 | 5.3 | 4.500 | 8.1 | 8.500 | 10.9 |
| 0.500 | 3.8 | 2.000 | 5.5 | 5.000 | 8.5 | 9.000 | 11.2 |
| 0.600 | 3.4 | 2.200 | 5.8 | 5.500 | 8.9 | 9.500 | 11.5 |
| 0.800 | 3.6 | 2.400 | 6.0 | 6.000 | 9.3 | | |
| 1.000 | 4.0 | 2.600 | 6.2 | 6.500 | 9.6 | | |

©1982-2018 Innovyze

## Storage Structures for Storm

### Porous Car Park Manhole: 4, DS/PN: 1.003

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m) | 5.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 8.6 |
| Max Percolation (l/s) | 11.9 | Slope (1:X) | 100.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 119.120 | Cap Volume Depth (m) | 0.400 |

### Porous Car Park Manhole: 6, DS/PN: 2.000

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m) | 5.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 20.8 |
| Max Percolation (l/s) | 28.9 | Slope (1:X) | 100.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 119.020 | Cap Volume Depth (m) | 0.400 |

### Porous Car Park Manhole: 8, DS/PN: 3.002

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m) | 5.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 15.4 |
| Max Percolation (l/s) | 21.4 | Slope (1:X) | 100.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 119.045 | Cap Volume Depth (m) | 0.500 |

### Porous Car Park Manhole: 16, DS/PN: 5.002

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m) | 5.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 22.0 |
| Max Percolation (l/s) | 30.6 | Slope (1:X) | 100.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 119.020 | Cap Volume Depth (m) | 0.500 |

### Swale Manhole: 21, DS/PN: 7.000

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m) | 18.0 |
| Infiltration Coefficient Side (m/hr) | 0.00000 | Side Slope (1:X) | 3.0 |
| Safety Factor | 2.0 | Slope (1:X) | 100.0 |
| Porosity | 1.00 | Cap Volume Depth (m) | 0.000 |
| Invert Level (m) | 118.550 | Cap Infiltration Depth (m) | 0.000 |
| Base Width (m) | 0.3 | Include Swale Volume | Yes |

©1982-2018 Innovyze

## Swale Manhole: 24, DS/PN: 8.000

Warning:- Volume should always be included unless the upstream pipe is being used for storage and/or as a carrier

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m) | 10.0 |
| Infiltration Coefficient Side (m/hr) | 0.00000 | Side Slope (1:X) | 3.0 |
| Safety Factor | 2.0 | Slope (1:X) | 100.0 |
| Porosity | 1.00 | Cap Volume Depth (m) | 0.000 |
| Invert Level (m) | 118.560 | Cap Infiltration Depth (m) | 0.000 |
| Base Width (m) | 0.3 | Include Swale Volume | Yes |

©1982-2018 Innovyze

## 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 * 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 6
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 Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 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, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 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 Winter | 1 | +0% | 30/30 Winter | | | | 119.132 |
| 1.001 | 2 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 118.977 |
| 1.002 | 3 | 60 Winter | 1 | +0% | 1/30 Winter | | | | 118.890 |
| 1.003 | 4 | 60 Winter | 1 | +0% | 1/15 Summer | | | | 118.888 |
| 1.004 | 5 | 60 Winter | 1 | +0% | 1/15 Summer | | | | 118.887 |
| 2.000 | 6 | 60 Winter | 1 | +0% | 30/15 Summer | | | | 118.886 |
| 1.005 | 6 | 60 Winter | 1 | +0% | 1/15 Summer | | | | 118.884 |
| 3.000 | 8 | 240 Winter | 1 | +0% | 1/60 Winter | | | | 119.007 |
| 3.001 | 8 | 240 Winter | 1 | +0% | 1/30 Summer | | | | 119.007 |
| 4.000 | 12 | 15 Winter | 1 | +0% | 30/60 Winter | | | | 119.120 |
| 4.001 | 12 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 119.025 |
| 4.002 | 12 | 240 Winter | 1 | +0% | 1/15 Winter | | | | 119.007 |
| 3.002 | 8 | 240 Winter | 1 | +0% | 1/15 Summer | | | | 119.007 |
| 5.000 | 14 | 15 Winter | 1 | +0% | 100/30 Summer | | | | 119.174 |
| 5.001 | 14 | 240 Winter | 1 | +0% | 1/120 Winter | | | | 119.007 |
| 5.002 | 16 | 240 Winter | 1 | +0% | 1/60 Winter | | | | 119.007 |
| 5.003 | 16 | 240 Winter | 1 | +0% | 1/30 Summer | | | | 119.006 |
| 3.003 | 8 | 240 Winter | 1 | +0% | 1/15 Summer | | | | 119.006 |
| 6.000 | 19 | 15 Winter | 1 | +0% | | | | | 119.019 |

©1982-2018 Innovyze

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

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| 1.000 | 1 | -0.068 | 0.000 | 0.21 | | 1.4 | OK | |
| 1.001 | 2 | -0.063 | 0.000 | 0.29 | | 1.9 | OK | |
| 1.002 | 3 | 0.055 | 0.000 | 0.19 | | 1.1 | SURCHARGED | |
| 1.003 | 4 | 0.128 | 0.000 | 0.08 | | 0.9 | SURCHARGED | |
| 1.004 | 5 | 0.167 | 0.000 | 0.05 | | 0.7 | SURCHARGED | |
| 2.000 | 6 | -0.014 | 0.000 | 0.07 | | 1.5 | OK | |
| 1.005 | 6 | 0.244 | 0.000 | 0.04 | | 1.0 | SURCHARGED | |
| 3.000 | 8 | 0.052 | 0.000 | 0.02 | | 0.2 | SURCHARGED | |
| 3.001 | 8 | 0.157 | 0.000 | 0.02 | | 0.2 | SURCHARGED | |
| 4.000 | 12 | -0.080 | 0.000 | 0.09 | | 0.5 | OK | |
| 4.001 | 12 | -0.075 | 0.000 | 0.14 | | 0.9 | OK | |
| 4.002 | 12 | 0.177 | 0.000 | 0.05 | | 0.3 | SURCHARGED | |
| 3.002 | 8 | 0.217 | 0.000 | 0.03 | | 0.4 | SURCHARGED | |
| 5.000 | 14 | -0.076 | 0.000 | 0.13 | | 0.8 | OK | |
| 5.001 | 14 | 0.027 | 0.000 | 0.02 | | 0.2 | SURCHARGED | |
| 5.002 | 16 | 0.057 | 0.000 | 0.04 | | 0.6 | SURCHARGED | |
| 5.003 | 16 | 0.136 | 0.000 | 0.02 | | 0.4 | SURCHARGED | |
| 3.003 | 8 | 0.346 | 0.000 | 0.03 | | 0.4 | SURCHARGED | |
| 6.000 | 19 | -0.081 | 0.000 | 0.08 | | 1.1 | OK | |

©1982-2018 Innovyze

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

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| 3.004 | 8 | 30 Winter | 1 | +0% | 30/15 Summer | | | | 118.501 |
| 7.000 | 21 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 118.594 |
| 7.001 | 21 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 118.557 |
| 1.006 | 8 | 30 Winter | 1 | +0% | 1/15 Summer | | | | 118.496 |
| 8.000 | 24 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 118.611 |
| 8.001 | 21 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 118.589 |
| 8.002 | 26 | 30 Winter | 1 | +0% | 30/15 Summer | | | | 118.491 |
| 1.007 | 9 | 30 Winter | 1 | +0% | 1/15 Summer | | | | 118.489 |

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| 3.004 | 8 | -0.074 | 0.000 | 0.10 | | 1.9 | OK | |
| 7.000 | 21 | -0.106 | 0.000 | 0.19 | | 2.0 | OK | |
| 7.001 | 21 | -0.123 | 0.000 | 0.07 | | 3.2 | OK | |
| 1.006 | 8 | 0.286 | 0.000 | 0.26 | | 3.2 | SURCHARGED | |
| 8.000 | 24 | -0.099 | 0.000 | 0.25 | | 2.7 | OK | |
| 8.001 | 21 | -0.101 | 0.000 | 0.23 | | 3.2 | OK | |
| 8.002 | 26 | -0.054 | 0.000 | 0.07 | | 2.5 | OK | |
| 1.007 | 9 | 0.249 | 0.000 | 0.13 | | 4.0 | SURCHARGED | |

©1982-2018 Innovyze

## 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 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 6
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 Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 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, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 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 | 60 Winter | 30 | +0% | 30/30 Winter | | | | 119.217 |
| 1.001 | 2 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 119.212 |
| 1.002 | 3 | 60 Winter | 30 | +0% | 1/30 Winter | | | | 119.207 |
| 1.003 | 4 | 60 Winter | 30 | +0% | 1/15 Summer | | | | 119.205 |
| 1.004 | 5 | 60 Winter | 30 | +0% | 1/15 Summer | | | | 119.203 |
| 2.000 | 6 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 119.203 |
| 1.005 | 6 | 60 Winter | 30 | +0% | 1/15 Summer | | | | 119.201 |
| 3.000 | 8 | 240 Winter | 30 | +0% | 1/60 Winter | | | | 119.239 |
| 3.001 | 8 | 240 Winter | 30 | +0% | 1/30 Summer | | | | 119.239 |
| 4.000 | 12 | 240 Winter | 30 | +0% | 30/60 Winter | | | | 119.240 |
| 4.001 | 12 | 240 Winter | 30 | +0% | 30/15 Summer | | | | 119.240 |
| 4.002 | 12 | 240 Winter | 30 | +0% | 1/15 Winter | | | | 119.239 |
| 3.002 | 8 | 240 Winter | 30 | +0% | 1/15 Summer | | | | 119.239 |
| 5.000 | 14 | 240 Winter | 30 | +0% | 100/30 Summer | | | | 119.240 |
| 5.001 | 14 | 240 Winter | 30 | +0% | 1/120 Winter | | | | 119.239 |
| 5.002 | 16 | 240 Winter | 30 | +0% | 1/60 Winter | | | | 119.239 |
| 5.003 | 16 | 240 Winter | 30 | +0% | 1/30 Summer | | | | 119.238 |
| 3.003 | 8 | 240 Winter | 30 | +0% | 1/15 Summer | | | | 119.237 |
| 6.000 | 19 | 15 Winter | 30 | +0% | | | | | 119.030 |

©1982-2018 Innovyze

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

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| 1.000 | 1 | 0.017 | 0.000 | 0.27 | | 1.7 | SURCHARGED | |
| 1.001 | 2 | 0.172 | 0.000 | 0.32 | | 2.0 | SURCHARGED | |
| 1.002 | 3 | 0.372 | 0.000 | 0.29 | | 1.7 | SURCHARGED | |
| 1.003 | 4 | 0.445 | 0.000 | 0.16 | | 2.0 | SURCHARGED | |
| 1.004 | 5 | 0.483 | 0.000 | 0.14 | | 1.9 | FLOOD RISK | |
| 2.000 | 6 | 0.303 | 0.000 | 0.09 | | 2.0 | SURCHARGED | |
| 1.005 | 6 | 0.561 | 0.000 | 0.05 | | 1.2 | FLOOD RISK | |
| 3.000 | 8 | 0.284 | 0.000 | 0.03 | | 0.4 | SURCHARGED | |
| 3.001 | 8 | 0.389 | 0.000 | 0.05 | | 0.6 | SURCHARGED | |
| 4.000 | 12 | 0.040 | 0.000 | 0.04 | | 0.2 | SURCHARGED | |
| 4.001 | 12 | 0.140 | 0.000 | 0.06 | | 0.4 | SURCHARGED | |
| 4.002 | 12 | 0.409 | 0.000 | 0.10 | | 0.6 | SURCHARGED | |
| 3.002 | 8 | 0.449 | 0.000 | 0.05 | | 0.6 | SURCHARGED | |
| 5.000 | 14 | -0.010 | 0.000 | 0.06 | | 0.4 | OK | |
| 5.001 | 14 | 0.259 | 0.000 | 0.03 | | 0.3 | SURCHARGED | |
| 5.002 | 16 | 0.289 | 0.000 | 0.05 | | 0.6 | SURCHARGED | |
| 5.003 | 16 | 0.368 | 0.000 | 0.02 | | 0.4 | SURCHARGED | |
| 3.003 | 8 | 0.577 | 0.000 | 0.04 | | 0.5 | FLOOD RISK | |
| 6.000 | 19 | -0.070 | 0.000 | 0.19 | | 2.7 | OK | |

©1982-2018 Innovyze

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

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| 3.004 | 8 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 118.800 |
| 7.000 | 21 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 118.797 |
| 7.001 | 21 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 118.797 |
| 1.006 | 8 | 60 Winter | 30 | +0% | 1/15 Summer | | | | 118.795 |
| 8.000 | 24 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 118.795 |
| 8.001 | 21 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 118.794 |
| 8.002 | 26 | 60 Winter | 30 | +0% | 30/15 Summer | | | | 118.790 |
| 1.007 | 9 | 60 Winter | 30 | +0% | 1/15 Summer | | | | 118.788 |

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| 3.004 | 8 | 0.225 | 0.000 | 0.14 | | 2.7 | SURCHARGED | |
| 7.000 | 21 | 0.097 | 0.000 | 0.21 | | 2.2 | SURCHARGED | |
| 7.001 | 21 | 0.117 | 0.000 | 0.08 | | 3.6 | SURCHARGED | |
| 1.006 | 8 | 0.585 | 0.000 | 0.31 | | 3.9 | SURCHARGED | |
| 8.000 | 24 | 0.085 | 0.000 | 0.28 | | 3.0 | SURCHARGED | |
| 8.001 | 21 | 0.104 | 0.000 | 0.25 | | 3.5 | SURCHARGED | |
| 8.002 | 26 | 0.245 | 0.000 | 0.07 | | 2.6 | SURCHARGED | |
| 1.007 | 9 | 0.548 | 0.000 | 0.13 | | 4.0 | SURCHARGED | |

©1982-2018 Innovyze

## 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 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 6
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 Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 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, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 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 | 30 Winter | 100 | +40% | 30/30 Winter | | | | 119.467 |
| 1.001 | 2 | 30 Winter | 100 | +40% | 30/15 Summer | | | | 119.424 |
| 1.002 | 3 | 120 Winter | 100 | +40% | 1/30 Winter | | | | 119.405 |
| 1.003 | 4 | 120 Winter | 100 | +40% | 1/15 Summer | | | | 119.402 |
| 1.004 | 5 | 120 Winter | 100 | +40% | 1/15 Summer | | | | 119.401 |
| 2.000 | 6 | 120 Winter | 100 | +40% | 30/15 Summer | | | | 119.401 |
| 1.005 | 6 | 120 Winter | 100 | +40% | 1/15 Summer | | | | 119.399 |
| 3.000 | 8 | 360 Winter | 100 | +40% | 1/60 Winter | | | | 119.472 |
| 3.001 | 8 | 360 Winter | 100 | +40% | 1/30 Summer | | | | 119.471 |
| 4.000 | 12 | 360 Winter | 100 | +40% | 30/60 Winter | | | | 119.472 |
| 4.001 | 12 | 360 Winter | 100 | +40% | 30/15 Summer | | | | 119.472 |
| 4.002 | 12 | 360 Winter | 100 | +40% | 1/15 Winter | | | | 119.471 |
| 3.002 | 8 | 360 Winter | 100 | +40% | 1/15 Summer | | | | 119.471 |
| 5.000 | 14 | 360 Winter | 100 | +40% | 100/30 Summer | | | | 119.472 |
| 5.001 | 14 | 360 Winter | 100 | +40% | 1/120 Winter | | | | 119.471 |
| 5.002 | 16 | 360 Winter | 100 | +40% | 1/60 Winter | | | | 119.471 |
| 5.003 | 16 | 360 Winter | 100 | +40% | 1/30 Summer | | | | 119.470 |
| 3.003 | 8 | 360 Winter | 100 | +40% | 1/15 Summer | | | | 119.469 |
| 6.000 | 19 | 15 Winter | 100 | +40% | | | | | 119.041 |

©1982-2018 Innovyze

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

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| 1.000 | 1 | 0.267 | 0.000 | 0.56 | | 3.6 | FLOOD RISK | |
| 1.001 | 2 | 0.384 | 0.000 | 0.71 | | 4.6 | FLOOD RISK | |
| 1.002 | 3 | 0.570 | 0.000 | 0.42 | | 2.5 | FLOOD RISK | |
| 1.003 | 4 | 0.642 | 0.000 | 0.15 | | 1.8 | FLOOD RISK | |
| 1.004 | 5 | 0.681 | 0.000 | 0.13 | | 1.9 | FLOOD RISK | |
| 2.000 | 6 | 0.501 | 0.000 | 0.07 | | 1.5 | FLOOD RISK | |
| 1.005 | 6 | 0.759 | 0.000 | 0.05 | | 1.2 | FLOOD RISK | |
| 3.000 | 8 | 0.517 | 0.000 | 0.05 | | 0.6 | FLOOD RISK | |
| 3.001 | 8 | 0.621 | 0.000 | 0.07 | | 0.9 | FLOOD RISK | |
| 4.000 | 12 | 0.272 | 0.000 | 0.04 | | 0.3 | FLOOD RISK | |
| 4.001 | 12 | 0.372 | 0.000 | 0.07 | | 0.4 | FLOOD RISK | |
| 4.002 | 12 | 0.641 | 0.000 | 0.16 | | 0.9 | FLOOD RISK | |
| 3.002 | 8 | 0.681 | 0.000 | 0.07 | | 0.9 | FLOOD RISK | |
| 5.000 | 14 | 0.222 | 0.000 | 0.07 | | 0.4 | FLOOD RISK | |
| 5.001 | 14 | 0.491 | 0.000 | 0.03 | | 0.4 | FLOOD RISK | |
| 5.002 | 16 | 0.521 | 0.000 | 0.03 | | 0.4 | SURCHARGED | |
| 5.003 | 16 | 0.600 | 0.000 | 0.02 | | 0.3 | FLOOD RISK | |
| 3.003 | 8 | 0.809 | 0.000 | 0.04 | | 0.6 | FLOOD RISK | |
| 6.000 | 19 | -0.059 | 0.000 | 0.35 | | 5.0 | OK | |

©1982-2018 Innovyze

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

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|---|---|---|---|---|---|---|---|---|---|
| 3.004 | 8 | 60 Winter | 100 | +40% | 30/15 Summer | | | | 118.997 |
| 7.000 | 21 | 60 Winter | 100 | +40% | 30/15 Summer | | | | 118.994 |
| 7.001 | 21 | 60 Winter | 100 | +40% | 30/15 Summer | | | | 118.993 |
| 1.006 | 8 | 60 Winter | 100 | +40% | 1/15 Summer | | | | 118.991 |
| 8.000 | 24 | 60 Winter | 100 | +40% | 30/15 Summer | | | | 118.992 |
| 8.001 | 21 | 60 Winter | 100 | +40% | 30/15 Summer | | | | 118.991 |
| 8.002 | 26 | 60 Winter | 100 | +40% | 30/15 Summer | | | | 118.986 |
| 1.007 | 9 | 60 Winter | 100 | +40% | 1/15 Summer | | | | 118.984 |

| PN | US/MH Name | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) | Status | Level Exceeded |
|---|---|---|---|---|---|---|---|---|
| 3.004 | 8 | 0.422 | 0.000 | 0.26 | | 5.0 | SURCHARGED | |
| 7.000 | 21 | 0.294 | 0.000 | 0.21 | | 2.3 | FLOOD RISK | |
| 7.001 | 21 | 0.313 | 0.000 | 0.09 | | 3.8 | FLOOD RISK | |
| 1.006 | 8 | 0.781 | 0.000 | 0.34 | | 4.3 | FLOOD RISK | |
| 8.000 | 24 | 0.282 | 0.000 | 0.31 | | 3.3 | SURCHARGED | |
| 8.001 | 21 | 0.301 | 0.000 | 0.26 | | 3.6 | SURCHARGED | |
| 8.002 | 26 | 0.441 | 0.000 | 0.06 | | 2.3 | FLOOD RISK | |
| 1.007 | 9 | 0.744 | 0.000 | 0.13 | | 4.0 | FLOOD RISK | |

©1982-2018 Innovyze