## 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) | 100 | PIMP (%) | 100 |
| M5-60 (mm) | 18.000 | Add Flow / Climate Change (%) | 0 |
| Ratio R | 0.358 | 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 | 0.109 | 4-8 | 0.040 |

Total Area Contributing (ha) = 0.149

Total Pipe Volume (m³) = 3.644

### 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | 3.899 | 0.026 | 150.0 | 0.149 | 5.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S2.000 | 1.000 | 0.007 | 150.0 | 0.000 | 5.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S2.001 | 4.957 | 0.033 | 150.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S2.002 | 18.688 | 0.124 | 150.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S2.003 | 3.490 | 0.024 | 145.4 | 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | 50.00 | 5.06 | 33.540 | 0.149 | 0.0 | 0.0 | 0.0 | 1.07 | 42.4 | 20.2 |
| S2.000 | 50.00 | 5.02 | 32.740 | 0.000 | 0.0 | 0.0 | 0.0 | 1.07 | 42.4 | 0.0 |
| S2.001 | 50.00 | 5.09 | 32.733 | 0.000 | 0.0 | 0.0 | 0.0 | 1.07 | 42.4 | 0.0 |
| S2.002 | 50.00 | 5.39 | 32.700 | 0.000 | 0.0 | 0.0 | 0.0 | 1.06 | 42.3 | 0.0 |
| S2.003 | 50.00 | 5.44 | 32.576 | 0.000 | 0.0 | 0.0 | 0.0 | 1.08 | 43.0 | 0.0 |

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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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.001 | 2.750 | 0.018 | 152.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S3.000 | 1.723 | 0.011 | 150.0 | 0.000 | 5.00 | 6.9 | 0.600 | o | 225 | Pipe/Conduit | |
| S3.001 | 2.845 | 0.019 | 149.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S1.002 | 13.077 | 0.031 | 421.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 450 | 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| S1.001 | 50.00 | 5.48 | 32.552 | 0.149 | 0.0 | 0.0 | 0.0 | 1.06 | 42.0 | 20.2 |
| S3.000 | 50.00 | 5.03 | 33.540 | 0.000 | 6.9 | 0.0 | 0.0 | 1.07 | 42.4 | 6.9 |
| S3.001 | 50.00 | 5.07 | 33.529 | 0.000 | 6.9 | 0.0 | 0.0 | 1.07 | 42.4 | 6.9 |
| S1.002 | 50.00 | 5.71 | 31.116 | 0.149 | 6.9 | 0.0 | 0.0 | 0.98 | 156.4 | 27.1 |

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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 | 0.149 | 0.149 | 0.149 |
| 2.000 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 2.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 2.002 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 2.003 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 3.000 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 3.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.002 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| | | | | Total | Total | Total |
| | | | | 0.149 | 0.149 | 0.149 |

## 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) |
|---|---|---|---|---|---|---|
| S1.002 | SW | 34.900 | 31.085 | 31.085 | 1350 | 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 | 1 |
| Number of Online Controls | 1 | 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) | 18.000 | Storm Duration (mins) | 30 |
| Ratio R | 0.358 | | |

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## Online Controls for Storm

### Hydro-Brake® Optimum Manhole: SW1, DS/PN: S1.001, Volume (m³): 4.5

| | |
|---|---|
| Unit Reference | MD-SCL-0194-2330-1170-2330 |
| Design Head (m) | 1.170 |
| Design Flow (l/s) | 23.3 |
| Flush-Flo™ | Calculated |
| Objective | Minimise blockage risk |
| Application | Surface |
| Sump Available | Yes |
| Diameter (mm) | 194 |
| Invert Level (m) | 32.552 |
| Minimum Outlet Pipe Diameter (mm) | 225 |
| Suggested Manhole Diameter (mm) | 1500 |

| Control Points | Head (m) | Flow (l/s) |
|---|---|---|
| Design Point (Calculated) | 1.170 | 23.3 |
| Flush-Flo™ | 0.284 | 23.3 |
| Kick-Flo® | 0.711 | 18.4 |
| Mean Flow over Head Range | - | 19.2 |

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 | 7.4 | 1.200 | 23.6 | 3.000 | 36.5 | 7.000 | 55.0 |
| 0.200 | 19.9 | 1.400 | 25.4 | 3.500 | 39.3 | 7.500 | 56.8 |
| 0.300 | 23.3 | 1.600 | 27.0 | 4.000 | 42.0 | 8.000 | 58.6 |
| 0.400 | 22.7 | 1.800 | 28.6 | 4.500 | 44.4 | 8.500 | 60.4 |
| 0.500 | 21.9 | 2.000 | 30.1 | 5.000 | 46.7 | 9.000 | 62.1 |
| 0.600 | 20.8 | 2.200 | 31.5 | 5.500 | 48.9 | 9.500 | 63.7 |
| 0.800 | 19.5 | 2.400 | 32.8 | 6.000 | 51.0 | | |
| 1.000 | 21.6 | 2.600 | 34.1 | 6.500 | 53.0 | | |

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## Storage Structures for Storm

### Cellular Storage Manhole: SW-Attenuation Tank, DS/PN: S2.000

Invert Level (m) 32.740 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.96
Infiltration Coefficient Side (m/hr) 0.00000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 30.0 | 0.0 | 1.076 | 0.0 | 0.0 |
| 1.075 | 30.0 | 0.0 | | | |

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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 * 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 | 1 |
| Number of Online Controls | 1 | 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 0.358 |
| 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 | DVD Status | OFF |
| Analysis Timestep | Fine | Inertia Status | OFF |
| DTS Status | ON | | |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 180, 240, 360 |
| Return Period(s) (years) | 1, 2, 30, 100 |
| Climate Change (%) | 0, 0, 0, 40 |

| PN | US/MH Name | Event | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) |
|---|---|---|---|---|---|---|
| S1.000 | SWDP1 | 15 minute 1 year Winter I+0% | 43.300 | 33.669 | -0.096 | 0.000 |
| S2.000 | SW-Attenuation Tank | 15 minute 1 year Summer I+0% | 35.475 | 32.740 | -0.225 | 0.000 |
| S2.001 | SW4 | 15 minute 1 year Summer I+0% | 35.475 | 32.733 | -0.225 | 0.000 |
| S2.002 | SW3 | 15 minute 1 year Winter I+0% | 35.475 | 32.712 | -0.213 | 0.000 |
| S2.003 | SW2 | 15 minute 1 year Winter I+0% | 35.077 | 32.725 | -0.076 | 0.000 |
| S1.001 | SW1 | 15 minute 1 year Winter I+0% | 34.965 | 32.726 | -0.051 | 0.000 |
| S3.000 | SW-DP2 | 30 minute 1 year Winter I+0% | 43.300 | 33.613 | -0.152 | 0.000 |
| S3.001 | SW5 | 30 minute 1 year Winter I+0% | 34.965 | 33.606 | -0.148 | 0.000 |
| S1.002 | SWCW1 | 15 minute 1 year Winter I+0% | 34.902 | 31.266 | -0.300 | 0.000 |

| PN | US/MH Name | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Discharge Vol (m³) | Maximum Velocity (m/s) | Half Drain Time (mins) | Pipe Flow (l/s) |
|---|---|---|---|---|---|---|---|---|
| S1.000 | SWDP1 | 0.62 | | 0.009 | 8.390 | 0.8 | | 18.0 |
| S2.000 | SW-Attenuation Tank | 0.00 | | 0.000 | 0.000 | 0.0 | | 0.0 |
| S2.001 | SW4 | 0.00 | | 0.000 | 0.000 | 0.0 | | 0.0 |
| S2.002 | SW3 | 0.00 | | 0.006 | -0.001 | 0.1 | | 0.1 |
| S2.003 | SW2 | 0.05 | | 0.299 | -0.005 | 0.1 | | 1.5 |
| S1.001 | SW1 | 0.62 | | 0.364 | 8.393 | 1.0 | | 17.1 |

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

| PN | US/MH Name | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Discharge Vol (m³) | Maximum Velocity (m/s) | Half Drain Time (mins) | Pipe Flow (l/s) |
|---|---|---|---|---|---|---|---|---|
| S3.000 | SW-DP2 | 0.23 | | 0.005 | 24.775 | 0.6 | | 6.9 |
| S3.001 | SW5 | 0.25 | | 0.032 | 24.683 | 0.6 | | 6.9 |
| S1.002 | SWCW1 | 0.24 | | 0.208 | 32.919 | 0.5 | | 23.9 |

| PN | US/MH Name | Status |
|---|---|---|
| S1.000 | SWDP1 | OK |
| S2.000 | SW-Attenuation Tank | OK |
| S2.001 | SW4 | OK |
| S2.002 | SW3 | OK |
| S2.003 | SW2 | OK |
| S1.001 | SW1 | OK |
| S3.000 | SW-DP2 | OK |
| S3.001 | SW5 | OK |
| S1.002 | SWCW1 | 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 | 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 | 1 |
| Number of Online Controls | 1 | 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 | 0.358 |
| 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 | DVD Status | OFF |
| Analysis Timestep | Fine | Inertia Status | OFF |
| DTS Status | ON | | |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 180, 240, 360 |
| Return Period(s) (years) | 1, 2, 30, 100 |
| Climate Change (%) | 0, 0, 0, 40 |

| PN | US/MH Name | Event | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) |
|---|---|---|---|---|---|---|
| S1.000 | SWDP1 | 15 minute 2 year Winter I+0% | 43.300 | 33.694 | -0.071 | 0.000 |
| S2.000 | SW-Attenuation Tank | 15 minute 2 year Winter I+0% | 35.475 | 32.740 | -0.225 | 0.000 |
| S2.001 | SW4 | 15 minute 2 year Winter I+0% | 35.475 | 32.760 | -0.198 | 0.000 |
| S2.002 | SW3 | 15 minute 2 year Winter I+0% | 35.475 | 32.771 | -0.154 | 0.000 |
| S2.003 | SW2 | 15 minute 2 year Winter I+0% | 35.077 | 32.773 | -0.027 | 0.000 |
| S1.001 | SW1 | 15 minute 2 year Winter I+0% | 34.965 | 32.775 | -0.002 | 0.000 |
| S3.000 | SW-DP2 | 240 minute 2 year Winter I+0% | 43.300 | 33.613 | -0.152 | 0.000 |
| S3.001 | SW5 | 15 minute 2 year Summer I+0% | 34.965 | 33.606 | -0.148 | 0.000 |
| S1.002 | SWCW1 | 15 minute 2 year Winter I+0% | 34.902 | 31.280 | -0.286 | 0.000 |

| PN | US/MH Name | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Discharge Vol (m³) | Maximum Velocity (m/s) | Half Drain Time (mins) | Pipe Flow (l/s) |
|---|---|---|---|---|---|---|---|---|
| S1.000 | SWDP1 | 0.80 | | 0.011 | 10.840 | 0.8 | | 23.2 |
| S2.000 | SW-Attenuation Tank | 0.00 | | 0.003 | 0.000 | 0.0 | 14 | 0.0 |
| S2.001 | SW4 | 0.00 | | 0.006 | -0.003 | 0.1 | | 0.1 |
| S2.002 | SW3 | 0.01 | | 0.054 | -0.003 | 0.2 | | 0.5 |
| S2.003 | SW2 | 0.09 | | 0.485 | 0.000 | 0.1 | | 2.6 |
| S1.001 | SW1 | 0.77 | | 0.470 | 10.835 | 1.1 | | 21.1 |

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

| PN | US/MH Name | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Discharge Vol (m³) | Maximum Velocity (m/s) | Half Drain Time (mins) | Pipe Flow (l/s) |
|---|---|---|---|---|---|---|---|---|
| S3.000 | SW-DP2 | 0.23 | | 0.005 | 198.720 | 0.6 | | 6.9 |
| S3.001 | SW5 | 0.25 | | 0.032 | 24.683 | 0.6 | | 6.9 |
| S1.002 | SWCW1 | 0.29 | | 0.227 | 35.351 | 0.5 | | 28.0 |

| PN | US/MH Name | Status |
|---|---|---|
| S1.000 | SWDP1 | OK |
| S2.000 | SW-Attenuation Tank | OK |
| S2.001 | SW4 | OK |
| S2.002 | SW3 | OK |
| S2.003 | SW2 | OK |
| S1.001 | SW1 | OK |
| S3.000 | SW-DP2 | OK |
| S3.001 | SW5 | OK |
| S1.002 | SWCW1 | 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 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 | 1 |
| Number of Online Controls | 1 | 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 0.358 |
| 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 | DVD Status | OFF |
| Analysis Timestep | Fine | Inertia Status | OFF |
| DTS Status | ON | | |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 180, 240, 360 |
| Return Period(s) (years) | 1, 2, 30, 100 |
| Climate Change (%) | 0, 0, 0, 40 |

| PN | US/MH Name | Event | US/CL (m) | Water Level (m) | Surcharged Depth (m) |
|---|---|---|---|---|---|
| S1.000 | SWDP1 | 15 minute 30 year Winter I+0% | 43.300 | 33.827 | 0.062 |
| S2.000 | SW-Attenuation Tank | 15 minute 30 year Winter I+0% | 35.475 | 32.901 | -0.064 |
| S2.001 | SW4 | 15 minute 30 year Winter I+0% | 35.475 | 33.019 | 0.061 |
| S2.002 | SW3 | 15 minute 30 year Winter I+0% | 35.475 | 33.093 | 0.168 |
| S2.003 | SW2 | 15 minute 30 year Winter I+0% | 35.077 | 33.194 | 0.393 |
| S1.001 | SW1 | 15 minute 30 year Summer I+0% | 34.965 | 33.252 | 0.475 |
| S3.000 | SW-DP2 | 240 minute 30 year Winter I+0% | 43.300 | 33.613 | -0.152 |
| S3.001 | SW5 | 15 minute 30 year Summer I+0% | 34.965 | 33.606 | -0.148 |
| S1.002 | SWCW1 | 15 minute 30 year Winter I+0% | 34.902 | 31.286 | -0.280 |

| PN | US/MH Name | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Discharge Vol (m³) | Maximum Velocity (m/s) | Half Drain Time (mins) |
|---|---|---|---|---|---|---|---|---|
| S1.000 | SWDP1 | 0.000 | 1.52 | | 0.020 | 20.497 | 1.1 | |
| S2.000 | SW-Attenuation Tank | 0.000 | 0.41 | | 4.828 | -0.093 | 0.7 | 6 |
| S2.001 | SW4 | 0.000 | 0.41 | | 0.083 | -0.087 | 0.7 | |
| S2.002 | SW3 | 0.000 | 0.32 | | 0.283 | -0.084 | 0.7 | |
| S2.003 | SW2 | 0.000 | 0.51 | | 0.892 | -0.081 | 0.5 | |
| S1.001 | SW1 | 0.000 | 0.83 | | 1.326 | 18.217 | 1.1 | |

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

| PN | US/MH Name | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Discharge Vol (m³) | Maximum Velocity (m/s) | Half Drain Time (mins) |
|---|---|---|---|---|---|---|---|---|
| S3.000 | SW-DP2 | 0.000 | 0.23 | | 0.005 | 198.720 | 0.6 | |
| S3.001 | SW5 | 0.000 | 0.25 | | 0.032 | 24.683 | 0.6 | |
| S1.002 | SWCW1 | 0.000 | 0.31 | | 0.237 | 44.932 | 0.5 | |

| PN | US/MH Name | Pipe Flow (l/s) | Status |
|---|---|---|---|
| S1.000 | SWDP1 | 43.9 | SURCHARGED |
| S2.000 | SW-Attenuation Tank | 12.2 | OK |
| S2.001 | SW4 | 12.4 | SURCHARGED |
| S2.002 | SW3 | 12.3 | SURCHARGED |
| S2.003 | SW2 | 14.4 | SURCHARGED |
| S1.001 | SW1 | 22.8 | SURCHARGED |
| S3.000 | SW-DP2 | 6.9 | OK |
| S3.001 | SW5 | 6.9 | OK |
| S1.002 | SWCW1 | 30.1 | 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 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 | 1 |
| Number of Online Controls | 1 | 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 0.358 |
| 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 | DVD Status | OFF |
| Analysis Timestep | Fine | Inertia Status | OFF |
| DTS Status | ON | | |

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 180, 240, 360 |
| Return Period(s) (years) | 1, 2, 30, 100 |
| Climate Change (%) | 0, 0, 0, 40 |

| PN | US/MH Name | Event | US/CL (m) | Water Level (m) | Surcharged Depth (m) |
|---|---|---|---|---|---|
| S1.000 | SWDP1 | 15 minute 100 year Winter I+40% | 43.300 | 34.052 | 0.287 |
| S2.000 | SW-Attenuation Tank | 30 minute 100 year Winter I+40% | 35.475 | 33.350 | 0.385 |
| S2.001 | SW4 | 30 minute 100 year Winter I+40% | 35.475 | 33.352 | 0.394 |
| S2.002 | SW3 | 15 minute 100 year Winter I+40% | 35.475 | 33.395 | 0.470 |
| S2.003 | SW2 | 15 minute 100 year Winter I+40% | 35.077 | 33.606 | 0.805 |
| S1.001 | SW1 | 15 minute 100 year Winter I+40% | 34.965 | 33.735 | 0.958 |
| S3.000 | SW-DP2 | 240 minute 100 year Summer I+40% | 43.300 | 33.613 | -0.152 |
| S3.001 | SW5 | 15 minute 100 year Summer I+40% | 34.965 | 33.606 | -0.148 |
| S1.002 | SWCW1 | 15 minute 100 year Winter I+40% | 34.902 | 31.287 | -0.279 |

| PN | US/MH Name | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Discharge Vol (m³) | Maximum Velocity (m/s) | Half Drain Time (mins) |
|---|---|---|---|---|---|---|---|---|
| S1.000 | SWDP1 | 0.000 | 2.73 | | 0.036 | 37.047 | 2.0 | |
| S2.000 | SW-Attenuation Tank | 0.000 | 0.99 | | 18.245 | -0.477 | 0.8 | 14 |
| S2.001 | SW4 | 0.000 | 0.92 | | 0.178 | -0.481 | 0.8 | |
| S2.002 | SW3 | 0.000 | 0.58 | | 0.368 | -0.208 | 0.8 | |
| S2.003 | SW2 | 0.000 | 0.82 | | 1.009 | -0.211 | 0.6 | |
| S1.001 | SW1 | 0.000 | 0.85 | | 2.283 | 36.815 | 1.1 | |

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

| PN | US/MH Name | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Discharge Vol (m³) | Maximum Velocity (m/s) | Half Drain Time (mins) |
|---|---|---|---|---|---|---|---|---|
| S3.000 | SW-DP2 | 0.000 | 0.23 | | 0.005 | 198.720 | 0.6 | |
| S3.001 | SW5 | 0.000 | 0.25 | | 0.032 | 24.683 | 0.6 | |
| S1.002 | SWCW1 | 0.000 | 0.31 | | 0.237 | 61.337 | 0.5 | |

| PN | US/MH Name | Pipe Flow (l/s) | Status |
|---|---|---|---|
| S1.000 | SWDP1 | 79.3 | SURCHARGED |
| S2.000 | SW-Attenuation Tank | 29.6 | SURCHARGED |
| S2.001 | SW4 | 27.5 | SURCHARGED |
| S2.002 | SW3 | 22.2 | SURCHARGED |
| S2.003 | SW2 | 23.4 | SURCHARGED |
| S1.001 | SW1 | 23.3 | SURCHARGED |
| S3.000 | SW-DP2 | 6.9 | OK |
| S3.001 | SW5 | 6.9 | OK |
| S1.002 | SWCW1 | 30.1 | OK |

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