



Design Settings

|                       |                   |                                      |               |
|-----------------------|-------------------|--------------------------------------|---------------|
| Rainfall Methodology  | FSR               | Maximum Time of Concentration (mins) | 30.00         |
| Return Period (years) | 100               | Maximum Rainfall (mm/hr)             | 50.0          |
| Additional Flow (%)   | 40                | Minimum Velocity (m/s)               | 1.00          |
| FSR Region            | England and Wales | Connection Type                      | Level Soffits |
| M5-60 (mm)            | 17.000            | Minimum Backdrop Height (m)          | 0.200         |
| Ratio-R               | 0.400             | Preferred Cover Depth (m)            | 1.200         |
| CV                    | 0.750             | Include Intermediate Ground          | ✓             |
| Time of Entry (mins)  | 5.00              | Enforce best practice design rules   | x             |

Nodes

| Name | Area<br>(ha) | T of E<br>(mins) | Cover<br>Level<br>(m) | Diameter<br>(mm) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|------|--------------|------------------|-----------------------|------------------|----------------|-----------------|--------------|
| S11  | 0.016        | 5.00             | 100.000               | 480              | 1122.900       | 539.500         | 0.500        |
| S10  | 0.017        | 5.00             | 100.000               | 480              | 1131.374       | 524.878         | 0.700        |
| S9   | 0.012        | 5.00             | 99.300                | 480              | 1132.123       | 487.155         | 0.800        |
| S8   |              |                  | 99.300                | 480              | 1135.603       | 481.547         | 0.900        |
| S7   |              |                  | 99.100                | 1200             | 1137.514       | 468.284         | 0.950        |
| S1   | 0.016        | 5.00             | 100.000               | 480              | 1114.128       | 519.420         | 0.600        |
| S2   | 0.013        | 5.00             | 99.500                | 480              | 1112.155       | 501.574         | 0.500        |
| S3   | 0.011        | 5.00             | 99.500                | 480              | 1118.638       | 503.058         | 0.600        |
| S5   | 0.013        | 5.00             | 99.500                | 480              | 1119.680       | 468.213         | 0.900        |
| S4   |              |                  | 99.500                | 480              | 1127.425       | 470.213         | 1.000        |
| S6   |              |                  | 99.000                | 480              | 1128.961       | 465.498         | 0.950        |
| S12  |              |                  | 99.000                | 1200             | 1125.534       | 464.382         | 1.000        |

Links

| Name  | US<br>Node | DS<br>Node | Length<br>(m) | ks (mm) /<br>n | US IL<br>(m) | DS IL<br>(m) | Fall<br>(m) | Slope<br>(1:X) | Dia<br>(mm) | T of C<br>(mins) | Rain<br>(mm/hr) |
|-------|------------|------------|---------------|----------------|--------------|--------------|-------------|----------------|-------------|------------------|-----------------|
| 1.000 | S11        | S10        | 16.900        | 0.600          | 99.500       | 99.300       | 0.200       | 84.5           | 150         | 5.26             | 50.0            |
| 1.001 | S10        | S9         | 37.730        | 0.600          | 99.300       | 98.500       | 0.800       | 47.2           | 150         | 5.69             | 50.0            |
| 1.002 | S9         | S8         | 6.600         | 0.600          | 98.500       | 98.400       | 0.100       | 66.0           | 150         | 5.77             | 50.0            |
| 1.003 | S8         | S7         | 13.400        | 0.600          | 98.400       | 98.150       | 0.250       | 53.6           | 150         | 5.94             | 50.0            |
| 1.004 | S7         | S6         | 8.995         | 0.600          | 98.150       | 98.050       | 0.100       | 90.0           | 150         | 6.08             | 50.0            |
| 2.000 | S1         | S2         | 17.954        | 0.600          | 99.400       | 99.000       | 0.400       | 44.9           | 150         | 5.20             | 50.0            |
| 2.001 | S2         | S3         | 6.650         | 0.600          | 99.000       | 98.900       | 0.100       | 66.5           | 150         | 5.29             | 50.0            |
| 2.002 | S3         | S4         | 34.000        | 0.600          | 98.900       | 98.500       | 0.400       | 85.0           | 150         | 5.81             | 50.0            |
| 3.000 | S5         | S4         | 8.000         | 0.600          | 98.600       | 98.500       | 0.100       | 80.0           | 150         | 5.12             | 50.0            |
| 2.003 | S4         | S6         | 4.959         | 0.600          | 98.500       | 98.050       | 0.450       | 11.0           | 150         | 5.84             | 50.0            |

| Name  | Vel<br>(m/s) | Cap<br>(l/s) | Flow<br>(l/s) | US<br>Depth<br>(m) | DS<br>Depth<br>(m) | Σ Area<br>(ha) | Σ Add<br>Inflow<br>(l/s) | Pro<br>Depth<br>(mm) | Pro<br>Velocity<br>(m/s) |
|-------|--------------|--------------|---------------|--------------------|--------------------|----------------|--------------------------|----------------------|--------------------------|
| 1.000 | 1.094        | 19.3         | 3.0           | 0.350              | 0.550              | 0.016          | 0.0                      | 40                   | 0.799                    |
| 1.001 | 1.469        | 26.0         | 6.3           | 0.550              | 0.650              | 0.033          | 0.0                      | 50                   | 1.212                    |
| 1.002 | 1.239        | 21.9         | 8.5           | 0.650              | 0.750              | 0.045          | 0.0                      | 65                   | 1.162                    |
| 1.003 | 1.377        | 24.3         | 8.5           | 0.750              | 0.800              | 0.045          | 0.0                      | 61                   | 1.257                    |
| 1.004 | 1.060        | 18.7         | 8.5           | 0.800              | 0.800              | 0.045          | 0.0                      | 71                   | 1.037                    |
| 2.000 | 1.506        | 26.6         | 3.0           | 0.450              | 0.350              | 0.016          | 0.0                      | 34                   | 1.006                    |
| 2.001 | 1.235        | 21.8         | 5.5           | 0.350              | 0.450              | 0.029          | 0.0                      | 51                   | 1.031                    |
| 2.002 | 1.091        | 19.3         | 7.6           | 0.450              | 0.850              | 0.040          | 0.0                      | 65                   | 1.026                    |
| 3.000 | 1.125        | 19.9         | 2.5           | 0.750              | 0.850              | 0.013          | 0.0                      | 35                   | 0.765                    |
| 2.003 | 3.052        | 53.9         | 10.1          | 0.850              | 0.800              | 0.053          | 0.0                      | 44                   | 2.341                    |

Links

| Name  | US Node | DS Node | Length (m) | ks (mm) / n | US IL (m) | DS IL (m) | Fall (m) | Slope (1:X) | Dia (mm) | T of C (mins) | Rain (mm/hr) |
|-------|---------|---------|------------|-------------|-----------|-----------|----------|-------------|----------|---------------|--------------|
| 1.005 | S6      | S12     | 3.605      | 0.600       | 98.050    | 98.000    | 0.050    | 72.1        | 150      | 6.13          | 50.0         |

| Name  | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Σ Area (ha) | Σ Add Inflow (l/s) | Pro Depth (mm) | Pro Velocity (m/s) |
|-------|-----------|-----------|------------|--------------|--------------|-------------|--------------------|----------------|--------------------|
| 1.005 | 1.185     | 20.9      | 18.6       | 0.800        | 0.850        | 0.098       | 0.0                | 110            | 1.336              |

Pipeline Schedule

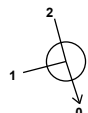
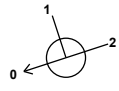
| Link  | Length (m) | Slope (1:X) | Dia (mm) | Link Type | US CL (m) | US IL (m) | US Depth (m) | DS CL (m) | DS IL (m) | DS Depth (m) |
|-------|------------|-------------|----------|-----------|-----------|-----------|--------------|-----------|-----------|--------------|
| 1.000 | 16.900     | 84.5        | 150      | Circular  | 100.000   | 99.500    | 0.350        | 100.000   | 99.300    | 0.550        |
| 1.001 | 37.730     | 47.2        | 150      | Circular  | 100.000   | 99.300    | 0.550        | 99.300    | 98.500    | 0.650        |
| 1.002 | 6.600      | 66.0        | 150      | Circular  | 99.300    | 98.500    | 0.650        | 99.300    | 98.400    | 0.750        |
| 1.003 | 13.400     | 53.6        | 150      | Circular  | 99.300    | 98.400    | 0.750        | 99.100    | 98.150    | 0.800        |
| 1.004 | 8.995      | 90.0        | 150      | Circular  | 99.100    | 98.150    | 0.800        | 99.000    | 98.050    | 0.800        |
| 2.000 | 17.954     | 44.9        | 150      | Circular  | 100.000   | 99.400    | 0.450        | 99.500    | 99.000    | 0.350        |
| 2.001 | 6.650      | 66.5        | 150      | Circular  | 99.500    | 99.000    | 0.350        | 99.500    | 98.900    | 0.450        |
| 2.002 | 34.000     | 85.0        | 150      | Circular  | 99.500    | 98.900    | 0.450        | 99.500    | 98.500    | 0.850        |
| 3.000 | 8.000      | 80.0        | 150      | Circular  | 99.500    | 98.600    | 0.750        | 99.500    | 98.500    | 0.850        |
| 2.003 | 4.959      | 11.0        | 150      | Circular  | 99.500    | 98.500    | 0.850        | 99.000    | 98.050    | 0.800        |
| 1.005 | 3.605      | 72.1        | 150      | Circular  | 99.000    | 98.050    | 0.800        | 99.000    | 98.000    | 0.850        |

| Link  | US Node | Dia (mm) | Node Type | MH Type   | DS Node | Dia (mm) | Node Type | MH Type   |
|-------|---------|----------|-----------|-----------|---------|----------|-----------|-----------|
| 1.000 | S11     | 480      | Manhole   | Adoptable | S10     | 480      | Manhole   | Adoptable |
| 1.001 | S10     | 480      | Manhole   | Adoptable | S9      | 480      | Manhole   | Adoptable |
| 1.002 | S9      | 480      | Manhole   | Adoptable | S8      | 480      | Manhole   | Adoptable |
| 1.003 | S8      | 480      | Manhole   | Adoptable | S7      | 1200     | Manhole   | Adoptable |
| 1.004 | S7      | 1200     | Manhole   | Adoptable | S6      | 480      | Manhole   | Adoptable |
| 2.000 | S1      | 480      | Manhole   | Adoptable | S2      | 480      | Manhole   | Adoptable |
| 2.001 | S2      | 480      | Manhole   | Adoptable | S3      | 480      | Manhole   | Adoptable |
| 2.002 | S3      | 480      | Manhole   | Adoptable | S4      | 480      | Manhole   | Adoptable |
| 3.000 | S5      | 480      | Manhole   | Adoptable | S4      | 480      | Manhole   | Adoptable |
| 2.003 | S4      | 480      | Manhole   | Adoptable | S6      | 480      | Manhole   | Adoptable |
| 1.005 | S6      | 480      | Manhole   | Adoptable | S12     | 1200     | Manhole   | Adoptable |

Manhole Schedule

| Node | Easting<br>(m) | Northing<br>(m) | CL<br>(m) | Depth<br>(m) | Dia<br>(mm) | Connections                                                                         | Link | IL<br>(m) | Dia<br>(mm) |     |
|------|----------------|-----------------|-----------|--------------|-------------|-------------------------------------------------------------------------------------|------|-----------|-------------|-----|
| S11  | 1122.900       | 539.500         | 100.000   | 0.500        | 480         |  | 0    | 1.000     | 99.500      | 150 |
| S10  | 1131.374       | 524.878         | 100.000   | 0.700        | 480         |  | 1    | 1.000     | 99.300      | 150 |
|      |                |                 |           |              |             |  | 0    | 1.001     | 99.300      | 150 |
| S9   | 1132.123       | 487.155         | 99.300    | 0.800        | 480         |  | 1    | 1.001     | 98.500      | 150 |
|      |                |                 |           |              |             |  | 0    | 1.002     | 98.500      | 150 |

**Manhole Schedule**

| Node | Easting<br>(m) | Northing<br>(m) | CL<br>(m) | Depth<br>(m) | Dia<br>(mm) | Connections                                                                          | Link | IL<br>(m) | Dia<br>(mm) |     |
|------|----------------|-----------------|-----------|--------------|-------------|--------------------------------------------------------------------------------------|------|-----------|-------------|-----|
| S8   | 1135.603       | 481.547         | 99.300    | 0.900        | 480         |     | 1    | 1.002     | 98.400      | 150 |
| S7   | 1137.514       | 468.284         | 99.100    | 0.950        | 1200        |     | 1    | 1.003     | 98.150      | 150 |
| S1   | 1114.128       | 519.420         | 100.000   | 0.600        | 480         |     | 0    | 1.004     | 98.150      | 150 |
| S2   | 1112.155       | 501.574         | 99.500    | 0.500        | 480         |    | 1    | 2.000     | 99.400      | 150 |
| S3   | 1118.638       | 503.058         | 99.500    | 0.600        | 480         |    | 1    | 2.001     | 99.000      | 150 |
| S5   | 1119.680       | 468.213         | 99.500    | 0.900        | 480         |  | 0    | 2.002     | 98.900      | 150 |
| S4   | 1127.425       | 470.213         | 99.500    | 1.000        | 480         |   | 1    | 3.000     | 98.600      | 150 |
| S6   | 1128.961       | 465.498         | 99.000    | 0.950        | 480         |  | 2    | 2.002     | 98.500      | 150 |
| S12  | 1125.534       | 464.382         | 99.000    | 1.000        | 1200        |  | 0    | 2.003     | 98.500      | 150 |
|      |                |                 |           |              |             |                                                                                      | 2    | 1.004     | 98.050      | 150 |
|      |                |                 |           |              |             |                                                                                      | 1    | 1.005     | 98.050      | 150 |
|      |                |                 |           |              |             |                                                                                      | 1    | 1.005     | 98.000      | 150 |

**Simulation Settings**

|                      |                   |                            |        |
|----------------------|-------------------|----------------------------|--------|
| Rainfall Methodology | FSR               | Analysis Speed             | Normal |
| FSR Region           | England and Wales | Skip Steady State          | x      |
| M5-60 (mm)           | 17.000            | Drain Down Time (mins)     | 240    |
| Ratio-R              | 0.400             | Additional Storage (m³/ha) | 0.0    |
| Summer CV            | 0.750             | Check Discharge Rate(s)    | x      |
| Winter CV            | 0.840             | Check Discharge Volume     | x      |

**Storm Durations**

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

| Return Period<br>(years) | Climate Change<br>(CC %) | Additional Area<br>(A %) | Additional Flow<br>(Q %) |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 30                       | 0                        | 0                        | 0                        |
| 100                      | 40                       | 0                        | 0                        |

**Node S12 Depth/Area Storage Structure**

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.02796 | Safety Factor | 2.0  | Invert Level (m)          | 97.500 |
| Side Inf Coefficient (m/hr) | 0.02796 | Porosity      | 1.00 | Time to half empty (mins) | 2655   |

| Depth<br>(m) | Area<br>(m²) | Inf Area<br>(m²) | Depth<br>(m) | Area<br>(m²) | Inf Area<br>(m²) |
|--------------|--------------|------------------|--------------|--------------|------------------|
| 0.000        | 50.0         | 50.0             | 1.500        | 226.4        | 226.4            |

**Results for 30 year Critical Storm Duration. Lowest mass balance: 99.79%**

| Node Event        | US<br>Node | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status     |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 15 minute winter  | S11        | 10             | 99.550       | 0.050        | 4.7             | 0.0091           | 0.0000        | OK         |
| 15 minute winter  | S10        | 10             | 99.363       | 0.063        | 9.6             | 0.0113           | 0.0000        | OK         |
| 15 minute winter  | S9         | 11             | 98.592       | 0.092        | 12.9            | 0.0166           | 0.0000        | OK         |
| 15 minute winter  | S8         | 11             | 98.477       | 0.077        | 12.8            | 0.0140           | 0.0000        | OK         |
| 15 minute winter  | S7         | 11             | 98.351       | 0.201        | 12.9            | 0.2276           | 0.0000        | SURCHARGED |
| 15 minute winter  | S1         | 10             | 99.442       | 0.042        | 4.7             | 0.0077           | 0.0000        | OK         |
| 15 minute winter  | S2         | 10             | 99.071       | 0.071        | 8.4             | 0.0129           | 0.0000        | OK         |
| 15 minute winter  | S3         | 10             | 98.990       | 0.090        | 11.5            | 0.0163           | 0.0000        | OK         |
| 15 minute winter  | S5         | 10             | 98.646       | 0.046        | 3.8             | 0.0083           | 0.0000        | OK         |
| 15 minute winter  | S4         | 11             | 98.557       | 0.057        | 15.0            | 0.0103           | 0.0000        | OK         |
| 15 minute winter  | S6         | 11             | 98.292       | 0.242        | 27.3            | 0.0438           | 0.0000        | SURCHARGED |
| 720 minute winter | S12        | 675            | 97.921       | -0.079       | 2.4             | 31.5080          | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link         | DS<br>Node | Outflow<br>(l/s) | Velocity<br>(m/s) | Flow/Cap | Link<br>Vol (m³) |
|--------------------------------|------------|--------------|------------|------------------|-------------------|----------|------------------|
| 15 minute winter               | S11        | 1.000        | S10        | 4.6              | 0.768             | 0.240    | 0.1022           |
| 15 minute winter               | S10        | 1.001        | S9         | 9.4              | 1.040             | 0.363    | 0.3428           |
| 15 minute winter               | S9         | 1.002        | S8         | 12.8             | 1.252             | 0.585    | 0.0675           |
| 15 minute winter               | S8         | 1.003        | S7         | 12.9             | 1.178             | 0.528    | 0.1793           |
| 15 minute winter               | S7         | 1.004        | S6         | 12.5             | 0.711             | 0.668    | 0.1584           |
| 15 minute winter               | S1         | 2.000        | S2         | 4.6              | 0.758             | 0.175    | 0.1110           |
| 15 minute winter               | S2         | 2.001        | S3         | 8.3              | 0.859             | 0.380    | 0.0642           |
| 15 minute winter               | S3         | 2.002        | S4         | 11.4             | 1.344             | 0.592    | 0.2917           |
| 15 minute winter               | S5         | 3.000        | S4         | 3.8              | 0.736             | 0.189    | 0.0423           |
| 15 minute winter               | S4         | 2.003        | S6         | 15.0             | 1.127             | 0.279    | 0.0589           |
| 15 minute winter               | S6         | 1.005        | S12        | 27.0             | 1.533             | 1.289    | 0.0627           |
| 720 minute winter              | S12        | Infiltration |            | 0.4              |                   |          |                  |

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.79%**

| Node Event         | US<br>Node | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status     |
|--------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 15 minute winter   | S11        | 10             | 99.570       | 0.070        | 8.4             | 0.0127           | 0.0000        | OK         |
| 15 minute winter   | S10        | 10             | 99.388       | 0.088        | 17.2            | 0.0160           | 0.0000        | OK         |
| 15 minute winter   | S9         | 12             | 98.951       | 0.451        | 23.2            | 0.0816           | 0.0000        | SURCHARGED |
| 15 minute winter   | S8         | 12             | 98.838       | 0.438        | 19.4            | 0.0793           | 0.0000        | SURCHARGED |
| 15 minute winter   | S7         | 12             | 98.646       | 0.496        | 18.9            | 0.5605           | 0.0000        | SURCHARGED |
| 15 minute winter   | S1         | 10             | 99.458       | 0.058        | 8.4             | 0.0104           | 0.0000        | OK         |
| 15 minute winter   | S2         | 11             | 99.109       | 0.109        | 15.1            | 0.0198           | 0.0000        | OK         |
| 15 minute winter   | S3         | 11             | 99.061       | 0.161        | 20.7            | 0.0292           | 0.0000        | SURCHARGED |
| 15 minute winter   | S5         | 9              | 98.662       | 0.062        | 6.8             | 0.0112           | 0.0000        | OK         |
| 15 minute winter   | S4         | 12             | 98.655       | 0.155        | 26.5            | 0.0280           | 0.0000        | SURCHARGED |
| 15 minute winter   | S6         | 13             | 98.512       | 0.462        | 42.6            | 0.0836           | 0.0000        | SURCHARGED |
| 1440 minute winter | S12        | 1350           | 98.167       | 0.167        | 3.6             | 59.7570          | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link         | DS<br>Node | Outflow<br>(l/s) | Velocity<br>(m/s) | Flow/Cap | Link<br>Vol (m³) |
|--------------------------------|------------|--------------|------------|------------------|-------------------|----------|------------------|
| 15 minute winter               | S11        | 1.000        | S10        | 8.3              | 0.879             | 0.429    | 0.1595           |
| 15 minute winter               | S10        | 1.001        | S9         | 16.9             | 1.120             | 0.653    | 0.5353           |
| 15 minute winter               | S9         | 1.002        | S8         | 19.4             | 1.294             | 0.886    | 0.1162           |
| 15 minute winter               | S8         | 1.003        | S7         | 18.9             | 1.188             | 0.777    | 0.2359           |
| 15 minute winter               | S7         | 1.004        | S6         | 19.5             | 1.107             | 1.041    | 0.1584           |
| 15 minute winter               | S1         | 2.000        | S2         | 8.3              | 0.834             | 0.313    | 0.1781           |
| 15 minute winter               | S2         | 2.001        | S3         | 14.9             | 0.950             | 0.682    | 0.1043           |
| 15 minute winter               | S3         | 2.002        | S4         | 19.9             | 1.369             | 1.033    | 0.5921           |
| 15 minute winter               | S5         | 3.000        | S4         | 6.8              | 0.792             | 0.340    | 0.0930           |
| 15 minute winter               | S4         | 2.003        | S6         | 25.4             | 1.471             | 0.470    | 0.0873           |
| 15 minute winter               | S6         | 1.005        | S12        | 42.5             | 2.412             | 2.027    | 0.0628           |
| 1440 minute winter             | S12        | Infiltration |            | 0.5              |                   |          |                  |