

## Design Settings

|                       |                   |                                      |               |
|-----------------------|-------------------|--------------------------------------|---------------|
| Rainfall Methodology  | FSR               | Maximum Time of Concentration (mins) | 30.00         |
| Return Period (years) | 100               | Maximum Rainfall (mm/hr)             | 50.0          |
| Additional Flow (%)   | 0                 | Minimum Velocity (m/s)               | 1.00          |
| FSR Region            | England and Wales | Connection Type                      | Level Soffits |
| M5-60 (mm)            | 20.000            | Minimum Backdrop Height (m)          | 0.200         |
| Ratio-R               | 0.450             | Preferred Cover Depth (m)            | 1.200         |
| CV                    | 0.750             | Include Intermediate Ground          | ✓             |
| Time of Entry (mins)  | 5.00              | Enforce best practice design rules   | ✓             |

## Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Diameter (mm) | Width (mm) | Depth (m) |
|------|-----------|---------------|-----------------|---------------|------------|-----------|
| 2.01 | 0.006     | 5.00          | 15.146          | 450           |            | 0.696     |
| 2.02 | 0.003     | 5.00          | 15.064          | 450           |            | 0.834     |
| 2.07 | 0.010     | 5.00          | 15.113          | 450           |            | 0.713     |
| 2.03 | 0.004     | 5.00          | 15.064          | 600           | 450        | 1.584     |
| 2.08 | 0.006     | 5.00          | 15.132          | 450           |            | 0.732     |
| 2.04 | 0.004     | 5.00          | 15.065          | 450           | 600        | 1.755     |
| RE2  | 0.004     | 5.00          | 15.103          | 300           |            | 0.903     |
| RE1  | 0.003     | 5.00          | 15.180          | 300           |            | 0.980     |
| 2.06 | 0.002     | 5.00          | 15.040          | 1200          |            | 1.960     |
| CS2  | 0.000     |               | 14.850          | 300           |            | 1.820     |
| DMH  |           |               | 14.850          | 300           |            | 1.830     |

## 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) |
|-------|---------|---------|------------|-------------|-----------|-----------|----------|-------------|----------|---------------|
| 1.000 | 2.01    | 2.02    | 3.916      | 0.600       | 14.450    | 14.300    | 0.150    | 26.1        | 150      | 5.03          |
| 1.001 | 2.02    | 2.03    | 7.719      | 0.600       | 14.230    | 14.130    | 0.100    | 77.2        | 150      | 5.15          |
| 2.000 | 2.07    | 2.03    | 2.567      | 0.600       | 14.400    | 14.300    | 0.100    | 25.7        | 150      | 5.02          |
| 1.002 | 2.03    | 2.04    | 15.142     | 0.600       | 13.480    | 13.310    | 0.170    | 89.1        | 150      | 5.38          |
| 3.000 | 2.08    | 2.04    | 1.579      | 0.600       | 14.400    | 14.300    | 0.100    | 15.8        | 150      | 5.01          |
| 1.003 | 2.04    | 2.06    | 14.398     | 0.600       | 13.310    | 13.155    | 0.155    | 92.9        | 150      | 5.61          |
| 4.000 | RE2     | 2.06    | 11.250     | 0.600       | 14.200    | 14.000    | 0.200    | 56.3        | 150      | 5.14          |
| 5.000 | RE1     | 2.06    | 11.590     | 0.600       | 14.200    | 14.000    | 0.200    | 58.0        | 150      | 5.15          |
| 1.004 | 2.06    | CS2     | 4.379      | 0.600       | 13.080    | 13.030    | 0.050    | 87.6        | 225      | 5.66          |
| 1.005 | CS2     | DMH     | 2.000      | 0.600       | 13.030    | 13.020    | 0.010    | 200.0       | 100      | 5.73          |

| Name  | US Node | DS Node | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Σ Area (ha) |
|-------|---------|---------|-----------|-----------|------------|--------------|--------------|-------------|
| 1.000 | 2.01    | 2.02    | 1.978     | 35.0      | 0.8        | 0.546        | 0.614        | 0.006       |
| 1.001 | 2.02    | 2.03    | 1.145     | 20.2      | 1.2        | 0.684        | 0.784        | 0.009       |
| 2.000 | 2.07    | 2.03    | 1.995     | 35.3      | 1.4        | 0.563        | 0.614        | 0.010       |
| 1.002 | 2.03    | 2.04    | 1.065     | 18.8      | 3.1        | 1.434        | 1.605        | 0.023       |
| 3.000 | 2.08    | 2.04    | 2.547     | 45.0      | 0.8        | 0.582        | 0.615        | 0.006       |
| 1.003 | 2.04    | 2.06    | 1.043     | 18.4      | 4.5        | 1.605        | 1.735        | 0.033       |
| 4.000 | RE2     | 2.06    | 1.344     | 23.7      | 0.5        | 0.753        | 0.890        | 0.004       |
| 5.000 | RE1     | 2.06    | 1.324     | 23.4      | 0.4        | 0.830        | 0.890        | 0.003       |
| 1.004 | 2.06    | CS2     | 1.398     | 55.6      | 5.7        | 1.735        | 1.595        | 0.042       |
| 1.005 | CS2     | DMH     | 0.540     | 4.2       | 5.7        | 1.720        | 1.730        | 0.042       |

## Manhole Schedule

| Node | CL (m) | Depth (m) | Dia (mm) | Width (mm) | Node Type | Connections                                                                         | Link | IL (m) | Dia (mm) |
|------|--------|-----------|----------|------------|-----------|-------------------------------------------------------------------------------------|------|--------|----------|
| 2.01 | 15.146 | 0.696     | 450      |            | Manhole   |  | 0    | 1.000  | 14.450   |
| 2.02 | 15.064 | 0.834     | 450      |            | Manhole   |  | 1    | 1.000  | 14.300   |
| 2.07 | 15.113 | 0.713     | 450      |            | Manhole   |  | 0    | 1.001  | 14.230   |
|      |        |           |          |            |           |                                                                                     | 0    | 2.000  | 14.400   |

## Manhole Schedule

| Node | CL (m) | Depth (m) | Dia (mm) | Width (mm) | Node Type | Connections | Link                          | IL (m)                     | Dia (mm)          |
|------|--------|-----------|----------|------------|-----------|-------------|-------------------------------|----------------------------|-------------------|
| 2.03 | 15.064 | 1.584     | 600      | 450        | Manhole   |             | 1 2.000<br>2 1.001            | 14.300<br>14.130           | 150<br>150        |
| 2.08 | 15.132 | 0.732     | 450      |            | Manhole   |             | 0 1.002                       | 13.480                     | 150               |
| 2.04 | 15.065 | 1.755     | 450      | 600        | Manhole   |             | 1 3.000<br>2 1.002            | 14.400<br>13.310           | 150<br>150        |
| RE2  | 15.103 | 0.903     | 300      |            | Manhole   |             | 0 1.003                       | 13.310                     | 150               |
| RE1  | 15.180 | 0.980     | 300      |            | Manhole   |             | 0 4.000                       | 14.200                     | 150               |
| 2.06 | 15.040 | 1.960     | 1200     |            | Manhole   |             | 1 5.000<br>2 4.000<br>3 1.003 | 14.200<br>14.000<br>13.155 | 150<br>150<br>150 |
| CS2  | 14.850 | 1.820     | 300      |            | Manhole   |             | 0 1.004                       | 13.080                     | 225               |
| DMH  | 14.850 | 1.830     | 300      |            | Manhole   |             | 0 1.005<br>1 1.005            | 13.030<br>13.020           | 100<br>100        |

## Simulation Settings

|                      |                   |                   |        |                            |      |
|----------------------|-------------------|-------------------|--------|----------------------------|------|
| Rainfall Methodology | FSR               | Summer CV         | 0.750  | Drain Down Time (mins)     | 240  |
| FSR Region           | England and Wales | Winter CV         | 0.840  | Additional Storage (m³/ha) | 20.0 |
| M5-60 (mm)           | 20.000            | Analysis Speed    | Normal | Check Discharge Rate(s)    | x    |
| Ratio-R              | 0.450             | Skip Steady State | ✓      | Check Discharge Volume     | x    |

## Storm Durations

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

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) | Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1                     | 0                     | 0                     | 0                     | 30                    | 0                     | 0                     | 0                     |
| 10                    | 0                     | 0                     | 0                     | 100                   | 40                    | 0                     | 0                     |

## Node DMH Offline Weir Control

|              |     |                  |        |                   |       |                       |       |
|--------------|-----|------------------|--------|-------------------|-------|-----------------------|-------|
| Flap Valve   | x   | Invert Level (m) | 13.020 | Design Flow (l/s) |       | Discharge Coefficient | 0.590 |
| Loop to Node | CS2 | Design Depth (m) | 1.600  | Width (m)         | 0.300 |                       |       |

## Node CS2 Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 12.000 |
| Side Inf Coefficient (m/hr) | 1.29600 | Porosity      | 0.95 | Time to half empty (mins) | 69     |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|-----------|-----------|---------------|-----------|-----------|---------------|-----------|-----------|---------------|
| 0.000     | 4.5       | 4.5           | 1.600     | 4.5       | 22.1          | 1.601     | 0.0       | 22.1          |

**Results for 1 year Critical Storm Duration. Lowest mass balance: 83.06%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m³) | Status |
|------------------|---------|-------------|-----------|-----------|--------------|------------|--------|
| 15 minute winter | 2.01    | 10          | 14.467    | 0.017     | 0.9          | 0.0000     | OK     |
| 15 minute winter | 2.02    | 10          | 14.256    | 0.026     | 1.3          | 0.0000     | OK     |
| 15 minute winter | 2.07    | 10          | 14.423    | 0.022     | 1.5          | 0.0000     | OK     |
| 15 minute winter | 2.03    | 11          | 13.522    | 0.042     | 3.3          | 0.0000     | OK     |
| 15 minute winter | 2.08    | 10          | 14.416    | 0.016     | 0.9          | 0.0000     | OK     |
| 15 minute winter | 2.04    | 11          | 13.364    | 0.054     | 4.8          | 0.0000     | OK     |
| 15 minute winter | RE2     | 11          | 14.217    | 0.017     | 0.6          | 0.0000     | OK     |
| 15 minute winter | RE1     | 11          | 14.214    | 0.014     | 0.4          | 0.0000     | OK     |
| 15 minute winter | 2.06    | 11          | 13.135    | 0.055     | 6.1          | 0.0000     | OK     |
| 60 minute winter | CS2     | 46          | 12.625    | -0.405    | 2.9          | 0.0000     | OK     |
| 15 minute summer | DMH     | 1           | 13.020    | 0.000     | 0.0          | 0.0000     | OK     |

| Link Event (Outflow) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|----------------------|---------|--------------|---------|---------------|----------------|----------|---------------|--------------------|
| 15 minute winter     | 2.01    | 1.000        | 2.02    | 0.9           | 0.820          | 0.025    | 0.0042        |                    |
| 15 minute winter     | 2.02    | 1.001        | 2.03    | 1.2           | 0.627          | 0.062    | 0.0154        |                    |
| 15 minute winter     | 2.07    | 2.000        | 2.03    | 1.5           | 0.943          | 0.042    | 0.0040        |                    |
| 15 minute winter     | 2.03    | 1.002        | 2.04    | 3.3           | 0.683          | 0.175    | 0.0739        |                    |
| 15 minute winter     | 2.08    | 3.000        | 2.04    | 0.9           | 0.953          | 0.020    | 0.0015        |                    |
| 15 minute winter     | 2.04    | 1.003        | 2.06    | 4.8           | 0.861          | 0.259    | 0.0799        |                    |
| 15 minute winter     | RE2     | 4.000        | 2.06    | 0.6           | 0.568          | 0.025    | 0.0119        |                    |
| 15 minute winter     | RE1     | 5.000        | 2.06    | 0.4           | 0.498          | 0.017    | 0.0093        |                    |
| 15 minute winter     | 2.06    | 1.004        | CS2     | 6.1           | 0.868          | 0.109    | 0.0307        |                    |
| 15 minute summer     | CS2     | 1.005        | DMH     | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| 60 minute winter     | CS2     | Infiltration |         | 1.2           |                |          |               |                    |
| 15 minute summer     | DMH     | Weir         | CS2     | 0.0           |                |          |               | 0.0                |

**Results for 10 year Critical Storm Duration. Lowest mass balance: 83.06%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m³) | Status |
|------------------|---------|-------------|-----------|-----------|--------------|------------|--------|
| 15 minute winter | 2.01    | 10          | 14.474    | 0.024     | 1.7          | 0.0000     | OK     |
| 15 minute winter | 2.02    | 10          | 14.267    | 0.037     | 2.6          | 0.0000     | OK     |
| 15 minute winter | 2.07    | 10          | 14.431    | 0.031     | 2.8          | 0.0000     | OK     |
| 15 minute winter | 2.03    | 10          | 13.541    | 0.061     | 6.4          | 0.0000     | OK     |
| 15 minute winter | 2.08    | 10          | 14.422    | 0.022     | 1.7          | 0.0000     | OK     |
| 15 minute winter | 2.04    | 11          | 13.388    | 0.078     | 9.1          | 0.0000     | OK     |
| 15 minute winter | RE2     | 11          | 14.222    | 0.022     | 1.1          | 0.0000     | OK     |
| 15 minute winter | RE1     | 10          | 14.220    | 0.020     | 0.9          | 0.0000     | OK     |
| 15 minute winter | 2.06    | 11          | 13.158    | 0.078     | 11.6         | 0.0000     | OK     |
| 60 minute winter | CS2     | 44          | 13.120    | 0.090     | 5.6          | 0.0000     | OK     |
| 60 minute winter | DMH     | 46          | 13.125    | 0.105     | 0.5          | 0.0000     | OK     |

  

| Link Event (Outflow) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|----------------------|---------|--------------|---------|---------------|----------------|----------|---------------|--------------------|
| 15 minute winter     | 2.01    | 1.000        | 2.02    | 1.7           | 0.987          | 0.048    | 0.0067        |                    |
| 15 minute winter     | 2.02    | 1.001        | 2.03    | 2.5           | 0.762          | 0.125    | 0.0256        |                    |
| 15 minute winter     | 2.07    | 2.000        | 2.03    | 2.8           | 1.115          | 0.079    | 0.0064        |                    |
| 15 minute winter     | 2.03    | 1.002        | 2.04    | 6.4           | 0.797          | 0.338    | 0.1213        |                    |
| 15 minute winter     | 2.08    | 3.000        | 2.04    | 1.7           | 1.134          | 0.037    | 0.0023        |                    |
| 15 minute winter     | 2.04    | 1.003        | 2.06    | 9.2           | 1.014          | 0.497    | 0.1299        |                    |
| 15 minute winter     | RE2     | 4.000        | 2.06    | 1.1           | 0.680          | 0.046    | 0.0182        |                    |
| 15 minute winter     | RE1     | 5.000        | 2.06    | 0.9           | 0.625          | 0.037    | 0.0159        |                    |
| 15 minute winter     | 2.06    | 1.004        | CS2     | 11.6          | 1.027          | 0.209    | 0.0496        |                    |
| 30 minute winter     | CS2     | 1.005        | DMH     | 0.4           | 0.111          | 0.086    | 0.0146        |                    |
| 60 minute winter     | CS2     | Infiltration |         | 2.2           |                |          |               |                    |
| 30 minute winter     | DMH     | Weir         | CS2     | 0.7           |                |          |               | 0.1                |

**Results for 30 year Critical Storm Duration. Lowest mass balance: 83.06%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m³) | Status     |
|------------------|---------|-------------|-----------|-----------|--------------|------------|------------|
| 15 minute winter | 2.01    | 10          | 14.477    | 0.027     | 2.2          | 0.0000     | OK         |
| 15 minute winter | 2.02    | 10          | 14.272    | 0.042     | 3.3          | 0.0000     | OK         |
| 15 minute winter | 2.07    | 10          | 14.436    | 0.036     | 3.6          | 0.0000     | OK         |
| 15 minute winter | 2.03    | 10          | 13.551    | 0.071     | 8.2          | 0.0000     | OK         |
| 15 minute winter | 2.08    | 10          | 14.425    | 0.025     | 2.2          | 0.0000     | OK         |
| 15 minute winter | 2.04    | 11          | 13.402    | 0.092     | 11.6         | 0.0000     | OK         |
| 15 minute winter | RE2     | 11          | 14.225    | 0.025     | 1.4          | 0.0000     | OK         |
| 15 minute winter | RE1     | 10          | 14.222    | 0.022     | 1.1          | 0.0000     | OK         |
| 60 minute winter | 2.06    | 47          | 13.314    | 0.234     | 7.5          | 0.0000     | SURCHARGED |
| 60 minute winter | CS2     | 46          | 13.312    | 0.282     | 7.5          | 0.0000     | SURCHARGED |
| 60 minute winter | DMH     | 45          | 13.323    | 0.303     | 29.9         | 0.0000     | OK         |

  

| Link Event (Outflow) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|----------------------|---------|--------------|---------|---------------|----------------|----------|---------------|--------------------|
| 15 minute winter     | 2.01    | 1.000        | 2.02    | 2.2           | 1.057          | 0.062    | 0.0080        |                    |
| 15 minute winter     | 2.02    | 1.001        | 2.03    | 3.2           | 0.812          | 0.158    | 0.0304        |                    |
| 15 minute winter     | 2.07    | 2.000        | 2.03    | 3.6           | 1.188          | 0.101    | 0.0077        |                    |
| 15 minute winter     | 2.03    | 1.002        | 2.04    | 8.1           | 0.835          | 0.429    | 0.1464        |                    |
| 15 minute winter     | 2.08    | 3.000        | 2.04    | 2.2           | 1.210          | 0.048    | 0.0028        |                    |
| 15 minute winter     | 2.04    | 1.003        | 2.06    | 11.6          | 1.071          | 0.631    | 0.1564        |                    |
| 15 minute winter     | RE2     | 4.000        | 2.06    | 1.4           | 0.729          | 0.059    | 0.0216        |                    |
| 15 minute winter     | RE1     | 5.000        | 2.06    | 1.1           | 0.664          | 0.045    | 0.0185        |                    |
| 15 minute winter     | 2.06    | 1.004        | CS2     | 14.8          | 1.091          | 0.267    | 0.1222        |                    |
| 60 minute winter     | CS2     | 1.005        | DMH     | 3.1           | 0.390          | 0.719    | 0.0156        |                    |
| 60 minute winter     | CS2     | Infiltration |         | 2.6           |                |          |               |                    |
| 30 minute winter     | DMH     | Weir         | CS2     | 26.6          |                |          |               | 14.9               |

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 83.06%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m³) | Status     |
|------------------|---------|-------------|-----------|-----------|--------------|------------|------------|
| 15 minute winter | 2.01    | 10          | 14.487    | 0.037     | 3.9          | 0.0000     | OK         |
| 15 minute winter | 2.02    | 10          | 14.289    | 0.059     | 5.9          | 0.0000     | OK         |
| 15 minute winter | 2.07    | 10          | 14.450    | 0.050     | 6.5          | 0.0000     | OK         |
| 60 minute winter | 2.03    | 46          | 14.251    | 0.771     | 7.4          | 0.0000     | SURCHARGED |
| 15 minute winter | 2.08    | 10          | 14.435    | 0.035     | 3.9          | 0.0000     | OK         |
| 60 minute winter | 2.04    | 45          | 14.243    | 0.933     | 10.6         | 0.0000     | SURCHARGED |
| 60 minute winter | RE2     | 49          | 14.241    | 0.041     | 1.3          | 0.0000     | OK         |
| 60 minute winter | RE1     | 49          | 14.240    | 0.040     | 1.0          | 0.0000     | OK         |
| 60 minute winter | 2.06    | 44          | 14.246    | 1.166     | 14.2         | 0.0000     | SURCHARGED |
| 60 minute winter | CS2     | 43          | 14.369    | 1.339     | 308.9        | 0.0000     | SURCHARGED |
| 60 minute winter | DMH     | 48          | 14.484    | 1.464     | 61.3         | 0.0000     | OK         |

  

| Link Event (Outflow) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|----------------------|---------|--------------|---------|---------------|----------------|----------|---------------|--------------------|
| 15 minute winter     | 2.01    | 1.000        | 2.02    | 3.9           | 1.235          | 0.111    | 0.0123        |                    |
| 15 minute winter     | 2.02    | 1.001        | 2.03    | 5.8           | 0.949          | 0.286    | 0.0471        |                    |
| 15 minute winter     | 2.07    | 2.000        | 2.03    | 6.5           | 1.373          | 0.184    | 0.0121        |                    |
| 15 minute winter     | 2.03    | 1.002        | 2.04    | 14.3          | 0.920          | 0.758    | 0.2666        |                    |
| 15 minute winter     | 2.08    | 3.000        | 2.04    | 3.9           | 1.395          | 0.086    | 0.0044        |                    |
| 15 minute summer     | 2.04    | 1.003        | 2.06    | 19.8          | 1.133          | 1.077    | 0.2535        |                    |
| 15 minute winter     | RE2     | 4.000        | 2.06    | 2.6           | 0.866          | 0.108    | 0.0334        |                    |
| 15 minute winter     | RE1     | 5.000        | 2.06    | 1.9           | 0.791          | 0.083    | 0.0284        |                    |
| 60 minute winter     | 2.06    | 1.004        | CS2     | 80.1          | 2.014          | 1.441    | 0.1742        |                    |
| 60 minute winter     | CS2     | 1.005        | DMH     | -85.4         | -10.922        | -20.145  | 0.0156        |                    |
| 15 minute winter     | CS2     | Infiltration |         | 3.2           |                |          |               |                    |
| 60 minute winter     | DMH     | Weir         | CS2     | 239.4         |                |          |               | 38.1               |