

## 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               | 0.403             | 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) | Depth (m) |
|-------|-----------|---------------|-----------------|---------------|-----------|
| NODE  | 0.000     | 5.00          | 13.336          | 1200          | 0.486     |
| 4.01  | 0.010     | 5.00          | 13.547          | 1200          | 0.847     |
| 4.02  | 0.030     | 5.00          | 14.200          | 1200          | 1.600     |
| 4.03  | 0.022     | 5.00          | 14.639          | 1200          | 2.669     |
| CS4.1 | 0.000     |               | 14.688          | 300           | 2.818     |
| DMH   |           |               | 14.712          | 300           | 2.843     |

## 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 | NODE    | 4.01    | 4.634      | 0.600       | 12.850    | 12.700    | 0.150    | 30.9        | 150      | 5.04          |
| 1.001 | 4.01    | 4.02    | 14.894     | 0.600       | 12.700    | 12.600    | 0.100    | 148.9       | 150      | 5.34          |
| 1.002 | 4.02    | 4.03    | 11.806     | 0.600       | 12.600    | 12.450    | 0.150    | 78.7        | 150      | 5.52          |
| 1.003 | 4.03    | CS4.1   | 3.910      | 0.600       | 11.970    | 11.870    | 0.100    | 39.1        | 150      | 5.56          |
| 1.004 | CS4.1   | DMH     | 1.958      | 0.600       | 11.870    | 11.869    | 0.001    | 1958.0      | 150      | 5.71          |

| 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 | NODE    | 4.01    | 1.818     | 32.1      | 0.0        | 0.336        | 0.697        | 0.000       |
| 1.001 | 4.01    | 4.02    | 0.821     | 14.5      | 1.4        | 0.697        | 1.450        | 0.010       |
| 1.002 | 4.02    | 4.03    | 1.134     | 20.0      | 5.4        | 1.450        | 2.039        | 0.040       |
| 1.003 | 4.03    | CS4.1   | 1.614     | 28.5      | 8.4        | 2.519        | 2.668        | 0.062       |
| 1.004 | CS4.1   | DMH     | 0.219     | 3.9       | 8.4        | 2.668        | 2.693        | 0.062       |

## Manhole Schedule

| Node  | CL (m) | Depth (m) | Dia (mm) | Node Type | Connections                                                                         | Link  | IL (m) | Dia (mm) |
|-------|--------|-----------|----------|-----------|-------------------------------------------------------------------------------------|-------|--------|----------|
| NODE  | 13.336 | 0.486     | 1200     | Manhole   |  |       |        |          |
|       |        |           |          |           | 0                                                                                   | 1.000 | 12.850 | 150      |
| 4.01  | 13.547 | 0.847     | 1200     | Manhole   |  | 1     | 1.000  | 12.700   |
|       |        |           |          |           | 0                                                                                   | 1.001 | 12.700 | 150      |
| 4.02  | 14.200 | 1.600     | 1200     | Manhole   |  | 1     | 1.001  | 12.600   |
|       |        |           |          |           | 0                                                                                   | 1.002 | 12.600 | 150      |
| 4.03  | 14.639 | 2.669     | 1200     | Manhole   |  | 1     | 1.002  | 12.450   |
|       |        |           |          |           | 0                                                                                   | 1.003 | 11.970 | 150      |
| CS4.1 | 14.688 | 2.818     | 300      | Manhole   |  | 1     | 1.003  | 11.870   |
|       |        |           |          |           | 0                                                                                   | 1.004 | 11.870 | 150      |
| DMH   | 14.712 | 2.843     | 300      | Manhole   |  | 1     | 1.004  | 11.869   |
|       |        |           |          |           | 0                                                                                   | 1.004 | 11.869 | 150      |

### Simulation Settings

|                      |                   |                        |        |                                         |      |
|----------------------|-------------------|------------------------|--------|-----------------------------------------|------|
| Rainfall Methodology | FSR               | Summer CV              | 0.750  | Additional Storage (m <sup>3</sup> /ha) | 20.0 |
| FSR Region           | England and Wales | Analysis Speed         | Normal | Check Discharge Rate(s)                 | x    |
| M5-60 (mm)           | 20.000            | Skip Steady State      | x      | Check Discharge Volume                  | x    |
| Ratio-R              | 0.400             | Drain Down Time (mins) | 240    |                                         |      |

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

### Node DMH Offline Orifice Control

|              |       |                  |        |                       |       |
|--------------|-------|------------------|--------|-----------------------|-------|
| Flap Valve   | x     | Invert Level (m) | 11.869 | Discharge Coefficient | 0.600 |
| Loop to Node | CS4.1 | Diameter (m)     | 0.100  |                       |       |

### Node CS4.1 Depth/Area Storage Structure

|                             |          |               |      |                           |        |
|-----------------------------|----------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000  | Safety Factor | 2.0  | Invert Level (m)          | 11.270 |
| Side Inf Coefficient (m/hr) | 16.16000 | Porosity      | 0.95 | Time to half empty (mins) | 7      |

| Depth (m) | Area (m <sup>2</sup> ) | Inf Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf Area (m <sup>2</sup> ) |
|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|
| 0.000     | 3.0                    | 3.0                        | 1.600     | 3.0                    | 14.2                       | 1.601     | 0.0                    | 14.2                       |

**Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m³) | Status |
|------------------|---------|-------------|-----------|-----------|--------------|------------|--------|
| 15 minute summer | NODE    | 1           | 12.850    | 0.000     | 0.0          | 0.0000     | OK     |
| 15 minute summer | 4.01    | 11          | 12.730    | 0.030     | 1.3          | 0.0000     | OK     |
| 15 minute summer | 4.02    | 10          | 12.654    | 0.054     | 5.3          | 0.0000     | OK     |
| 15 minute summer | 4.03    | 10          | 12.032    | 0.062     | 8.2          | 0.0000     | OK     |
| 15 minute summer | CS4.1   | 13          | 11.700    | -0.170    | 8.1          | 0.0000     | OK     |
| 15 minute summer | DMH     | 1           | 11.869    | 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 summer     | NODE    | 1.000        | 4.01    | 0.0           | 0.000          | 0.000    | 0.0059        |                    |
| 15 minute summer     | 4.01    | 1.001        | 4.02    | 1.3           | 0.320          | 0.089    | 0.0615        |                    |
| 15 minute summer     | 4.02    | 1.002        | 4.03    | 5.2           | 0.929          | 0.258    | 0.0657        |                    |
| 15 minute summer     | 4.03    | 1.003        | CS4.1   | 8.1           | 1.278          | 0.283    | 0.0247        |                    |
| 15 minute summer     | CS4.1   | 1.004        | DMH     | 0.0           | 0.000          | 0.000    | 0.0000        |                    |
| 15 minute summer     | CS4.1   | Infiltration |         | 6.2           |                |          |               |                    |
| 15 minute summer     | DMH     | Orifice      | CS4.1   | 0.0           |                |          |               | 0.0                |

**Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m³) | Status     |
|------------------|---------|-------------|-----------|-----------|--------------|------------|------------|
| 15 minute summer | NODE    | 1           | 12.850    | 0.000     | 0.0          | 0.0000     | OK         |
| 15 minute summer | 4.01    | 10          | 12.742    | 0.042     | 2.6          | 0.0000     | OK         |
| 15 minute summer | 4.02    | 10          | 12.681    | 0.081     | 10.3         | 0.0000     | OK         |
| 15 minute summer | 4.03    | 10          | 12.065    | 0.095     | 15.8         | 0.0000     | OK         |
| 15 minute summer | CS4.1   | 13          | 12.023    | 0.153     | 15.7         | 0.0000     | SURCHARGED |
| 15 minute summer | DMH     | 13          | 12.023    | 0.154     | 1.3          | 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 summer     | NODE    | 1.000        | 4.01    | 0.0           | 0.000          | 0.000    | 0.0095        |                    |
| 15 minute summer     | 4.01    | 1.001        | 4.02    | 2.5           | 0.376          | 0.176    | 0.1022        |                    |
| 15 minute summer     | 4.02    | 1.002        | 4.03    | 10.1          | 1.098          | 0.505    | 0.1091        |                    |
| 15 minute summer     | 4.03    | 1.003        | CS4.1   | 15.7          | 1.482          | 0.550    | 0.0560        |                    |
| 15 minute summer     | CS4.1   | 1.004        | DMH     | 1.2           | -0.158         | 0.300    | 0.0345        |                    |
| 15 minute summer     | CS4.1   | Infiltration |         | 11.4          |                |          |               |                    |
| 15 minute summer     | DMH     | Orifice      | CS4.1   | 0.6           |                |          |               | 0.1                |

**Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m³) | Status     |
|------------------|---------|-------------|-----------|-----------|--------------|------------|------------|
| 15 minute summer | NODE    | 1           | 12.850    | 0.000     | 0.0          | 0.0000     | OK         |
| 15 minute summer | 4.01    | 10          | 12.748    | 0.048     | 3.3          | 0.0000     | OK         |
| 15 minute summer | 4.02    | 10          | 12.694    | 0.094     | 13.1         | 0.0000     | OK         |
| 15 minute summer | 4.03    | 12          | 12.207    | 0.237     | 20.0         | 0.0000     | SURCHARGED |
| 15 minute summer | CS4.1   | 13          | 12.165    | 0.295     | 19.5         | 0.0000     | SURCHARGED |
| 15 minute summer | DMH     | 13          | 12.167    | 0.298     | 2.3          | 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 summer     | NODE    | 1.000        | 4.01    | 0.0           | 0.000          | 0.000    | 0.0112        |                    |
| 15 minute summer     | 4.01    | 1.001        | 4.02    | 3.2           | 0.392          | 0.222    | 0.1228        |                    |
| 15 minute summer     | 4.02    | 1.002        | 4.03    | 12.8          | 1.157          | 0.640    | 0.1313        |                    |
| 15 minute summer     | 4.03    | 1.003        | CS4.1   | 19.5          | 1.516          | 0.683    | 0.0688        |                    |
| 15 minute summer     | CS4.1   | 1.004        | DMH     | 2.0           | -0.258         | 0.512    | 0.0345        |                    |
| 15 minute summer     | CS4.1   | Infiltration |         | 13.7          |                |          |               |                    |
| 15 minute summer     | DMH     | Orifice      | CS4.1   | 0.7           |                |          |               | 0.1                |

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Flood (m³) | Status     |
|------------------|---------|-------------|-----------|-----------|--------------|------------|------------|
| 15 minute summer | NODE    | 12          | 12.895    | 0.045     | 1.0          | 0.0000     | OK         |
| 15 minute summer | 4.01    | 12          | 12.895    | 0.195     | 6.0          | 0.0000     | SURCHARGED |
| 15 minute summer | 4.02    | 12          | 12.886    | 0.286     | 22.5         | 0.0000     | SURCHARGED |
| 15 minute summer | 4.03    | 13          | 12.763    | 0.793     | 34.3         | 0.0000     | SURCHARGED |
| 15 minute summer | CS4.1   | 13          | 12.659    | 0.789     | 29.5         | 0.0000     | SURCHARGED |
| 15 minute summer | DMH     | 13          | 12.658    | 0.789     | 6.3          | 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 summer     | NODE    | 1.000        | 4.01    | 1.1           | 0.082          | 0.033    | 0.0512        |                    |
| 15 minute summer     | 4.01    | 1.001        | 4.02    | 5.4           | 0.412          | 0.372    | 0.2622        |                    |
| 15 minute summer     | 4.02    | 1.002        | 4.03    | 21.1          | 1.200          | 1.053    | 0.2078        |                    |
| 15 minute summer     | 4.03    | 1.003        | CS4.1   | 29.5          | 1.675          | 1.034    | 0.0688        |                    |
| 15 minute summer     | CS4.1   | 1.004        | DMH     | 4.2           | 0.761          | 1.082    | 0.0345        |                    |
| 15 minute summer     | CS4.1   | Infiltration |         | 21.7          |                |          |               |                    |
| 15 minute summer     | DMH     | Orifice      | CS4.1   | 0.7           |                |          |               | -0.1               |