

### Design Settings

|                       |                   |                                      |               |
|-----------------------|-------------------|--------------------------------------|---------------|
| Rainfall Methodology  | FSR               | Maximum Time of Concentration (mins) | 30.00         |
| Return Period (years) | 1                 | 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)            | 17.000            | Minimum Backdrop Height (m)          | 0.200         |
| Ratio-R               | 0.400             | Preferred Cover Depth (m)            | 0.600         |
| 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) | Easting (m) | Northing (m) | Depth (m) |
|------|-----------|---------------|-----------------|---------------|-------------|--------------|-----------|
| 1    | 0.178     | 5.00          | 38.800          | 1200          | 470344.692  | 174532.874   | 1.800     |
| 2    |           |               | 38.800          | 1200          | 470324.443  | 174529.388   | 1.921     |

### 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) |
|-------|---------|---------|------------|-------------|-----------|-----------|----------|-------------|----------|---------------|--------------|
| 1.000 | 1       | 2       | 20.547     | 0.600       | 37.000    | 36.879    | 0.121    | 169.8       | 225      | 5.34          | 45.3         |

| 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) |
|-------|-----------|-----------|------------|--------------|--------------|-------------|--------------------|----------------|--------------------|
| 1.000 | 1.000     | 39.8      | 21.9       | 1.575        | 1.696        | 0.178       | 0.0                | 119            | 1.023              |

### 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 | 20.547     | 169.8       | 225      | Circular  | 38.800    | 37.000    | 1.575        | 38.800    | 36.879    | 1.696        |

| Link  | US Node | Dia (mm) | Node Type | MH Type   | DS Node | Dia (mm) | Node Type | MH Type   |
|-------|---------|----------|-----------|-----------|---------|----------|-----------|-----------|
| 1.000 | 1       | 1200     | Manhole   | Adoptable | 2       | 1200     | Manhole   | Adoptable |

### Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m) | Depth (m) | Dia (mm) | Connections                                                                          | Link | IL (m) | Dia (mm) |     |
|------|-------------|--------------|--------|-----------|----------|--------------------------------------------------------------------------------------|------|--------|----------|-----|
| 1    | 470344.692  | 174532.874   | 38.800 | 1.800     | 1200     |   | 0    | 1.000  | 37.000   | 225 |
| 2    | 470324.443  | 174529.388   | 38.800 | 1.921     | 1200     |  | 1    | 1.000  | 36.879   | 225 |

### 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 (m <sup>3</sup> /ha) | 20.0   |
| 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 %) |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 1                        | 0                        | 0                        | 0                        |
| 30                       | 0                        | 0                        | 0                        |
| 100                      | 40                       | 0                        | 0                        |

### Node 1 Online Hydro-Brake® Control

|                          |        |                         |                                |
|--------------------------|--------|-------------------------|--------------------------------|
| Flap Valve               | x      | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓      | Sump Available          | ✓                              |
| Invert Level (m)         | 37.000 | Product Number          | CTL-SHE-0070-2000-0800-2000    |
| Design Depth (m)         | 0.800  | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s)        | 2.0    | Min Node Diameter (mm)  | 1200                           |

### Node 1 Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 37.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 0.95 | Time to half empty (mins) |        |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 133.0                     | 0.0                           | 0.800        | 133.0                     | 0.0                           | 0.801        | 0.0                       | 0.0                           |

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

| 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 |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|--------|
| 180 minute winter | 1          | 132            | 37.106       | 0.106        | 5.1             | 13.6754          | 0.0000        | OK     |
| 15 minute summer  | 2          | 1              | 36.879       | 0.000        | 1.2             | 0.0000           | 0.0000        | OK     |

| Link Event<br>(Upstream Depth) | US<br>Node | Link         | DS<br>Node | Outflow<br>(l/s) | Discharge<br>Vol (m³) |
|--------------------------------|------------|--------------|------------|------------------|-----------------------|
| 180 minute winter              | 1          | Hydro-Brake® | 2          | 1.8              | 19.9                  |

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

| 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     |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 180 minute winter | 1          | 172            | 37.295       | 0.295        | 12.1            | 38.1817          | 0.0000        | SURCHARGED |
| 15 minute summer  | 2          | 1              | 36.879       | 0.000        | 1.9             | 0.0000           | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link         | DS<br>Node | Outflow<br>(l/s) | Discharge<br>Vol (m³) |
|--------------------------------|------------|--------------|------------|------------------|-----------------------|
| 180 minute winter              | 1          | Hydro-Brake® | 2          | 2.0              | 42.3                  |

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

| 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     |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 240 minute winter | 1          | 236            | 37.640       | 0.640        | 18.1            | 82.9099          | 0.0000        | SURCHARGED |
| 15 minute summer  | 2          | 1              | 36.879       | 0.000        | 2.0             | 0.0000           | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link         | DS<br>Node | Outflow<br>(l/s) | Discharge<br>Vol (m³) |
|--------------------------------|------------|--------------|------------|------------------|-----------------------|
| 240 minute winter              | 1          | Hydro-Brake® | 2          | 2.0              | 45.7                  |