## 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) | 1 | PIMP (%) | 100 |
| M5-60 (mm) | 18.000 | Add Flow / Climate Change (%) | 0 |
| Ratio R | 0.400 | Minimum Backdrop Height (m) | 0.000 |
| Maximum Rainfall (mm/hr) | 50 | Maximum Backdrop Height (m) | 0.000 |
| Maximum Time of Concentration (mins) | 30 | Min Design Depth for Optimisation (m) | 0.000 |
| 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 | 0.054 | 4-8 | 0.011 |

Total Area Contributing (ha) = 0.065

Total Pipe Volume (m³) = 15.174

### 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 10.764 | 0.071 | 151.6 | 0.009 | 2.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| 1.001 | 23.796 | 0.059 | 403.3 | 0.047 | 0.00 | 0.0 | 0.600 | [] | -132 | Pipe/Conduit | |
| 1.002 | 15.581 | 0.039 | 399.5 | 0.000 | 0.00 | 0.0 | 0.600 | [] | -131 | Pipe/Conduit | |
| 2.000 | 9.366 | 0.023 | 407.2 | 0.009 | 2.00 | 0.0 | 0.600 | [] | -131 | Pipe/Conduit | |
| 1.003 | 13.482 | 0.054 | 249.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | 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) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 50.00 | 2.17 | 80.388 | 0.009 | 0.0 | 0.0 | 0.0 | 1.06 | 42.1 | 1.2 |
| 1.001 | 50.00 | 2.51 | 80.142 | 0.056 | 0.0 | 0.0 | 0.0 | 1.17 | 468.0 | 7.6 |
| 1.002 | 50.00 | 2.77 | 80.083 | 0.056 | 0.0 | 0.0 | 0.0 | 1.00 | 200.6 | 7.6 |
| 2.000 | 50.00 | 2.16 | 80.242 | 0.009 | 0.0 | 0.0 | 0.0 | 0.99 | 198.7 | 1.2 |
| 1.003 | 47.88 | 5.36 | 80.044 | 0.000 | 5.6 | 0.0 | 0.0 | 0.63 | 11.2 | 5.6 |

## Conduit Sections for Storm

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

| Section Number | Conduit Type | Major Dimn. (mm) | Minor Dimn. (mm) | Side Slope (Deg) | Corner Splay (mm) | 4*Hyd Radius (m) | XSect Area ($m^2$) |
|---|---|---|---|---|---|---|---|
| -131 | [] | 500 | 400 | 90.0 | | 0.444 | 0.200 |
| -132 | [] | 1000 | 400 | 90.0 | | 0.571 | 0.400 |

## PIPELINE SCHEDULES for Storm

### Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| 1.000 | o | 225 | S1 | 81.200 | 80.388 | 0.587 | Open Manhole | 1200 |
| 1.001 | [] | -132 | Attenuation | 81.150 | 80.142 | 0.608 | Open Manhole | 1200 |
| 1.002 | [] | -131 | Attenuation | 81.150 | 80.083 | 0.667 | Open Manhole | 1200 |
| 2.000 | [] | -131 | Attenuation | 81.150 | 80.242 | 0.508 | Open Manhole | 3000 |
| 1.003 | o | 150 | Outfall | 81.150 | 80.044 | 0.956 | Open Manhole | 1200 |

### Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| 1.000 | 10.764 | 151.6 | Attenuation | 81.150 | 80.317 | 0.608 | Open Manhole | 1200 |
| 1.001 | 23.796 | 403.3 | Attenuation | 81.150 | 80.083 | 0.667 | Open Manhole | 1200 |
| 1.002 | 15.581 | 399.5 | Outfall | 81.150 | 80.044 | 0.706 | Open Manhole | 1200 |
| 2.000 | 9.366 | 407.2 | Outfall | 81.150 | 80.219 | 0.531 | Open Manhole | 1200 |
| 1.003 | 13.482 | 249.7 | | 80.620 | 79.990 | 0.480 | Open Manhole | 1200 |

## 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) |
|---|---|---|---|---|---|---|
| 1.003 | | 80.620 | 79.990 | 0.000 | 1200 | 0 |