


|   |   |   |
|---|---|---|
| PHG Consulting Engineers                              |   | Page 1  |
| 107 Cowbridge Road East<br>Cardiff<br>Wales, CF11 9AG |   |  |
| Date 22/10/2025 12:16<br>File 2595-NETWORK.MDX        | Designed by tony.owensredwood<br>Checked by |   |
| Innovyze  |   | Network 2020.1.3  |

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

|   |       |
|---|-------|
| Return Period (years)                         | 2     |
| FEH Rainfall Version                          | 1999  |
| Site Location GB 333706 186335 ST 33706 86335 |       |
| C (1km)                                       | 0.000 |
| D1 (1km)                                      | 0.000 |
| D2 (1km)                                      | 0.000 |
| D3 (1km)                                      | 0.000 |
| E (1km)                                       | 0.000 |
| F (1km)                                       | 0.000 |
| Maximum Rainfall (mm/hr)                      | 50    |
| Maximum Time of Concentration (mins)          | 30    |
| Foul Sewage (l/s/ha)                          | 0.000 |
| Volumetric Runoff Coeff.                      | 0.750 |
| PIMP (%)                                      | 100   |
| Add Flow / Climate Change (%)                 | 0     |
| Minimum Backdrop Height (m)                   | 0.200 |
| Maximum Backdrop Height (m)                   | 1.500 |
| Min Design Depth for Optimisation (m)         | 1.200 |
| Min Vel for Auto Design only (m/s)            | 1.00  |
| Min Slope for Optimisation (1:X)              | 500   |

Designed with Level Soffits

Time Area Diagram for Storm

| Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|-------------|-----------|-------------|-----------|-------------|-----------|
| 0-4         | 0.222     | 4-8         | 0.204     | 8-12        | 0.001     |

Total Area Contributing (ha) = 0.427

Total Pipe Volume (m³) = 28.645









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 |
|----|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|-------------|
|----|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|-------------|

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) |
|----|--------------|-------------|-----------|---------------|-------------------|------------|----------------|-----------|-----------|------------|
|----|--------------|-------------|-----------|---------------|-------------------|------------|----------------|-----------|-----------|------------|

Network Design Table for Storm

| PN    | Length<br>(m) | Fall<br>(m) | Slope<br>(1:X) | I.Area<br>(ha) | T.E.<br>(mins) | Base<br>Flow (l/s) | k<br>(mm) | HYD<br>SECT | DIA<br>(mm) | Section Type | Auto<br>Design  |
|-------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------------|-------------|--------------|---|
| 1.000 | 18.259        | 0.040       | 462.1          | 0.032          | 5.00           | 0.0                | 0.600     | o           | 450         | Pipe/Conduit |  |
| 1.001 | 25.799        | 0.067       | 386.0          | 0.109          | 0.00           | 0.0                | 0.600     | o           | 450         | Pipe/Conduit |  |
| 1.002 | 16.874        | 0.067       | 252.5          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 450         | Pipe/Conduit |  |
| 1.003 | 54.783        | 0.083       | 660.0          | 0.117          | 0.00           | 0.0                | 0.600     | o           | 450         | Pipe/Conduit |  |
| 1.004 | 25.430        | 0.057       | 450.0          | 0.095          | 0.00           | 0.0                | 0.600     | o           | 450         | Pipe/Conduit |  |
| 1.005 | 13.187        | 0.029       | 450.0          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 450         | Pipe/Conduit |  |
| 1.006 | 18.804        | 0.043       | 437.3          | 0.073          | 0.00           | 0.0                | 0.600     | o           | 450         | Pipe/Conduit |  |
| 1.007 | 6.975         | 0.023       | 303.3          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 450         | Pipe/Conduit |  |

Network Results Table

| PN    | Rain<br>(mm/hr) | T.C.<br>(mins) | US/IL<br>(m) | Σ I.Area<br>(ha) | Σ Base<br>Flow (l/s) | Foul<br>(l/s) | Add Flow<br>(l/s) | Vel<br>(m/s) | Cap<br>(l/s) | Flow<br>(l/s) |
|-------|-----------------|----------------|--------------|------------------|----------------------|---------------|-------------------|--------------|--------------|---------------|
| 1.000 | 11.30           | 5.31           | 5.559        | 0.032            | 0.0                  | 0.0           | 0.0               | 0.95         | 151.4        | 1.0           |
| 1.001 | 10.69           | 5.61           | 5.519        | 0.142            | 0.0                  | 0.0           | 0.0               | 1.15         | 182.7        | 4.1           |
| 1.002 | 10.29           | 5.83           | 5.452        | 0.142            | 0.0                  | 0.0           | 0.0               | 1.27         | 202.8        | 4.1           |
| 1.003 | 8.57            | 7.00           | 5.385        | 0.259            | 0.0                  | 0.0           | 0.0               | 0.78         | 124.7        | 6.0           |
| 1.004 | 8.06            | 7.44           | 5.302        | 0.354            | 0.0                  | 0.0           | 0.0               | 0.95         | 151.4        | 7.7           |
| 1.005 | 7.82            | 7.67           | 5.245        | 0.354            | 0.0                  | 0.0           | 0.0               | 0.95         | 151.4        | 7.7           |
| 1.006 | 7.50            | 8.00           | 5.216        | 0.427            | 0.0                  | 0.0           | 0.0               | 0.97         | 153.6        | 8.7           |
| 1.007 | 7.41            | 8.10           | 5.173        | 0.427            | 0.0                  | 0.0           | 0.0               | 1.16         | 184.8        | 8.7           |

107 Cowbridge Road East  
Cardiff  
Wales, CF11 9AG



Date 22/10/2025 12:16  
File 2595-NETWORK.MDX

Designed by tony.owensredwood  
Checked by

Innovyze Network 2020.1.3

Manhole Schedules for Storm

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam., L*W (mm) | Pipe Out |                  |               | Pipes In |                  |               | Backdrop (mm) |
|---------|-----------|--------------|---------------|--------------------|----------|------------------|---------------|----------|------------------|---------------|---------------|
|         |           |              |               |                    | PN       | Invert Level (m) | Diameter (mm) | PN       | Invert Level (m) | Diameter (mm) |               |
| 1       | 6.375     | 0.816        | Open Manhole  | 1350               | 1.000    | 5.559            | 450           |          |                  |               |               |
| 2       | 6.650     | 1.131        | Open Manhole  | 1350               | 1.001    | 5.519            | 450           | 1.000    | 5.519            | 450           |               |
| 3       | 6.665     | 1.213        | Open Manhole  | 1350               | 1.002    | 5.452            | 450           | 1.001    | 5.452            | 450           |               |
| 4       | 6.680     | 1.295        | Open Manhole  | 1350               | 1.003    | 5.385            | 450           | 1.002    | 5.385            | 450           |               |
| 5       | 6.600     | 1.298        | Open Manhole  | 1350               | 1.004    | 5.302            | 450           | 1.003    | 5.302            | 450           |               |
| 6       | 6.850     | 1.605        | Open Manhole  | 1350               | 1.005    | 5.245            | 450           | 1.004    | 5.245            | 450           |               |
| 7       | 6.700     | 1.484        | Open Manhole  | 1350               | 1.006    | 5.216            | 450           | 1.005    | 5.216            | 450           |               |
| 8       | 6.300     | 1.127        | Open Manhole  | 1350               | 1.007    | 5.173            | 450           | 1.006    | 5.173            | 450           |               |
|         | 6.100     | 0.950        | Open Manhole  | 0                  |          | OUTFALL          |               | 1.007    | 5.150            | 450           |               |

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| 1       | 333780.903          | 186276.598           | 333780.903               | 186276.598                | Required       |                |
| 2       | 333767.768          | 186289.280           | 333767.768               | 186289.280                | Required       |                |
| 3       | 333747.568          | 186305.329           | 333747.568               | 186305.329                | Required       |                |
| 4       | 333740.958          | 186320.855           | 333740.958               | 186320.855                | Required       |                |
| 5       | 333698.928          | 186355.992           | 333698.928               | 186355.992                | Required       |                |
| 6       | 333679.916          | 186372.880           | 333679.916               | 186372.880                | Required       |                |
| 7       | 333668.973          | 186380.239           | 333668.973               | 186380.239                | Required       |                |
| 8       | 333650.328          | 186377.799           | 333650.328               | 186377.799                | Required       |                |
|         | 333647.476          | 186384.164           |                          |                           | No Entry       |                |

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        | 450       | 1       | 6.375       | 5.559       | 0.366       | Open Manhole  | 1350               |
| 1.001 | o        | 450       | 2       | 6.650       | 5.519       | 0.681       | Open Manhole  | 1350               |
| 1.002 | o        | 450       | 3       | 6.665       | 5.452       | 0.763       | Open Manhole  | 1350               |
| 1.003 | o        | 450       | 4       | 6.680       | 5.385       | 0.845       | Open Manhole  | 1350               |
| 1.004 | o        | 450       | 5       | 6.600       | 5.302       | 0.848       | Open Manhole  | 1350               |
| 1.005 | o        | 450       | 6       | 6.850       | 5.245       | 1.155       | Open Manhole  | 1350               |
| 1.006 | o        | 450       | 7       | 6.700       | 5.216       | 1.034       | Open Manhole  | 1350               |
| 1.007 | o        | 450       | 8       | 6.300       | 5.173       | 0.677       | Open Manhole  | 1350               |

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 | 18.259     | 462.1       | 2       | 6.650       | 5.519       | 0.681       | Open Manhole  | 1350               |
| 1.001 | 25.799     | 386.0       | 3       | 6.665       | 5.452       | 0.763       | Open Manhole  | 1350               |
| 1.002 | 16.874     | 252.5       | 4       | 6.680       | 5.385       | 0.845       | Open Manhole  | 1350               |
| 1.003 | 54.783     | 660.0       | 5       | 6.600       | 5.302       | 0.848       | Open Manhole  | 1350               |
| 1.004 | 25.430     | 450.0       | 6       | 6.850       | 5.245       | 1.155       | Open Manhole  | 1350               |
| 1.005 | 13.187     | 450.0       | 7       | 6.700       | 5.216       | 1.034       | Open Manhole  | 1350               |
| 1.006 | 18.804     | 437.3       | 8       | 6.300       | 5.173       | 0.677       | Open Manhole  | 1350               |
| 1.007 | 6.975      | 303.3       |         | 6.100       | 5.150       | 0.500       | Open Manhole  | 0                  |

Area Summary for Storm

| Pipe Number | PIMP Type | PIMP Name | PIMP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) |
|-------------|-----------|-----------|----------|-----------------|----------------|-----------------|
| 1.000       | User      | -         | 100      | 0.032           | 0.032          | 0.032           |
| 1.001       | User      | -         | 100      | 0.109           | 0.109          | 0.109           |
| 1.002       | -         | -         | 100      | 0.000           | 0.000          | 0.000           |
| 1.003       | User      | -         | 100      | 0.117           | 0.117          | 0.117           |
| 1.004       | User      | -         | 100      | 0.095           | 0.095          | 0.095           |
| 1.005       | -         | -         | 100      | 0.000           | 0.000          | 0.000           |
| 1.006       | User      | -         | 100      | 0.073           | 0.073          | 0.073           |
| 1.007       | -         | -         | 100      | 0.000           | 0.000          | 0.000           |
|             |           |           |          | Total           | Total          | Total           |
|             |           |           |          | 0.427           | 0.427          | 0.427           |

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) |
|---------------------|--------------|--------------|--------------|------------------|----------|--------|
| 1.007               |              | 6.100        | 5.150        | 0.000            | 0        | 0      |

Simulation Criteria for Storm

|                                 |       |  |       |
|---------------------------------|-------|--|-------|
| Volumetric Runoff Coeff         | 0.750 | Additional Flow - % of Total Flow          | 0.000 |
| Areal Reduction Factor          | 1.000 | MADD Factor * 10m <sup>3</sup> /ha Storage | 2.000 |
| Hot Start (mins)                | 0     | Inlet Coefficient                          | 0.800 |
| Hot Start Level (mm)            | 0     | Flow per Person per Day (l/per/day)        | 0.000 |
| Manhole Headloss Coeff (Global) | 0.500 | Run Time (mins)                            | 60    |
| Foul Sewage per hectare (l/s)   | 0.000 | Output Interval (mins)                     | 1     |
|                                 |       |  |       |
| Number of Input Hydrographs     | 0     | Number of Storage Structures               | 5     |
| Number of Online Controls       | 1     | Number of Time/Area Diagrams               | 0     |
| Number of Offline Controls      | 0     | Number of Real Time Controls               | 0     |

Synthetic Rainfall Details

|                       |                                 |
|-----------------------|---------------------------------|
| Rainfall Model        | FEH                             |
| Return Period (years) | 2                               |
| FEH Rainfall Version  | 1999                            |
| Site Location         | GB 333706 186335 ST 33706 86335 |
| C (1km)               | 0.000                           |
| D1 (1km)              | 0.000                           |
| D2 (1km)              | 0.000                           |
| D3 (1km)              | 0.000                           |
| E (1km)               | 0.000                           |
| F (1km)               | 0.000                           |
| Summer Storms         | Yes                             |
| Winter Storms         | Yes                             |
| Cv (Summer)           | 0.750                           |
| Cv (Winter)           | 0.840                           |

|   |  |
|---|--|
| 107 Cowbridge Road East<br>Cardiff<br>Wales, CF11 9AG |  |
|---|--|




|  |   |
|--|---|
| Date 22/10/2025 12:16<br>File 2595-NETWORK.MDX | Designed by tony.owensredwood<br>Checked by |
|--|---|

|          |                  |
|----------|------------------|
| Innovyze | Network 2020.1.3 |
|----------|------------------|

Synthetic Rainfall Details

Storm Duration (mins) 30

|   |   |   |
|---|---|---|
| PHG Consulting Engineers                              |   | Page 7  |
| 107 Cowbridge Road East<br>Cardiff<br>Wales, CF11 9AG |   |  |
| Date 22/10/2025 12:16<br>File 2595-NETWORK.MDX        | Designed by tony.owensredwood<br>Checked by |   |
| Innovyze  |   | Network 2020.1.3  |

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.007, Volume (m³): 4.4

|                                   |                            |
|-----------------------------------|----------------------------|
| Unit Reference                    | MD-SHE-0085-3400-1200-3400 |
| Design Head (m)                   | 1.200                      |
| Design Flow (l/s)                 | 3.4                        |
| Flush-Flo™                        | Calculated                 |
| Objective                         | Minimise upstream storage  |
| Application                       | Surface                    |
| Sump Available                    | Yes                        |
| Diameter (mm)                     | 85                         |
| Invert Level (m)                  | 5.173                      |
| Minimum Outlet Pipe Diameter (mm) | 100                        |
| Suggested Manhole Diameter (mm)   | 1200                       |

| Control Points            | Head (m) | Flow (l/s) |
|---------------------------|----------|------------|
| Design Point (Calculated) | 1.200    | 3.4        |
| Flush-Flo™                | 0.363    | 3.4        |
| Kick-Flo®                 | 0.743    | 2.7        |
| Mean Flow over Head Range | -        | 3.0        |

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
| 0.100     | 2.5        | 1.200     | 3.4        | 3.000     | 5.2        | 7.000     | 7.7        |
| 0.200     | 3.2        | 1.400     | 3.6        | 3.500     | 5.6        | 7.500     | 8.0        |
| 0.300     | 3.4        | 1.600     | 3.9        | 4.000     | 5.9        | 8.000     | 8.3        |
| 0.400     | 3.4        | 1.800     | 4.1        | 4.500     | 6.3        | 8.500     | 8.5        |
| 0.500     | 3.3        | 2.000     | 4.3        | 5.000     | 6.6        | 9.000     | 8.7        |
| 0.600     | 3.2        | 2.200     | 4.5        | 5.500     | 6.9        | 9.500     | 9.0        |
| 0.800     | 2.8        | 2.400     | 4.7        | 6.000     | 7.2        |           |            |
| 1.000     | 3.1        | 2.600     | 4.9        | 6.500     | 7.5        |           |            |

107 Cowbridge Road East  
Cardiff  
Wales, CF11 9AG

Designed by tony.owensredwood  
Checked by



Date 22/10/2025 12:16  
File 2595-NETWORK.MDX

Network 2020.1.3

Innovyze

Storage Structures for Storm

Tank or Pond Manhole: 1, DS/PN: 1.000

Invert Level (m) 6.175

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|
| 0.000     | 61.0                   | 0.200     | 111.7                  |

Cellular Storage Manhole: 2, DS/PN: 1.001

Invert Level (m) 5.519 Safety Factor 2.0  
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95  
Infiltration Coefficient Side (m/hr) 0.00000

| 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     | 67.5                   | 67.5                        | 0.801     | 0.0                    | 93.9                        |
| 0.800     | 67.5                   | 93.9                        |           |                        |                             |

Tank or Pond Manhole: 5, DS/PN: 1.004

Invert Level (m) 6.450

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|
| 0.000     | 44.0                   | 0.150     | 101.4                  |

Cellular Storage Manhole: 7, DS/PN: 1.006

Invert Level (m) 5.218 Safety Factor 2.0  
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95  
Infiltration Coefficient Side (m/hr) 0.00000

| 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     | 81.0                   | 81.0                        | 1.300     | 0.0                    | 127.8                       |
| 1.200     | 81.0                   | 127.8                       |           |                        |                             |

Tank or Pond Manhole: 8, DS/PN: 1.007

Invert Level (m) 5.173

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|
| 0.000     | 81.0                   | 1.127     | 251.0                  |

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for Storm

Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0    MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
Hot Start Level (mm) 0    Inlet Coefficient 0.800  
Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0    Number of Storage Structures 5  
Number of Online Controls 1    Number of Time/Area Diagrams 0  
Number of Offline Controls 0    Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH  
FEH Rainfall Version 2013  
Site Location GB 333706 186335 ST 33706 86335  
Data Type Point  
Cv (Summer) 1.000  
Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status OFF  
DVD Status ON  
Inertia Status ON

Profile(s) Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440  
Return Period(s) (years) 2, 30, 100  
Climate Change (%) 0, 0, 40

| PN    | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|-------|------------|-------|---------------|----------------|---------------------|-----------------|--------------------|---------------|-----------------|
| 1.000 | 1          | 30    | Summer        | 2              | +0%                 | 100/120         | Summer             |               | 5.640           |
| 1.001 | 2          | 30    | Summer        | 2              | +0%                 | 100/30          | Summer             |               | 5.623           |
| 1.002 | 3          | 480   | Summer        | 2              | +0%                 | 100/30          | Summer             |               | 5.577           |
| 1.003 | 4          | 480   | Summer        | 2              | +0%                 | 100/15          | Summer             |               | 5.576           |
| 1.004 | 5          | 480   | Summer        | 2              | +0%                 | 30/240          | Summer             |               | 5.575           |
| 1.005 | 6          | 480   | Summer        | 2              | +0%                 | 30/120          | Summer             |               | 5.574           |
| 1.006 | 7          | 480   | Summer        | 2              | +0%                 | 30/120          | Summer             |               | 5.573           |
| 1.007 | 8          | 480   | Summer        | 2              | +0%                 | 30/60           | Summer             |               | 5.572           |

| PN    | US/MH Name | Surcharged |                          |                   | Flooded               |             |            | Half Drain Pipe |                |
|-------|------------|------------|--------------------------|-------------------|-----------------------|-------------|------------|-----------------|----------------|
|       |            | Depth (m)  | Volume (m <sup>3</sup> ) | Flow / Cap. (l/s) | Flow / Overflow (l/s) | Time (mins) | Flow (l/s) | Status          | Level Exceeded |
| 1.000 | 1          | -0.369     | 0.000                    | 0.05              |                       |             | 5.4        | OK              |                |
| 1.001 | 2          | -0.346     | 0.000                    | 0.10              |                       | 16          | 13.5       | OK              |                |

107 Cowbridge Road East  
Cardiff  
Wales, CF11 9AG



Date 22/10/2025 12:16  
File 2595-NETWORK.MDX

Designed by tony.owensredwood  
Checked by

Innovyze Network 2020.1.3

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for Storm

| PN    | US/MH<br>Name | Surcharged Flooded |                             | Flow / Overflow |       | Half Drain     | Pipe          | Status | Level<br>Exceeded |
|-------|---------------|--------------------|-----------------------------|-----------------|-------|----------------|---------------|--------|-------------------|
|       |               | Depth<br>(m)       | Volume<br>(m <sup>3</sup> ) | Cap.            | (l/s) | Time<br>(mins) | Flow<br>(l/s) |        |                   |
| 1.002 | 3             | -0.326             | 0.000                       | 0.04            |       |                | 6.0           | OK     |                   |
| 1.003 | 4             | -0.259             | 0.000                       | 0.10            |       |                | 11.0          | OK     |                   |
| 1.004 | 5             | -0.177             | 0.000                       | 0.11            |       |                | 14.1          | OK     |                   |
| 1.005 | 6             | -0.121             | 0.000                       | 0.15            |       |                | 13.5          | OK     |                   |
| 1.006 | 7             | -0.093             | 0.000                       | 0.10            |       | 341            | 11.2          | OK     |                   |
| 1.007 | 8             | -0.051             | 0.000                       | 0.03            |       |                | 3.4           | OK     |                   |

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for Storm

Simulation Criteria

Areal Reduction Factor 1.000    Additional Flow - % of Total Flow 0.000  
Hot Start (mins) 0    MADD Factor \* 10m<sup>3</sup>/ha Storage 2.000  
Hot Start Level (mm) 0    Inlet Coefficient 0.800  
Manhole Headloss Coeff (Global) 0.500    Flow per Person per Day (l/per/day) 0.000  
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0    Number of Storage Structures 5  
Number of Online Controls 1    Number of Time/Area Diagrams 0  
Number of Offline Controls 0    Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH  
FEH Rainfall Version 2013  
Site Location GB 333706 186335 ST 33706 86335  
Data Type Point  
Cv (Summer) 1.000  
Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status OFF  
DVD Status ON  
Inertia Status ON

Profile(s) Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440  
Return Period(s) (years) 2, 30, 100  
Climate Change (%) 0, 0, 40

| PN    | US/MH Name | Storm      | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|-------|------------|------------|---------------|----------------|---------------------|-----------------|--------------------|---------------|-----------------|
| 1.000 | 1          | 480 Winter | 30            | +0%            | 100/120 Summer      |                 |                    |               | 5.820           |
| 1.001 | 2          | 480 Winter | 30            | +0%            | 100/30 Summer       |                 |                    |               | 5.820           |
| 1.002 | 3          | 480 Winter | 30            | +0%            | 100/30 Summer       |                 |                    |               | 5.820           |
| 1.003 | 4          | 480 Winter | 30            | +0%            | 100/15 Summer       |                 |                    |               | 5.820           |
| 1.004 | 5          | 480 Winter | 30            | +0%            | 30/240 Summer       |                 |                    |               | 5.816           |
| 1.005 | 6          | 480 Winter | 30            | +0%            | 30/120 Summer       |                 |                    |               | 5.815           |
| 1.006 | 7          | 480 Winter | 30            | +0%            | 30/120 Summer       |                 |                    |               | 5.814           |
| 1.007 | 8          | 480 Winter | 30            | +0%            | 30/60 Summer        |                 |                    |               | 5.813           |

| PN    | US/MH Name | Depth (m) | Surcharged Volume (m <sup>3</sup> ) | Flooded Flow / Cap. (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status | Level Exceeded |
|-------|------------|-----------|-------------------------------------|---------------------------|------------------------|-----------------|--------|----------------|
| 1.000 | 1          | -0.189    | 0.000                               | 0.01                      |                        | 1.6             | OK     |                |
| 1.001 | 2          | -0.149    | 0.000                               | 0.04                      | 275                    | 5.7             | OK     |                |

107 Cowbridge Road East  
Cardiff  
Wales, CF11 9AG



Date 22/10/2025 12:16  
File 2595-NETWORK.MDX

Designed by tony.owensredwood  
Checked by

Innovyze Network 2020.1.3

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)  
for Storm

| PN    | US/MH<br>Name | Surcharged   |                             | Flooded |          | Flow /<br>Cap. (l/s) | Half Drain<br>Time<br>(mins) | Pipe<br>Flow<br>(l/s) | Status     | Level<br>Exceeded |
|-------|---------------|--------------|-----------------------------|---------|----------|----------------------|------------------------------|-----------------------|------------|-------------------|
|       |               | Depth<br>(m) | Volume<br>(m <sup>3</sup> ) | Flow    | Overflow |                      |                              |                       |            |                   |
| 1.002 | 3             | -0.082       | 0.000                       | 0.03    |          |                      |                              | 5.5                   | OK         |                   |
| 1.003 | 4             | -0.015       | 0.000                       | 0.09    |          |                      |                              | 10.5                  | OK         |                   |
| 1.004 | 5             | 0.064        | 0.000                       | 0.10    |          |                      |                              | 13.3                  | SURCHARGED |                   |
| 1.005 | 6             | 0.120        | 0.000                       | 0.14    |          |                      |                              | 12.5                  | SURCHARGED |                   |
| 1.006 | 7             | 0.148        | 0.000                       | 0.12    |          |                      | 540                          | 13.3                  | SURCHARGED |                   |
| 1.007 | 8             | 0.190        | 0.000                       | 0.03    |          |                      |                              | 3.4                   | SURCHARGED |                   |

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

|                                 |       |  |       |
|---------------------------------|-------|--|-------|
| Areal Reduction Factor          | 1.000 | Additional Flow - % of Total Flow          | 0.000 |
| Hot Start (mins)                | 0     | MADD Factor * 10m <sup>3</sup> /ha Storage | 2.000 |
| Hot Start Level (mm)            | 0     | Inlet Coefficient                          | 0.800 |
| Manhole Headloss Coeff (Global) | 0.500 | Flow per Person per Day (l/per/day)        | 0.000 |
| Foul Sewage per hectare (l/s)   | 0.000 |  |       |


|                             |   |                              |   |
|-----------------------------|---|------------------------------|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 5 |
| Number of Online Controls   | 1 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls  | 0 | Number of Real Time Controls | 0 |

Synthetic Rainfall Details

|                                    |   |
|------------------------------------|---|
| Rainfall Model                     | FEH                                       |
| FEH Rainfall Version               | 2013                                      |
| Site Location                      | GB 333706 186335 ST 33706 86335           |
| Data Type                          | Point                                     |
| Cv (Summer)                        | 1.000                                     |
| Cv (Winter)                        | 1.000                                     |
| Margin for Flood Risk Warning (mm) | 300.0                                     |
| Analysis Timestep                  | 2.5 Second Increment (Extended)           |
| DTS Status                         | OFF                                       |
| DVD Status                         | ON  |
| Inertia Status                     | ON  |
| Profile(s)                         | Summer and Winter                         |
| Duration(s) (mins)                 | 15, 30, 60, 120, 240, 360, 480, 960, 1440 |
| Return Period(s) (years)           | 2, 30, 100                                |
| Climate Change (%)                 | 0, 0, 40                                  |

| PN    | US/MH Name | Storm      | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|-------|------------|------------|---------------|----------------|---------------------|-----------------|--------------------|---------------|-----------------|
| 1.000 | 1          | 480 Winter | 100           | +40%           | 100/120 Summer      |                 |                    |               | 6.300           |
| 1.001 | 2          | 480 Winter | 100           | +40%           | 100/30 Summer       |                 |                    |               | 6.300           |
| 1.002 | 3          | 480 Winter | 100           | +40%           | 100/30 Summer       |                 |                    |               | 6.300           |
| 1.003 | 4          | 480 Winter | 100           | +40%           | 100/15 Summer       |                 |                    |               | 6.300           |
| 1.004 | 5          | 480 Winter | 100           | +40%           | 30/240 Summer       |                 |                    |               | 6.299           |
| 1.005 | 6          | 480 Winter | 100           | +40%           | 30/120 Summer       |                 |                    |               | 6.297           |
| 1.006 | 7          | 480 Winter | 100           | +40%           | 30/120 Summer       |                 |                    |               | 6.296           |
| 1.007 | 8          | 480 Winter | 100           | +40%           | 30/60 Summer        |                 |                    |               | 6.295           |

| PN    | US/MH Name | Depth (m) | Surcharged Volume (m <sup>3</sup> ) | Flooded Flow / Cap. (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status     | Pipe Level Exceeded |
|-------|------------|-----------|-------------------------------------|---------------------------|------------------------|-----------------|------------|---------------------|
| 1.000 | 1          | 0.291     | 0.000                               | 0.03                      |                        | 2.8             | FLOOD RISK |                     |
| 1.001 | 2          | 0.331     | 0.000                               | 0.07                      | 852                    | 9.7             | SURCHARGED |                     |

|   |   |   |
|---|---|---|
| PHG Consulting Engineers                              |   | Page 14   |
| 107 Cowbridge Road East<br>Cardiff<br>Wales, CF11 9AG |   |  |
| Date 22/10/2025 12:16<br>File 2595-NETWORK.MDX        | Designed by tony.owensredwood<br>Checked by |   |
| Innovyze  | Network 2020.1.3                            |   |

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH<br>Name | Surcharged Flooded |                             | Flow / Overflow |       | Half Drain     | Pipe          | Status     | Level<br>Exceeded |
|-------|---------------|--------------------|-----------------------------|-----------------|-------|----------------|---------------|------------|-------------------|
|       |               | Depth<br>(m)       | Volume<br>(m <sup>3</sup> ) | Cap.            | (l/s) | Time<br>(mins) | Flow<br>(l/s) |            |                   |
| 1.002 | 3             | 0.398              | 0.000                       | 0.06            |       |                | 9.3           | SURCHARGED |                   |
| 1.003 | 4             | 0.465              | 0.000                       | 0.17            |       |                | 19.0          | SURCHARGED |                   |
| 1.004 | 5             | 0.547              | 0.000                       | 0.21            |       |                | 27.1          | SURCHARGED |                   |
| 1.005 | 6             | 0.602              | 0.000                       | 0.29            |       |                | 26.8          | SURCHARGED |                   |
| 1.006 | 7             | 0.630              | 0.000                       | 0.21            |       | 1122           | 23.7          | SURCHARGED |                   |
| 1.007 | 8             | 0.672              | 0.000                       | 0.03            |       |                | 3.4           | FLOOD RISK |                   |