

|                                                                            |                              |                                                                                     |
|----------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------|
| Banners Gate Ltd                                                           |                              | Page 0                                                                              |
| Cavendish House<br>10-11 Birmingham Street<br>Halesowen W Midlands B63 3HN | Littlehampton                |  |
| Date 17/08/2019<br>File                                                    | Designed by TB<br>Checked by |                                                                                     |
| XP Solutions Network 2018.1.1                                              |                              |                                                                                     |

  

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for NETWORK 1 19.08.20.SWS

Pipe Sizes NETWORK 2 19.08.17 Manhole Sizes NETWORK 2 19.08.17

|                                      |                  |
|--------------------------------------|------------------|
| FEH Rainfall Model                   |                  |
| Return Period (years)                | 2                |
| FEH Rainfall Version                 | 2013             |
| Site Location                        | GB 503220 103890 |
| Data Type                            | Point            |
| 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)          | 0.000            |
| Mn Design Depth for Optimisation (m) | 1.200            |
| Mn Vel for Auto Design only (m/s)    | 0.75             |
| Mn Slope for Optimisation (1:X)      | 500              |

Designed with Level Soffits

Time Area Diagram for NETWORK 1 19.08.20.SWS

| Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|-------------|-----------|-------------|-----------|-------------|-----------|
| 0-4         | 0.169     | 4-8         | 0.203     | 8-12        | 0.015     |

Total Area Contributing (ha) = 0.388

Total Pipe Volume (mE) = 9.634

  

Network Design Table for NETWORK 1 19.08.20.SWS

Y - Indicates pipe capacity < flow

| 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                                                                           |
|--------|------------|----------|-------------|--------------|--------------|-----------------|--------|----------|----------|--------------|---------------------------------------------------------------------------------------|
| S1.000 | 30.491     | 0.182    | 167.5       | 0.100        | 6.00         | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |  |

Network Results Table

| PN     | Rain (mm/hr) | T. C. (mins) | US/IL (m) | √ I. Area (ha) | √ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|--------|--------------|--------------|-----------|----------------|-------------------|------------|----------------|-----------|-----------|------------|
| S1.000 | 50.00        | 6.66         | 5.911     | 0.100          | 0.0               | 0.0        | 0.0            | 0.77      | 13.7      | 13.5       |

ø1982- 2018 Innovyze

|                                                                             |                 |                 |                |                   |                      |                    |                   |              |              |                                                                                     |                                                                                     |
|-----------------------------------------------------------------------------|-----------------|-----------------|----------------|-------------------|----------------------|--------------------|-------------------|--------------|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Banners Gate Ltd                                                            |                 |                 |                |                   |                      |                    |                   |              |              | Page 1                                                                              |                                                                                     |
| Cavendish House<br>10- 11 Birmingham Street<br>Halesowen W Midlands B63 3HN |                 |                 |                |                   |                      | Littlehampton      |                   |              |              |  |                                                                                     |
| Date 17/08/2019                                                             |                 |                 |                |                   |                      | Designed by TB     |                   |              |              |                                                                                     |                                                                                     |
| File                                                                        |                 |                 |                |                   |                      | Checked by         |                   |              |              |                                                                                     |                                                                                     |
| XP Solutions                                                                |                 |                 |                |                   |                      | Network 2018.1.1   |                   |              |              |                                                                                     |                                                                                     |
| <u>Network Design Table for NETWORK 1 19.08.20.SW5</u>                      |                 |                 |                |                   |                      |                    |                   |              |              |                                                                                     |                                                                                     |
| 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                                                                      |
| S1.001                                                                      | 25.593          | 0.153           | 167.3          | 0.080             | 0.00                 | 0.0                | 0.600             | o            | 225          | Pi pe/Conduit                                                                       |  |
| S1.002                                                                      | 26.383          | 0.111           | 237.7          | 0.000             | 0.00                 | 0.0                | 0.600             | o            | 300          | Pi pe/Conduit                                                                       |  |
| S2.000                                                                      | 28.200          | 0.396           | 71.2           | 0.045             | 6.00                 | 0.0                | 0.600             | o            | 225          | Pi pe/Conduit                                                                       |  |
| S1.003                                                                      | 20.356          | 0.086           | 236.7          | 0.092             | 0.00                 | 0.0                | 0.600             | o            | 300          | Pi pe/Conduit                                                                       |  |
| S3.000                                                                      | 28.334          | 0.899           | 31.5           | 0.045             | 6.00                 | 0.0                | 0.600             | o            | 150          | Pi pe/Conduit                                                                       |  |
| S1.004                                                                      | 9.685           | 0.041           | 236.2          | 0.026             | 0.00                 | 0.0                | 0.600             | o            | 300          | Pi pe/Conduit                                                                       |  |
| S1.005                                                                      | 14.897          | 0.063           | 236.5          | 0.000             | 0.00                 | 0.0                | 0.600             | o            | 300          | Pi pe/Conduit                                                                       |  |
| S1.006                                                                      | 14.897          | 0.063           | 236.5          | 0.000             | 0.00                 | 0.0                | 0.600             | o            | 300          | Pi pe/Conduit                                                                       |  |
| S1.007                                                                      | 20.432          | 0.136           | 150.2          | 0.000             | 0.00                 | 0.0                | 0.600             | o            | 150          | Pi pe/Conduit                                                                       |  |
| <u>Network Results Table</u>                                                |                 |                 |                |                   |                      |                    |                   |              |              |                                                                                     |                                                                                     |
| PN                                                                          | Rain<br>(mm/hr) | T. C.<br>(mins) | US/IL<br>(m)   | √ I. Area<br>(ha) | √ 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)                                                                       |                                                                                     |
| S1.001                                                                      | 50.00           | 7.08            | 5.730          | 0.180             | 0.0                  | 0.0                | 0.0               | 1.01         | 40.1         | 24.4                                                                                |                                                                                     |
| S1.002                                                                      | 50.00           | 7.51            | 5.500          | 0.180             | 0.0                  | 0.0                | 0.0               | 1.02         | 71.8         | 24.4                                                                                |                                                                                     |
| S2.000                                                                      | 50.00           | 6.30            | 5.643          | 0.045             | 0.0                  | 0.0                | 0.0               | 1.55         | 61.7         | 6.1                                                                                 |                                                                                     |
| S1.003                                                                      | 50.00           | 7.85            | 5.389          | 0.317             | 0.0                  | 0.0                | 0.0               | 1.02         | 71.9         | 42.9                                                                                |                                                                                     |
| S3.000                                                                      | 50.00           | 6.26            | 6.352          | 0.045             | 0.0                  | 0.0                | 0.0               | 1.80         | 31.8         | 6.1                                                                                 |                                                                                     |
| S1.004                                                                      | 50.00           | 8.00            | 5.303          | 0.388             | 0.0                  | 0.0                | 0.0               | 1.02         | 72.0         | 52.5                                                                                |                                                                                     |
| S1.005                                                                      | 50.00           | 8.25            | 5.262          | 0.388             | 0.0                  | 0.0                | 0.0               | 1.02         | 72.0         | 52.5                                                                                |                                                                                     |
| S1.006                                                                      | 50.00           | 8.49            | 5.199          | 0.388             | 0.0                  | 0.0                | 0.0               | 1.02         | 72.0         | 52.5                                                                                |                                                                                     |
| S1.007                                                                      | 50.00           | 8.91            | 5.136          | 0.388             | 0.0                  | 0.0                | 0.0               | 0.82         | 14.4         | 52.5                                                                                |                                                                                     |
| ©1982- 2018 Innovyze                                                        |                 |                 |                |                   |                      |                    |                   |              |              |                                                                                     |                                                                                     |

|                                                                            |  |                                                                                                      |
|----------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------|
| Banners Gate Ltd                                                           |  | Page 2                                                                                               |
| Cavendish House<br>10-11 Birmingham Street<br>Halesowen W Midlands B63 3HN |  | Littlehampton<br> |
| Date 17/08/2019<br>File                                                    |  | Designed by TB<br>Checked by                                                                         |
| XP Solutions                                                               |  | Network 2018.1.1                                                                                     |

  

Area Summary for NETWORK 1 19.08.20.SW5

| Pipe Number | PI MP Type | PI MP Name | PI MP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) |
|-------------|------------|------------|-----------|-----------------|----------------|-----------------|
| 1.000       | -          | -          | 100       | 0.100           | 0.100          | 0.100           |
| 1.001       | -          | -          | 100       | 0.080           | 0.080          | 0.080           |
| 1.002       | -          | -          | 100       | 0.000           | 0.000          | 0.000           |
| 2.000       | -          | -          | 100       | 0.045           | 0.045          | 0.045           |
| 1.003       | -          | -          | 100       | 0.092           | 0.092          | 0.092           |
| 3.000       | -          | -          | 100       | 0.045           | 0.045          | 0.045           |
| 1.004       | -          | -          | 100       | 0.026           | 0.026          | 0.026           |
| 1.005       | -          | -          | 100       | 0.000           | 0.000          | 0.000           |
| 1.006       | -          | -          | 100       | 0.000           | 0.000          | 0.000           |
| 1.007       | -          | -          | 100       | 0.000           | 0.000          | 0.000           |
|             |            |            |           | Total           | Total          | Total           |
|             |            |            |           | 0.388           | 0.388          | 0.388           |

  

Free Flowing Outfall Details for NETWORK 1 19.08.20.SW5

| Outfall Pipe Number | Outfall Name | C. Level (m) | I. Level (m) | M n I. Level (m) | D, L (mm) | W (mm) |
|---------------------|--------------|--------------|--------------|------------------|-----------|--------|
| S1.007              | S16          | 7.137        | 5.000        | 0.000            | 0         | 0      |

  

Simulation Criteria for NETWORK 1 19.08.20.SW5

|                                 |       |                                     |       |
|---------------------------------|-------|-------------------------------------|-------|
| Volumetric Runoff Coeff         | 0.750 | Additional Flow - % of Total Flow   | 0.000 |
| Areal Reduction Factor          | 1.000 | MADD Factor * 10mE/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 | 1 |
| 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              | Summer Storms         | Yes   |
| Return Period (years) | 2                | Winter Storms         | Yes   |
| FEH Rainfall Version  | 2013             | Cv (Summer)           | 0.750 |
| Site Location         | GB 503220 103890 | Cv (Winter)           | 0.840 |
| Data Type             | Point            | Storm Duration (mins) | 30    |

  

©1982- 2018 Innovyze

|                                                                            |                  |                                                                                     |
|----------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------|
| Banners Gate Ltd                                                           |                  | Page 3                                                                              |
| Cavendish House<br>10-11 Birmingham Street<br>Halesowen W Midlands B63 3HN | Littlehampton    |  |
| Date 17/08/2019                                                            | Designed by TB   |                                                                                     |
| File                                                                       | Checked by       |                                                                                     |
| XP Solutions                                                               | Network 2018.1.1 |                                                                                     |

### Online Controls for NETWORK 1 19.08.20.SWS

Hydro-Brake÷ Optimum Manhole: SHB1, DS/PN: S1.007, Volume (mE): 4.1

|                                   |                            |
|-----------------------------------|----------------------------|
| Unit Reference                    | MD-SHE-0094-5000-1764-5000 |
| Design Head (m)                   | 1.764                      |
| Design Flow (l/s)                 | 5.0                        |
| Flush-Flow                        | Calculated                 |
| Objective                         | Minimise upstream storage  |
| Application                       | Surface                    |
| Surp Available                    | Yes                        |
| Diameter (mm)                     | 94                         |
| Invert Level (m)                  | 5.136                      |
| Minimum Outlet Pipe Diameter (mm) | 150                        |
| Suggested Manhole Diameter (mm)   | 1200                       |

| Control Points            | Head (m) | Flow (l/s) |
|---------------------------|----------|------------|
| Design Point (Calculated) | 1.764    | 5.0        |
| Flush-Flow                | 0.416    | 4.4        |
| Kick-Flow                 | 0.844    | 3.6        |
| Mean Flow over Head Range | -        | 4.1        |

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     | 3.0        | 1.200     | 4.2        | 3.000     | 6.4        | 7.000     | 9.6        |
| 0.200     | 4.1        | 1.400     | 4.5        | 3.500     | 6.9        | 7.500     | 9.9        |
| 0.300     | 4.3        | 1.600     | 4.8        | 4.000     | 7.3        | 8.000     | 10.2       |
| 0.400     | 4.4        | 1.800     | 5.0        | 4.500     | 7.7        | 8.500     | 10.5       |
| 0.500     | 4.4        | 2.000     | 5.3        | 5.000     | 8.1        | 9.000     | 10.8       |
| 0.600     | 4.3        | 2.200     | 5.5        | 5.500     | 8.5        | 9.500     | 11.0       |
| 0.800     | 3.8        | 2.400     | 5.8        | 6.000     | 8.9        |           |            |
| 1.000     | 3.8        | 2.600     | 6.0        | 6.500     | 9.2        |           |            |

|                                                                            |                              |                                                                                     |
|----------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------|
| Banners Gate Ltd                                                           |                              | Page 4                                                                              |
| Cavendish House<br>10-11 Birmingham Street<br>Halesowen W Midlands B63 3HN | Littlehampton                |  |
| Date 17/08/2019<br>File                                                    | Designed by TB<br>Checked by |                                                                                     |
| XP Solutions Network 2018.1.1                                              |                              |                                                                                     |

Storage Structures for NETWORK 1 19.08.20.SWS

Cellular Storage Manhole: SCS1, DS/PN: S1.006

Invert Level (m) 5.199 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     | 170.0                  | 170.0                       | 1.201     | 0.0                    | 232.6                       |
| 1.200     | 170.0                  | 232.6                       |           |                        |                             |

ø1982- 2018 Innovye

| Banners Gate Ltd                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                 |                      | Page 5                       |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|----------------------|------------------------------|------------------|-----------------|--------------------|---------------|----------------|-----------------|----------------------|---------------------|------------------|-----------------|--------------------|---------------|----------------|--------|-----------|-------|-------|---------------|---------------|------|--|--------|----|-----------|-----|-------|---------------|-------|------|------|--------|------------|-----------|-----|------|---------------|--|--|--|--------|----|-----------|-----|------|---------------|---------------|--|--|--------|-----|-----------|-----|------|---------------|--|--|--|--------|-----|-----------|-----|------|---------------|--|--|--|--------|-----|------------|-----|------|---------------|--|--|--|--------|------|------------|-----|------|---------------|--|--|--|--------|------|------------|-----|------|---------------|--|--|--|--------|------|------------|-----|------|---------------|--|--|--|
| Cavendish House<br>10-11 Birmingham Street<br>Halesowen W Midlands B63 3HN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |                 |                      | Littlehampton                |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| Date 17/08/2019<br>File                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                 |                      | Designed by TB<br>Checked by |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| XP Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                 |                      | Network 2018.1.1             |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| <div>Summary of Critical Results by Maximum Level (Rank 1) for NETWORK 1<br/>19.08.20.SW5</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |                 |                      |                              |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| <div>Simulation Criteria</div> <div>Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000<br/>Hot Start (mins) 0 MADD Factor * 10mE/ha Storage 2.000<br/>Hot Start Level (mm) 0 Inlet Coefficient 0.800<br/>Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000<br/>Foul Sewage per hectare (l/s) 0.000</div> <div>Number of Input Hydrographs 0 Number of Storage Structures 1<br/>Number of Online Controls 1 Number of Time/Area Diagrams 0<br/>Number of Offline Controls 0 Number of Real Time Controls 0</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |                 |                      |                              |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| <div>Synthetic Rainfall Details</div> <div>Rainfall Model FEH Data Type Point<br/>FEH Rainfall Version 2013 Cv (Summer) 0.750<br/>Site Location GB 503220 103890 Cv (Winter) 0.840</div> <div>Margin for Flood Risk Warning (mm) 300.0<br/>Analysis Timestep 2.5 Second Increment (Extended)<br/>DTS Status OFF<br/>DVD Status ON<br/>Inertia Status ON</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |                 |                      |                              |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| <div>Profile(s) Summer and Winter<br/>Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440<br/>Return Period(s) (years) 100<br/>Climate Change (%) 40</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |                 |                      |                              |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| <table><tr><th>PN</th><th>US/MH Name</th><th>Storm</th><th>Return Period</th><th>Climate Change</th><th>First (X) Surge</th><th>First (Y) Flood</th><th>First (Z) Overflow</th><th>Overflow Act.</th></tr><tr><td>S1.000</td><td>S2</td><td>15 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td>100/15 Summer</td><td></td><td></td></tr><tr><td>S1.001</td><td>S4</td><td>15 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td></tr><tr><td>S1.002</td><td>S6</td><td>15 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td></tr><tr><td>S2.000</td><td>S8</td><td>15 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td>100/15 W nter</td><td></td><td></td></tr><tr><td>S1.003</td><td>S10</td><td>15 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td></tr><tr><td>S3.000</td><td>S12</td><td>15 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td></tr><tr><td>S1.004</td><td>S14</td><td>240 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td></tr><tr><td>S1.005</td><td>SCP1</td><td>240 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td></tr><tr><td>S1.006</td><td>SCS1</td><td>240 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td></tr><tr><td>S1.007</td><td>SHB1</td><td>240 W nter</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td></tr></table> |            |                 |                      |                              |                  |                 |                    | PN            | US/MH Name     | Storm           | Return Period        | Climate Change      | First (X) Surge  | First (Y) Flood | First (Z) Overflow | Overflow Act. | S1.000         | S2     | 15 W nter | 100   | +40%  | 100/15 Summer | 100/15 Summer |      |  | S1.001 | S4 | 15 W nter | 100 | +40%  | 100/15 Summer |       |      |      | S1.002 | S6         | 15 W nter | 100 | +40% | 100/15 Summer |  |  |  | S2.000 | S8 | 15 W nter | 100 | +40% | 100/15 Summer | 100/15 W nter |  |  | S1.003 | S10 | 15 W nter | 100 | +40% | 100/15 Summer |  |  |  | S3.000 | S12 | 15 W nter | 100 | +40% | 100/15 Summer |  |  |  | S1.004 | S14 | 240 W nter | 100 | +40% | 100/15 Summer |  |  |  | S1.005 | SCP1 | 240 W nter | 100 | +40% | 100/15 Summer |  |  |  | S1.006 | SCS1 | 240 W nter | 100 | +40% | 100/15 Summer |  |  |  | S1.007 | SHB1 | 240 W nter | 100 | +40% | 100/15 Summer |  |  |  |
| PN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | US/MH Name | Storm           | Return Period        | Climate Change               | First (X) Surge  | First (Y) Flood | First (Z) Overflow | Overflow Act. |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S2         | 15 W nter       | 100                  | +40%                         | 100/15 Summer    | 100/15 Summer   |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S4         | 15 W nter       | 100                  | +40%                         | 100/15 Summer    |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S6         | 15 W nter       | 100                  | +40%                         | 100/15 Summer    |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S2.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S8         | 15 W nter       | 100                  | +40%                         | 100/15 Summer    | 100/15 W nter   |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S10        | 15 W nter       | 100                  | +40%                         | 100/15 Summer    |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S3.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S12        | 15 W nter       | 100                  | +40%                         | 100/15 Summer    |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.004                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S14        | 240 W nter      | 100                  | +40%                         | 100/15 Summer    |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SCP1       | 240 W nter      | 100                  | +40%                         | 100/15 Summer    |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.006                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SCS1       | 240 W nter      | 100                  | +40%                         | 100/15 Summer    |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.007                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SHB1       | 240 W nter      | 100                  | +40%                         | 100/15 Summer    |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| <table><tr><th>PN</th><th>US/MH Name</th><th>Water Level (m)</th><th>Surcharged Depth (m)</th><th>Flooded Volume (mE)</th><th>Pipe Flow / Cap.</th><th>Overflow (l/s)</th><th>Pipe Flow (l/s)</th><th>Status</th><th>Level Exceeded</th></tr><tr><td>S1.000</td><td>S2</td><td>7.443</td><td>1.382</td><td>11.856</td><td>2.66</td><td>34.8</td><td></td><td>FLOOD</td><td>6</td></tr><tr><td>S1.001</td><td>S4</td><td>7.332</td><td>1.377</td><td>0.000</td><td>1.76</td><td>65.3</td><td></td><td>SURCHARGED</td><td></td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |                 |                      |                              |                  |                 |                    | PN            | US/MH Name     | Water Level (m) | Surcharged Depth (m) | Flooded Volume (mE) | Pipe Flow / Cap. | Overflow (l/s)  | Pipe Flow (l/s)    | Status        | Level Exceeded | S1.000 | S2        | 7.443 | 1.382 | 11.856        | 2.66          | 34.8 |  | FLOOD  | 6  | S1.001    | S4  | 7.332 | 1.377         | 0.000 | 1.76 | 65.3 |        | SURCHARGED |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| PN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | US/MH Name | Water Level (m) | Surcharged Depth (m) | Flooded Volume (mE)          | Pipe Flow / Cap. | Overflow (l/s)  | Pipe Flow (l/s)    | Status        | Level Exceeded |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S2         | 7.443           | 1.382                | 11.856                       | 2.66             | 34.8            |                    | FLOOD         | 6              |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| S1.001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | S4         | 7.332           | 1.377                | 0.000                        | 1.76             | 65.3            |                    | SURCHARGED    |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |
| ø1982- 2018 Innovyze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |                 |                      |                              |                  |                 |                    |               |                |                 |                      |                     |                  |                 |                    |               |                |        |           |       |       |               |               |      |  |        |    |           |     |       |               |       |      |      |        |            |           |     |      |               |  |  |  |        |    |           |     |      |               |               |  |  |        |     |           |     |      |               |  |  |  |        |     |           |     |      |               |  |  |  |        |     |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |        |      |            |     |      |               |  |  |  |

|                                                                                                   |            |                 |                      |                     |             |                |                                                                                     |            |                |
|---------------------------------------------------------------------------------------------------|------------|-----------------|----------------------|---------------------|-------------|----------------|-------------------------------------------------------------------------------------|------------|----------------|
| Banners Gate Ltd                                                                                  |            |                 |                      |                     |             |                | Page 6                                                                              |            |                |
| Cavendish House<br>10-11 Birmingham Street<br>Halesowen W Midlands B63 3HN                        |            |                 |                      | Littlehampton       |             |                |  |            |                |
| Date 17/08/2019                                                                                   |            |                 |                      | Designed by TB      |             |                |                                                                                     |            |                |
| File                                                                                              |            |                 |                      | Checked by          |             |                |                                                                                     |            |                |
| XP Solutions                                                                                      |            |                 |                      | Network 2018.1.1    |             |                |                                                                                     |            |                |
| <u>Summary of Critical Results by Maximum Level (Rank 1) for NETWORK 1</u><br><u>19.08.20.SW5</u> |            |                 |                      |                     |             |                |                                                                                     |            |                |
| PN                                                                                                | US/MH Name | Water Level (m) | Surcharged Depth (m) | Flooded Volume (mE) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s)                                                                     | Status     | Level Exceeded |
| S1.002                                                                                            | S6         | 6.944           | 1.144                | 0.000               | 0.95        |                | 61.5                                                                                | SURCHARGED | 1              |
| S2.000                                                                                            | S8         | 6.865           | 0.997                | 0.480               | 0.57        |                | 32.5                                                                                | FLOOD      |                |
| S1.003                                                                                            | S10        | 6.844           | 1.155                | 0.000               | 2.10        |                | 132.0                                                                               | SURCHARGED |                |
| S3.000                                                                                            | S12        | 7.007           | 0.505                | 0.000               | 0.82        |                | 24.9                                                                                | SURCHARGED |                |
| S1.004                                                                                            | S14        | 6.822           | 1.219                | 0.000               | 0.80        |                | 44.9                                                                                | SURCHARGED |                |
| S1.005                                                                                            | SCP1       | 6.819           | 1.257                | 0.000               | 0.74        |                | 44.5                                                                                | SURCHARGED |                |
| S1.006                                                                                            | SCS1       | 6.814           | 1.315                | 0.000               | 0.16        |                | 9.8                                                                                 | SURCHARGED |                |
| S1.007                                                                                            | SHB1       | 6.810           | 1.524                | 0.000               | 0.36        |                | 4.9                                                                                 | SURCHARGED |                |
| ø1982- 2018 Innovyze                                                                              |            |                 |                      |                     |             |                |                                                                                     |            |                |