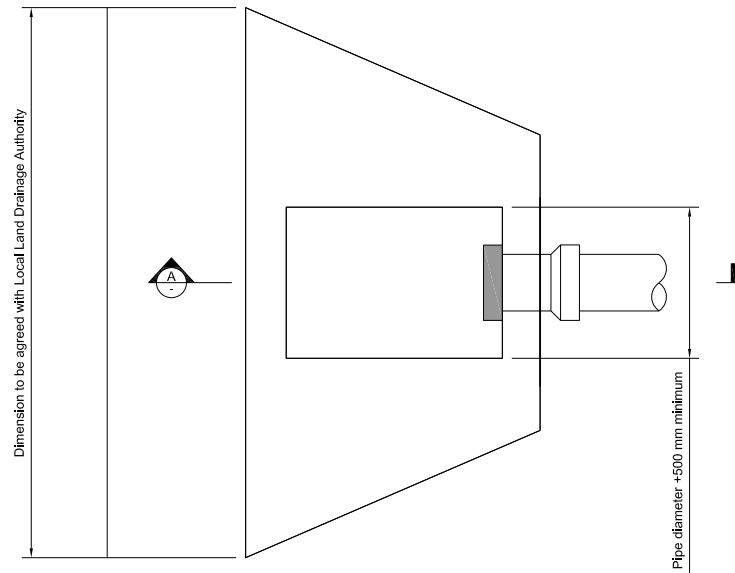
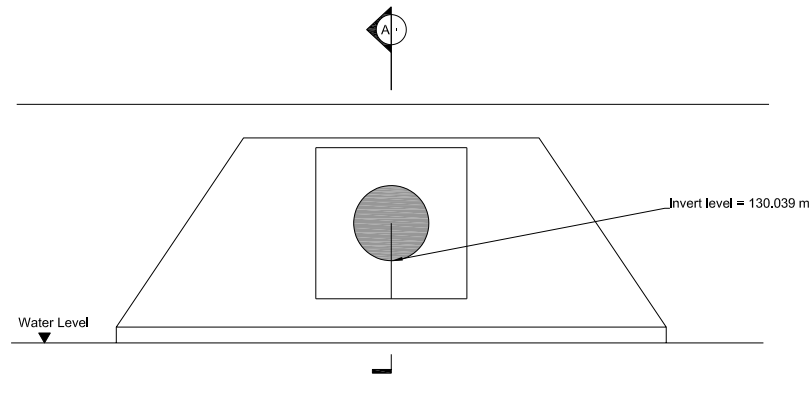


Section A-A



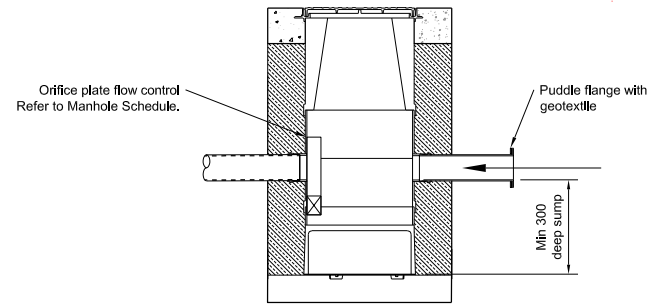
Plan



Front Elevation

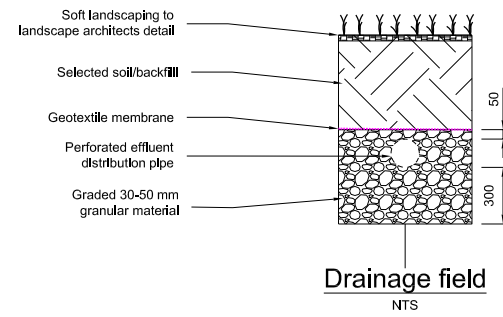
Typical Detail of Outfall Detention Basin

NTS



Typical Flow Control and Catchpit Inspection Chamber Detail

Scale 1:20



Notes

1. For drainage general notes and below ground drainage manhole schedule refer to J4053-C-DR-0102.
2. Do not scale the drawing.
3. This drawing to be read in conjunction with all other Architects and Engineers drawings and specifications including outline structural specification.
4. All dimensions are in millimetres unless noted otherwise.
5. Any discrepancies between structural and architectural setting out dimensions must be brought to the attention of the Architect and Engineers.

| Rev | Date     | Description      | Dm | App |
|-----|----------|------------------|----|-----|
| 01  | 24.08.20 | Stage 4 Re-Issue | GB | GPD |
| 00  | 21.07.20 | Stage 4 Issue    | GB | GPD |

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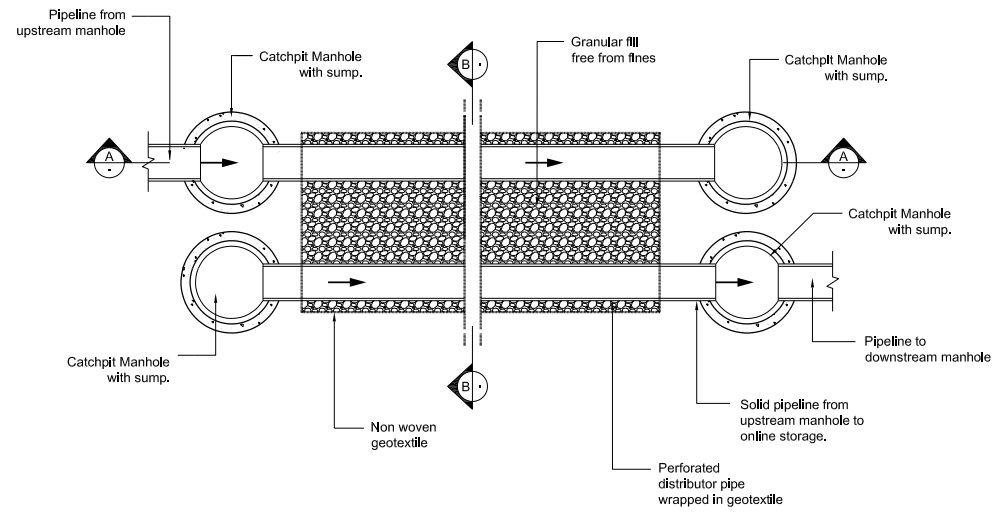
Project  
**Hemel Hempstead Crematorium**

Drawing Title  
**Below Ground Drainage Details Sheet 3**

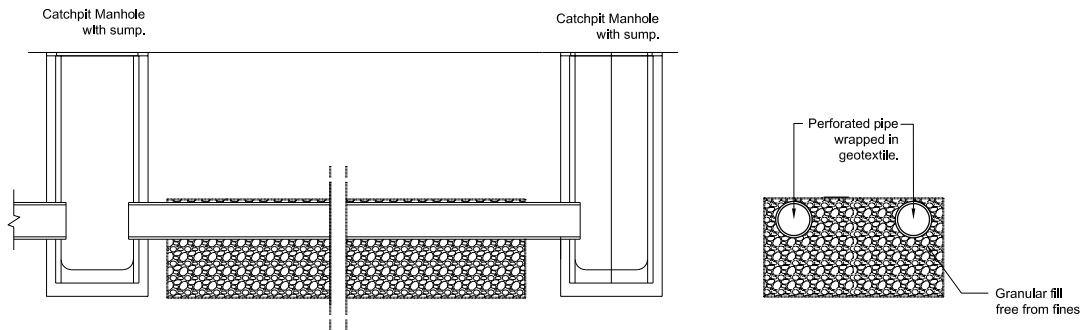
Drawing Status  
**Technical Design**

| Drawn by | Checked by | Sheet size | Scale    | Rev status |
|----------|------------|------------|----------|------------|
| GB       | GPD        | A1         | As Shown | S4         |

| Drawing Number  | Revision |
|-----------------|----------|
| J4053-C-DE-0403 | 01       |



Sectional Plan



Section A-A

Section B-B

Alternative Treatment Stage

NTS

Notes

1. For drainage general notes and below ground drainage manhole schedule refer to J4053-C-DR-0102.
2. Do not scale the drawing.
3. This drawing to be read in conjunction with all other Architects and Engineers drawings and specifications including outline structural specification.
4. All dimensions are in millimetres unless noted otherwise.
5. Any discrepancies between structural and architectural setting out dimensions must be brought to the attention of the Architect and Engineers.

| Rev | Date     | Description   | Dm  | App |
|-----|----------|---------------|-----|-----|
| 00  | 24.08.20 | Stage 4 Issue | GPD | GPD |

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Project  
**Hemel Hempstead Crematorium**

Drawing Title  
**Below Ground Drainage Details Sheet 4**

Drawing Status  
**Technical Design**

| Drawn by | Checked by | Sheet size | Scale | Rev status |
|----------|------------|------------|-------|------------|
| AM       | GPD        | A1         | NTS   | S4         |

| Drawing Number  | Revision |
|-----------------|----------|
| J4053-C-DE-0404 | 00       |

**APPENDIX E – GREENFIELD RUNOFF CALCULATIONS**

Calculated by:

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

Latitude:

Longitude:

Reference:

Date:

## Runoff estimation approach

## Site characteristics

Total site area (ha):

## Methodology

$Q_{BAR}$  estimation method:

SPR estimation method:

## Soil characteristics

|              | Default | Edited |
|--------------|---------|--------|
| SOIL type:   | 1       | 4      |
| HOST class:  | N/A     | N/A    |
| SPR/SPRHOST: | 0.1     | 0.47   |

## Hydrological characteristics

|                                | Default | Edited |
|--------------------------------|---------|--------|
| SAAR (mm):                     | 699     | 699    |
| Hydrological region:           | 6       | 6      |
| Growth curve factor 1 year:    | 0.85    | 0.85   |
| Growth curve factor 30 years:  | 2.3     | 2.3    |
| Growth curve factor 100 years: | 3.19    | 3.19   |
| Growth curve factor 200 years: | 3.74    | 3.74   |

## Notes

### (1) Is $Q_{BAR} < 2.0$ l/s/ha?

When  $Q_{BAR}$  is  $< 2.0$  l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates $< 5.0$ l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

### (3) Is $SPR/SPRHOST \leq 0.3$ ?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

|                       | Default | Edited |
|-----------------------|---------|--------|
| $Q_{BAR}$ (l/s):      | 0.92    | 26.31  |
| 1 in 1 year (l/s):    | 0.78    | 22.36  |
| 1 in 30 years (l/s):  | 2.11    | 60.5   |
| 1 in 100 year (l/s):  | 2.92    | 83.92  |
| 1 in 200 years (l/s): | 3.42    | 98.39  |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

**APPENDIX F – MICRODRAINAGE CALCULATIONS AND RESULTS**

48-50 Scrutton Street  
 London  
 EC2A 4HH

Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



Date 03/03/2021  
 File microdrainage model.MDX

Designed by GB/GP-D  
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Network 2020.1

Existing Network Details for Existing

| 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 |
|-------|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|
| 5.000 | 11.616     | 0.078    | 148.9       | 0.013       | 45.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 5.001 | 40.368     | 0.718    | 56.3        | 0.041       | 45.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 6.000 | 11.125     | 0.122    | 91.2        | 0.017       | 45.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 7.000 | 8.827      | 0.031    | 284.7       | 0.027       | 45.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 8.000 | 17.149     | 0.086    | 199.4       | 0.029       | 45.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 8.001 | 15.414     | 0.095    | 162.3       | 0.000       | 0.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 7.001 | 10.478     | 0.042    | 249.5       | 0.000       | 0.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 7.002 | 39.483     | 0.689    | 57.3        | 0.016       | 45.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 9.000 | 10.908     | 0.072    | 151.5       | 0.006       | 45.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |

Network Results Table

| PN    | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Vel (m/s) | Cap (l/s) |
|-------|-----------|---------------|-------------------|-----------|-----------|
| 5.000 | 134.400   | 0.013         | 0.0               | 0.63      | 4.9       |
| 5.001 | 134.322   | 0.054         | 0.0               | 1.03      | 8.1       |
| 6.000 | 133.650   | 0.017         | 0.0               | 1.05      | 18.6      |
| 7.000 | 134.590   | 0.027         | 0.0               | 0.59      | 10.4      |
| 8.000 | 134.640   | 0.029         | 0.0               | 0.71      | 12.5      |
| 8.001 | 134.654   | 0.029         | 0.0               | 0.79      | 13.9      |
| 7.001 | 134.559   | 0.056         | 0.0               | 0.63      | 11.2      |
| 7.002 | 134.517   | 0.072         | 0.0               | 1.33      | 23.5      |
| 9.000 | 133.900   | 0.006         | 0.0               | 0.81      | 14.4      |

48-50 Scrutton Street  
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Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



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Network 2020.1

Existing Network Details for Existing

| 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 |
|--------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------------|-------------|--------------|
| 7.003  | 10.038        | 0.300       | 33.5           | 0.000          | 5.00           | 0.0                | 0.600     | o           | 150         | Pipe/Conduit |
| 5.002  | 25.831        | 0.517       | 50.0           | 0.004          | 0.00           | 0.0                | 0.600     | o           | 150         | Pipe/Conduit |
| 10.000 | 3.539         | 0.250       | 14.2           | 0.009          | 5.00           | 0.0                | 0.600     | o           | 150         | Pipe/Conduit |
| 10.001 | 11.819        | 0.079       | 149.6          | 0.000          | 45.00          | 0.0                | 0.600     | o           | 150         | Pipe/Conduit |
| 11.000 | 3.536         | 0.079       | 44.8           | 0.021          | 5.00           | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 10.002 | 3.443         | 0.023       | 149.7          | 0.000          | 45.00          | 0.0                | 0.600     | o           | 150         | Pipe/Conduit |
| 12.000 | 3.536         | 0.102       | 34.7           | 0.006          | 5.00           | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |

Network Results Table

| PN     | US/IL<br>(m) | Σ I.Area<br>(ha) | Σ Base<br>Flow (l/s) | Vel<br>(m/s) | Cap<br>(l/s) |
|--------|--------------|------------------|----------------------|--------------|--------------|
| 7.003  | 133.828      | 0.077            | 0.0                  | 1.75         | 30.9         |
| 5.002  | 133.528      | 0.152            | 0.0                  | 1.43         | 25.2         |
| 10.000 | 133.300      | 0.009            | 0.0                  | 2.69         | 47.6         |
| 10.001 | 133.050      | 0.009            | 0.0                  | 0.82         | 14.5         |
| 11.000 | 133.100      | 0.021            | 0.0                  | 1.16         | 9.1          |
| 10.002 | 132.971      | 0.030            | 0.0                  | 0.82         | 14.5         |
| 12.000 | 133.100      | 0.006            | 0.0                  | 1.31         | 10.3         |

48-50 Scrutton Street  
 London  
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Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



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Network 2020.1

Existing Network Details for Existing

| 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 |
|--------|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|
| 10.003 | 4.916      | 0.058    | 84.8        | 0.014       | 0.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 5.003  | 11.589     | 0.058    | 199.8       | 0.007       | 45.00       | 0.0             | 0.600  | o        | 225      | Pipe/Conduit |
| 13.000 | 36.369     | 0.568    | 64.0        | 0.042       | 5.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 14.000 | 13.989     | 0.500    | 28.0        | 0.015       | 30.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 14.001 | 11.690     | 0.615    | 19.0        | 0.014       | 45.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 13.001 | 11.627     | 0.078    | 149.1       | 0.007       | 45.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 15.000 | 3.432      | 0.179    | 19.2        | 0.006       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 16.000 | 5.336      | 0.179    | 29.8        | 0.012       | 45.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |

Network Results Table

| PN     | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Vel (m/s) | Cap (l/s) |
|--------|-----------|---------------|-------------------|-----------|-----------|
| 10.003 | 132.948   | 0.050         | 0.0               | 1.09      | 19.3      |
| 5.003  | 132.815   | 0.209         | 0.0               | 0.92      | 36.6      |
| 13.000 | 133.400   | 0.042         | 0.0               | 1.26      | 22.2      |
| 14.000 | 134.000   | 0.015         | 0.0               | 1.46      | 11.5      |
| 14.001 | 133.500   | 0.029         | 0.0               | 1.78      | 14.0      |
| 13.001 | 132.835   | 0.078         | 0.0               | 0.82      | 14.5      |
| 15.000 | 133.800   | 0.006         | 0.0               | 1.77      | 13.9      |
| 16.000 | 133.800   | 0.012         | 0.0               | 1.42      | 11.1      |



48-50 Scrutton Street  
 London  
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Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



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Existing Network Details for Existing

| 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 |
|--------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------------|-------------|--------------|
| 15.001 | 20.244        | 0.889       | 22.8           | 0.010          | 45.00          | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 17.000 | 3.732         | 0.293       | 12.7           | 0.005          | 5.00           | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 5.004  | 22.974        | 0.153       | 150.2          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 225         | Pipe/Conduit |
| 18.000 | 5.027         | 0.101       | 50.0           | 0.008          | 5.00           | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 19.000 | 17.751        | 0.800       | 22.2           | 0.014          | 45.00          | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 19.001 | 6.792         | 0.346       | 19.6           | 0.000          | 45.00          | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 5.005  | 22.551        | 0.629       | 35.9           | 0.014          | 45.00          | 0.0                | 0.600     | o           | 225         | Pipe/Conduit |

Network Results Table

| PN     | US/IL<br>(m) | Σ I.Area<br>(ha) | Σ Base<br>Flow (l/s) | Vel<br>(m/s) | Cap<br>(l/s) |
|--------|--------------|------------------|----------------------|--------------|--------------|
| 15.001 | 133.621      | 0.028            | 0.0                  | 1.62         | 12.8         |
| 17.000 | 133.100      | 0.005            | 0.0                  | 2.18         | 17.1         |
| 5.004  | 132.682      | 0.321            | 0.0                  | 1.06         | 42.3         |
| 18.000 | 133.100      | 0.008            | 0.0                  | 1.09         | 8.6          |
| 19.000 | 133.800      | 0.014            | 0.0                  | 1.65         | 12.9         |
| 19.001 | 133.000      | 0.014            | 0.0                  | 1.75         | 13.8         |
| 5.005  | 132.529      | 0.357            | 0.0                  | 2.19         | 87.2         |

48-50 Scrutton Street  
 London  
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Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



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Network 2020.1

Existing Network Details for Existing

| 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 |
|--------|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|
| 20.000 | 4.187      | 0.276    | 15.2        | 0.002       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 5.006  | 19.285     | 1.105    | 17.5        | 0.000       | 0.00        | 0.0             | 0.600  | o        | 225      | Pipe/Conduit |
| 21.000 | 5.975      | 0.150    | 39.8        | 0.010       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 5.007  | 6.571      | 0.033    | 199.1       | 0.001       | 0.00        | 0.0             | 0.600  | o        | 300      | Pipe/Conduit |
| 22.000 | 5.427      | 0.083    | 65.4        | 0.005       | 5.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 5.008  | 6.571      | 0.033    | 199.1       | 0.000       | 0.00        | 0.0             | 0.600  | o        | 300      | Pipe/Conduit |
| 23.000 | 4.900      | 0.166    | 29.5        | 0.008       | 5.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |

Network Results Table

| PN     | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Vel (m/s) | Cap (l/s) |
|--------|-----------|---------------|-------------------|-----------|-----------|
| 20.000 | 132.301   | 0.002         | 0.0               | 1.99      | 15.7      |
| 5.006  | 132.030   | 0.359         | 0.0               | 3.15      | 125.1     |
| 21.000 | 131.200   | 0.010         | 0.0               | 1.23      | 9.6       |
| 5.007  | 130.850   | 0.370         | 0.0               | 1.11      | 78.5      |
| 22.000 | 131.050   | 0.005         | 0.0               | 1.25      | 22.0      |
| 5.008  | 130.817   | 0.375         | 0.0               | 1.11      | 78.5      |
| 23.000 | 131.100   | 0.008         | 0.0               | 1.86      | 32.9      |

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Innovyze

Network 2020.1

Existing Network Details for Existing

| 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 |
|--------|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|
| 5.009  | 4.441      | 0.022    | 201.9       | 0.001       | 0.00        | 0.0             | 0.600  | o        | 300      | Pipe/Conduit |
| 24.000 | 1.795      | 0.017    | 105.6       | 0.016       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 24.001 | 13.319     | 0.196    | 68.0        | 0.005       | 45.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 25.000 | 8.115      | 0.213    | 38.1        | 0.025       | 45.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 26.000 | 11.321     | 0.113    | 100.0       | 0.007       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 24.002 | 7.402      | 0.315    | 23.5        | 0.000       | 45.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 27.000 | 12.829     | 0.128    | 100.4       | 0.018       | 10.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 28.000 | 12.220     | 0.122    | 100.6       | 0.009       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |

Network Results Table

| PN     | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Vel (m/s) | Cap (l/s) |
|--------|-----------|---------------|-------------------|-----------|-----------|
| 5.009  | 130.784   | 0.384         | 0.0               | 1.10      | 78.0      |
| 24.000 | 133.700   | 0.016         | 0.0               | 0.75      | 5.9       |
| 24.001 | 133.683   | 0.021         | 0.0               | 0.94      | 7.3       |
| 25.000 | 133.700   | 0.025         | 0.0               | 1.25      | 9.8       |
| 26.000 | 133.600   | 0.007         | 0.0               | 0.77      | 6.0       |
| 24.002 | 133.487   | 0.053         | 0.0               | 1.60      | 12.6      |
| 27.000 | 133.250   | 0.018         | 0.0               | 1.00      | 17.7      |
| 28.000 | 133.013   | 0.009         | 0.0               | 0.77      | 6.0       |

48-50 Scrutton Street  
 London  
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Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



Date 03/03/2021  
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Network 2020.1

Existing Network Details for Existing

| 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 |
|--------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------------|-------------|--------------|
| 24.003 | 23.101        | 0.232       | 99.7           | 0.022          | 45.00          | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 29.000 | 7.375         | 0.158       | 46.7           | 0.001          | 5.00           | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 30.000 | 3.710         | 0.158       | 23.5           | 0.003          | 5.00           | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 31.000 | 15.761        | 0.158       | 100.0          | 0.012          | 5.00           | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 29.001 | 5.984         | 0.234       | 25.6           | 0.005          | 45.00          | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 32.000 | 9.226         | 0.092       | 100.0          | 0.010          | 10.00          | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |
| 33.000 | 6.244         | 0.392       | 15.9           | 0.007          | 5.00           | 0.0                | 0.600     | o           | 100         | Pipe/Conduit |

Network Results Table

| PN     | US/IL<br>(m) | Σ I.Area<br>(ha) | Σ Base<br>Flow (l/s) | Vel<br>(m/s) | Cap<br>(l/s) |
|--------|--------------|------------------|----------------------|--------------|--------------|
| 24.003 | 132.892      | 0.102            | 0.0                  | 0.77         | 6.0          |
| 29.000 | 133.300      | 0.001            | 0.0                  | 1.13         | 8.9          |
| 30.000 | 133.300      | 0.003            | 0.0                  | 1.60         | 12.6         |
| 31.000 | 133.300      | 0.012            | 0.0                  | 0.77         | 6.0          |
| 29.001 | 133.142      | 0.021            | 0.0                  | 1.53         | 12.0         |
| 32.000 | 133.000      | 0.010            | 0.0                  | 0.77         | 6.0          |
| 33.000 | 133.300      | 0.007            | 0.0                  | 1.95         | 15.3         |

48-50 Scrutton Street  
 London  
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Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc

Date 03/03/2021  
 File microdrainage model.MDX

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Existing Network Details for Existing

| 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 |
|--------|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|
| 29.002 | 9.275      | 0.248    | 37.4        | 0.000       | 10.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 34.000 | 18.629     | 0.190    | 98.0        | 0.004       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 24.004 | 5.106      | 0.051    | 100.0       | 0.000       | 10.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 35.000 | 6.551      | 0.491    | 13.3        | 0.003       | 10.00       | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 24.005 | 13.181     | 0.089    | 148.1       | 0.017       | 45.00       | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 36.000 | 7.577      | 0.229    | 33.1        | 0.015       | 5.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 36.001 | 17.119     | 0.273    | 62.7        | 0.000       | 0.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |

Network Results Table

| PN     | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Vel (m/s) | Cap (l/s) |
|--------|-----------|---------------|-------------------|-----------|-----------|
| 29.002 | 132.908   | 0.038         | 0.0               | 1.27      | 9.9       |
| 34.000 | 132.850   | 0.004         | 0.0               | 0.78      | 6.1       |
| 24.004 | 132.610   | 0.144         | 0.0               | 1.00      | 17.8      |
| 35.000 | 133.100   | 0.003         | 0.0               | 2.13      | 16.7      |
| 24.005 | 132.559   | 0.164         | 0.0               | 0.82      | 14.6      |
| 36.000 | 133.000   | 0.015         | 0.0               | 1.76      | 31.0      |
| 36.001 | 132.771   | 0.015         | 0.0               | 1.27      | 22.5      |

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Existing Network Details for Existing

| 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 |
|--------|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|
| 37.000 | 5.293      | 0.106    | 50.0        | 0.010       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 24.006 | 17.779     | 0.661    | 26.9        | 0.010       | 0.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 38.000 | 3.600      | 0.241    | 14.9        | 0.000       | 5.00        | 0.0             | 0.600  | o        | 100      | Pipe/Conduit |
| 24.007 | 11.463     | 0.478    | 24.0        | 0.007       | 0.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 39.000 | 6.076      | 0.409    | 14.9        | 0.002       | 5.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 24.008 | 9.892      | 0.419    | 23.6        | 0.001       | 0.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |
| 40.000 | 5.439      | 0.088    | 61.8        | 0.007       | 5.00        | 0.0             | 0.600  | o        | 150      | Pipe/Conduit |

Network Results Table

| PN     | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Vel (m/s) | Cap (l/s) |
|--------|-----------|---------------|-------------------|-----------|-----------|
| 37.000 | 133.400   | 0.010         | 0.0               | 1.09      | 8.6       |
| 24.006 | 132.470   | 0.199         | 0.0               | 1.95      | 34.4      |
| 38.000 | 132.100   | 0.000         | 0.0               | 2.01      | 15.8      |
| 24.007 | 131.809   | 0.206         | 0.0               | 2.06      | 36.5      |
| 39.000 | 131.740   | 0.002         | 0.0               | 2.63      | 46.4      |
| 24.008 | 131.331   | 0.209         | 0.0               | 2.08      | 36.8      |
| 40.000 | 131.000   | 0.007         | 0.0               | 1.28      | 22.6      |

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Existing Network Details for Existing

| 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 |
|-------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------------|-------------|--------------|
| 5.010 | 9.070         | 0.045       | 200.0          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 300         | Pipe/Conduit |
| 5.011 | 65.278        | 0.326       | 200.0          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 300         | Pipe/Conduit |
| 5.012 | 8.764         | 0.058       | 150.0          | 0.000          | 0.00           | 0.0                | 0.600     | oo          | 300         | Double Pipe  |
| 5.013 | 14.614        | 0.097       | 150.0          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 300         | Pipe/Conduit |
| 5.014 | 23.738        | 0.136       | 174.5          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 300         | Pipe/Conduit |
| 5.015 | 9.531         | 0.095       | 100.0          | 0.000          | 5.00           | 0.0                | 0.600     | o           | 150         | Pipe/Conduit |
| 5.016 | 3.912         | 0.039       | 100.0          | 0.000          | 0.00           | 0.0                | 0.600     | o           | 150         | Pipe/Conduit |
| 5.017 | 5.531         | 0.000       | 0.0            | 0.000          | 0.00           | 0.0                | 0.600     | o           | 150         | Pipe/Conduit |

Network Results Table

| PN    | US/IL<br>(m) | Σ I.Area<br>(ha) | Σ Base<br>Flow (l/s) | Vel<br>(m/s) | Cap<br>(l/s) |
|-------|--------------|------------------|----------------------|--------------|--------------|
| 5.010 | 130.762      | 0.600            | 0.0                  | 1.11         | 78.3         |
| 5.011 | 130.717      | 0.600            | 0.0                  | 1.11         | 78.3         |
| 5.012 | 130.391      | 0.600            | 0.0                  | 1.28         | 181.2        |
| 5.013 | 130.333      | 0.600            | 0.0                  | 1.28         | 90.6         |
| 5.014 | 130.236      | 0.600            | 0.0                  | 1.19         | 83.9         |
| 5.015 | 130.000      | 0.600            | 0.0                  | 1.00         | 17.8         |
| 5.016 | 129.905      | 0.600            | 0.0                  | 1.00         | 17.8         |
| 5.017 | 131.800      | 0.600            | 0.0                  | 0.00         | 0.0          |

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Hemel Hempstead Crematorium  
Surface Water Drainage  
1 in 100yr plus 40% cc



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Network 2020.1

Manhole Schedules for Existing

| MH Name          | MH CL (m) | MH Depth (m) | MH Connection | MH Diam.,L*W (mm) | PN     | Pipe Out Invert Level (m) | Diameter (mm) | PN     | Pipes In Invert Level (m) | Diameter (mm) | Backdrop (mm) |
|------------------|-----------|--------------|---------------|-------------------|--------|---------------------------|---------------|--------|---------------------------|---------------|---------------|
| permeable paving | 135.060   | 0.660        | Open Manhole  | 100               | 5.000  | 134.400                   | 100           |        |                           |               |               |
| 2.0              | 134.930   | 0.608        | Open Manhole  | 450               | 5.001  | 134.322                   | 100           | 5.000  | 134.322                   | 100           |               |
| permeable paving | 134.150   | 0.500        | Open Manhole  | 100               | 6.000  | 133.650                   | 150           |        |                           |               |               |
| permeable paving | 135.190   | 0.600        | Open Manhole  | 100               | 7.000  | 134.590                   | 150           |        |                           |               |               |
| permeable paving | 135.240   | 0.600        | Open Manhole  | 100               | 8.000  | 134.640                   | 150           |        |                           |               |               |
| 1.0              | 135.240   | 0.686        | Open Manhole  | 450               | 8.001  | 134.654                   | 150           | 8.000  | 134.554                   | 150           |               |
| 1.1              | 135.190   | 0.631        | Open Manhole  | 450               | 7.001  | 134.559                   | 150           | 7.000  | 134.559                   | 150           |               |
|                  |           |              |               |                   |        |                           |               | 8.001  | 134.559                   | 150           |               |
| permeable paving | 135.325   | 0.808        | Open Manhole  | 450               | 7.002  | 134.517                   | 150           | 7.001  | 134.517                   | 150           |               |
| permeable paving | 134.450   | 0.550        | Open Manhole  | 100               | 9.000  | 133.900                   | 150           |        |                           |               |               |
| 1.3              | 134.550   | 0.722        | Open Manhole  | 900               | 7.003  | 133.828                   | 150           | 7.002  | 133.828                   | 150           |               |
|                  |           |              |               |                   |        |                           |               | 9.000  | 133.828                   | 150           |               |
| 1.4              | 134.260   | 0.732        | Open Manhole  | 900               | 5.002  | 133.528                   | 150           | 5.001  | 133.604                   | 100           | 26            |
|                  |           |              |               |                   |        |                           |               | 6.000  | 133.528                   | 150           |               |
|                  |           |              |               |                   |        |                           |               | 7.003  | 133.528                   | 150           |               |
| DP5              | 134.400   | 1.100        | Open Manhole  | 450               | 10.000 | 133.300                   | 150           |        |                           |               |               |
| 3.0              | 134.300   | 1.250        | Open Manhole  | 450               | 10.001 | 133.050                   | 150           | 10.000 | 133.050                   | 150           |               |
| DP4              | 134.400   | 1.300        | Open Manhole  | 450               | 11.000 | 133.100                   | 100           |        |                           |               |               |
| junction         | 134.300   | 1.329        | Junction      |                   | 10.002 | 132.971                   | 150           | 10.001 | 132.971                   | 150           |               |
|                  |           |              |               |                   |        |                           |               | 11.000 | 133.021                   | 100           |               |
| DP3              | 134.400   | 1.300        | Open Manhole  | 450               | 12.000 | 133.100                   | 100           |        |                           |               |               |
| 3.2              | 134.300   | 1.352        | Junction      |                   | 10.003 | 132.948                   | 150           | 10.002 | 132.948                   | 150           |               |
|                  |           |              |               |                   |        |                           |               | 12.000 | 132.998                   | 100           |               |
| 1.5              | 134.350   | 1.535        | Open Manhole  | 1200              | 5.003  | 132.815                   | 225           | 5.002  | 133.011                   | 150           | 121           |



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Manhole Schedules for Existing

| MH Name                    | MH CL (m) | MH Depth (m) | MH Connection | MH Diam., L*W (mm) | PN     | Pipe Out Invert Level (m) | Diameter (mm) | PN     | Pipes In Invert Level (m) | Diameter (mm) | Backdrop (mm) |
|----------------------------|-----------|--------------|---------------|--------------------|--------|---------------------------|---------------|--------|---------------------------|---------------|---------------|
|                            |           |              |               |                    |        |                           |               | 10.003 | 132.890                   | 150           |               |
| 4.0 soft landscaping inlet | 134.750   | 1.350        | Open Manhole  | 450                | 13.000 | 133.400                   | 150           |        |                           |               |               |
| RGarden                    | 134.700   | 0.700        | Open Manhole  | 450                | 14.000 | 134.000                   | 100           |        |                           |               |               |
| 4.1                        | 134.600   | 1.100        | Open Manhole  | 450                | 14.001 | 133.500                   | 100           | 14.000 | 133.500                   | 100           |               |
| DP1                        | 134.110   | 1.278        | Open Manhole  | 450                | 13.001 | 132.835                   | 150           | 13.000 | 132.832                   | 150           |               |
| soft landscaping inlet     | 134.335   | 0.535        | Open Manhole  | 100                | 15.000 | 133.800                   | 100           | 14.001 | 132.885                   | 100           |               |
| 5.0                        | 134.300   | 0.500        | Open Manhole  | 100                | 16.000 | 133.800                   | 100           |        |                           |               |               |
| DP2                        | 134.400   | 0.779        | Open Manhole  | 450                | 15.001 | 133.621                   | 100           | 15.000 | 133.621                   | 100           |               |
| 1.6                        | 134.400   | 1.300        | Open Manhole  | 100                | 17.000 | 133.100                   | 100           | 16.000 | 133.621                   | 100           |               |
|                            | 134.283   | 1.601        | Open Manhole  | 1200               | 5.004  | 132.682                   | 225           | 5.003  | 132.757                   | 225           | 75            |
|                            |           |              |               |                    |        |                           |               | 13.001 | 132.757                   | 150           |               |
|                            |           |              |               |                    |        |                           |               | 15.001 | 132.732                   | 100           |               |
|                            |           |              |               |                    |        |                           |               | 17.000 | 132.807                   | 100           |               |
| DP6                        | 134.400   | 1.300        | Open Manhole  | 100                | 18.000 | 133.100                   | 100           |        |                           |               |               |
| Filter drain               | 134.400   | 0.600        | Open Manhole  | 100                | 19.000 | 133.800                   | 100           |        |                           |               |               |
| bend                       | 134.400   | 1.400        | Open Manhole  | 450                | 19.001 | 133.000                   | 100           | 19.000 | 133.000                   | 100           |               |
| 1.7                        | 134.336   | 1.807        | Open Manhole  | 1200               | 5.005  | 132.529                   | 225           | 5.004  | 132.529                   | 225           |               |
|                            |           |              |               |                    |        |                           |               | 18.000 | 132.999                   | 100           | 345           |
|                            |           |              |               |                    |        |                           |               | 19.001 | 132.654                   | 100           |               |
| RG                         | 133.601   | 1.300        | Open Manhole  | 450                | 20.000 | 132.301                   | 100           |        |                           |               |               |
| 1.8                        | 133.253   | 1.353        | Open Manhole  | 1200               | 5.006  | 132.030                   | 225           | 5.005  | 131.900                   | 225           |               |
|                            |           |              |               |                    |        |                           |               | 20.000 | 132.025                   | 100           |               |

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Manhole Schedules for Existing

| MH Name                         | MH CL (m) | MH Depth (m) | MH Connection | MH Diam.,L*W (mm) | PN     | Pipe Out Invert Level (m) | Diameter (mm) | PN     | Pipes In Invert Level (m) | Diameter (mm) | Backdrop (mm) |
|---------------------------------|-----------|--------------|---------------|-------------------|--------|---------------------------|---------------|--------|---------------------------|---------------|---------------|
| RG                              | 132.800   | 1.600        | Open Manhole  | 450               | 21.000 | 131.200                   | 100           |        |                           |               |               |
| 1.9                             | 132.071   | 1.221        | Open Manhole  | 1200              | 5.007  | 130.850                   | 300           | 5.006  | 130.925                   | 225           |               |
|                                 |           |              |               |                   |        |                           |               | 21.000 | 131.050                   | 100           |               |
| RG                              | 132.500   | 1.450        | Open Manhole  | 450               | 22.000 | 131.050                   | 150           |        |                           |               |               |
| junction                        | 132.120   | 1.303        | Junction      |                   | 5.008  | 130.817                   | 300           | 5.007  | 130.817                   | 300           |               |
|                                 |           |              |               |                   |        |                           |               | 22.000 | 130.967                   | 150           |               |
| RG                              | 132.000   | 0.900        | Open Manhole  | 450               | 23.000 | 131.100                   | 150           |        |                           |               |               |
| junction                        | 132.120   | 1.336        | Junction      |                   | 5.009  | 130.784                   | 300           | 5.008  | 130.784                   | 300           |               |
|                                 |           |              |               |                   |        |                           |               | 23.000 | 130.934                   | 150           |               |
| dp16                            | 134.400   | 0.700        | Open Manhole  | 100               | 24.000 | 133.700                   | 100           |        |                           |               |               |
| 6.0                             | 134.346   | 0.663        | Open Manhole  | 450               | 24.001 | 133.683                   | 100           | 24.000 | 133.683                   | 100           |               |
| inlet from soft landscaped area | 134.309   | 0.609        | Open Manhole  | 450               | 25.000 | 133.700                   | 100           |        |                           |               |               |
| DP11                            | 134.400   | 0.800        | Open Manhole  | 100               | 26.000 | 133.600                   | 100           |        |                           |               |               |
| 6.1                             | 134.341   | 0.854        | Open Manhole  | 450               | 24.002 | 133.487                   | 100           | 24.001 | 133.487                   | 100           |               |
|                                 |           |              |               |                   |        |                           |               | 25.000 | 133.487                   | 100           |               |
|                                 |           |              |               |                   |        |                           |               | 26.000 | 133.487                   | 100           |               |
| RG                              | 134.213   | 0.963        | Open Manhole  | 450               | 27.000 | 133.250                   | 150           |        |                           |               |               |
| 8                               | 134.313   | 1.300        | Open Manhole  | 450               | 28.000 | 133.013                   | 100           |        |                           |               |               |
| 6.2                             | 134.314   | 1.422        | Open Manhole  | 450               | 24.003 | 132.892                   | 100           | 24.002 | 133.172                   | 100           | 280           |
|                                 |           |              |               |                   |        |                           |               | 27.000 | 133.122                   | 150           | 280           |
|                                 |           |              |               |                   |        |                           |               | 28.000 | 132.892                   | 100           |               |
| DP9                             | 134.400   | 1.100        | Open Manhole  | 100               | 29.000 | 133.300                   | 100           |        |                           |               |               |
| DP8                             | 134.400   | 1.100        | Open Manhole  | 100               | 30.000 | 133.300                   | 100           |        |                           |               |               |
| DP7                             | 134.400   | 1.100        | Open Manhole  | 100               | 31.000 | 133.300                   | 100           |        |                           |               |               |

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Manhole Schedules for Existing

| MH Name       | MH CL (m) | MH Depth (m) | MH Connection | MH Diam.,L*W (mm) | Pipe Out PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
|---------------|-----------|--------------|---------------|-------------------|-------------|---------------------------|------------------------|-------------|---------------------------|------------------------|---------------|
| 10            | 134.400   | 1.258        | Open Manhole  | 450               | 29.001      | 133.142                   | 100                    | 29.000      | 133.142                   | 100                    |               |
|               |           |              |               |                   |             |                           |                        | 30.000      | 133.142                   | 100                    |               |
|               |           |              |               |                   |             |                           |                        | 31.000      | 133.142                   | 100                    |               |
| 9             | 134.250   | 1.250        | Open Manhole  | 450               | 32.000      | 133.000                   | 100                    |             |                           |                        |               |
| DP10          | 134.400   | 1.100        | Open Manhole  | 100               | 33.000      | 133.300                   | 100                    |             |                           |                        |               |
| 10.1          | 134.250   | 1.342        | Open Manhole  | 450               | 29.002      | 132.908                   | 100                    | 29.001      | 132.908                   | 100                    |               |
|               |           |              |               |                   |             |                           |                        | 32.000      | 132.908                   | 100                    |               |
|               |           |              |               |                   |             |                           |                        | 33.000      | 132.908                   | 100                    |               |
| 12            | 134.150   | 1.300        | Open Manhole  | 450               | 34.000      | 132.850                   | 100                    |             |                           |                        |               |
| 6.3           | 134.253   | 1.643        | Open Manhole  | 450               | 24.004      | 132.610                   | 150                    | 24.003      | 132.660                   | 100                    |               |
|               |           |              |               |                   |             |                           |                        | 29.002      | 132.660                   | 100                    |               |
|               |           |              |               |                   |             |                           |                        | 34.000      | 132.660                   | 100                    |               |
| dp17 junction | 134.400   | 1.300        | Open Manhole  | 450               | 35.000      | 133.100                   | 100                    |             |                           |                        |               |
|               | 134.400   | 1.841        | Junction      |                   | 24.005      | 132.559                   | 150                    | 24.004      | 132.559                   | 150                    |               |
|               |           |              |               |                   |             |                           |                        | 35.000      | 132.609                   | 100                    |               |
| DP13          | 134.400   | 1.400        | Open Manhole  | 100               | 36.000      | 133.000                   | 150                    |             |                           |                        |               |
| 11            | 134.156   | 1.385        | Open Manhole  | 450               | 36.001      | 132.771                   | 150                    | 36.000      | 132.771                   | 150                    |               |
| DP14          | 134.400   | 1.000        | Open Manhole  | 100               | 37.000      | 133.400                   | 100                    |             |                           |                        |               |
| 6.4           | 134.260   | 1.790        | Open Manhole  | 450               | 24.006      | 132.470                   | 150                    | 24.005      | 132.470                   | 150                    |               |
|               |           |              |               |                   |             |                           |                        | 36.001      | 132.498                   | 150                    | 28            |
|               |           |              |               |                   |             |                           |                        | 37.000      | 133.294                   | 100                    | 774           |
| RG            | 133.400   | 1.300        | Open Manhole  | 450               | 38.000      | 132.100                   | 100                    |             |                           |                        |               |
| 6.5           | 133.400   | 1.591        | Open Manhole  | 450               | 24.007      | 131.809                   | 150                    | 24.006      | 131.809                   | 150                    |               |
|               |           |              |               |                   |             |                           |                        | 38.000      | 131.859                   | 100                    |               |

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Manhole Schedules for Existing

| MH Name        | MH CL (m) | MH Depth (m) | MH Connection | MH Diam., L*W (mm) | PN     | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | PN     | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
|----------------|-----------|--------------|---------------|--------------------|--------|---------------------------|------------------------|--------|---------------------------|------------------------|---------------|
| RG junction    | 132.740   | 1.000        | Open Manhole  | 450                | 39.000 | 131.740                   | 150                    |        |                           |                        |               |
|                | 132.740   | 1.409        | Junction      |                    | 24.008 | 131.331                   | 150                    | 24.007 | 131.331                   | 150                    |               |
|                |           |              |               |                    |        |                           |                        | 39.000 | 131.331                   | 150                    |               |
| RG 1.10        | 132.100   | 1.100        | Open Manhole  | 450                | 40.000 | 131.000                   | 150                    |        |                           |                        |               |
|                | 132.200   | 1.438        | Open Manhole  | 1200               | 5.010  | 130.762                   | 300                    | 5.009  | 130.762                   | 300                    |               |
|                |           |              |               |                    |        |                           |                        | 24.008 | 130.912                   | 150                    | 150           |
|                |           |              |               |                    |        |                           |                        | 40.000 | 130.912                   | 150                    |               |
| 1.11           | 133.000   | 2.283        | Open Manhole  | 1200               | 5.011  | 130.717                   | 300                    | 5.010  | 130.717                   | 300                    |               |
| 1.12.2         | 132.800   | 2.409        | Open Manhole  | 1200               | 5.012  | 130.391                   | 300                    | 5.011  | 130.391                   | 300                    |               |
| 1.12.4         | 132.600   | 2.267        | Open Manhole  | 1200               | 5.013  | 130.333                   | 300                    | 5.012  | 130.333                   | 300                    |               |
| New Pond inlet | 132.200   | 1.964        | Open Manhole  | 1200               | 5.014  | 130.236                   | 300                    | 5.013  | 130.236                   | 300                    |               |
| Pond outfall   | 132.200   | 2.200        | Open Manhole  | 1200               | 5.015  | 130.000                   | 150                    | 5.014  | 130.100                   | 300                    | 250           |
| IC22           | 132.200   | 2.295        | Open Manhole  | 1200               | 5.016  | 129.905                   | 150                    | 5.015  | 129.905                   | 150                    |               |
| IC23           | 132.400   | 2.534        | Open Manhole  | 1200               | 5.017  | 131.800                   | 150                    | 5.016  | 129.866                   | 150                    |               |
|                | 132.200   | 0.400        | Open Manhole  | 500                |        | OUTFALL                   |                        | 5.017  | 131.800                   | 150                    |               |

| MH Name          | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|------------------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| permeable paving | 508821.074          | 206075.157           | 508821.074               | 206075.157                | Required       |                |
| 2.0              | 508832.652          | 206074.205           | 508832.652               | 206074.205                | Required       |                |

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Manhole Schedules for Existing

| MH Name          | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|------------------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| permeable paving | 508870.869          | 206039.694           | 508870.869               | 206039.694                | Required       |                |
| permeable paving | 508821.985          | 206086.339           | 508821.985               | 206086.339                | Required       |                |
| permeable paving | 508815.469          | 206101.232           | 508815.469               | 206101.232                | Required       |                |
| 1.0              | 508832.614          | 206100.841           | 508832.614               | 206100.841                | Required       |                |
| 1.1              | 508830.775          | 206085.537           | 508830.775               | 206085.537                | Required       |                |
| permeable paving | 508840.403          | 206081.405           | 508840.403               | 206081.405                | Required       |                |
| permeable paving | 508877.530          | 206047.333           | 508877.530               | 206047.333                | Required       |                |
| 1.3              | 508869.431          | 206054.640           | 508869.431               | 206054.640                | Required       |                |
| 1.4              | 508862.674          | 206047.218           | 508862.674               | 206047.218                | Required       |                |
| DP5              | 508860.456          | 206010.797           | 508860.456               | 206010.797                | Required       |                |

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Manhole Schedules for Existing

| MH Name                | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|------------------------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
|                        | 3.0 508860.308      | 206014.333           | 508860.308               | 206014.333                | Required       |                |
|                        | DP4 508851.750      | 206018.789           | 508851.750               | 206018.789                | Required       |                |
| junction               | 508851.599          | 206022.322           |                          |                           | No Entry       |                |
|                        | DP3 508849.214      | 206021.118           | 508849.214               | 206021.118                | Required       |                |
|                        | 3.2 508849.063      | 206024.650           |                          |                           | No Entry       |                |
|                        | 1.5 508845.441      | 206027.975           | 508845.441               | 206027.975                | Required       |                |
|                        | 4.0 508802.343      | 206051.838           | 508802.343               | 206051.838                | Required       |                |
| soft landscaping inlet | 508822.804          | 206044.298           | 508822.804               | 206044.298                | Required       |                |
|                        | RGarden 508834.952  | 206037.362           | 508834.952               | 206037.362                | Required       |                |
|                        | 4.1 508829.122      | 206027.230           | 508829.122               | 206027.230                | Required       |                |

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Manhole Schedules for Existing

| MH Name                | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|------------------------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| DP1                    | 508823.783          | 206000.912           | 508823.783               | 206000.912                | Required       |                |
| soft landscaping inlet | 508823.075          | 206009.557           | 508823.075               | 206009.557                | Required       |                |
| 5.0                    | 508824.131          | 206004.326           | 508824.131               | 206004.326                | Required       |                |
| DP2                    | 508837.314          | 206015.650           | 508837.314               | 206015.650                | Required       |                |
| 1.6                    | 508837.685          | 206019.364           | 508837.685               | 206019.364                | Required       |                |
| DP6                    | 508851.147          | 206000.172           | 508851.147               | 206000.172                | Required       |                |
| Filter drain           | 508839.654          | 205984.437           | 508839.654               | 205984.437                | Required       |                |
| bend                   | 508851.104          | 205998.001           |                          |                           | No Entry       |                |
| 1.7                    | 508854.604          | 206003.822           | 508854.604               | 206003.822                | Required       |                |
| RG                     | 508870.619          | 205992.869           | 508870.619               | 205992.869                | Required       |                |

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Manhole Schedules for Existing

| MH Name                         | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---------------------------------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| 1.8                             | 508871.380          | 205988.751           | 508871.380               | 205988.751                | Required       |                |
| RG                              | 508877.254          | 205974.541           | 508877.254               | 205974.541                | Required       |                |
| 1.9                             | 508873.857          | 205969.626           | 508873.857               | 205969.626                | Required       |                |
| RG                              | 508875.680          | 205964.780           | 508875.680               | 205964.780                | Required       |                |
| junction                        | 508870.296          | 205964.103           |                          |                           | No Entry       |                |
| RG                              | 508870.957          | 205956.094           | 508870.957               | 205956.094                | Required       |                |
| junction                        | 508866.735          | 205958.580           |                          |                           | No Entry       |                |
| dp16                            | 508812.777          | 205998.565           | 508812.777               | 205998.565                | Required       |                |
| 6.0                             | 508811.016          | 205998.916           | 508811.016               | 205998.916                | Required       |                |
| inlet from soft landscaped area | 508804.749          | 205996.730           | 508804.749               | 205996.730                | Required       |                |



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Manhole Schedules for Existing

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| DP11    | 508813.233          | 205987.421           | 508813.233               | 205987.421                | Required       |                |
| 6.1     | 508802.034          | 205989.082           | 508802.034               | 205989.082                | Required       |                |
| RG      | 508784.324          | 205984.949           | 508784.324               | 205984.949                | Required       |                |
| 8       | 508788.075          | 205991.843           | 508788.075               | 205991.843                | Required       |                |
| 6.2     | 508797.080          | 205983.581           | 508797.080               | 205983.581                | Required       |                |
| DP9     | 508825.227          | 205986.546           | 508825.227               | 205986.546                | Required       |                |
| DP8     | 508827.790          | 205977.651           | 508827.790               | 205977.651                | Required       |                |
| DP7     | 508839.110          | 205984.937           | 508839.110               | 205984.937                | Required       |                |
| 10      | 508824.425          | 205979.214           | 508824.425               | 205979.214                | Required       |                |
| 9       | 508813.581          | 205981.042           | 508813.581               | 205981.042                | Required       |                |

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Manhole Schedules for Existing

| MH Name  | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|----------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| DP10     | 508820.178          | 205981.046           | 508820.178               | 205981.046                | Required       |                |
| 10.1     | 508820.379          | 205974.805           | 508820.379               | 205974.805                | Required       |                |
| 12       | 508801.514          | 205954.245           | 508801.514               | 205954.245                | Required       |                |
| 6.3      | 508814.109          | 205967.971           | 508814.109               | 205967.971                | Required       |                |
| dp17     | 508818.060          | 205971.069           | 508818.060               | 205971.069                | Required       |                |
| junction | 508817.872          | 205964.520           |                          |                           | No Entry       |                |
| DP13     | 508838.322          | 205975.852           | 508838.322               | 205975.852                | Required       |                |
| 11       | 508839.067          | 205968.311           | 508839.067               | 205968.311                | Required       |                |
| DP14     | 508829.549          | 205960.528           | 508829.549               | 205960.528                | Required       |                |
| 6.4      | 508827.587          | 205955.612           | 508827.587               | 205955.612                | Required       |                |

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Manhole Schedules for Existing

| MH Name        | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|----------------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| RG             | 508844.753          | 205945.060           | 508844.753               | 205945.060                | Required       |                |
| 6.5            | 508843.907          | 205948.559           | 508843.907               | 205948.559                | Required       |                |
| RG             | 508854.500          | 205945.650           | 508854.500               | 205945.650                | Required       |                |
| junction       | 508854.929          | 205951.711           |                          |                           | No Entry       |                |
| RG             | 508863.620          | 205949.467           | 508863.620               | 205949.467                | Required       |                |
| 1.10           | 508864.305          | 205954.863           | 508864.305               | 205954.863                | Required       |                |
| 1.11           | 508866.538          | 205946.071           | 508866.538               | 205946.071                | Required       |                |
| 1.12.2         | 508890.074          | 205885.184           | 508890.074               | 205885.184                | Required       |                |
| 1.12.4         | 508893.984          | 205877.341           | 508893.984               | 205877.341                | Required       |                |
| New Pond inlet | 508895.858          | 205862.848           | 508895.858               | 205862.848                | Required       |                |

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Manhole Schedules for Existing

| MH Name      | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|--------------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| Pond outfall | 508901.945          | 205839.904           | 508901.945               | 205839.904                | Required       |                |
| IC22         | 508910.496          | 205835.695           | 508910.496               | 205835.695                | Required       |                |
| IC23         | 508914.400          | 205835.437           | 508914.400               | 205835.437                | Required       |                |
|              | 508919.931          | 205835.357           |                          |                           | No Entry       |                |

Simulation Criteria for Existing

|                         |       |                                   |       |                                     |       |
|-------------------------|-------|-----------------------------------|-------|-------------------------------------|-------|
| Volumetric Runoff Coeff | 0.840 | Manhole Headloss Coeff (Global)   | 0.500 | Inlet Coefficient                   | 0.800 |
| Areal Reduction Factor  | 1.000 | Foul Sewage per hectare (l/s)     | 0.000 | Flow per Person per Day (l/per/day) | 0.000 |
| Hot Start (mins)        | 0     | Additional Flow - % of Total Flow | 0.000 | Run Time (mins)                     | 2880  |
| Hot Start Level (mm)    | 0     | MADD Factor * 10m³/ha Storage     | 2.000 | Output Interval (mins)              | 24    |

Number of Input Hydrographs 0    Number of Offline Controls 0    Number of Time/Area Diagrams 0  
 Number of Online Controls 1    Number of Storage Structures 22    Number of Real Time Controls 0

Synthetic Rainfall Details

|                          |     |              |              |                 |       |
|--------------------------|-----|--------------|--------------|-----------------|-------|
| Rainfall Model           | FSR | M5-60 (mm)   | 20.000       | Cv (Summer)     | 0.750 |
| Return Period (years)    | 100 | Ratio R      | 0.400        | Cv (Winter)     | 0.840 |
| Region England and Wales |     | Profile Type | Winter Storm | Duration (mins) | 1440  |

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Online Controls for Existing

Hydro-Brake® Optimum Manhole: IC22, DS/PN: 5.016, Volume (m³): 2.7

|                   |                            |                                   |         |
|-------------------|----------------------------|-----------------------------------|---------|
| Unit Reference    | MD-SHE-0061-2000-1500-2000 | Sump Available                    | Yes     |
| Design Head (m)   | 1.500                      | Diameter (mm)                     | 61      |
| Design Flow (l/s) | 2.0                        | Invert Level (m)                  | 129.905 |
| Flush-Flo™        | Calculated                 | Minimum Outlet Pipe Diameter (mm) | 75      |
| Objective         | Minimise upstream storage  | Suggested Manhole Diameter (mm)   | 1200    |
| Application       | Surface                    |                                   |         |

| Control Points            | Head (m) | Flow (l/s) | Control Points            | Head (m) | Flow (l/s) |
|---------------------------|----------|------------|---------------------------|----------|------------|
| Design Point (Calculated) | 1.500    | 2.0        | Kick-Flo®                 | 0.545    | 1.3        |
| Flush-Flo™                | 0.269    | 1.6        | Mean Flow over Head Range | -        | 1.5        |

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) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
| 0.100     | 1.3        | 0.600     | 1.3        | 1.600     | 2.1        | 2.600     | 2.6        | 5.000     | 3.5        | 7.500     | 4.2        |
| 0.200     | 1.5        | 0.800     | 1.5        | 1.800     | 2.2        | 3.000     | 2.7        | 5.500     | 3.6        | 8.000     | 4.3        |
| 0.300     | 1.6        | 1.000     | 1.7        | 2.000     | 2.3        | 3.500     | 3.0        | 6.000     | 3.8        | 8.500     | 4.5        |
| 0.400     | 1.5        | 1.200     | 1.8        | 2.200     | 2.4        | 4.000     | 3.1        | 6.500     | 3.9        | 9.000     | 4.6        |
| 0.500     | 1.4        | 1.400     | 1.9        | 2.400     | 2.5        | 4.500     | 3.3        | 7.000     | 4.1        | 9.500     | 4.7        |

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Storage Structures for Existing

Porous Car Park Manhole: permeable paving, DS/PN: 5.000

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 134.560 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 12.9    | Width (m)        | 9.7     | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 4.8     | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: 2.0, DS/PN: 5.001

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 134.430 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 51.1    | Width (m)        | 38.3    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 4.8     | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: permeable paving, DS/PN: 6.000

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.650 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 26.2    | Width (m)        | 15.7    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 6.0     | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: permeable paving, DS/PN: 7.000

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 134.790 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 33.3    | Width (m)        | 12.0    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 10.0    | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: permeable paving, DS/PN: 8.000

|                                      |         |                  |         |             |       |
|--------------------------------------|---------|------------------|---------|-------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Safety Factor    | 2.0     | Width (m)   | 22.8  |
| Membrane Percolation (mm/hr)         | 1000    | Porosity         | 0.30    | Length (m)  | 5.0   |
| Max Percolation (l/s)                | 31.7    | Invert Level (m) | 134.740 | Slope (1:X) | 100.0 |

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Porous Car Park Manhole: permeable paving, DS/PN: 8.000

Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.350

Porous Car Park Manhole: permeable paving, DS/PN: 7.002

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 134.825 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 59.1    | Width (m)        | 4.8     | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 44.3    | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: permeable paving, DS/PN: 9.000

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.950 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 20.9    | Width (m)        | 15.7    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 4.8     | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: 3.0, DS/PN: 10.001

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.800 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 47.8    | Width (m)        | 8.6     | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 20.0    | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: 1.5, DS/PN: 5.003

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.850 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 24.3    | Width (m)        | 7.6     | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 11.5    | Cap Volume Depth (m)    | 0.350 |

Infiltration Basin Manhole: RGarden, DS/PN: 14.001

|                                      |         |                                      |         |          |      |
|--------------------------------------|---------|--------------------------------------|---------|----------|------|
| Invert Level (m)                     | 133.500 | Infiltration Coefficient Side (m/hr) | 0.00000 | Porosity | 1.00 |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Safety Factor                        | 2.0     |          |      |

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Infiltration Basin Manhole: RGarden, DS/PN: 14.001

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|
| 0.000     | 100.0                  | 1.100     | 100.0                  |

Porous Car Park Manhole: 4.1, DS/PN: 13.001

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.610 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 23.2    | Width (m)        | 7.2     | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 11.6    | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: 5.0, DS/PN: 15.001

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.900 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 21.7    | Width (m)        | 3.9     | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 20.0    | Cap Volume Depth (m)    | 0.350 |

Infiltration Trench Manhole: Filter drain, DS/PN: 19.000

|                                      |         |                   |         |                            |       |
|--------------------------------------|---------|-------------------|---------|----------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Invert Level (m)  | 133.800 | Cap Volume Depth (m)       | 0.000 |
| Infiltration Coefficient Side (m/hr) | 0.00000 | Trench Width (m)  | 0.3     | Cap Infiltration Depth (m) | 0.000 |
| Safety Factor                        | 2.0     | Trench Length (m) | 17.0    |                            |       |
| Porosity                             | 0.30    | Slope (1:X)       | 500.0   |                            |       |

Porous Car Park Manhole: 1.7, DS/PN: 5.005

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.936 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 50.0    | Width (m)        | 12.0    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 15.0    | Cap Volume Depth (m)    | 0.350 |



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Porous Car Park Manhole: 6.0, DS/PN: 24.001

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.846 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 16.6    | Width (m)        | 4.6     | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 13.0    | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: 6.1, DS/PN: 24.002

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.841 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 39.1    | Width (m)        | 19.0    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 7.4     | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: 6.2, DS/PN: 24.003


|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.714 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 73.5    | Width (m)        | 11.5    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 23.0    | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: 10, DS/PN: 29.001

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.900 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 17.5    | Width (m)        | 10.5    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 6.0     | Cap Volume Depth (m)    | 0.350 |

Porous Car Park Manhole: 9, DS/PN: 32.000

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.750 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 33.8    | Width (m)        | 13.5    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 9.0     | Cap Volume Depth (m)    | 0.350 |

|   |   |   |
|---|---|---|
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Porous Car Park Manhole: junction, DS/PN: 24.005

|                                      |         |                  |         |                         |       |
|--------------------------------------|---------|------------------|---------|-------------------------|-------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30    | Slope (1:X)             | 100.0 |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 133.900 | Depression Storage (mm) | 5     |
| Max Percolation (l/s)                | 57.8    | Width (m)        | 16.0    | Evaporation (mm/day)    | 3     |
| Safety Factor                        | 2.0     | Length (m)       | 13.0    | Cap Volume Depth (m)    | 0.350 |

Tank or Pond Manhole: Pond outfall, DS/PN: 5.015

Invert Level (m) 130.000

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|
| 0.000     | 145.0                  | 0.400     | 289.1                  | 0.800     | 482.5                  | 1.200     | 725.2                  | 1.600     | 1017.1                 | 2.000     | 1358.3                 | 2.400     | 0.0                    |
| 0.100     | 176.4                  | 0.500     | 332.8                  | 0.900     | 538.6                  | 1.300     | 793.5                  | 1.700     | 1097.8                 | 2.100     | 1451.3                 | 2.500     | 0.0                    |
| 0.200     | 210.9                  | 0.600     | 379.6                  | 1.000     | 597.7                  | 1.400     | 865.0                  | 1.800     | 1181.5                 | 2.200     | 1547.3                 |           |                        |
| 0.300     | 248.5                  | 0.700     | 429.5                  | 1.100     | 659.9                  | 1.500     | 939.5                  | 1.900     | 1268.4                 | 2.300     | 0.0                    |           |                        |

Deep Bore Soakaway Manhole: IC23, DS/PN: 5.017

|                             |        |                                      |         |
|-----------------------------|--------|--------------------------------------|---------|
| Chamber Invert Level (m)    | 99.566 | Borehole Depth (m)                   | 30.300  |
| Chamber Diameter/Length (m) | 1.200  | Infiltration Coefficient Base (m/hr) | 3.60000 |
| Borehole Diameter (m)       | 0.200  | Safety Factor                        | 2.0     |

| Depth (m) | Infil. Coef. (m/hr) | Depth (m) | Infil. Coef. (m/hr) | Depth (m) | Infil. Coef. (m/hr) | Depth (m) | Infil. Coef. (m/hr) |
|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|
| 0.000     | 0.00000             | 10.900    | 0.00000             | 18.000    | 3.60000             | 30.300    | 3.60000             |

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

Simulation Criteria

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

Number of Input Hydrographs 0    Number of Offline Controls 0    Number of Time/Area Diagrams 0  
Number of Online Controls 1    Number of Storage Structures 22    Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model    FSR M5-60 (mm) 20.000    Cv (Summer) 0.750  
Region England and Wales    Ratio R 0.400    Cv (Winter) 0.840

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

Profile(s)    Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440  
Return Period(s) (years)    1, 30, 100  
Climate Change (%)    0, 40, 40

| PN    | US/MH Name       | Event                        | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m <sup>3</sup> ) | Flow / Overflow Cap. (l/s) | Maximum Vol (m <sup>3</sup> ) | Half Drain Time (mins) | Pipe Flow (l/s) | Status |
|-------|------------------|------------------------------|-----------|-----------------|----------------------|----------------------------------|----------------------------|-------------------------------|------------------------|-----------------|--------|
|       |                  |                              |           |                 |                      |                                  |                            |                               |                        |                 |        |
| 5.000 | permeable paving | 60 minute 1 year Winter I+0% | 135.060   | 134.421         | -0.079               | 0.000                            | 0.10                       | 0.000                         | 27                     | 0.5             | OK     |
| 5.001 | 2.0              | 60 minute 1 year Winter I+0% | 134.930   | 134.356         | -0.066               | 0.000                            | 0.25                       | 0.020                         | 29                     | 2.0             | OK     |
| 6.000 | permeable paving | 60 minute 1 year Winter I+0% | 134.150   | 133.669         | -0.131               | 0.000                            | 0.04                       | 0.082                         | 25                     | 0.6             | OK     |
| 7.000 | permeable paving | 60 minute 1 year Winter I+0% | 135.190   | 134.625         | -0.115               | 0.000                            | 0.11                       | 0.000                         | 27                     | 1.0             | OK     |
| 8.000 | permeable paving | 60 minute 1 year Winter I+0% | 135.240   | 134.688         | -0.102               | 0.000                            | 0.09                       | 0.000                         | 35                     | 1.1             | OK     |
| 8.001 | 1.0              | 60 minute 1 year Winter I+0% | 135.240   | 134.682         | -0.122               | 0.000                            | 0.08                       | 0.169                         |                        | 1.1             | OK     |
| 7.001 | 1.1              | 60 minute 1 year Winter I+0% | 135.190   | 134.605         | -0.104               | 0.000                            | 0.20                       | 0.077                         |                        | 2.0             | OK     |
| 7.002 | permeable paving | 60 minute 1 year Winter I+0% | 135.325   | 134.551         | -0.116               | 0.000                            | 0.11                       | 0.031                         | 24                     | 2.6             | OK     |
| 9.000 | permeable paving | 60 minute 1 year Winter I+0% | 134.450   | 133.911         | -0.139               | 0.000                            | 0.02                       | 0.000                         | 13                     | 0.2             | OK     |

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

| PN     | US/MH Name             | Event                            | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m <sup>3</sup> ) | Flow / Overflow Cap. (l/s) | Maximum Vol (m <sup>3</sup> ) | Half Drain Time (mins) | Pipe Flow (l/s) |
|--------|------------------------|----------------------------------|-----------|-----------------|----------------------|----------------------------------|----------------------------|-------------------------------|------------------------|-----------------|
| 7.003  |                        | 1.3 60 minute 1 year Winter I+0% | 134.550   | 133.860         | -0.118               | 0.000                            | 0.10                       | 0.046                         |                        | 2.8             |
| 5.002  |                        | 1.4 60 minute 1 year Winter I+0% | 134.260   | 133.576         | -0.102               | 0.000                            | 0.22                       | 0.055                         |                        | 5.4             |
| 10.000 |                        | DP5 15 minute 1 year Winter I+0% | 134.400   | 133.319         | -0.131               | 0.000                            | 0.04                       | 0.002                         |                        | 1.3             |
| 10.001 |                        | 3.0 15 minute 1 year Winter I+0% | 134.300   | 133.081         | -0.119               | 0.000                            | 0.09                       | 0.006                         | 6                      | 1.2             |
| 11.000 |                        | DP4 15 minute 1 year Winter I+0% | 134.400   | 133.143         | -0.057               | 0.000                            | 0.39                       | 0.006                         |                        | 2.9             |
| 10.002 | junction               | 15 minute 1 year Winter I+0%     | 134.300   | 133.036         | -0.085               | 0.000                            | 0.38                       | 0.109                         |                        | 4.2             |
| 12.000 |                        | DP3 15 minute 1 year Winter I+0% | 134.400   | 133.121         | -0.079               | 0.000                            | 0.10                       | 0.003                         |                        | 0.8             |
| 10.003 |                        | 3.2 15 minute 1 year Winter I+0% | 134.300   | 133.018         | -0.080               | 0.000                            | 0.44                       | 0.090                         |                        | 6.6             |
| 5.003  |                        | 1.5 15 minute 1 year Winter I+0% | 134.350   | 132.887         | -0.153               | 0.000                            | 0.23                       | 0.077                         | 45                     | 7.1             |
| 13.000 |                        | 4.0 15 minute 1 year Winter I+0% | 134.750   | 133.454         | -0.096               | 0.000                            | 0.27                       | 0.008                         |                        | 5.8             |
| 14.000 | soft landscaping inlet | 60 minute 1 year Winter I+0%     | 134.700   | 134.016         | -0.084               | 0.000                            | 0.06                       | 0.002                         |                        | 0.7             |
| 14.001 | RGarden                | 60 minute 1 year Winter I+0%     | 134.600   | 133.516         | -0.084               | 0.000                            | 0.06                       | 1.586                         | 49                     | 0.8             |
| 13.001 |                        | 4.1 15 minute 1 year Winter I+0% | 134.110   | 132.906         | -0.079               | 0.000                            | 0.45                       | 0.036                         | 7                      | 5.9             |
| 15.000 |                        | DP1 15 minute 1 year Winter I+0% | 134.335   | 133.818         | -0.082               | 0.000                            | 0.07                       | 0.000                         |                        | 0.8             |
| 16.000 | soft landscaping inlet | 60 minute 1 year Winter I+0%     | 134.300   | 133.813         | -0.087               | 0.000                            | 0.04                       | 0.000                         |                        | 0.4             |
| 15.001 |                        | 5.0 15 minute 1 year Winter I+0% | 134.400   | 133.641         | -0.080               | 0.000                            | 0.09                       | 0.005                         | 41                     | 1.1             |
| 17.000 |                        | DP2 15 minute 1 year Winter I+0% | 134.400   | 133.114         | -0.086               | 0.000                            | 0.05                       | 0.000                         |                        | 0.7             |
| 5.004  |                        | 1.6 15 minute 1 year Winter I+0% | 134.283   | 132.777         | -0.130               | 0.000                            | 0.37                       | 0.110                         |                        | 14.5            |
| 18.000 |                        | DP6 15 minute 1 year Winter I+0% | 134.400   | 133.126         | -0.074               | 0.000                            | 0.15                       | 0.000                         |                        | 1.1             |
| 19.000 | Filter drain           | 60 minute 1 year Winter I+0%     | 134.400   | 133.813         | -0.087               | 0.000                            | 0.04                       | 0.004                         | 25                     | 0.5             |
| 19.001 | bend                   | 60 minute 1 year Winter I+0%     | 134.400   | 133.013         | -0.087               | 0.000                            | 0.04                       | 0.002                         |                        | 0.5             |
| 5.005  |                        | 1.7 15 minute 1 year Winter I+0% | 134.336   | 132.597         | -0.157               | 0.000                            | 0.20                       | 0.136                         | 7                      | 15.7            |
| 20.000 |                        | RG 15 minute 1 year Winter I+0%  | 133.601   | 132.311         | -0.090               | 0.000                            | 0.02                       | 0.001                         |                        | 0.3             |
| 5.006  |                        | 1.8 15 minute 1 year Winter I+0% | 133.253   | 132.087         | -0.168               | 0.000                            | 0.14                       | 0.309                         |                        | 16.1            |
| 21.000 |                        | RG 15 minute 1 year Winter I+0%  | 132.800   | 131.227         | -0.073               | 0.000                            | 0.16                       | 0.004                         |                        | 1.4             |
| 5.007  |                        | 1.9 15 minute 1 year Winter I+0% | 132.071   | 130.966         | -0.184               | 0.000                            | 0.31                       | 0.129                         |                        | 17.5            |
| 22.000 |                        | RG 15 minute 1 year Winter I+0%  | 132.500   | 131.070         | -0.130               | 0.000                            | 0.04                       | 0.002                         |                        | 0.7             |
| 5.008  | junction               | 15 minute 1 year Winter I+0%     | 132.120   | 130.945         | -0.172               | 0.000                            | 0.29                       | 0.241                         |                        | 18.1            |
| 23.000 |                        | RG 15 minute 1 year Winter I+0%  | 132.000   | 131.120         | -0.130               | 0.000                            | 0.04                       | 0.002                         |                        | 1.1             |
| 5.009  | junction               | 15 minute 1 year Winter I+0%     | 132.120   | 130.933         | -0.151               | 0.000                            | 0.31                       | 0.311                         |                        | 19.0            |
| 24.000 | dp16                   | 15 minute 1 year Winter I+0%     | 134.400   | 133.754         | -0.046               | 0.000                            | 0.56                       | 0.000                         |                        | 2.2             |
| 24.001 |                        | 6.0 15 minute 1 year Winter I+0% | 134.346   | 133.722         | -0.061               | 0.000                            | 0.32                       | 0.009                         | 6                      | 2.2             |

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

| PN     | US/MH<br>Name          | Status |
|--------|------------------------|--------|
| 7.003  | 1.3                    | OK     |
| 5.002  | 1.4                    | OK     |
| 10.000 | DP5                    | OK     |
| 10.001 | 3.0                    | OK     |
| 11.000 | DP4                    | OK     |
| 10.002 | junction               | OK*    |
| 12.000 | DP3                    | OK     |
| 10.003 | 3.2                    | OK*    |
| 5.003  | 1.5                    | OK     |
| 13.000 | 4.0                    | OK     |
| 14.000 | soft landscaping inlet | OK     |
| 14.001 | RGarden                | OK     |
| 13.001 | 4.1                    | OK     |
| 15.000 | DP1                    | OK     |
| 16.000 | soft landscaping inlet | OK     |
| 15.001 | 5.0                    | OK     |
| 17.000 | DP2                    | OK     |
| 5.004  | 1.6                    | OK     |
| 18.000 | DP6                    | OK     |
| 19.000 | Filter drain           | OK     |
| 19.001 | bend                   | OK     |
| 5.005  | 1.7                    | OK     |
| 20.000 | RG                     | OK     |
| 5.006  | 1.8                    | OK     |
| 21.000 | RG                     | OK     |
| 5.007  | 1.9                    | OK     |
| 22.000 | RG                     | OK     |
| 5.008  | junction               | OK*    |
| 23.000 | RG                     | OK     |
| 5.009  | junction               | OK*    |
| 24.000 | dp16                   | OK     |

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Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



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

| PN     | US/MH<br>Name | Status |
|--------|---------------|--------|
| 24.001 | 6.0           | OK     |

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

| PN     | US/MH Name                      | Event                         | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m <sup>3</sup> ) | Flow / Cap. (l/s) | Overflow (l/s) | Maximum Vol (m <sup>3</sup> ) | Half Drain Time (mins) |
|--------|---------------------------------|-------------------------------|-----------|-----------------|----------------------|----------------------------------|-------------------|----------------|-------------------------------|------------------------|
| 25.000 | inlet from soft landscaped area | 60 minute 1 year Winter I+0%  | 134.309   | 133.721         | -0.079               | 0.000                            | 0.10              |                | 0.003                         |                        |
| 26.000 | DP11                            | 15 minute 1 year Winter I+0%  | 134.400   | 133.628         | -0.072               | 0.000                            | 0.17              |                | 0.000                         |                        |
| 24.002 | 6.1                             | 15 minute 1 year Winter I+0%  | 134.341   | 133.526         | -0.061               | 0.000                            | 0.32              |                | 0.033                         | 7                      |
| 27.000 | RG                              | 15 minute 1 year Winter I+0%  | 134.213   | 133.283         | -0.117               | 0.000                            | 0.11              |                | 0.004                         |                        |
| 28.000 | 8                               | 15 minute 1 year Winter I+0%  | 134.313   | 133.045         | -0.068               | 0.000                            | 0.22              |                | 0.004                         |                        |
| 24.003 | 6.2                             | 15 minute 1 year Winter I+0%  | 134.314   | 133.027         | 0.035                | 0.000                            | 1.08              |                | 0.075                         | 4                      |
| 29.000 | DP9                             | 15 minute 1 year Winter I+0%  | 134.400   | 133.308         | -0.092               | 0.000                            | 0.02              |                | 0.000                         |                        |
| 30.000 | DP8                             | 15 minute 1 year Winter I+0%  | 134.400   | 133.313         | -0.087               | 0.000                            | 0.04              |                | 0.000                         |                        |
| 31.000 | DP7                             | 15 minute 1 year Winter I+0%  | 134.400   | 133.337         | -0.063               | 0.000                            | 0.29              |                | 0.000                         |                        |
| 29.001 | 10                              | 15 minute 1 year Winter I+0%  | 134.400   | 133.173         | -0.069               | 0.000                            | 0.20              |                | 0.021                         | 6                      |
| 32.000 | 9                               | 60 minute 1 year Summer I+0%  | 134.250   | 133.025         | -0.075               | 0.000                            | 0.12              |                | 0.003                         | 7                      |
| 33.000 | DP10                            | 15 minute 1 year Winter I+0%  | 134.400   | 133.318         | -0.082               | 0.000                            | 0.07              |                | 0.000                         |                        |
| 29.002 | 10.1                            | 15 minute 1 year Winter I+0%  | 134.250   | 132.949         | -0.059               | 0.000                            | 0.34              |                | 0.025                         |                        |
| 34.000 | 12                              | 15 minute 1 year Winter I+0%  | 134.150   | 132.871         | -0.079               | 0.000                            | 0.09              |                | 0.002                         |                        |
| 24.004 | 6.3                             | 15 minute 1 year Winter I+0%  | 134.253   | 132.702         | -0.058               | 0.000                            | 0.69              |                | 0.030                         |                        |
| 35.000 | dp17                            | 15 minute 1 year Winter I+0%  | 134.400   | 133.109         | -0.091               | 0.000                            | 0.02              |                | 0.001                         |                        |
| 24.005 | junction                        | 15 minute 1 year Winter I+0%  | 134.400   | 132.651         | -0.058               | 0.000                            | 0.69              |                | 0.126                         | 8                      |
| 36.000 | DP13                            | 15 minute 1 year Winter I+0%  | 134.400   | 133.028         | -0.122               | 0.000                            | 0.08              |                | 0.000                         |                        |
| 36.001 | 11                              | 15 minute 1 year Winter I+0%  | 134.156   | 132.803         | -0.118               | 0.000                            | 0.10              |                | 0.009                         |                        |
| 37.000 | DP14                            | 15 minute 1 year Winter I+0%  | 134.400   | 133.429         | -0.071               | 0.000                            | 0.18              |                | 0.000                         |                        |
| 24.006 | 6.4                             | 15 minute 1 year Winter I+0%  | 134.260   | 132.541         | -0.079               | 0.000                            | 0.45              |                | 0.073                         |                        |
| 38.000 | RG                              | 15 minute 1 year Summer I+0%  | 133.400   | 132.100         | -0.100               | 0.000                            | 0.00              |                | 0.000                         |                        |
| 24.007 | 6.5                             | 15 minute 1 year Winter I+0%  | 133.400   | 131.881         | -0.078               | 0.000                            | 0.46              |                | 0.021                         |                        |
| 39.000 | RG                              | 15 minute 1 year Winter I+0%  | 132.740   | 131.746         | -0.144               | 0.000                            | 0.01              |                | 0.000                         |                        |
| 24.008 | junction                        | 15 minute 1 year Winter I+0%  | 132.740   | 131.399         | -0.082               | 0.000                            | 0.42              |                | 0.076                         |                        |
| 40.000 | RG                              | 15 minute 1 year Winter I+0%  | 132.100   | 131.021         | -0.129               | 0.000                            | 0.05              |                | 0.003                         |                        |
| 5.010  | 1.10                            | 15 minute 1 year Winter I+0%  | 132.200   | 130.927         | -0.135               | 0.000                            | 0.58              |                | 0.300                         |                        |
| 5.011  | 1.11                            | 15 minute 1 year Winter I+0%  | 133.000   | 130.862         | -0.155               | 0.000                            | 0.45              |                | 0.349                         |                        |
| 5.012  | 1.12.2                          | 15 minute 1 year Winter I+0%  | 132.800   | 130.496         | -0.195               | 0.000                            | 0.27              |                | 0.282                         |                        |
| 5.013  | 1.12.4                          | 15 minute 1 year Winter I+0%  | 132.600   | 130.473         | -0.160               | 0.000                            | 0.45              |                | 0.501                         |                        |
| 5.014  | New Pond inlet                  | 15 minute 1 year Winter I+0%  | 132.200   | 130.377         | -0.159               | 0.000                            | 0.45              |                | 0.406                         |                        |
| 5.015  | Pond outfall                    | 480 minute 1 year Winter I+0% | 132.200   | 130.352         | 0.202                | 0.000                            | 0.16              |                | 73.253                        |                        |

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

| PN     | US/MH<br>Name                   | Pipe<br>Flow<br>(l/s) | Status     |
|--------|---------------------------------|-----------------------|------------|
| 25.000 | inlet from soft landscaped area | 0.9                   | OK         |
| 26.000 |                                 | DP11 1.0              | OK         |
| 24.002 |                                 | 6.1 3.7               | OK         |
| 27.000 |                                 | RG 1.8                | OK         |
| 28.000 |                                 | 8 1.2                 | OK         |
| 24.003 |                                 | 6.2 6.3               | SURCHARGED |
| 29.000 |                                 | DP9 0.1               | OK         |
| 30.000 |                                 | DP8 0.4               | OK         |
| 31.000 |                                 | DP7 1.7               | OK         |
| 29.001 |                                 | 10 2.2                | OK         |
| 32.000 |                                 | 9 0.7                 | OK         |
| 33.000 |                                 | DP10 1.0              | OK         |
| 29.002 |                                 | 10.1 3.2              | OK         |
| 34.000 |                                 | 12 0.5                | OK         |
| 24.004 |                                 | 6.3 9.7               | OK         |
| 35.000 |                                 | dp17 0.3              | OK         |
| 24.005 | junction                        | 10.1                  | OK*        |
| 36.000 |                                 | DP13 2.1              | OK         |
| 36.001 |                                 | 11 2.1                | OK         |
| 37.000 |                                 | DP14 1.4              | OK         |
| 24.006 |                                 | 6.4 14.4              | OK         |
| 38.000 |                                 | RG 0.0                | OK         |
| 24.007 |                                 | 6.5 15.1              | OK         |
| 39.000 |                                 | RG 0.3                | OK         |
| 24.008 | junction                        | 15.5                  | OK*        |
| 40.000 |                                 | RG 0.9                | OK         |
| 5.010  |                                 | 1.10 35.1             | OK         |
| 5.011  |                                 | 1.11 33.7             | OK         |
| 5.012  |                                 | 1.12.2 33.7           | OK         |
| 5.013  |                                 | 1.12.4 33.8           | OK         |
| 5.014  | New Pond inlet                  | 33.6                  | OK         |



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

| PN    | US/MH<br>Name | Pipe<br>Flow<br>(l/s) | Status     |
|-------|---------------|-----------------------|------------|
| 5.015 | Pond outfall  | 2.5                   | SURCHARGED |

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

| PN    | US/MH<br>Name | Event                          | US/CL<br>(m) | Water Level<br>(m) | Surcharged Depth<br>(m) | Flooded Volume<br>(m <sup>3</sup> ) | Flow / Cap.<br>(l/s) | Overflow<br>(l/s) | Maximum Vol<br>(m <sup>3</sup> ) | Half Drain Time<br>(mins) | Pipe Flow<br>(l/s) | Status     |
|-------|---------------|--------------------------------|--------------|--------------------|-------------------------|-------------------------------------|----------------------|-------------------|----------------------------------|---------------------------|--------------------|------------|
|       |               |                                |              |                    |                         |                                     |                      |                   |                                  |                           |                    |            |
| 5.016 | IC22          | 480 minute 1 year Winter I+0%  | 132.200      | 130.348            | 0.293                   | 0.000                               | 0.13                 |                   | 0.643                            |                           | 1.6                | SURCHARGED |
| 5.017 | IC23          | 1440 minute 1 year Winter I+0% | 132.400      | 122.457            | -9.493                  | 0.000                               | 0.00                 |                   | 0.719                            | 997                       | 0.0                | OK         |

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

Simulation Criteria

Areal Reduction Factor 1.000    Manhole Headloss Coeff (Global) 0.500    MADD Factor \* 10m³/ha Storage 2.000  
 Hot Start (mins) 0    Foul Sewage per hectare (l/s) 0.000    Inlet Coefficient 0.800  
 Hot Start Level (mm) 0    Additional Flow - % of Total Flow 0.000    Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0    Number of Offline Controls 0    Number of Time/Area Diagrams 0  
 Number of Online Controls 1    Number of Storage Structures 22    Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model    FSR M5-60 (mm) 20.000 Cv (Summer) 0.750  
 Region England and Wales    Ratio R 0.400 Cv (Winter) 0.840

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

Profile(s)    Summer and Winter  
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440  
 Return Period(s) (years)    1, 30, 100  
 Climate Change (%)    0, 40, 40

**WARNING: Half Drain Time has not been calculated as the structure is too full.**

| PN    | US/MH Name       | Event                          | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Overflow Cap. (l/s) | Maximum Vol (m³) | Half Drain Time (mins) | Pipe Flow (l/s) | Status |
|-------|------------------|--------------------------------|-----------|-----------------|----------------------|---------------------|----------------------------|------------------|------------------------|-----------------|--------|
| 5.000 | permeable paving | 60 minute 30 year Winter I+40% | 135.060   | 134.441         | -0.059               | 0.000               | 0.35                       | 0.000            | 28                     | 1.6             | OK     |
| 5.001 | 2.0              | 60 minute 30 year Winter I+40% | 134.930   | 134.392         | -0.030               | 0.000               | 0.84                       | 0.047            | 28                     | 6.7             | OK     |
| 6.000 | permeable paving | 60 minute 30 year Winter I+40% | 134.150   | 133.685         | -0.115               | 0.000               | 0.13                       | 0.291            | 23                     | 2.1             | OK     |
| 7.000 | permeable paving | 60 minute 30 year Winter I+40% | 135.190   | 134.665         | -0.075               | 0.000               | 0.36                       | 0.001            | 27                     | 3.3             | OK     |
| 8.000 | permeable paving | 60 minute 30 year Winter I+40% | 135.240   | 134.723         | -0.067               | 0.000               | 0.30                       | 0.001            | 31                     | 3.5             | OK     |
| 8.001 | 1.0              | 60 minute 30 year Winter I+40% | 135.240   | 134.707         | -0.097               | 0.000               | 0.28                       | 0.218            |                        | 3.5             | OK     |

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

| PN     | US/MH Name             | Event                              | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Overflow Cap. (l/s) | Maximum Vol (m³) | Half Drain Time (mins) | Pipe Flow (l/s) |
|--------|------------------------|------------------------------------|-----------|-----------------|----------------------|---------------------|----------------------------|------------------|------------------------|-----------------|
| 7.001  |                        | 1.1 60 minute 30 year Winter I+40% | 135.190   | 134.650         | -0.059               | 0.000               | 0.68                       | 0.164            |                        | 6.8             |
| 7.002  | permeable paving       | 60 minute 30 year Winter I+40%     | 135.325   | 134.582         | -0.085               | 0.000               | 0.39                       | 0.066            | 29                     | 8.8             |
| 9.000  | permeable paving       | 60 minute 30 year Winter I+40%     | 134.450   | 133.922         | -0.128               | 0.000               | 0.05                       | 0.000            | 28                     | 0.7             |
| 7.003  |                        | 1.3 60 minute 30 year Winter I+40% | 134.550   | 133.889         | -0.089               | 0.000               | 0.35                       | 0.095            |                        | 9.5             |
| 5.002  |                        | 1.4 60 minute 30 year Winter I+40% | 134.260   | 133.627         | -0.051               | 0.000               | 0.77                       | 0.121            |                        | 18.4            |
| 10.000 |                        | DP5 15 minute 30 year Winter I+40% | 134.400   | 133.337         | -0.113               | 0.000               | 0.14                       | 0.005            |                        | 4.3             |
| 10.001 |                        | 3.0 15 minute 30 year Winter I+40% | 134.300   | 133.234         | 0.034                | 0.000               | 0.32                       | 0.051            | 4                      | 4.2             |
| 11.000 |                        | DP4 15 minute 30 year Winter I+40% | 134.400   | 133.354         | 0.154                | 0.000               | 1.28                       | 0.040            |                        | 9.7             |
| 10.002 | junction               | 15 minute 30 year Summer I+40%     | 134.300   | 133.121         | 0.000                | 0.000               | 1.24                       | 0.455            |                        | 13.5            |
| 12.000 |                        | DP3 15 minute 30 year Winter I+40% | 134.400   | 133.181         | -0.019               | 0.000               | 0.32                       | 0.012            |                        | 2.8             |
| 10.003 |                        | 3.2 15 minute 30 year Summer I+40% | 134.300   | 133.098         | 0.000                | 0.000               | 1.45                       | 0.292            |                        | 21.9            |
| 5.003  |                        | 1.5 15 minute 30 year Winter I+40% | 134.350   | 133.010         | -0.030               | 0.000               | 0.76                       | 0.261            | 5                      | 23.6            |
| 13.000 |                        | 4.0 15 minute 30 year Winter I+40% | 134.750   | 133.581         | 0.031                | 0.000               | 0.90                       | 0.028            |                        | 19.4            |
| 14.000 | soft landscaping inlet | 30 minute 30 year Winter I+40%     | 134.700   | 134.031         | -0.069               | 0.000               | 0.22                       | 0.004            |                        | 2.3             |
| 14.001 | RGarden                | 60 minute 30 year Winter I+40%     | 134.600   | 133.535         | -0.065               | 0.000               | 0.27                       | 3.526            | 37                     | 3.5             |
| 13.001 |                        | 4.1 15 minute 30 year Winter I+40% | 134.110   | 133.136         | 0.151                | 0.000               | 1.44                       | 0.326            | 4                      | 18.9            |
| 15.000 |                        | DP1 15 minute 30 year Winter I+40% | 134.335   | 133.834         | -0.066               | 0.000               | 0.25                       | 0.000            |                        | 2.9             |
| 16.000 | soft landscaping inlet | 60 minute 30 year Winter I+40%     | 134.300   | 133.826         | -0.074               | 0.000               | 0.15                       | 0.000            |                        | 1.5             |
| 15.001 |                        | 5.0 30 minute 30 year Winter I+40% | 134.400   | 133.661         | -0.060               | 0.000               | 0.31                       | 0.012            | 40                     | 3.8             |
| 17.000 |                        | DP2 15 minute 30 year Winter I+40% | 134.400   | 133.127         | -0.073               | 0.000               | 0.17                       | 0.000            |                        | 2.4             |
| 5.004  |                        | 1.6 15 minute 30 year Winter I+40% | 134.283   | 132.973         | 0.066                | 0.000               | 1.22                       | 0.894            |                        | 47.4            |
| 18.000 |                        | DP6 15 minute 30 year Winter I+40% | 134.400   | 133.151         | -0.049               | 0.000               | 0.51                       | 0.000            |                        | 3.8             |
| 19.000 | Filter drain           | 60 minute 30 year Winter I+40%     | 134.400   | 133.825         | -0.075               | 0.000               | 0.14                       | 0.014            | 26                     | 1.7             |
| 19.001 | bend                   | 60 minute 30 year Winter I+40%     | 134.400   | 133.025         | -0.075               | 0.000               | 0.14                       | 0.005            |                        | 1.7             |
| 5.005  |                        | 1.7 15 minute 30 year Winter I+40% | 134.336   | 132.662         | -0.092               | 0.000               | 0.64                       | 0.352            | 6                      | 51.3            |
| 20.000 |                        | RG 15 minute 30 year Winter I+40%  | 133.601   | 132.320         | -0.081               | 0.000               | 0.08                       | 0.002            |                        | 1.1             |
| 5.006  |                        | 1.8 15 minute 30 year Winter I+40% | 133.253   | 132.138         | -0.117               | 0.000               | 0.46                       | 0.432            |                        | 52.2            |
| 21.000 |                        | RG 15 minute 30 year Winter I+40%  | 132.800   | 131.576         | 0.276                | 0.000               | 0.53                       | 0.059            |                        | 4.5             |
| 5.007  |                        | 1.9 15 minute 30 year Winter I+40% | 132.071   | 131.558         | 0.408                | 0.000               | 0.98                       | 1.171            |                        | 54.6            |
| 22.000 |                        | RG 15 minute 30 year Winter I+40%  | 132.500   | 131.487         | 0.287                | 0.000               | 0.12                       | 0.069            |                        | 2.2             |
| 5.008  | junction               | 15 minute 30 year Summer I+40%     | 132.120   | 131.117         | 0.000                | 0.000               | 0.88                       | 1.131            |                        | 53.8            |
| 23.000 |                        | RG 15 minute 30 year Winter I+40%  | 132.000   | 131.405         | 0.155                | 0.000               | 0.14                       | 0.048            |                        | 3.5             |

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

| PN     | US/MH<br>Name          | Status      |
|--------|------------------------|-------------|
| 7.001  | 1.1                    | OK          |
| 7.002  | permeable paving       | OK          |
| 9.000  | permeable paving       | OK          |
| 7.003  | 1.3                    | OK          |
| 5.002  | 1.4                    | OK          |
| 10.000 | DP5                    | OK          |
| 10.001 | 3.0                    | SURCHARGED  |
| 11.000 | DP4                    | SURCHARGED  |
| 10.002 | junction               | SURCHARGED* |
| 12.000 | DP3                    | OK          |
| 10.003 | 3.2                    | SURCHARGED* |
| 5.003  | 1.5                    | OK          |
| 13.000 | 4.0                    | SURCHARGED  |
| 14.000 | soft landscaping inlet | OK          |
| 14.001 | RGarden                | OK          |
| 13.001 | 4.1                    | SURCHARGED  |
| 15.000 | DP1                    | OK          |
| 16.000 | soft landscaping inlet | OK          |
| 15.001 | 5.0                    | OK          |
| 17.000 | DP2                    | OK          |
| 5.004  | 1.6                    | SURCHARGED  |
| 18.000 | DP6                    | OK          |
| 19.000 | Filter drain           | OK          |
| 19.001 | bend                   | OK          |
| 5.005  | 1.7                    | OK          |
| 20.000 | RG                     | OK          |
| 5.006  | 1.8                    | OK          |
| 21.000 | RG                     | SURCHARGED  |
| 5.007  | 1.9                    | SURCHARGED  |
| 22.000 | RG                     | SURCHARGED  |
| 5.008  | junction               | SURCHARGED* |

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

| PN     | US/MH<br>Name | Status        |
|--------|---------------|---------------|
| 23.000 |               | RG SURCHARGED |

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

| PN     | US/MH Name                      | Event                           | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Overflow Cap. (l/s) | Maximum Vol (m³) | Half Drain Time (mins) |
|--------|---------------------------------|---------------------------------|-----------|-----------------|----------------------|---------------------|----------------------------|------------------|------------------------|
| 5.009  | junction                        | 15 minute 30 year Summer I+40%  | 132.120   | 131.084         | 0.000                | 0.000               | 0.90                       | 1.116            |                        |
| 24.000 | dp16                            | 15 minute 30 year Winter I+40%  | 134.400   | 133.978         | 0.178                | 0.000               | 1.82                       | 0.002            |                        |
| 24.001 | 6.0                             | 15 minute 30 year Winter I+40%  | 134.346   | 133.933         | 0.150                | 0.000               | 0.89                       | 0.573            | 5                      |
| 25.000 | inlet from soft landscaped area | 30 minute 30 year Winter I+40%  | 134.309   | 133.903         | 0.103                | 0.000               | 0.43                       | 0.031            |                        |
| 26.000 | DP11                            | 15 minute 30 year Winter I+40%  | 134.400   | 133.892         | 0.192                | 0.000               | 0.56                       | 0.002            |                        |
| 24.002 | 6.1                             | 30 minute 30 year Winter I+40%  | 134.341   | 133.883         | 0.296                | 0.000               | 0.67                       | 0.823            | 8                      |
| 27.000 | RG                              | 15 minute 30 year Winter I+40%  | 134.213   | 133.825         | 0.425                | 0.000               | 0.37                       | 0.091            |                        |
| 28.000 | 8                               | 15 minute 30 year Winter I+40%  | 134.313   | 133.821         | 0.708                | 0.000               | 0.69                       | 0.128            |                        |
| 24.003 | 6.2                             | 15 minute 30 year Winter I+40%  | 134.314   | 133.805         | 0.813                | 0.000               | 2.10                       | 1.926            | 7                      |
| 29.000 | DP9                             | 15 minute 30 year Winter I+40%  | 134.400   | 133.504         | 0.104                | 0.000               | 0.06                       | 0.002            |                        |
| 30.000 | DP8                             | 15 minute 30 year Winter I+40%  | 134.400   | 133.506         | 0.106                | 0.000               | 0.14                       | 0.002            |                        |
| 31.000 | DP7                             | 15 minute 30 year Winter I+40%  | 134.400   | 133.583         | 0.183                | 0.000               | 0.98                       | 0.002            |                        |
| 29.001 | 10                              | 15 minute 30 year Winter I+40%  | 134.400   | 133.501         | 0.259                | 0.000               | 0.63                       | 0.261            | 5                      |
| 32.000 | 9                               | 15 minute 30 year Winter I+40%  | 134.250   | 133.482         | 0.382                | 0.000               | 0.67                       | 0.076            | 4                      |
| 33.000 | DP10                            | 15 minute 30 year Winter I+40%  | 134.400   | 133.463         | 0.063                | 0.000               | 0.25                       | 0.001            |                        |
| 29.002 | 10.1                            | 15 minute 30 year Winter I+40%  | 134.250   | 133.447         | 0.439                | 0.000               | 1.11                       | 0.244            |                        |
| 34.000 | 12                              | 15 minute 30 year Winter I+40%  | 134.150   | 133.153         | 0.203                | 0.000               | 0.30                       | 0.047            |                        |
| 24.004 | 6.3                             | 15 minute 30 year Winter I+40%  | 134.253   | 133.140         | 0.380                | 0.000               | 1.51                       | 0.473            |                        |
| 35.000 | dp17                            | 15 minute 30 year Winter I+40%  | 134.400   | 133.117         | -0.083               | 0.000               | 0.07                       | 0.002            |                        |
| 24.005 | junction                        | 15 minute 30 year Winter I+40%  | 134.400   | 133.025         | 0.316                | 0.000               | 1.63                       | 0.584            | 6                      |
| 36.000 | DP13                            | 15 minute 30 year Winter I+40%  | 134.400   | 133.053         | -0.097               | 0.000               | 0.27                       | 0.000            |                        |
| 36.001 | 11                              | 15 minute 30 year Winter I+40%  | 134.156   | 132.856         | -0.065               | 0.000               | 0.34                       | 0.027            |                        |
| 37.000 | DP14                            | 15 minute 30 year Winter I+40%  | 134.400   | 133.458         | -0.042               | 0.000               | 0.63                       | 0.000            |                        |
| 24.006 | 6.4                             | 15 minute 30 year Winter I+40%  | 134.260   | 132.833         | 0.213                | 0.000               | 1.02                       | 0.542            |                        |
| 38.000 | RG                              | 15 minute 30 year Winter I+40%  | 133.400   | 132.163         | -0.037               | 0.000               | 0.01                       | 0.009            |                        |
| 24.007 | 6.5                             | 15 minute 30 year Winter I+40%  | 133.400   | 132.163         | 0.204                | 0.000               | 1.05                       | 0.205            |                        |
| 39.000 | RG                              | 15 minute 30 year Winter I+40%  | 132.740   | 131.757         | -0.133               | 0.000               | 0.03                       | 0.002            |                        |
| 24.008 | junction                        | 15 minute 30 year Summer I+40%  | 132.740   | 131.481         | 0.000                | 0.000               | 0.94                       | 0.419            |                        |
| 40.000 | RG                              | 15 minute 30 year Winter I+40%  | 132.100   | 131.322         | 0.172                | 0.000               | 0.15                       | 0.050            |                        |
| 5.010  | 1.10                            | 15 minute 30 year Winter I+40%  | 132.200   | 131.318         | 0.256                | 0.000               | 1.54                       | 1.103            |                        |
| 5.011  | 1.11                            | 15 minute 30 year Winter I+40%  | 133.000   | 131.186         | 0.169                | 0.000               | 1.21                       | 1.081            |                        |
| 5.012  | 1.12.2                          | 240 minute 30 year Winter I+40% | 132.800   | 131.016         | 0.325                | 0.000               | 0.39                       | 5.226            |                        |

48-50 Scrutton Street  
 London  
 EC2A 4HH

Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



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

| PN     | US/MH Name                      | Pipe Flow (l/s) | Status      |
|--------|---------------------------------|-----------------|-------------|
| 5.009  | junction                        | 55.5            | SURCHARGED* |
| 24.000 |                                 | dp16 7.2        | SURCHARGED  |
| 24.001 |                                 | 6.0 6.2         | SURCHARGED  |
| 25.000 | inlet from soft landscaped area | 3.9             | SURCHARGED  |
| 26.000 |                                 | DP11 3.2        | SURCHARGED  |
| 24.002 |                                 | 6.1 7.6         | SURCHARGED  |
| 27.000 |                                 | RG 5.9          | SURCHARGED  |
| 28.000 |                                 | 8 3.9           | SURCHARGED  |
| 24.003 |                                 | 6.2 12.3        | SURCHARGED  |
| 29.000 |                                 | DP9 0.5         | SURCHARGED  |
| 30.000 |                                 | DP8 1.4         | SURCHARGED  |
| 31.000 |                                 | DP7 5.6         | SURCHARGED  |
| 29.001 |                                 | 10 6.8          | SURCHARGED  |
| 32.000 |                                 | 9 3.7           | SURCHARGED  |
| 33.000 |                                 | DP10 3.4        | SURCHARGED  |
| 29.002 |                                 | 10.1 10.2       | SURCHARGED  |
| 34.000 |                                 | 12 1.7          | SURCHARGED  |
| 24.004 |                                 | 6.3 21.3        | SURCHARGED  |
| 35.000 |                                 | dp17 1.0        | OK          |
| 24.005 | junction                        | 23.7            | SURCHARGED* |
| 36.000 |                                 | DP13 7.2        | OK          |
| 36.001 |                                 | 11 7.1          | OK          |
| 37.000 |                                 | DP14 4.8        | OK          |
| 24.006 |                                 | 6.4 32.7        | SURCHARGED  |
| 38.000 |                                 | RG 0.1          | OK          |
| 24.007 |                                 | 6.5 34.4        | SURCHARGED  |
| 39.000 |                                 | RG 1.2          | OK          |
| 24.008 | junction                        | 34.5            | SURCHARGED* |
| 40.000 |                                 | RG 2.8          | SURCHARGED  |
| 5.010  |                                 | 1.10 92.5       | SURCHARGED  |
| 5.011  |                                 | 1.11 90.7       | SURCHARGED  |



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

| PN    | US/MH<br>Name | Pipe<br>Flow<br>(l/s) | Status     |
|-------|---------------|-----------------------|------------|
| 5.012 |               | 1.12.2 48.4           | SURCHARGED |

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

| PN    | US/MH Name     | Event                            | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Overflow |       |                  | Half Drain Time (mins) | Pipe Flow (l/s) |
|-------|----------------|----------------------------------|-----------|-----------------|----------------------|---------------------|-----------------|-------|------------------|------------------------|-----------------|
|       |                |                                  |           |                 |                      |                     | Cap.            | (l/s) | Maximum Vol (m³) |                        |                 |
| 5.013 | 1.12.4         | 960 minute 30 year Winter I+40%  | 132.600   | 130.952         | 0.319                | 0.000               | 0.24            |       | 1.765            | 18.3                   |                 |
| 5.014 | New Pond inlet | 1440 minute 30 year Winter I+40% | 132.200   | 130.950         | 0.414                | 0.000               | 0.18            |       | 1.751            | 13.4                   |                 |
| 5.015 | Pond outfall   | 1440 minute 30 year Winter I+40% | 132.200   | 130.948         | 0.798                | 0.000               | 0.15            |       | 318.198          | 2.4                    |                 |
| 5.016 | IC22           | 1440 minute 30 year Winter I+40% | 132.200   | 130.952         | 0.897                | 0.000               | 0.14            |       | 1.326            | 1.7                    |                 |
| 5.017 | IC23           | 1440 minute 30 year Winter I+40% | 132.400   | 122.900         | -9.050               | 0.000               | 0.00            |       | 0.733            | 0.0                    |                 |

| PN    | US/MH Name     | Status     |
|-------|----------------|------------|
| 5.013 | 1.12.4         | SURCHARGED |
| 5.014 | New Pond inlet | SURCHARGED |
| 5.015 | Pond outfall   | SURCHARGED |
| 5.016 | IC22           | SURCHARGED |
| 5.017 | IC23           | OK         |

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

Simulation Criteria

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

Number of Input Hydrographs 0    Number of Offline Controls 0    Number of Time/Area Diagrams 0  
Number of Online Controls 1    Number of Storage Structures 22    Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model    FSR M5-60 (mm) 20.000    Cv (Summer) 0.750  
Region England and Wales    Ratio R 0.400    Cv (Winter) 0.840

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

Profile(s)    Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440  
Return Period(s) (years)    1, 30, 100  
Climate Change (%)    0, 40, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

| PN    | US/MH Name       | Event     | US/CL (m) | Water        |           |                          | Surcharged        |                |                               | Flooded     |            |    | Half Drain |  | Pipe |
|-------|------------------|-----------|-----------|--------------|-----------|--------------------------|-------------------|----------------|-------------------------------|-------------|------------|----|------------|--|------|
|       |                  |           |           | Level (m)    | Depth (m) | Volume (m <sup>3</sup> ) | Flow / Cap. (l/s) | Overflow (l/s) | Maximum Vol (m <sup>3</sup> ) | Time (mins) | Flow (l/s) |    |            |  |      |
| 5.000 | permeable paving | 60 minute | 100 year  | Winter I+40% | 135.060   | 134.478                  | -0.022            | 0.000          | 0.46                          |             | 0.001      | 12 | 2.1        |  |      |
| 5.001 | 2.0              | 60 minute | 100 year  | Winter I+40% | 134.930   | 134.460                  | 0.038             | 0.000          | 1.03                          |             | 0.612      | 9  | 8.2        |  |      |
| 6.000 | permeable paving | 60 minute | 100 year  | Winter I+40% | 134.150   | 133.691                  | -0.109            | 0.000          | 0.17                          |             | 0.389      | 23 | 2.8        |  |      |
| 7.000 | permeable paving | 60 minute | 100 year  | Winter I+40% | 135.190   | 134.684                  | -0.056            | 0.000          | 0.47                          |             | 0.001      | 26 | 4.3        |  |      |
| 8.000 | permeable paving | 60 minute | 100 year  | Winter I+40% | 135.240   | 134.737                  | -0.053            | 0.000          | 0.40                          |             | 0.001      | 31 | 4.7        |  |      |
| 8.001 | 1.0              | 60 minute | 100 year  | Winter I+40% | 135.240   | 134.716                  | -0.088            | 0.000          | 0.36                          |             | 0.236      |    | 4.7        |  |      |

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

| PN    | US/MH<br>Name    | Status |
|-------|------------------|--------|
| 5.000 | permeable paving | OK     |
| 5.001 | 2.0 SURCHARGED   |        |
| 6.000 | permeable paving | OK     |
| 7.000 | permeable paving | OK     |
| 8.000 | permeable paving | OK     |
| 8.001 | 1.0              | OK     |

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

| PN     | US/MH Name             | Event                               | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) | Half Drain Time (mins) | Pipe Flow (l/s) |
|--------|------------------------|-------------------------------------|-----------|-----------------|----------------------|---------------------|-------------|----------------|------------------|------------------------|-----------------|
| 7.001  |                        | 1.1 60 minute 100 year Winter I+40% | 135.190   | 134.670         | -0.039               | 0.000               | 0.90        |                | 0.204            |                        | 9.0             |
| 7.002  | permeable paving       | 60 minute 100 year Winter I+40%     | 135.325   | 134.593         | -0.074               | 0.000               | 0.51        |                | 0.078            | 29                     | 11.6            |
| 9.000  | permeable paving       | 60 minute 100 year Winter I+40%     | 134.450   | 133.927         | -0.123               | 0.000               | 0.07        |                | 0.000            | 27                     | 0.9             |
| 7.003  |                        | 1.3 60 minute 100 year Winter I+40% | 134.550   | 133.899         | -0.079               | 0.000               | 0.45        |                | 0.112            |                        | 12.5            |
| 5.002  |                        | 1.4 60 minute 100 year Winter I+40% | 134.260   | 133.646         | -0.032               | 0.000               | 0.98        |                | 0.164            |                        | 23.6            |
| 10.000 |                        | DP5 15 minute 100 year Winter I+40% | 134.400   | 133.432         | -0.018               | 0.000               | 0.17        |                | 0.020            |                        | 5.4             |
| 10.001 |                        | 3.0 15 minute 100 year Winter I+40% | 134.300   | 133.425         | 0.225                | 0.000               | 0.38        |                | 0.111            | 4                      | 5.0             |
| 11.000 |                        | DP4 15 minute 100 year Winter I+40% | 134.400   | 133.605         | 0.405                | 0.000               | 1.61        |                | 0.080            |                        | 12.2            |
| 10.002 | junction               | 15 minute 100 year Summer I+40%     | 134.300   | 133.121         | 0.000                | 0.000               | 1.50        |                | 0.624            |                        | 16.3            |
| 12.000 |                        | DP3 15 minute 100 year Winter I+40% | 134.400   | 133.354         | 0.154                | 0.000               | 0.39        |                | 0.040            |                        | 3.4             |
| 10.003 |                        | 3.2 15 minute 100 year Summer I+40% | 134.300   | 133.098         | 0.000                | 0.000               | 1.74        |                | 0.439            |                        | 26.2            |
| 5.003  |                        | 1.5 15 minute 100 year Winter I+40% | 134.350   | 133.177         | 0.137                | 0.000               | 0.97        |                | 0.554            | 5                      | 30.4            |
| 13.000 |                        | 4.0 15 minute 100 year Winter I+40% | 134.750   | 134.035         | 0.485                | 0.000               | 1.11        |                | 0.100            |                        | 23.8            |
| 14.000 | soft landscaping inlet | 30 minute 100 year Winter I+40%     | 134.700   | 134.036         | -0.064               | 0.000               | 0.28        |                | 0.005            |                        | 3.1             |
| 14.001 | RGarden                | 60 minute 100 year Winter I+40%     | 134.600   | 133.542         | -0.058               | 0.000               | 0.37        |                | 4.178            | 35                     | 4.8             |
| 13.001 |                        | 4.1 15 minute 100 year Winter I+40% | 134.110   | 133.339         | 0.354                | 0.000               | 1.77        |                | 0.616            | 4                      | 23.2            |
| 15.000 |                        | DP1 15 minute 100 year Winter I+40% | 134.335   | 133.839         | -0.061               | 0.000               | 0.32        |                | 0.000            |                        | 3.7             |
| 16.000 | soft landscaping inlet | 60 minute 100 year Winter I+40%     | 134.300   | 133.830         | -0.070               | 0.000               | 0.20        |                | 0.000            |                        | 1.9             |
| 15.001 |                        | 5.0 30 minute 100 year Summer I+40% | 134.400   | 133.668         | -0.053               | 0.000               | 0.40        |                | 0.014            | 41                     | 4.9             |
| 17.000 |                        | DP2 15 minute 100 year Winter I+40% | 134.400   | 133.132         | -0.068               | 0.000               | 0.22        |                | 0.000            |                        | 3.1             |
| 5.004  |                        | 1.6 15 minute 100 year Winter I+40% | 134.283   | 133.099         | 0.192                | 0.000               | 1.52        |                | 1.143            |                        | 59.0            |
| 18.000 |                        | DP6 15 minute 100 year Winter I+40% | 134.400   | 133.160         | -0.040               | 0.000               | 0.66        |                | 0.000            |                        | 5.0             |
| 19.000 | Filter drain           | 60 minute 100 year Winter I+40%     | 134.400   | 133.829         | -0.071               | 0.000               | 0.18        |                | 0.019            | 26                     | 2.3             |
| 19.001 | bend                   | 60 minute 100 year Winter I+40%     | 134.400   | 133.029         | -0.071               | 0.000               | 0.18        |                | 0.006            |                        | 2.3             |
| 5.005  |                        | 1.7 30 minute 100 year Winter I+40% | 134.336   | 132.682         | -0.072               | 0.000               | 0.79        |                | 0.455            | 13                     | 63.2            |
| 20.000 |                        | RG 15 minute 100 year Winter I+40%  | 133.601   | 132.322         | -0.079               | 0.000               | 0.10        |                | 0.003            |                        | 1.4             |
| 5.006  |                        | 1.8 30 minute 100 year Winter I+40% | 133.253   | 132.182         | -0.073               | 0.000               | 0.56        |                | 0.546            |                        | 63.7            |
| 21.000 |                        | RG 30 minute 100 year Winter I+40%  | 132.800   | 131.867         | 0.567                | 0.000               | 0.53        |                | 0.105            |                        | 4.6             |
| 5.007  |                        | 1.9 30 minute 100 year Winter I+40% | 132.071   | 131.855         | 0.705                | 0.000               | 1.17        |                | 1.700            |                        | 65.2            |
| 22.000 |                        | RG 30 minute 100 year Winter I+40%  | 132.500   | 131.783         | 0.583                | 0.000               | 0.13        |                | 0.116            |                        | 2.3             |
| 5.008  | junction               | 15 minute 100 year Summer I+40%     | 132.120   | 131.117         | 0.000                | 0.000               | 1.05        |                | 1.335            |                        | 64.7            |
| 23.000 |                        | RG 30 minute 100 year Winter I+40%  | 132.000   | 131.701         | 0.451                | 0.000               | 0.14        |                | 0.095            |                        | 3.5             |

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Hemel Hempstead Crematorium  
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

| PN     | US/MH<br>Name          | Status      |
|--------|------------------------|-------------|
| 7.001  | 1.1                    | OK          |
| 7.002  | permeable paving       | OK          |
| 9.000  | permeable paving       | OK          |
| 7.003  | 1.3                    | OK          |
| 5.002  | 1.4                    | OK          |
| 10.000 | DP5                    | OK          |
| 10.001 | 3.0                    | SURCHARGED  |
| 11.000 | DP4                    | SURCHARGED  |
| 10.002 | junction               | SURCHARGED* |
| 12.000 | DP3                    | SURCHARGED  |
| 10.003 | 3.2                    | SURCHARGED* |
| 5.003  | 1.5                    | SURCHARGED  |
| 13.000 | 4.0                    | SURCHARGED  |
| 14.000 | soft landscaping inlet | OK          |
| 14.001 | RGarden                | OK          |
| 13.001 | 4.1                    | SURCHARGED  |
| 15.000 | DP1                    | OK          |
| 16.000 | soft landscaping inlet | OK          |
| 15.001 | 5.0                    | OK          |
| 17.000 | DP2                    | OK          |
| 5.004  | 1.6                    | SURCHARGED  |
| 18.000 | DP6                    | OK          |
| 19.000 | Filter drain           | OK          |
| 19.001 | bend                   | OK          |
| 5.005  | 1.7                    | OK          |
| 20.000 | RG                     | OK          |
| 5.006  | 1.8                    | OK          |
| 21.000 | RG                     | SURCHARGED  |
| 5.007  | 1.9                    | FLOOD RISK  |
| 22.000 | RG                     | SURCHARGED  |
| 5.008  | junction               | SURCHARGED* |

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

| PN     | US/MH<br>Name | Status        |
|--------|---------------|---------------|
| 23.000 |               | RG FLOOD RISK |

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

| PN     | US/MH Name                      | Event                            | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Overflow Cap. (l/s) | Maximum Vol (m³) |
|--------|---------------------------------|----------------------------------|-----------|-----------------|----------------------|---------------------|----------------------------|------------------|
| 5.009  | junction                        | 15 minute 100 year Summer I+40%  | 132.120   | 131.084         | 0.000                | 0.000               | 1.09                       | 1.319            |
| 24.000 | dp16                            | 15 minute 100 year Winter I+40%  | 134.400   | 134.064         | 0.264                | 0.000               | 2.41                       | 0.003            |
| 24.001 | 6.0                             | 15 minute 100 year Winter I+40%  | 134.346   | 133.976         | 0.193                | 0.000               | 0.91                       | 1.232            |
| 25.000 | inlet from soft landscaped area | 60 minute 100 year Winter I+40%  | 134.309   | 133.991         | 0.191                | 0.000               | 0.45                       | 0.045            |
| 26.000 | DP11                            | 60 minute 100 year Winter I+40%  | 134.400   | 133.951         | 0.251                | 0.000               | 0.39                       | 0.003            |
| 24.002 | 6.1                             | 60 minute 100 year Winter I+40%  | 134.341   | 133.947         | 0.360                | 0.000               | 0.70                       | 3.240            |
| 27.000 | RG                              | 30 minute 100 year Winter I+40%  | 134.213   | 133.894         | 0.494                | 0.000               | 0.46                       | 0.102            |
| 28.000 | 8                               | 15 minute 100 year Winter I+40%  | 134.313   | 133.899         | 0.786                | 0.000               | 0.93                       | 0.140            |
| 24.003 | 6.2                             | 30 minute 100 year Winter I+40%  | 134.314   | 133.881         | 0.889                | 0.000               | 2.17                       | 5.317            |
| 29.000 | DP9                             | 15 minute 100 year Winter I+40%  | 134.400   | 133.918         | 0.518                | 0.000               | 0.07                       | 0.005            |
| 30.000 | DP8                             | 15 minute 100 year Winter I+40%  | 134.400   | 133.921         | 0.521                | 0.000               | 0.16                       | 0.005            |
| 31.000 | DP7                             | 15 minute 100 year Winter I+40%  | 134.400   | 134.104         | 0.704                | 0.000               | 1.10                       | 0.006            |
| 29.001 | 10                              | 15 minute 100 year Winter I+40%  | 134.400   | 133.915         | 0.673                | 0.000               | 0.70                       | 0.362            |
| 32.000 | 9                               | 15 minute 100 year Winter I+40%  | 134.250   | 133.810         | 0.710                | 0.000               | 1.44                       | 0.847            |
| 33.000 | DP10                            | 15 minute 100 year Winter I+40%  | 134.400   | 133.830         | 0.430                | 0.000               | 0.29                       | 0.004            |
| 29.002 | 10.1                            | 15 minute 100 year Winter I+40%  | 134.250   | 133.806         | 0.798                | 0.000               | 1.21                       | 0.301            |
| 34.000 | 12                              | 15 minute 100 year Winter I+40%  | 134.150   | 133.522         | 0.572                | 0.000               | 0.34                       | 0.106            |
| 24.004 | 6.3                             | 15 minute 100 year Winter I+40%  | 134.253   | 133.502         | 0.742                | 0.000               | 1.54                       | 0.531            |
| 35.000 | dp17                            | 15 minute 100 year Winter I+40%  | 134.400   | 133.419         | 0.219                | 0.000               | 0.10                       | 0.050            |
| 24.005 | junction                        | 15 minute 100 year Winter I+40%  | 134.400   | 133.412         | 0.703                | 0.000               | 1.77                       | 0.984            |
| 36.000 | DP13                            | 15 minute 100 year Winter I+40%  | 134.400   | 133.306         | 0.156                | 0.000               | 0.35                       | 0.002            |
| 36.001 | 11                              | 15 minute 100 year Winter I+40%  | 134.156   | 133.286         | 0.365                | 0.000               | 0.40                       | 0.210            |
| 37.000 | DP14                            | 15 minute 100 year Winter I+40%  | 134.400   | 133.470         | -0.030               | 0.000               | 0.82                       | 0.001            |
| 24.006 | 6.4                             | 15 minute 100 year Winter I+40%  | 134.260   | 133.255         | 0.635                | 0.000               | 1.10                       | 0.648            |
| 38.000 | RG                              | 15 minute 100 year Winter I+40%  | 133.400   | 132.489         | 0.289                | 0.000               | 0.02                       | 0.061            |
| 24.007 | 6.5                             | 15 minute 100 year Winter I+40%  | 133.400   | 132.489         | 0.530                | 0.000               | 1.12                       | 0.409            |
| 39.000 | RG                              | 30 minute 100 year Winter I+40%  | 132.740   | 131.960         | 0.070                | 0.000               | 0.03                       | 0.034            |
| 24.008 | junction                        | 15 minute 100 year Summer I+40%  | 132.740   | 131.481         | 0.000                | 0.000               | 0.96                       | 0.796            |
| 40.000 | RG                              | 30 minute 100 year Winter I+40%  | 132.100   | 131.618         | 0.468                | 0.000               | 0.15                       | 0.097            |
| 5.010  | 1.10                            | 30 minute 100 year Winter I+40%  | 132.200   | 131.615         | 0.553                | 0.000               | 1.71                       | 1.476            |
| 5.011  | 1.11                            | 30 minute 100 year Winter I+40%  | 133.000   | 131.455         | 0.438                | 0.000               | 1.35                       | 1.386            |
| 5.012  | 1.12.2                          | 360 minute 100 year Winter I+40% | 132.800   | 131.202         | 0.511                | 0.000               | 0.38                       | 5.442            |



48-50 Scrutton Street  
 London  
 EC2A 4HH

Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



Date 03/03/2021  
 File microdrainage model.MDX

Designed by GB/GP-D  
 Checked by

Innovyze

Network 2020.1

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

| PN     | US/MH Name                      | Half Drain Time (mins) | Pipe Flow (l/s) | Status      |
|--------|---------------------------------|------------------------|-----------------|-------------|
| 5.009  | junction                        |                        | 66.6            | SURCHARGED* |
| 24.000 | dp16                            |                        | 9.5             | SURCHARGED  |
| 24.001 | 6.0                             | 8                      | 6.3             | SURCHARGED  |
| 25.000 | inlet from soft landscaped area |                        | 4.1             | SURCHARGED  |
| 26.000 | DP11                            |                        | 2.2             | SURCHARGED  |
| 24.002 | 6.1                             | 18                     | 8.1             | SURCHARGED  |
| 27.000 | RG                              |                        | 7.4             | SURCHARGED  |
| 28.000 | 8                               |                        | 5.3             | SURCHARGED  |
| 24.003 | 6.2                             | 17                     | 12.7            | SURCHARGED  |
| 29.000 | DP9                             |                        | 0.6             | SURCHARGED  |
| 30.000 | DP8                             |                        | 1.7             | SURCHARGED  |
| 31.000 | DP7                             |                        | 6.3             | FLOOD RISK  |
| 29.001 | 10                              | 8                      | 7.5             | SURCHARGED  |
| 32.000 | 9                               | 4                      | 8.1             | SURCHARGED  |
| 33.000 | DP10                            |                        | 4.0             | SURCHARGED  |
| 29.002 | 10.1                            |                        | 11.2            | SURCHARGED  |
| 34.000 | 12                              |                        | 2.0             | SURCHARGED  |
| 24.004 | 6.3                             |                        | 21.7            | SURCHARGED  |
| 35.000 | dp17                            |                        | 1.5             | SURCHARGED  |
| 24.005 | junction                        | 8                      | 25.8            | SURCHARGED* |
| 36.000 | DP13                            |                        | 9.3             | SURCHARGED  |
| 36.001 | 11                              |                        | 8.4             | SURCHARGED  |
| 37.000 | DP14                            |                        | 6.2             | OK          |
| 24.006 | 6.4                             |                        | 35.3            | SURCHARGED  |
| 38.000 | RG                              |                        | 0.2             | SURCHARGED  |
| 24.007 | 6.5                             |                        | 36.8            | SURCHARGED  |
| 39.000 | RG                              |                        | 1.2             | SURCHARGED  |
| 24.008 | junction                        |                        | 35.4            | SURCHARGED* |
| 40.000 | RG                              |                        | 2.9             | SURCHARGED  |
| 5.010  | 1.10                            |                        | 102.5           | SURCHARGED  |
| 5.011  | 1.11                            |                        | 101.1           | SURCHARGED  |

48-50 Scrutton Street  
 London  
 EC2A 4HH

Hemel Hempstead Crematorium  
 Surface Water Drainage  
 1 in 100yr plus 40% cc



Date 03/03/2021  
 File microdrainage model.MDX

Designed by GB/GP-D  
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Innovyze

Network 2020.1

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

| PN    | US/MH<br>Name | Half Drain<br>Time<br>(mins) | Pipe<br>Flow<br>(l/s) | Status     |
|-------|---------------|------------------------------|-----------------------|------------|
| 5.012 |               | 1.12.2                       | 47.1                  | SURCHARGED |

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 Surface Water Drainage  
 1 in 100yr plus 40% cc



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

| PN    | US/MH<br>Name  | Event       | US/CL<br>(m) | Water<br>Level<br>(m) | Surcharged<br>Depth<br>(m) | Flooded<br>Volume<br>(m³) | Flow /<br>Cap. | Overflow<br>(l/s) | Maximum<br>Vol (m³) | Half Drain<br>Time<br>(mins) | Pipe<br>Flow<br>(l/s) |
|-------|----------------|-------------|--------------|-----------------------|----------------------------|---------------------------|----------------|-------------------|---------------------|------------------------------|-----------------------|
|       |                |             |              |                       |                            |                           |                |                   |                     |                              |                       |
| 5.013 | 1.12.4         | 1440 minute | 132.600      | 131.133               | 0.500                      | 0.000                     | 0.22           |                   | 1.969               |                              | 16.6                  |
| 5.014 | New Pond inlet | 1440 minute | 132.200      | 131.131               | 0.595                      | 0.000                     | 0.22           |                   | 1.955               |                              | 16.6                  |
| 5.015 | Pond outfall   | 1440 minute | 132.200      | 131.129               | 0.979                      | 0.000                     | 0.16           |                   | 430.619             |                              | 2.5                   |
| 5.016 | IC22           | 1440 minute | 132.200      | 131.128               | 1.073                      | 0.000                     | 0.15           |                   | 1.526               |                              | 1.8                   |
| 5.017 | IC23           | 1440 minute | 132.400      | 123.304               | -8.646                     | 0.000                     | 0.00           |                   | 0.746               |                              | 0.0                   |

| PN    | US/MH<br>Name  | Status     |
|-------|----------------|------------|
| 5.013 | 1.12.4         | SURCHARGED |
| 5.014 | New Pond inlet | SURCHARGED |
| 5.015 | Pond outfall   | SURCHARGED |
| 5.016 | IC22           | SURCHARGED |
| 5.017 | IC23           | OK         |

**APPENDIX G – WATER QUALITY CALCULATIONS**

| Water Quality Assessment - Proposed carpark area   |   | DESIGN CONDITIONS   |  |   |   |
|--|---|---|--|---|---|
|  |   | 1   | 2  | 3 | 4 |
| <b>Land Use Type</b><br><b>Pollution Hazard Level</b><br><b>Pollution Hazard Indices</b><br><b>TSS</b><br><b>Metals</b><br><b>Hydrocarbons</b> | Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)<br>Medium<br>0.7<br>0.6<br>0.7 |   |  |   |   |
| <b>SuDS components proposed</b>  |   |   |  |   |   |
| <b>Component 1</b>   | Pervious pavement (where the pavement is not designed as an infiltration component)   | SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B   |  |   |   |
| <b>Component 2</b>   | Pond or wetland   | SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B   | Ponds/wetlands should be preceded by an upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events |   |   |
| <b>Component 3</b>   | None  |   |  |   |   |
| <b>SuDS Pollution Mitigation Indices</b>   |   |   |  |   |   |
| <b>TSS</b>   | >0.95   | 0.95  |  |   |   |
| <b>Metals</b>  |   | 0.95  |  |   |   |
| <b>Hydrocarbons</b>  |   | 0.95  |  |   |   |
| <b>Groundwater protection type</b>   | None  |   |  |   |   |
| <b>Groundwater protection Pollution Mitigation Indices</b>   |   |   |  |   |   |
| <b>TSS</b>   | 0   |   |  |   |   |
| <b>Metals</b>  | 0   |   |  |   |   |
| <b>Hydrocarbons</b>  | 0   |   |  |   |   |
| <b>Combined Pollution Mitigation Indices</b>   |   |   |  |   |   |
| <b>TSS</b>   | >0.95   | 0.95  |  |   |   |
| <b>Metals</b>  |   | 0.95  |  |   |   |
| <b>Hydrocarbons</b>  |   | 0.95  |  |   |   |
| <b>Acceptability of Pollution Mitigation</b>   |   | Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England |  |   |   |
| <b>TSS</b>   | Sufficient  |   |  |   |   |
| <b>Metals</b>  | Sufficient  |   |  |   |   |
| <b>Hydrocarbons</b>  | Sufficient  |   |  |   |   |

**SuDS Quality Assessment - Ring road and building roof runoff**

**DESIGN CONDITIONS**

|   |  | 1   | 2  | 3 | 4 |
|---|--|---|--|---|---|
| <b>Land Use Type</b><br>Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)  |  |   |  |   |   |
| <b>Pollution Hazard Level</b><br>Low<br><b>Pollution Hazard Indices</b><br>TSS 0.5<br>Metals 0.4<br>Hydrocarbons 0.4  |  |   |  |   |   |
| <b>SuDS components proposed</b>   |  |   |  |   |   |
| <b>Component 1</b><br>Pond or wetland   |  | SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B   | Ponds/wetlands should be preceded by an upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events |   |   |
| <b>Component 2</b><br>None  |  |   |  |   |   |
| <b>Component 3</b><br>None  |  |   |  |   |   |
| <b>SuDS Pollution Mitigation Indices</b><br>TSS 0.7<br>Metals 0.7<br>Hydrocarbons 0.5   |  |   |  |   |   |
| <b>Groundwater protection type</b><br>None<br><b>Groundwater protection Pollution Mitigation Indices</b><br>TSS 0<br>Metals 0<br>Hydrocarbons 0   |  |   |  |   |   |
| <b>Combined Pollution Mitigation Indices</b><br>TSS 0.7<br>Metals 0.7<br>Hydrocarbons 0.5<br><b>Acceptability of Pollution Mitigation</b><br>TSS Sufficient<br>Metals Sufficient<br>Hydrocarbons Sufficient |  | 0.7 Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England |  |   |   |

**APPENDIX H – KLARGESTER BIOFICIENT CERTIFICATE**



Prüfinstitut für  
Abwassertechnik  
GmbH

# PERFORMANCE RESULTS

**Kingspan Environmental Limited**  
College Road North, HP22 5EW Aylesbury  
United Kingdom

## EN 12566-3

Results corresponding to the Irish National Annex for IS EN 12566-3  
**Small wastewater treatment system Bio-Ficient**  
Fluidized bed reactor

|  |                            |                   |            |          |
|--|----------------------------|-------------------|------------|----------|
| Nominal organic daily load*              | 0.23                       | kg/d              |            |          |
| Nominal hydraulic daily load             | 0.60                       | m <sup>3</sup> /d |            |          |
| Material                                 | polyethylene (PE)          |                   |            |          |
| Watertightness (water test)              | pass                       |                   |            |          |
| Crushing resistance (pit test)           | pass (also wet conditions) |                   |            |          |
| Durability                               | pass                       |                   |            |          |
| Treatment efficiency (nominal sequences) |                            |                   | Efficiency | Effluent |
|  | COD                        |                   | 90.6 %     | 67 mg/l  |
|  | BOD <sub>5</sub>           |                   | 94.4 %     | 20 mg/l  |
|  | NH <sub>4</sub> -N**       |                   | 99.0 %     | 0.4 mg/l |
|  | SS                         |                   | 92.7 %     | 27 mg/l  |
| Electrical consumption                   | 0.52                       | kWh/d             |            |          |

\* at a test influent of  $\geq 300$  mg/l BOD<sub>5</sub> (mean)  
\*\* determined for temperatures  $\geq 12^\circ\text{C}$  in the bioreactor

Performance tested by:

**PIA – Prüfinstitut für Abwassertechnik GmbH**  
(PIA GmbH)  
Hergenrather Weg 30  
D-52074 Aachen

This document replaces neither the declaration  
of conformity nor the CE marking



Notified Body  
number 1739:



Certified according to  
ISO 9001:2008



Prüfinstitut für Abwassertechnik GmbH

*Elmar Lancé*  
geprüft - tested - testé

Elmar Lancé

March 2014