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# **Pound Fields, London Road, Hitchin**

## **Surface Water Drainage Strategy**

# Preface

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Project  
Information

Surface Water Drainage Strategy

For application for approval of reserved matters relating to Phases 2 & 3 being appearance, landscaping, layout and scale pursuant to planning permission 21/00434/HYA for the erection of 48 dwellings and associated works

Property Address

Pound Fields  
London Road  
Hitchin  
SG4 7NE

| Issue | Issue Date | Contributors | Issue Notes |
|-------|------------|--------------|-------------|
| 1     | 16/12/2024 | NG           | First Issue |
|       |            |              |             |
|       |            |              |             |
|       |            |              |             |

Prepared by

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| 3 | Conclusion                      | 7 |

Appendix A – Phase 1 Drainage Strategy

Appendix B – Phase 2 & 3 Drainage Strategy

Appendix C – Terms & Definitions

# 1 Introduction

- 1.1 Elivia Homes Limited have instructed to prepare a surface water drainage strategy for phases 2 and 3 on the development at Pound Fields, London Road, Hitchin.
- 1.2 Planning condition 14 has been discharged for phase 1 of the development.

## 2 Surface Water Drainage Strategy

- 2.1 The drainage strategy for phase 1 is detailed on drawing E22-032-177. As the strategy for phase 1 involved the surface water drainage passing through phases 2 and 3, the principle for the drainage strategy used has been agreed by the L.L.F.A. However, the drained areas etc. are based on a notional architects layout for phases 2 and 3.
- 2.2 Drawing E22-032-506 is based on the phase 1 drainage strategy but updated to suit the architects planning layout 24113-P101B.
- 2.3 The result of the new plan layout, the impermeable has nominally increased by 255 sqm. However, by increasing the diameter of some of the manholes, the 1 in 100 year plus climate change water level in the infiltration basin remains the same at 70.653 m A.O.D.

### 3 Conclusion

- 3.1 The strategy based on the principles of phase 1 still applies to phase 2 and 3. Detailed design drawings and calculation to be provided to clear condition 14 for phases 2 and 3 to follow in due course.

## Appendix A – Phase 1 Drainage Strategy

A.1 Drg. E22-032-177



## **Appendix B – Phase 2 & 3 Drainage Strategy**

**B.1 Drg. E22-032-506**

**B.2 Micro Drainage Calculations**





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**MICRODRAINAGE SURFACE WATER  
DRAINAGE CALCULATIONS**

**For**

**Application for approval of reserved matters relating to Phases 2 and 3 being  
appearance, landscaping layout and scale pursuant to planning permission  
21/00434/HYA for the erection of 48 dwellings and associated works**

**At**

**POUND FIELDS LONDON ROAD, HITCHIN**

**Project: E22-032**  
**Date: December 2024**  
**Author: Nigel Jones**  
**Status: Planning**  
**Revision: Fifth Issue**

## **APPENDIX**

MICRODRAINAGE NETWORK CALCULATIONS –

NETWORK DETAILS

2 YEAR RETURN PERIOD

10 YEAR RETURN PERIOD

30 YEAR RETURN PERIOD

100 YEAR RETURN PERIOD + 40% CLIMATE CHANGE

## **MICRODRAINAGE NETWORK CALCULATIONS**

## NETWORK DETAILS

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

|                                       |                           |       |
|---------------------------------------|---------------------------|-------|
| FEH Rainfall Model                    |                           |       |
| Return Period (years)                 |                           | 100   |
| FEH Rainfall Version                  |                           | 2013  |
| Site Location                         | GB 519261 227584 TL 19261 | 27584 |
| Data Type                             |                           | Point |
| Maximum Rainfall (mm/hr)              |                           | 50    |
| Maximum Time of Concentration (mins)  |                           | 30    |
| Foul Sewage (l/s/ha)                  |                           | 0.000 |
| Volumetric Runoff Coeff.              |                           | 0.750 |
| PIMP (%)                              |                           | 100   |
| Add Flow / Climate Change (%)         |                           | 0     |
| Minimum Backdrop Height (m)           |                           | 0.200 |
| Maximum Backdrop Height (m)           |                           | 1.500 |
| Min Design Depth for Optimisation (m) |                           | 1.200 |
| Min Vel for Auto Design only (m/s)    |                           | 1.00  |
| Min Slope for Optimisation (1:X)      |                           | 500   |

Designed with Level Soffits

Time Area Diagram for Storm

| Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 0-4         | 0.000     | 4-8         | 0.170     | 8-12        | 1.112     | 12-16       | 0.257     | 16-20       | 0.082     | 20-24       | 0.058     | 24-28       | 0.011     |

Total Area Contributing (ha) = 1.689

Total Pipe Volume (m³) = 652.899

Network Design Table for Storm

« - Indicates pipe capacity < flow

| PN    | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | n     | HYD SECT | DIA (mm) | Section Type    | Auto Design                                                                           |
|-------|------------|----------|-------------|-------------|-------------|-----------------|--------|-------|----------|----------|-----------------|---------------------------------------------------------------------------------------|
| 1.000 | 60.000     | 0.370    | 162.2       | 0.080       | 10.00       | 0.0             |        | 0.030 | → ↓ →    |          | Porous Car Park |  |
| 1.001 | 0.500      | 0.005    | 100.0       | 0.000       | 0.00        | 0.0             | 0.600  |       | o        | 150      | Pipe/Conduit    |  |
| 1.002 | 16.000     | 0.500    | 32.0        | 0.016       | 0.00        | 0.0             |        | 0.030 | → ↓ →    |          | Porous Car Park |  |
| 1.003 | 0.500      | 0.005    | 100.0       | 0.000       | 0.00        | 0.0             | 0.600  |       | o        | 150      | Pipe/Conduit    |  |
| 1.004 | 20.700     | 0.125    | 165.6       | 0.045       | 0.00        | 0.0             |        | 0.030 | → ↓ →    |          | Porous Car Park |  |
| 1.005 | 0.500      | 0.005    | 100.0       | 0.000       | 0.00        | 0.0             | 0.600  |       | o        | 150      | Pipe/Conduit    |  |

Network Results Table

| PN    | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | E Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|-------|--------------|-------------|-----------|---------------|-------------------|------------|----------------|-----------|-----------|------------|
| 1.000 | 50.00        | 12.20       | 77.250    | 0.080         | 0.0               | 0.0        | 0.0            | 0.45      | 349.7     | 10.8       |
| 1.001 | 50.00        | 12.21       | 76.880    | 0.080         | 0.0               | 0.0        | 0.0            | 1.00      | 17.8      | 10.8       |
| 1.002 | 50.00        | 12.45       | 76.380    | 0.096         | 0.0               | 0.0        | 0.0            | 1.13      | 1152.3    | 13.0       |
| 1.003 | 50.00        | 12.46       | 75.880    | 0.096         | 0.0               | 0.0        | 0.0            | 1.00      | 17.8      | 13.0       |
| 1.004 | 50.00        | 13.19       | 75.435    | 0.141         | 0.0               | 0.0        | 0.0            | 0.47      | 436.5     | 19.1       |
| 1.005 | 50.00        | 13.20       | 75.310    | 0.141         | 0.0               | 0.0        | 0.0            | 1.00      | 17.8«     | 19.1       |

Network Design Table for Storm

| PN    | Length<br>(m) | Fall<br>(m) | Slope<br>(1:X) | I.Area<br>(ha) | T.E.<br>(mins) | Base<br>Flow (l/s) | k<br>(mm) | n     | HYD<br>SECT | DIA<br>(mm) | Section Type    | Auto<br>Design                                                                        |
|-------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------|-------------|-------------|-----------------|---------------------------------------------------------------------------------------|
| 2.000 | 46.444        | 0.200       | 232.2          | 0.187          | 15.00          | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |    |
| 1.006 | 13.800        | 0.200       | 69.0           | 0.024          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |    |
| 1.007 | 16.100        | 0.200       | 80.5           | 0.000          | 0.00           | 0.0                | 0.600     |       | o           | 225         | Pipe/Conduit    |    |
| 1.008 | 11.800        | 0.350       | 33.7           | 0.000          | 0.00           | 0.0                | 0.600     |       | o           | 225         | Pipe/Conduit    |    |
| 3.000 | 20.300        | 0.475       | 42.7           | 0.053          | 5.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |    |
| 3.001 | 17.620        | 0.050       | 352.4          | 0.026          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |    |
| 3.002 | 32.223        | 1.275       | 25.3           | 0.112          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |    |
| 1.009 | 40.610        | 1.100       | 36.9           | 0.044          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |    |
| 1.010 | 9.340         | 0.550       | 17.0           | 0.010          | 0.00           | 0.0                | 0.600     |       | o           | 225         | Pipe/Conduit    |    |
| 4.000 | 22.800        | 0.135       | 168.9          | 0.034          | 5.00           | 0.0                | 0.600     |       | o           | 225         | Pipe/Conduit    |    |
| 4.001 | 7.860         | 0.045       | 174.7          | 0.092          | 0.00           | 0.0                | 0.600     |       | o           | 225         | Pipe/Conduit    |    |
| 5.000 | 20.159        | 0.120       | 168.0          | 0.045          | 5.00           | 0.0                | 0.600     |       | o           | 225         | Pipe/Conduit    |    |
| 6.000 | 8.300         | 0.140       | 59.3           | 0.043          | 5.00           | 0.0                | 0.600     |       | o           | 150         | Pipe/Conduit    |    |
| 6.001 | 32.010        | 0.190       | 168.5          | 0.121          | 0.00           | 0.0                | 0.600     |       | o           | 300         | Pipe/Conduit    |   |
| 5.001 | 19.894        | 0.115       | 173.0          | 0.043          | 0.00           | 0.0                | 0.600     |       | o           | 300         | Pipe/Conduit    |  |
| 5.002 | 10.556        | 0.060       | 175.9          | 0.022          | 0.00           | 0.0                | 0.600     |       | o           | 300         | Pipe/Conduit    |  |
| 1.011 | 37.090        | 1.850       | 20.0           | 0.025          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |  |
| 1.012 | 12.330        | 0.250       | 49.3           | 0.048          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |  |
| 7.000 | 27.478        | 1.000       | 27.5           | 0.041          | 5.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |  |

Network Results Table

| PN    | Rain<br>(mm/hr) | T.C.<br>(mins) | US/IL<br>(m) | Σ I.Area<br>(ha) | Σ Base<br>Flow (l/s) | Foul<br>(l/s) | Add Flow<br>(l/s) | Vel<br>(m/s) | Cap<br>(l/s) | Flow<br>(l/s) |
|-------|-----------------|----------------|--------------|------------------|----------------------|---------------|-------------------|--------------|--------------|---------------|
| 2.000 | 50.00           | 17.06          | 75.350       | 0.187            | 0.0                  | 0.0           | 0.0               | 0.38         | 320.1        | 25.3          |
| 1.006 | 50.00           | 17.38          | 75.150       | 0.352            | 0.0                  | 0.0           | 0.0               | 0.72         | 666.7        | 47.7          |
| 1.007 | 50.00           | 17.57          | 74.950       | 0.352            | 0.0                  | 0.0           | 0.0               | 1.46         | 58.0         | 47.7          |
| 1.008 | 50.00           | 17.65          | 74.750       | 0.352            | 0.0                  | 0.0           | 0.0               | 2.26         | 89.9         | 47.7          |
| 3.000 | 50.00           | 5.36           | 75.900       | 0.053            | 0.0                  | 0.0           | 0.0               | 0.94         | 890.0        | 7.2           |
| 3.001 | 50.00           | 6.25           | 75.425       | 0.079            | 0.0                  | 0.0           | 0.0               | 0.33         | 323.0        | 10.7          |
| 3.002 | 50.00           | 6.67           | 75.375       | 0.191            | 0.0                  | 0.0           | 0.0               | 1.29         | 1347.1       | 25.9          |
| 1.009 | 50.00           | 18.26          | 74.100       | 0.587            | 0.0                  | 0.0           | 0.0               | 1.12         | 1265.6       | 79.5          |
| 1.010 | 50.00           | 18.31          | 73.000       | 0.597            | 0.0                  | 0.0           | 0.0               | 3.19         | 126.9        | 80.8          |
| 4.000 | 50.00           | 5.38           | 72.630       | 0.034            | 0.0                  | 0.0           | 0.0               | 1.00         | 39.9         | 4.6           |
| 4.001 | 50.00           | 5.51           | 72.495       | 0.126            | 0.0                  | 0.0           | 0.0               | 0.99         | 39.2         | 17.1          |
| 5.000 | 50.00           | 5.33           | 72.745       | 0.045            | 0.0                  | 0.0           | 0.0               | 1.01         | 40.0         | 6.1           |
| 6.000 | 50.00           | 5.11           | 73.030       | 0.043            | 0.0                  | 0.0           | 0.0               | 1.31         | 23.1         | 5.8           |
| 6.001 | 50.00           | 5.55           | 72.815       | 0.164            | 0.0                  | 0.0           | 0.0               | 1.21         | 85.4         | 22.2          |
| 5.001 | 50.00           | 5.83           | 72.625       | 0.252            | 0.0                  | 0.0           | 0.0               | 1.19         | 84.3         | 34.1          |
| 5.002 | 50.00           | 5.97           | 72.510       | 0.274            | 0.0                  | 0.0           | 0.0               | 1.18         | 83.6         | 37.1          |
| 1.011 | 50.00           | 18.73          | 72.450       | 1.022            | 0.0                  | 0.0           | 0.0               | 1.46         | 1536.5       | 138.4         |
| 1.012 | 50.00           | 18.98          | 70.600       | 1.070            | 0.0                  | 0.0           | 0.0               | 0.84         | 746.2        | 144.9         |
| 7.000 | 50.00           | 5.37           | 75.200       | 0.041            | 0.0                  | 0.0           | 0.0               | 1.23         | 1267.9       | 5.6           |

Network Design Table for Storm

| PN    | Length<br>(m) | Fall<br>(m) | Slope<br>(1:X) | I.Area<br>(ha) | T.E.<br>(mins) | Base<br>Flow (l/s) | k<br>(mm) | n     | HYD<br>SECT | DIA<br>(mm) | Section Type    | Auto<br>Design                                                                       |
|-------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------|-------------|-------------|-----------------|--------------------------------------------------------------------------------------|
| 7.001 | 42.765        | 2.300       | 18.6           | 0.066          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 7.002 | 10.526        | 0.450       | 23.4           | 0.063          | 0.00           | 0.0                | 0.600     |       | o           | 225         | Pipe/Conduit    |   |
| 7.003 | 45.760        | 0.450       | 101.7          | 0.035          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 7.004 | 9.100         | 0.100       | 91.0           | 0.045          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 7.005 | 28.785        | 0.375       | 76.8           | 0.022          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 7.006 | 29.266        | 0.175       | 167.2          | 0.047          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 8.000 | 19.770        | 1.000       | 19.8           | 0.025          | 5.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 8.001 | 15.950        | 0.750       | 21.3           | 0.040          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 8.002 | 10.600        | 0.250       | 42.4           | 0.029          | 0.00           | 0.0                | 0.600     |       | o           | 225         | Pipe/Conduit    |   |
| 8.003 | 16.700        | 0.250       | 66.8           | 0.016          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 8.004 | 19.650        | 0.550       | 35.7           | 0.065          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 8.005 | 8.365         | 0.100       | 83.7           | 0.004          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 8.006 | 22.823        | 0.500       | 45.6           | 0.013          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 8.007 | 56.674        | 0.450       | 125.9          | 0.091          | 0.00           | 0.0                |           | 0.030 | → ↓ →       |             | Porous Car Park |   |
| 1.013 | 16.875        | 0.080       | 210.9          | 0.017          | 0.00           | 0.0                | 0.600     |       | o           | 525         | Pipe/Conduit    |   |
| 1.014 | 8.500         | 0.040       | 212.5          | 0.000          | 0.00           | 0.0                | 0.600     |       | o           | 525         | Pipe/Conduit    |   |
| 1.015 | 50.000        | 0.000       | 0.0            | 0.000          | 0.00           | 0.0                | 0.600     |       | o           | 300         | Pipe/Conduit    |   |
| 1.016 | 1.000         | 0.083       | 12.0           | 0.000          | 0.00           | 0.0                | 0.600     |       | o           | 150         | Pipe/Conduit    |  |

Network Results Table

| PN    | Rain<br>(mm/hr) | T.C.<br>(mins) | US/IL<br>(m) | Σ I.Area<br>(ha) | Σ Base<br>Flow (l/s) | Foul<br>(l/s) | Add Flow<br>(l/s) | Vel<br>(m/s) | Cap<br>(l/s) | Flow<br>(l/s) |
|-------|-----------------|----------------|--------------|------------------|----------------------|---------------|-------------------|--------------|--------------|---------------|
| 7.001 | 50.00           | 5.85           | 74.200       | 0.107            | 0.0                  | 0.0           | 0.0               | 1.49         | 1541.4       | 14.5          |
| 7.002 | 50.00           | 5.92           | 71.900       | 0.170            | 0.0                  | 0.0           | 0.0               | 2.72         | 108.0        | 23.0          |
| 7.003 | 50.00           | 7.11           | 71.450       | 0.205            | 0.0                  | 0.0           | 0.0               | 0.64         | 659.1        | 27.8          |
| 7.004 | 50.00           | 7.36           | 71.000       | 0.250            | 0.0                  | 0.0           | 0.0               | 0.61         | 527.3        | 33.9          |
| 7.005 | 50.00           | 8.19           | 70.900       | 0.272            | 0.0                  | 0.0           | 0.0               | 0.58         | 408.8        | 36.8          |
| 7.006 | 50.00           | 9.43           | 70.525       | 0.319            | 0.0                  | 0.0           | 0.0               | 0.39         | 277.0        | 43.2          |
| 8.000 | 50.00           | 5.23           | 74.200       | 0.025            | 0.0                  | 0.0           | 0.0               | 1.45         | 1494.8       | 3.4           |
| 8.001 | 50.00           | 5.42           | 73.200       | 0.065            | 0.0                  | 0.0           | 0.0               | 1.39         | 1441.3       | 8.8           |
| 8.002 | 50.00           | 5.51           | 72.450       | 0.094            | 0.0                  | 0.0           | 0.0               | 2.01         | 80.1         | 12.7          |
| 8.003 | 50.00           | 5.86           | 72.200       | 0.110            | 0.0                  | 0.0           | 0.0               | 0.79         | 813.2        | 14.9          |
| 8.004 | 50.00           | 6.17           | 71.950       | 0.175            | 0.0                  | 0.0           | 0.0               | 1.08         | 1112.0       | 23.7          |
| 8.005 | 50.00           | 6.36           | 71.400       | 0.179            | 0.0                  | 0.0           | 0.0               | 0.70         | 726.7        | 24.2          |
| 8.006 | 50.00           | 6.76           | 71.300       | 0.192            | 0.0                  | 0.0           | 0.0               | 0.95         | 983.8        | 26.0          |
| 8.007 | 50.00           | 8.41           | 70.800       | 0.283            | 0.0                  | 0.0           | 0.0               | 0.57         | 592.3        | 38.3          |
| 1.013 | 50.00           | 19.16          | 69.470       | 1.689            | 0.0                  | 0.0           | 0.0               | 1.54         | 333.0        | 228.7         |
| 1.014 | 50.00           | 19.25          | 69.390       | 1.689            | 0.0                  | 0.0           | 0.0               | 1.53         | 331.8        | 228.7         |
| 1.015 | 50.00           | 24.85          | 69.350       | 1.689            | 0.0                  | 0.0           | 0.0               | 0.15         | 10.5«        | 228.7         |
| 1.016 | 50.00           | 24.85          | 69.350       | 1.689            | 0.0                  | 0.0           | 0.0               | 2.92         | 51.6«        | 228.7         |

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Date 18/12/2024 11:12

File SW NETWORK CARRIER DRAIN.MDX

Designed by Nigel Jones

Checked by



Innovyze

Network 2020.1

Manhole Schedules for Storm

| 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) |
|---------|-----------|--------------|---------------|--------------------|-------|---------------------------|---------------|-------|---------------------------|---------------|---------------|
| ROAD 3  | 77.975    | 0.725        | Open Manhole  | 500                | 1.000 | 77.250                    |               |       |                           |               |               |
| BAFFLE  | 77.500    | 0.620        | Open Manhole  | 500                | 1.001 | 76.880                    | 150           | 1.000 | 76.880                    |               |               |
| ROAD 2  | 77.500    | 1.120        | Open Manhole  | 500                | 1.002 | 76.380                    |               | 1.001 | 76.875                    | 150           | 25            |
| BAFFLE  | 76.700    | 0.820        | Open Manhole  | 500                | 1.003 | 75.880                    | 150           | 1.002 | 75.880                    |               |               |
| ROAD 2  | 76.700    | 1.265        | Open Manhole  | 500                | 1.004 | 75.435                    |               | 1.003 | 75.875                    | 150           | 25            |
| BAFFLE  | 75.900    | 0.590        | Open Manhole  | 500                | 1.005 | 75.310                    | 150           | 1.004 | 75.310                    |               |               |
| CP01    | 76.040    | 0.690        | Open Manhole  | 1200               | 2.000 | 75.350                    |               |       |                           |               |               |
| ROAD 2  | 75.900    | 0.750        | Open Manhole  | 500                | 1.006 | 75.150                    |               | 1.005 | 75.305                    | 150           |               |
|         |           |              |               |                    |       |                           |               | 2.000 | 75.150                    |               |               |
| CP02    | 75.700    | 0.750        | Open Manhole  | 1200               | 1.007 | 74.950                    | 225           | 1.006 | 74.950                    |               |               |
| CP03    | 75.650    | 0.900        | Open Manhole  | 1200               | 1.008 | 74.750                    | 225           | 1.007 | 74.750                    | 225           |               |
| CP27    | 76.650    | 0.750        | Open Manhole  | 1200               | 3.000 | 75.900                    |               |       |                           |               |               |
| CP26    | 77.000    | 1.575        | Open Manhole  | 1200               | 3.001 | 75.425                    |               | 3.000 | 75.425                    |               |               |
| CP25    | 76.200    | 0.825        | Open Manhole  | 1200               | 3.002 | 75.375                    |               | 3.001 | 75.375                    |               |               |
| CP04    | 74.960    | 0.860        | Open Manhole  | 1200               | 1.009 | 74.100                    |               | 1.008 | 74.400                    | 225           |               |
|         |           |              |               |                    |       |                           |               | 3.002 | 74.100                    |               |               |
| CP05    | 73.750    | 0.750        | Open Manhole  | 1200               | 1.010 | 73.000                    | 225           | 1.009 | 73.000                    |               |               |
| CP26    | 73.250    | 0.620        | Open Manhole  | 1200               | 4.000 | 72.630                    | 225           |       |                           |               |               |
| CP25    | 73.400    | 0.905        | Open Manhole  | 1200               | 4.001 | 72.495                    | 225           | 4.000 | 72.495                    | 225           |               |
| CP29    | 73.500    | 0.755        | Open Manhole  | 1200               | 5.000 | 72.745                    | 225           |       |                           |               |               |
| CP31    | 75.000    | 1.970        | Open Manhole  | 1200               | 6.000 | 73.030                    | 150           |       |                           |               |               |
| CP30    | 74.500    | 1.685        | Open Manhole  | 1200               | 6.001 | 72.815                    | 300           | 6.000 | 72.890                    | 150           |               |
| CP28    | 73.500    | 0.875        | Open Manhole  | 1200               | 5.001 | 72.625                    | 300           | 5.000 | 72.625                    | 225           |               |
|         |           |              |               |                    |       |                           |               | 6.001 | 72.625                    | 300           |               |
| CP27    | 73.400    | 0.890        | Open Manhole  | 1200               | 5.002 | 72.510                    | 300           | 5.001 | 72.510                    | 300           |               |
| CP06    | 73.250    | 0.800        | Open Manhole  | 1200               | 1.011 | 72.450                    |               | 1.010 | 72.450                    | 225           |               |
|         |           |              |               |                    |       |                           |               | 4.001 | 72.450                    | 225           |               |
|         |           |              |               |                    |       |                           |               | 5.002 | 72.450                    | 300           |               |
| CP07    | 71.300    | 0.700        | Open Manhole  | 1200               | 1.012 | 70.600                    |               | 1.011 | 70.600                    |               |               |
| CP24    | 76.000    | 0.800        | Open Manhole  | 1200               | 7.000 | 75.200                    |               |       |                           |               |               |
| CP23    | 75.000    | 0.800        | Open Manhole  | 1200               | 7.001 | 74.200                    |               | 7.000 | 74.200                    |               |               |
| CP22    | 72.750    | 0.850        | Open Manhole  | 1200               | 7.002 | 71.900                    | 225           | 7.001 | 71.900                    |               |               |
| CP21    | 72.250    | 0.800        | Open Manhole  | 1200               | 7.003 | 71.450                    |               | 7.002 | 71.450                    | 225           |               |
| CP20    | 71.700    | 0.700        | Open Manhole  | 1200               | 7.004 | 71.000                    |               | 7.003 | 71.000                    |               |               |
| CP19    | 71.500    | 0.600        | Open Manhole  | 2400               | 7.005 | 70.900                    |               | 7.004 | 70.900                    |               |               |
| CP09    | 71.125    | 0.600        | Open Manhole  | 2400               | 7.006 | 70.525                    |               | 7.005 | 70.525                    |               |               |
| CP18    | 75.000    | 0.800        | Open Manhole  | 1200               | 8.000 | 74.200                    |               |       |                           |               |               |
| CP17    | 74.000    | 0.800        | Open Manhole  | 1200               | 8.001 | 73.200                    |               | 8.000 | 73.200                    |               |               |
| CP16    | 73.250    | 0.800        | Open Manhole  | 1200               | 8.002 | 72.450                    | 225           | 8.001 | 72.450                    |               |               |
| CP15    | 73.000    | 0.800        | Open Manhole  | 1200               | 8.003 | 72.200                    |               | 8.002 | 72.200                    | 225           |               |
| CP14    | 72.750    | 0.800        | Open Manhole  | 1200               | 8.004 | 71.950                    |               | 8.003 | 71.950                    |               |               |
| CP13    | 72.200    | 0.800        | Open Manhole  | 1200               | 8.005 | 71.400                    |               | 8.004 | 71.400                    |               |               |
| CP12    | 72.100    | 0.800        | Open Manhole  | 1200               | 8.006 | 71.300                    |               | 8.005 | 71.300                    |               |               |
| CP11    | 71.600    | 0.800        | Open Manhole  | 2400               | 8.007 | 70.800                    |               | 8.006 | 70.800                    |               |               |
| CP08    | 71.000    | 1.530        | Open Manhole  | 2400               | 1.013 | 69.470                    | 525           | 1.012 | 70.350                    |               | 865           |
|         |           |              |               |                    |       |                           |               | 7.006 | 70.350                    |               | 765           |

Manhole Schedules for Storm

| 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) |
|------------|-----------|--------------|----------------|-------------------|-------|---------------------------|---------------|-------|---------------------------|---------------|---------------|
|            |           |              |                |                   |       |                           |               | 8.007 | 70.350                    |               | 965           |
| CP10       | 71.000    | 1.610        | Open Manhole   | 2400              | 1.014 | 69.390                    | 525           | 1.013 | 69.390                    | 525           |               |
| POND       | 70.900    | 1.550        | Open Manhole   | 500               | 1.015 | 69.350                    | 300           | 1.014 | 69.350                    | 525           |               |
| DUMMY PIPE | 71.200    | 1.850        | Sealed Manhole | 500               | 1.016 | 69.350                    | 150           | 1.015 | 69.350                    | 300           |               |
|            | 70.900    | 1.633        | Open Manhole   | 0                 |       | OUTFALL                   |               | 1.016 | 69.267                    | 150           |               |

No coordinates have been specified, layout information cannot be produced.

PIPELINE SCHEDULES for Storm

Upstream Manhole

| PN    | Hyd<br>Sect | Diam<br>(mm) | MH<br>Name | C.Level<br>(m) | I.Level<br>(m) | D.Depth<br>(m) | MH<br>Connection | MH DIAM., L*W<br>(mm) |
|-------|-------------|--------------|------------|----------------|----------------|----------------|------------------|-----------------------|
| 1.000 | → ↓ →       |              | ROAD 3     | 77.975         | 77.250         | 0.190          | Open Manhole     | 500                   |
| 1.001 | ○           | 150          | BAFFLE     | 77.500         | 76.880         | 0.470          | Open Manhole     | 500                   |
| 1.002 | → ↓ →       |              | ROAD 2     | 77.500         | 76.380         | 0.500          | Open Manhole     | 500                   |
| 1.003 | ○           | 150          | BAFFLE     | 76.700         | 75.880         | 0.670          | Open Manhole     | 500                   |
| 1.004 | → ↓ →       |              | ROAD 2     | 76.700         | 75.435         | 0.700          | Open Manhole     | 500                   |
| 1.005 | ○           | 150          | BAFFLE     | 75.900         | 75.310         | 0.440          | Open Manhole     | 500                   |
| 2.000 | → ↓ →       |              | CP01       | 76.040         | 75.350         | 0.190          | Open Manhole     | 1200                  |
| 1.006 | → ↓ →       |              | ROAD 2     | 75.900         | 75.150         | 0.190          | Open Manhole     | 500                   |
| 1.007 | ○           | 225          | CP02       | 75.700         | 74.950         | 0.525          | Open Manhole     | 1200                  |
| 1.008 | ○           | 225          | CP03       | 75.650         | 74.750         | 0.675          | Open Manhole     | 1200                  |
| 3.000 | → ↓ →       |              | CP27       | 76.650         | 75.900         | 0.190          | Open Manhole     | 1200                  |
| 3.001 | → ↓ →       |              | CP26       | 77.000         | 75.425         | 1.000          | Open Manhole     | 1200                  |
| 3.002 | → ↓ →       |              | CP25       | 76.200         | 75.375         | 0.190          | Open Manhole     | 1200                  |
| 1.009 | → ↓ →       |              | CP04       | 74.960         | 74.100         | 0.190          | Open Manhole     | 1200                  |
| 1.010 | ○           | 225          | CP05       | 73.750         | 73.000         | 0.525          | Open Manhole     | 1200                  |
| 4.000 | ○           | 225          | CP26       | 73.250         | 72.630         | 0.395          | Open Manhole     | 1200                  |
| 4.001 | ○           | 225          | CP25       | 73.400         | 72.495         | 0.680          | Open Manhole     | 1200                  |
| 5.000 | ○           | 225          | CP29       | 73.500         | 72.745         | 0.530          | Open Manhole     | 1200                  |
| 6.000 | ○           | 150          | CP31       | 75.000         | 73.030         | 1.820          | Open Manhole     | 1200                  |

Downstream Manhole

| PN    | Length<br>(m) | Slope<br>(1:X) | MH<br>Name | C.Level<br>(m) | I.Level<br>(m) | D.Depth<br>(m) | MH<br>Connection | MH DIAM., L*W<br>(mm) |
|-------|---------------|----------------|------------|----------------|----------------|----------------|------------------|-----------------------|
| 1.000 | 60.000        | 162.2          | BAFFLE     | 77.500         | 76.880         | 0.085          | Open Manhole     | 500                   |
| 1.001 | 0.500         | 100.0          | ROAD 2     | 77.500         | 76.875         | 0.475          | Open Manhole     | 500                   |
| 1.002 | 16.000        | 32.0           | BAFFLE     | 76.700         | 75.880         | 0.200          | Open Manhole     | 500                   |
| 1.003 | 0.500         | 100.0          | ROAD 2     | 76.700         | 75.875         | 0.675          | Open Manhole     | 500                   |
| 1.004 | 20.700        | 165.6          | BAFFLE     | 75.900         | 75.310         | 0.025          | Open Manhole     | 500                   |
| 1.005 | 0.500         | 100.0          | ROAD 2     | 75.900         | 75.305         | 0.445          | Open Manhole     | 500                   |
| 2.000 | 46.444        | 232.2          | ROAD 2     | 75.900         | 75.150         | 0.250          | Open Manhole     | 500                   |
| 1.006 | 13.800        | 69.0           | CP02       | 75.700         | 74.950         | 0.190          | Open Manhole     | 1200                  |
| 1.007 | 16.100        | 80.5           | CP03       | 75.650         | 74.750         | 0.675          | Open Manhole     | 1200                  |
| 1.008 | 11.800        | 33.7           | CP04       | 74.960         | 74.400         | 0.335          | Open Manhole     | 1200                  |
| 3.000 | 20.300        | 42.7           | CP26       | 77.000         | 75.425         | 1.015          | Open Manhole     | 1200                  |
| 3.001 | 17.620        | 352.4          | CP25       | 76.200         | 75.375         | 0.250          | Open Manhole     | 1200                  |
| 3.002 | 32.223        | 25.3           | CP04       | 74.960         | 74.100         | 0.225          | Open Manhole     | 1200                  |
| 1.009 | 40.610        | 36.9           | CP05       | 73.750         | 73.000         | 0.080          | Open Manhole     | 1200                  |
| 1.010 | 9.340         | 17.0           | CP06       | 73.250         | 72.450         | 0.575          | Open Manhole     | 1200                  |
| 4.000 | 22.800        | 168.9          | CP25       | 73.400         | 72.495         | 0.680          | Open Manhole     | 1200                  |
| 4.001 | 7.860         | 174.7          | CP06       | 73.250         | 72.450         | 0.575          | Open Manhole     | 1200                  |
| 5.000 | 20.159        | 168.0          | CP28       | 73.500         | 72.625         | 0.650          | Open Manhole     | 1200                  |
| 6.000 | 8.300         | 59.3           | CP30       | 74.500         | 72.890         | 1.460          | Open Manhole     | 1200                  |

PIPELINE SCHEDULES for Storm

Upstream Manhole

| PN    | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|-------|----------|-----------|---------|-------------|-------------|-------------|---------------|--------------------|
| 6.001 | o        | 300       | CP30    | 74.500      | 72.815      | 1.385       | Open Manhole  | 1200               |
| 5.001 | o        | 300       | CP28    | 73.500      | 72.625      | 0.575       | Open Manhole  | 1200               |
| 5.002 | o        | 300       | CP27    | 73.400      | 72.510      | 0.590       | Open Manhole  | 1200               |
| 1.011 | → ↓ →    |           | CP06    | 73.250      | 72.450      | 0.190       | Open Manhole  | 1200               |
| 1.012 | → ↓ →    |           | CP07    | 71.300      | 70.600      | 0.190       | Open Manhole  | 1200               |
| 7.000 | → ↓ →    |           | CP24    | 76.000      | 75.200      | 0.190       | Open Manhole  | 1200               |
| 7.001 | → ↓ →    |           | CP23    | 75.000      | 74.200      | 0.190       | Open Manhole  | 1200               |
| 7.002 | o        | 225       | CP22    | 72.750      | 71.900      | 0.625       | Open Manhole  | 1200               |
| 7.003 | → ↓ →    |           | CP21    | 72.250      | 71.450      | 0.190       | Open Manhole  | 1200               |
| 7.004 | → ↓ →    |           | CP20    | 71.700      | 71.000      | 0.190       | Open Manhole  | 1200               |
| 7.005 | → ↓ →    |           | CP19    | 71.500      | 70.900      | 0.190       | Open Manhole  | 2400               |
| 7.006 | → ↓ →    |           | CP09    | 71.125      | 70.525      | 0.190       | Open Manhole  | 2400               |
| 8.000 | → ↓ →    |           | CP18    | 75.000      | 74.200      | 0.190       | Open Manhole  | 1200               |
| 8.001 | → ↓ →    |           | CP17    | 74.000      | 73.200      | 0.190       | Open Manhole  | 1200               |
| 8.002 | o        | 225       | CP16    | 73.250      | 72.450      | 0.575       | Open Manhole  | 1200               |
| 8.003 | → ↓ →    |           | CP15    | 73.000      | 72.200      | 0.190       | Open Manhole  | 1200               |
| 8.004 | → ↓ →    |           | CP14    | 72.750      | 71.950      | 0.190       | Open Manhole  | 1200               |
| 8.005 | → ↓ →    |           | CP13    | 72.200      | 71.400      | 0.190       | Open Manhole  | 1200               |
| 8.006 | → ↓ →    |           | CP12    | 72.100      | 71.300      | 0.190       | Open Manhole  | 1200               |
| 8.007 | → ↓ →    |           | CP11    | 71.600      | 70.800      | 0.190       | Open Manhole  | 2400               |
| 1.013 | o        | 525       | CP08    | 71.000      | 69.470      | 1.005       | Open Manhole  | 2400               |

Downstream Manhole

| PN    | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|-------|------------|-------------|---------|-------------|-------------|-------------|---------------|--------------------|
| 6.001 | 32.010     | 168.5       | CP28    | 73.500      | 72.625      | 0.575       | Open Manhole  | 1200               |
| 5.001 | 19.894     | 173.0       | CP27    | 73.400      | 72.510      | 0.590       | Open Manhole  | 1200               |
| 5.002 | 10.556     | 175.9       | CP06    | 73.250      | 72.450      | 0.500       | Open Manhole  | 1200               |
| 1.011 | 37.090     | 20.0        | CP07    | 71.300      | 70.600      | 0.090       | Open Manhole  | 1200               |
| 1.012 | 12.330     | 49.3        | CP08    | 71.000      | 70.350      | 0.140       | Open Manhole  | 2400               |
| 7.000 | 27.478     | 27.5        | CP23    | 75.000      | 74.200      | 0.190       | Open Manhole  | 1200               |
| 7.001 | 42.765     | 18.6        | CP22    | 72.750      | 71.900      | 0.240       | Open Manhole  | 1200               |
| 7.002 | 10.526     | 23.4        | CP21    | 72.250      | 71.450      | 0.575       | Open Manhole  | 1200               |
| 7.003 | 45.760     | 101.7       | CP20    | 71.700      | 71.000      | 0.090       | Open Manhole  | 1200               |
| 7.004 | 9.100      | 91.0        | CP19    | 71.500      | 70.900      | 0.090       | Open Manhole  | 2400               |
| 7.005 | 28.785     | 76.8        | CP09    | 71.125      | 70.525      | 0.190       | Open Manhole  | 2400               |
| 7.006 | 29.266     | 167.2       | CP08    | 71.000      | 70.350      | 0.240       | Open Manhole  | 2400               |
| 8.000 | 19.770     | 19.8        | CP17    | 74.000      | 73.200      | 0.190       | Open Manhole  | 1200               |
| 8.001 | 15.950     | 21.3        | CP16    | 73.250      | 72.450      | 0.190       | Open Manhole  | 1200               |
| 8.002 | 10.600     | 42.4        | CP15    | 73.000      | 72.200      | 0.575       | Open Manhole  | 1200               |
| 8.003 | 16.700     | 66.8        | CP14    | 72.750      | 71.950      | 0.190       | Open Manhole  | 1200               |
| 8.004 | 19.650     | 35.7        | CP13    | 72.200      | 71.400      | 0.190       | Open Manhole  | 1200               |
| 8.005 | 8.365      | 83.7        | CP12    | 72.100      | 71.300      | 0.190       | Open Manhole  | 1200               |
| 8.006 | 22.823     | 45.6        | CP11    | 71.600      | 70.800      | 0.190       | Open Manhole  | 2400               |
| 8.007 | 56.674     | 125.9       | CP08    | 71.000      | 70.350      | 0.040       | Open Manhole  | 2400               |
| 1.013 | 16.875     | 210.9       | CP10    | 71.000      | 69.390      | 1.085       | Open Manhole  | 2400               |

PIPELINE SCHEDULES for Storm

Upstream Manhole

| PN    | Hyd<br>Sect | Diam<br>(mm) | MH<br>Name | C.Level<br>(m) | I.Level<br>(m) | D.Depth<br>(m) | MH<br>Connection | MH DIAM., L*W<br>(mm) |
|-------|-------------|--------------|------------|----------------|----------------|----------------|------------------|-----------------------|
| 1.014 | o           | 525          | CP10       | 71.000         | 69.390         | 1.085          | Open Manhole     | 2400                  |
| 1.015 | o           | 300          | POND       | 70.900         | 69.350         | 1.250          | Open Manhole     | 500                   |
| 1.016 | o           | 150          | DUMMY PIPE | 71.200         | 69.350         | 1.700          | Sealed Manhole   | 500                   |

Downstream Manhole

| PN    | Length<br>(m) | Slope<br>(1:X) | MH<br>Name | C.Level<br>(m) | I.Level<br>(m) | D.Depth<br>(m) | MH<br>Connection | MH DIAM., L*W<br>(mm) |
|-------|---------------|----------------|------------|----------------|----------------|----------------|------------------|-----------------------|
| 1.014 | 8.500         | 212.5          | POND       | 70.900         | 69.350         | 1.025          | Open Manhole     | 500                   |
| 1.015 | 50.000        | 0.0            | DUMMY PIPE | 71.200         | 69.350         | 1.550          | Sealed Manhole   | 500                   |
| 1.016 | 1.000         | 12.0           |            | 70.900         | 69.267         | 1.483          | Open Manhole     | 0                     |

Free Flowing Outfall Details for Storm

| Outfall<br>Pipe Number | Outfall<br>Name | C. Level<br>(m) | I. Level<br>(m) | Min<br>I. Level<br>(m) | D,L<br>(mm) | W<br>(mm) |
|------------------------|-----------------|-----------------|-----------------|------------------------|-------------|-----------|
| 1.016                  |                 | 70.900          | 69.267          | 0.000                  | 0           | 0         |

Online Controls for Storm

Pump Manhole: DUMMY PIPE, DS/PN: 1.016, Volume (m³): 3.9

Invert Level (m) 69.350

| 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     | 0.0000     | 0.700     | 0.0000     | 1.300     | 0.0000     | 1.900     | 0.0000     | 2.500     | 0.0000     |
| 0.200     | 0.0000     | 0.800     | 0.0000     | 1.400     | 0.0000     | 2.000     | 0.0000     | 2.600     | 0.0000     |
| 0.300     | 0.0000     | 0.900     | 0.0000     | 1.500     | 0.0000     | 2.100     | 0.0000     | 2.700     | 0.0000     |
| 0.400     | 0.0000     | 1.000     | 0.0000     | 1.600     | 0.0000     | 2.200     | 0.0000     | 2.800     | 0.0000     |
| 0.500     | 0.0000     | 1.100     | 0.0000     | 1.700     | 0.0000     | 2.300     | 0.0000     | 2.900     | 0.0000     |
| 0.600     | 0.0000     | 1.200     | 0.0000     | 1.800     | 0.0000     | 2.400     | 0.0000     | 3.000     | 0.0000     |

Storage Structures for Storm

Porous Car Park Pipe: 1.000

|                                      |         |                         |       |
|--------------------------------------|---------|-------------------------|-------|
| Manning's N                          | 0.030   | Width (m)               | 4.8   |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 60.0  |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 162.2 |
| Max Percolation (l/s)                | 80.0    | Depression Storage (mm) | 5     |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3     |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190   |
| Invert Level (m)                     | 77.250  |                         |       |

Porous Car Park Pipe: 1.002

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 16.0 |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 32.0 |
| Max Percolation (l/s)                | 24.4    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 500  |
| Invert Level (m)                     | 76.380  |                         |      |

Porous Car Park Pipe: 1.004

|                                      |         |                         |       |
|--------------------------------------|---------|-------------------------|-------|
| Manning's N                          | 0.030   | Width (m)               | 5.5   |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 20.7  |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 165.6 |
| Max Percolation (l/s)                | 31.6    | Depression Storage (mm) | 5     |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3     |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 700   |
| Invert Level (m)                     | 75.435  |                         |       |

Porous Car Park Pipe: 2.000

|                                      |         |                         |       |
|--------------------------------------|---------|-------------------------|-------|
| Manning's N                          | 0.030   | Width (m)               | 5.5   |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 46.4  |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 232.2 |
| Max Percolation (l/s)                | 71.0    | Depression Storage (mm) | 5     |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3     |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190   |
| Invert Level (m)                     | 75.350  |                         |       |

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Under Drain Details          |       |                 |       |
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.225 | Manning's N     | 0.006 |

Porous Car Park Pipe: 1.006

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 13.8 |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 69.0 |
| Max Percolation (l/s)                | 21.1    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190  |
| Invert Level (m)                     | 75.150  |                         |      |

Porous Car Park Pipe: 3.000

|                                      |         |                  |        |
|--------------------------------------|---------|------------------|--------|
| Manning's N                          | 0.030   | Safety Factor    | 2.0    |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity         | 0.30   |
| Membrane Percolation (mm/hr)         | 1000    | Invert Level (m) | 75.900 |
| Max Percolation (l/s)                | 31.0    | Width (m)        | 5.5    |

Porous Car Park Pipe: 3.000

Length (m) 20.3 Evaporation (mm/day) 3  
Slope (1:X) 42.7 Membrane Depth (mm) 190  
Depression Storage (mm) 5

Under Drain Details  
Depth above Invert Level (m) 0.000 Number of Pipes 1  
Diameter (m) 0.225 Manning's N 0.006

Porous Car Park Pipe: 3.001

Manning's N 0.030 Width (m) 5.5  
Infiltration Coefficient Base (m/hr) 0.00000 Length (m) 17.6  
Membrane Percolation (mm/hr) 1000 Slope (1:X) 352.4  
Max Percolation (l/s) 26.9 Depression Storage (mm) 5  
Safety Factor 2.0 Evaporation (mm/day) 3  
Porosity 0.30 Membrane Depth (mm) 1000  
Invert Level (m) 75.425

Under Drain Details  
Depth above Invert Level (m) 0.000 Number of Pipes 1  
Diameter (m) 0.225 Manning's N 0.006

Porous Car Park Pipe: 3.002

Manning's N 0.030 Width (m) 5.5  
Infiltration Coefficient Base (m/hr) 0.00000 Length (m) 32.2  
Membrane Percolation (mm/hr) 1000 Slope (1:X) 25.3  
Max Percolation (l/s) 49.2 Depression Storage (mm) 5  
Safety Factor 2.0 Evaporation (mm/day) 3  
Porosity 0.30 Membrane Depth (mm) 190  
Invert Level (m) 75.375

Porous Car Park Pipe: 1.009

Manning's N 0.030 Width (m) 5.5  
Infiltration Coefficient Base (m/hr) 0.00000 Length (m) 40.6  
Membrane Percolation (mm/hr) 1000 Slope (1:X) 36.9  
Max Percolation (l/s) 62.0 Depression Storage (mm) 5  
Safety Factor 2.0 Evaporation (mm/day) 3  
Porosity 0.30 Membrane Depth (mm) 190  
Invert Level (m) 74.100

Under Drain Details  
Depth above Invert Level (m) 0.000 Number of Pipes 1  
Diameter (m) 0.225 Manning's N 0.006

Porous Car Park Pipe: 1.011

Manning's N 0.030 Width (m) 5.5  
Infiltration Coefficient Base (m/hr) 0.00000 Length (m) 37.1  
Membrane Percolation (mm/hr) 1000 Slope (1:X) 20.0  
Max Percolation (l/s) 56.7 Depression Storage (mm) 5  
Safety Factor 2.0 Evaporation (mm/day) 3  
Porosity 0.30 Membrane Depth (mm) 190  
Invert Level (m) 72.450

Under Drain Details  
Depth above Invert Level (m) 0.000 Number of Pipes 1  
Diameter (m) 0.300 Manning's N 0.006

Porous Car Park Pipe: 1.012

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 12.3 |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 49.3 |
| Max Percolation (l/s)                | 18.8    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190  |
| Invert Level (m)                     | 70.600  |                         |      |

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Under Drain Details          |       |                 |       |
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.300 | Manning's N     | 0.006 |

Porous Car Park Pipe: 7.000

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 27.5 |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 27.5 |
| Max Percolation (l/s)                | 42.0    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190  |
| Invert Level (m)                     | 75.200  |                         |      |

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Under Drain Details          |       |                 |       |
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.225 | Manning's N     | 0.006 |

Porous Car Park Pipe: 7.001

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 42.8 |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 18.6 |
| Max Percolation (l/s)                | 65.3    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190  |
| Invert Level (m)                     | 74.200  |                         |      |

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Under Drain Details          |       |                 |       |
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.225 | Manning's N     | 0.006 |

Porous Car Park Pipe: 7.003

|                                      |         |                         |       |
|--------------------------------------|---------|-------------------------|-------|
| Manning's N                          | 0.030   | Width (m)               | 5.5   |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 45.8  |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 101.7 |
| Max Percolation (l/s)                | 69.9    | Depression Storage (mm) | 5     |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3     |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190   |
| Invert Level (m)                     | 71.450  |                         |       |

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Under Drain Details          |       |                 |       |
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.225 | Manning's N     | 0.006 |

Porous Car Park Pipe: 7.004

|                                      |         |                         |        |
|--------------------------------------|---------|-------------------------|--------|
| Manning's N                          | 0.030   | Invert Level (m)        | 71.000 |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m)               | 5.5    |
| Membrane Percolation (mm/hr)         | 1000    | Length (m)              | 9.1    |
| Max Percolation (l/s)                | 13.9    | Slope (1:X)             | 91.0   |
| Safety Factor                        | 2.0     | Depression Storage (mm) | 5      |
| Porosity                             | 0.30    | Evaporation (mm/day)    | 3      |

Porous Car Park Pipe: 7.004

Membrane Depth (mm) 190

Under Drain Details

Depth above Invert Level (m) 0.000 Number of Pipes 1

Diameter (m) 0.225 Manning's N 0.006

Porous Car Park Pipe: 7.005

Manning's N 0.030 Width (m) 5.5

Infiltration Coefficient Base (m/hr) 0.00000 Length (m) 28.8

Membrane Percolation (mm/hr) 1000 Slope (1:X) 76.8

Max Percolation (l/s) 44.0 Depression Storage (mm) 5

Safety Factor 2.0 Evaporation (mm/day) 3

Porosity 0.30 Membrane Depth (mm) 190

Invert Level (m) 70.900

Under Drain Details

Depth above Invert Level (m) 0.000 Number of Pipes 1

Diameter (m) 0.225 Manning's N 0.006

Porous Car Park Pipe: 7.006

Manning's N 0.030 Width (m) 5.5

Infiltration Coefficient Base (m/hr) 0.00000 Length (m) 29.3

Membrane Percolation (mm/hr) 1000 Slope (1:X) 167.2

Max Percolation (l/s) 44.7 Depression Storage (mm) 5

Safety Factor 2.0 Evaporation (mm/day) 3

Porosity 0.30 Membrane Depth (mm) 190

Invert Level (m) 70.525

Under Drain Details

Depth above Invert Level (m) 0.000 Number of Pipes 1

Diameter (m) 0.225 Manning's N 0.006

Porous Car Park Pipe: 8.000

Manning's N 0.030 Width (m) 5.5

Infiltration Coefficient Base (m/hr) 0.00000 Length (m) 19.8

Membrane Percolation (mm/hr) 1000 Slope (1:X) 19.8

Max Percolation (l/s) 30.2 Depression Storage (mm) 5

Safety Factor 2.0 Evaporation (mm/day) 3

Porosity 0.30 Membrane Depth (mm) 190

Invert Level (m) 74.200

Under Drain Details

Depth above Invert Level (m) 0.000 Number of Pipes 1

Diameter (m) 0.225 Manning's N 0.006

Porous Car Park Pipe: 8.001

Manning's N 0.030 Width (m) 5.5

Infiltration Coefficient Base (m/hr) 0.00000 Length (m) 16.0

Membrane Percolation (mm/hr) 1000 Slope (1:X) 21.3

Max Percolation (l/s) 24.4 Depression Storage (mm) 5

Safety Factor 2.0 Evaporation (mm/day) 3

Porosity 0.30 Membrane Depth (mm) 190

Invert Level (m) 73.200

Under Drain Details

Depth above Invert Level (m) 0.000 Number of Pipes 1

Diameter (m) 0.225 Manning's N 0.006

Porous Car Park Pipe: 8.003

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 16.7 |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 66.8 |
| Max Percolation (l/s)                | 25.5    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190  |
| Invert Level (m)                     | 72.200  |                         |      |

Under Drain Details

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.225 | Manning's N     | 0.006 |

Porous Car Park Pipe: 8.004

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 19.7 |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 35.7 |
| Max Percolation (l/s)                | 30.0    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190  |
| Invert Level (m)                     | 71.950  |                         |      |

Under Drain Details

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.225 | Manning's N     | 0.006 |

Porous Car Park Pipe: 8.005

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 8.4  |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 83.7 |
| Max Percolation (l/s)                | 12.8    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190  |
| Invert Level (m)                     | 71.400  |                         |      |

Under Drain Details

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.225 | Manning's N     | 0.006 |

Porous Car Park Pipe: 8.006

|                                      |         |                         |      |
|--------------------------------------|---------|-------------------------|------|
| Manning's N                          | 0.030   | Width (m)               | 5.5  |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Length (m)              | 22.8 |
| Membrane Percolation (mm/hr)         | 1000    | Slope (1:X)             | 45.6 |
| Max Percolation (l/s)                | 34.9    | Depression Storage (mm) | 5    |
| Safety Factor                        | 2.0     | Evaporation (mm/day)    | 3    |
| Porosity                             | 0.30    | Membrane Depth (mm)     | 190  |
| Invert Level (m)                     | 71.300  |                         |      |

Under Drain Details

|                              |       |                 |       |
|------------------------------|-------|-----------------|-------|
| Depth above Invert Level (m) | 0.000 | Number of Pipes | 1     |
| Diameter (m)                 | 0.225 | Manning's N     | 0.006 |

Porous Car Park Pipe: 8.007

|                                      |         |                         |        |
|--------------------------------------|---------|-------------------------|--------|
| Manning's N                          | 0.030   | Invert Level (m)        | 70.800 |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m)               | 5.5    |
| Membrane Percolation (mm/hr)         | 1000    | Length (m)              | 56.7   |
| Max Percolation (l/s)                | 86.6    | Slope (1:X)             | 125.9  |
| Safety Factor                        | 2.0     | Depression Storage (mm) | 5      |
| Porosity                             | 0.30    | Evaporation (mm/day)    | 3      |

Porous Car Park Pipe: 8.007

Membrane Depth (mm) 190

Under Drain Details

Depth above Invert Level (m) 0.000 Number of Pipes 1  
Diameter (m) 0.225 Manning's N 0.060

Complex Manhole: POND, DS/PN: 1.015

Cellular Storage

Invert Level (m) 69.350 Safety Factor 5.0  
Infiltration Coefficient Base (m/hr) 0.15840 Porosity 0.95  
Infiltration Coefficient Side (m/hr) 0.00000

| Depth (m) | Area (m <sup>2</sup> ) | Inf. Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf. Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf. Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------------------------|-----------|------------------------|-----------------------------|-----------|------------------------|-----------------------------|
| 0.000     | 1000.0                 | 1000.0                      | 0.400     | 1000.0                 | 1000.0                      | 0.401     | 0.0                    | 1000.0                      |

Tank or Pond

Invert Level (m) 69.850

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|
| 0.000     | 700.8                  | 1.050     | 1323.9                 |

Volume Summary (Static)

Length Calculations based on True Length

| Pipe<br>Number | USMH<br>Name | Manhole<br>Volume (m³) | Pipe<br>Volume (m³) | Storage<br>Structure<br>Volume (m³) | Total<br>Volume (m³) |
|----------------|--------------|------------------------|---------------------|-------------------------------------|----------------------|
| 1.000          | ROAD 3       | 0.142                  | 45.839              | 0.000                               | 45.981               |
| 1.001          | BAFFLE       | 0.122                  | 0.000               | 0.000                               | 0.122                |
| 1.002          | ROAD 2       | 0.220                  | 15.857              | 0.000                               | 16.076               |
| 1.003          | BAFFLE       | 0.161                  | 0.000               | 0.000                               | 0.161                |
| 1.004          | ROAD 2       | 0.248                  | 18.831              | 0.000                               | 19.080               |
| 1.005          | BAFFLE       | 0.116                  | 0.000               | 0.000                               | 0.116                |
| 2.000          | CP01         | 0.780                  | 38.884              | 0.000                               | 39.664               |
| 1.006          | ROAD 2       | 0.147                  | 11.966              | 0.000                               | 12.113               |
| 1.007          | CP02         | 0.848                  | 0.592               | 0.000                               | 1.441                |
| 1.008          | CP03         | 1.018                  | 0.421               | 0.000                               | 1.439                |
| 3.000          | CP27         | 0.848                  | 18.180              | 0.000                               | 19.028               |
| 3.001          | CP26         | 1.781                  | 16.035              | 0.000                               | 17.817               |
| 3.002          | CP25         | 0.933                  | 32.504              | 0.000                               | 33.437               |
| 1.009          | CP04         | 0.973                  | 44.665              | 0.000                               | 45.637               |
| 1.010          | CP05         | 0.848                  | 0.324               | 0.000                               | 1.172                |
| 4.000          | CP26         | 0.701                  | 0.859               | 0.000                               | 1.560                |
| 4.001          | CP25         | 1.024                  | 0.265               | 0.000                               | 1.288                |
| 5.000          | CP29         | 0.854                  | 0.754               | 0.000                               | 1.608                |
| 6.000          | CP31         | 2.228                  | 0.125               | 0.000                               | 2.353                |
| 6.001          | CP30         | 1.906                  | 2.178               | 0.000                               | 4.084                |
| 5.001          | CP28         | 0.990                  | 1.321               | 0.000                               | 2.311                |
| 5.002          | CP27         | 1.007                  | 0.661               | 0.000                               | 1.668                |
| 1.011          | CP06         | 0.905                  | 37.899              | 0.000                               | 38.804               |
| 1.012          | CP07         | 0.792                  | 9.382               | 0.000                               | 10.174               |
| 7.000          | CP24         | 0.905                  | 27.180              | 0.000                               | 28.085               |
| 7.001          | CP23         | 0.905                  | 42.992              | 0.000                               | 43.897               |
| 7.002          | CP22         | 0.961                  | 0.371               | 0.000                               | 1.332                |
| 7.003          | CP21         | 0.905                  | 46.090              | 0.000                               | 46.995               |
| 7.004          | CP20         | 0.792                  | 6.346               | 0.000                               | 7.138                |
| 7.005          | CP19         | 2.714                  | 18.584              | 0.000                               | 21.298               |
| 7.006          | CP09         | 2.714                  | 18.923              | 0.000                               | 21.637               |
| 8.000          | CP18         | 0.905                  | 19.208              | 0.000                               | 20.112               |
| 8.001          | CP17         | 0.905                  | 15.256              | 0.000                               | 16.161               |
| 8.002          | CP16         | 0.905                  | 0.374               | 0.000                               | 1.279                |
| 8.003          | CP15         | 0.905                  | 16.032              | 0.000                               | 16.937               |
| 8.004          | CP14         | 0.905                  | 19.083              | 0.000                               | 19.988               |
| 8.005          | CP13         | 0.905                  | 7.411               | 0.000                               | 8.316                |
| 8.006          | CP12         | 0.905                  | 21.745              | 0.000                               | 22.650               |
| 8.007          | CP11         | 3.619                  | 56.137              | 0.000                               | 59.756               |
| 1.013          | CP08         | 6.922                  | 3.133               | 0.000                               | 10.055               |
| 1.014          | CP10         | 7.283                  | 1.526               | 0.000                               | 8.810                |
| 1.015          | POND         | 0.304                  | 3.499               | 1426.088                            | 1429.891             |
| 1.016          | DUMMY PIPE   | 0.363                  | 0.013               | 0.000                               | 0.377                |
| Total          |              | 54.313                 | 621.447             | 1426.088                            | 2101.848             |

**2 YEAR RETURN PERIOD**

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0    Number of Offline Controls 0    Number of Time/Area Diagrams 0  
 Number of Online Controls 1    Number of Storage Structures 25    Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH    Data Type Point  
 FEH Rainfall Version 2013 Cv (Summer) 0.750  
 Site Location GB 519261 227584 TL 19261 27584 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0  
 Analysis Timestep 2.5 Second Increment (Extended)  
 DTS Status OFF  
 DVD Status ON  
 Inertia Status ON

Profile(s) Summer and Winter  
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080  
 Return Period(s) (years) 2  
 Climate Change (%) 0

|       |           |           |        |         |           |           |           |          | Water  | Surcharged | Flooded |        |
|-------|-----------|-----------|--------|---------|-----------|-----------|-----------|----------|--------|------------|---------|--------|
| US/MH |           |           | Return | Climate | First (X) | First (Y) | First (Z) | Overflow | Level  | Depth      | Volume  | Flow / |
| PN    | Name      | Storm     | Period | Change  | Surcharge | Flood     | Overflow  | Act.     | (m)    | (m)        | (m³)    | Cap.   |
| 1.000 | ROAD 3    | 15 Winter | 2      | +0%     |           |           |           |          | 77.293 | -0.492     | 0.000   | 0.02   |
| 1.001 | BAFFLE 15 | Winter    | 2      | +0%     |           |           |           |          | 76.978 | -0.052     | 0.000   | 0.76   |
| 1.002 | ROAD 2    | 15 Winter | 2      | +0%     |           |           |           |          | 76.404 | -0.596     | 0.000   | 0.01   |
| 1.003 | BAFFLE 15 | Winter    | 2      | +0%     |           |           |           |          | 75.979 | -0.051     | 0.000   | 0.77   |
| 1.004 | ROAD 2    | 30 Winter | 2      | +0%     |           |           |           |          | 75.479 | -0.521     | 0.000   | 0.02   |
| 1.005 | BAFFLE 30 | Winter    | 2      | +0%     |           |           |           |          | 75.420 | -0.040     | 0.000   | 0.89   |
| 2.000 | CP01      | 30 Winter | 2      | +0%     |           |           |           |          | 75.409 | -0.441     | 0.000   | 0.05   |
| 1.006 | ROAD 2    | 30 Winter | 2      | +0%     |           |           |           |          | 75.209 | -0.501     | 0.000   | 0.04   |
| 1.007 | CP02      | 30 Winter | 2      | +0%     |           |           |           |          | 75.063 | -0.112     | 0.000   | 0.51   |
| 1.008 | CP03      | 30 Winter | 2      | +0%     |           |           |           |          | 74.840 | -0.135     | 0.000   | 0.34   |
| 3.000 | CP27      | 15 Winter | 2      | +0%     |           |           |           |          | 75.925 | -0.535     | 0.000   | 0.01   |
| 3.001 | CP26      | 15 Winter | 2      | +0%     |           |           |           |          | 75.483 | -0.517     | 0.000   | 0.04   |
| 3.002 | CP25      | 15 Winter | 2      | +0%     |           |           |           |          | 75.418 | -0.592     | 0.000   | 0.02   |
| 1.009 | CP04      | 15 Winter | 2      | +0%     |           |           |           |          | 74.164 | -0.606     | 0.000   | 0.04   |
| 1.010 | CP05      | 15 Winter | 2      | +0%     |           |           |           |          | 73.103 | -0.122     | 0.000   | 0.43   |
| 4.000 | CP26      | 15 Winter | 2      | +0%     |           |           |           |          | 72.688 | -0.167     | 0.000   | 0.15   |
| 4.001 | CP25      | 15 Winter | 2      | +0%     |           |           |           |          | 72.620 | -0.100     | 0.000   | 0.59   |
| 5.000 | CP29      | 15 Winter | 2      | +0%     |           |           |           |          | 72.814 | -0.156     | 0.000   | 0.19   |
| 6.000 | CP31      | 15 Winter | 2      | +0%     |           |           |           |          | 73.091 | -0.089     | 0.000   | 0.34   |
| 6.001 | CP30      | 15 Winter | 2      | +0%     |           |           |           |          | 72.928 | -0.187     | 0.000   | 0.30   |
| 5.001 | CP28      | 15 Winter | 2      | +0%     |           |           |           |          | 72.772 | -0.153     | 0.000   | 0.48   |
| 5.002 | CP27      | 15 Winter | 2      | +0%     |           |           |           |          | 72.683 | -0.127     | 0.000   | 0.62   |
| 1.011 | CP06      | 15 Winter | 2      | +0%     |           |           |           |          | 72.532 | -0.528     | 0.000   | 0.06   |
| 1.012 | CP07      | 15 Winter | 2      | +0%     |           |           |           |          | 70.710 | -0.400     | 0.000   | 0.13   |
| 7.000 | CP24      | 15 Winter | 2      | +0%     |           |           |           |          | 75.219 | -0.591     | 0.000   | 0.01   |
| 7.001 | CP23      | 15 Winter | 2      | +0%     |           |           |           |          | 74.228 | -0.582     | 0.000   | 0.01   |
| 7.002 | CP22      | 15 Winter | 2      | +0%     |           |           |           |          | 71.978 | -0.147     | 0.000   | 0.26   |
| 7.003 | CP21      | 15 Winter | 2      | +0%     |           |           |           |          | 71.516 | -0.544     | 0.000   | 0.04   |
| 7.004 | CP20      | 15 Winter | 2      | +0%     |           |           |           |          | 71.070 | -0.440     | 0.000   | 0.06   |
| 7.005 | CP19      | 15 Winter | 2      | +0%     |           |           |           |          | 70.969 | -0.341     | 0.000   | 0.09   |
| 7.006 | CP09      | 15 Winter | 2      | +0%     |           |           |           |          | 70.617 | -0.318     | 0.000   | 0.14   |

Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH<br>Name | Overflow<br>(1/s) | Half Drain     |  | Pipe<br>Flow<br>(1/s) | Status | Level<br>Exceeded |
|-------|---------------|-------------------|----------------|--|-----------------------|--------|-------------------|
|       |               |                   | Time<br>(mins) |  |                       |        |                   |
| 1.000 | ROAD 3        |                   | 8              |  | 8.3                   | OK     |                   |
| 1.001 | BAFFLE        |                   |                |  | 8.2                   | OK     |                   |
| 1.002 | ROAD 2        |                   | 9              |  | 8.4                   | OK     |                   |
| 1.003 | BAFFLE        |                   |                |  | 8.4                   | OK     |                   |
| 1.004 | ROAD 2        |                   | 13             |  | 9.8                   | OK     |                   |
| 1.005 | BAFFLE        |                   |                |  | 9.7                   | OK     |                   |
| 2.000 | CP01          |                   | 11             |  | 15.5                  | OK     |                   |
| 1.006 | ROAD 2        |                   | 12             |  | 26.0                  | OK     |                   |
| 1.007 | CP02          |                   |                |  | 26.0                  | OK     |                   |
| 1.008 | CP03          |                   |                |  | 26.0                  | OK     |                   |
| 3.000 | CP27          |                   | 5              |  | 8.5                   | OK     |                   |
| 3.001 | CP26          |                   | 7              |  | 11.6                  | OK     |                   |
| 3.002 | CP25          |                   | 7              |  | 25.2                  | OK     |                   |
| 1.009 | CP04          |                   | 9              |  | 44.1                  | OK     |                   |
| 1.010 | CP05          |                   |                |  | 44.7                  | OK     |                   |
| 4.000 | CP26          |                   |                |  | 5.4                   | OK     |                   |
| 4.001 | CP25          |                   |                |  | 17.7                  | OK     |                   |
| 5.000 | CP29          |                   |                |  | 7.0                   | OK     |                   |
| 6.000 | CP31          |                   |                |  | 6.9                   | OK     |                   |
| 6.001 | CP30          |                   |                |  | 23.2                  | OK     |                   |
| 5.001 | CP28          |                   |                |  | 35.3                  | OK     |                   |
| 5.002 | CP27          |                   |                |  | 38.3                  | OK     |                   |
| 1.011 | CP06          |                   | 11             |  | 91.9                  | OK     |                   |
| 1.012 | CP07          |                   | 10             |  | 96.9                  | OK     |                   |
| 7.000 | CP24          |                   | 5              |  | 6.6                   | OK     |                   |
| 7.001 | CP23          |                   | 5              |  | 15.4                  | OK     |                   |
| 7.002 | CP22          |                   |                |  | 23.3                  | OK     |                   |
| 7.003 | CP21          |                   | 7              |  | 28.0                  | OK     |                   |
| 7.004 | CP20          |                   | 8              |  | 32.7                  | OK     |                   |
| 7.005 | CP19          |                   | 8              |  | 34.8                  | OK     |                   |
| 7.006 | CP09          |                   | 8              |  | 38.1                  | OK     |                   |

Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH<br>Name | Storm      | Return<br>Period | Climate<br>Change | First (X)<br>Surcharge | First (Y)<br>Flood | First (Z)<br>Overflow<br>Overflow | Overflow<br>Act. | Water        | Surcharged   | Flooded        |
|-------|---------------|------------|------------------|-------------------|------------------------|--------------------|-----------------------------------|------------------|--------------|--------------|----------------|
|       |               |            |                  |                   |                        |                    |                                   |                  | Level<br>(m) | Depth<br>(m) | Volume<br>(m³) |
| 8.000 | CP18          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 74.211       | -0.599       | 0.000          |
| 8.001 | CP17          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 73.222       | -0.588       | 0.000          |
| 8.002 | CP16          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 72.518       | -0.157       | 0.000          |
| 8.003 | CP15          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 72.241       | -0.569       | 0.000          |
| 8.004 | CP14          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 71.994       | -0.566       | 0.000          |
| 8.005 | CP13          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 71.458       | -0.552       | 0.000          |
| 8.006 | CP12          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 71.350       | -0.560       | 0.000          |
| 8.007 | CP11          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 70.883       | -0.527       | 0.000          |
| 1.013 | CP08          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 69.787       | -0.208       | 0.000          |
| 1.014 | CP10          | 15 Winter  | 2                | +0%               |                        |                    |                                   |                  | 69.735       | -0.180       | 0.000          |
| 1.015 | POND          | 240 Winter | 2                | +0%               |                        |                    |                                   |                  | 69.612       | -0.038       | 0.000          |
| 1.016 | DUMMY PIPE    | 240 Winter | 2                | +0%               | 2/60 Winter            |                    |                                   |                  | 69.612       | 0.112        | 0.000          |

| PN    | US/MH<br>Name | Flow /<br>Cap. | Overflow<br>(l/s) | Half Drain     |                | Pipe<br>Flow<br>(l/s) | Status      | Level<br>Exceeded |
|-------|---------------|----------------|-------------------|----------------|----------------|-----------------------|-------------|-------------------|
|       |               |                |                   | Time<br>(mins) | Time<br>(mins) |                       |             |                   |
| 8.000 | CP18          | 0.00           |                   | 4              |                | 3.9                   | OK          |                   |
| 8.001 | CP17          | 0.01           |                   | 5              |                | 9.4                   | OK          |                   |
| 8.002 | CP16          | 0.20           |                   |                |                | 13.4                  | OK          |                   |
| 8.003 | CP15          | 0.02           |                   | 7              |                | 15.5                  | OK          |                   |
| 8.004 | CP14          | 0.02           |                   | 7              |                | 23.9                  | OK          |                   |
| 8.005 | CP13          | 0.04           |                   | 7              |                | 24.6                  | OK          |                   |
| 8.006 | CP12          | 0.03           |                   | 8              |                | 25.9                  | OK          |                   |
| 8.007 | CP11          | 0.06           |                   | 7              |                | 36.8                  | OK          |                   |
| 1.013 | CP08          | 0.64           |                   |                |                | 159.4                 | OK          |                   |
| 1.014 | CP10          | 0.76           |                   |                |                | 159.9                 | OK          |                   |
| 1.015 | POND          | 0.03           |                   | 253            |                | 0.8                   | OK          |                   |
| 1.016 | DUMMY PIPE    | 0.00           |                   |                |                | 0.0                   | SURCHARGED* |                   |

## **10 YEAR RETURN PERIOD**

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0  
Number of Online Controls 1 Number of Storage Structures 25 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point  
FEH Rainfall Version 2013 Cv (Summer) 0.750  
Site Location GB 519261 227584 TL 19261 27584 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status OFF  
DVD Status ON  
Inertia Status ON

Profile(s) Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,  
1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080  
Return Period(s) (years) 10  
Climate Change (%) 0

|       |           |           |        |         |           |           |           | Water    | Surcharged | Flooded |        |        |
|-------|-----------|-----------|--------|---------|-----------|-----------|-----------|----------|------------|---------|--------|--------|
|       |           |           |        |         | First (X) | First (Y) | First (Z) | Overflow | Level      | Depth   | Volume | Flow / |
| PN    | US/MH     | Storm     | Return | Climate | Surcharge | Flood     | Overflow  | Act.     | (m)        | (m)     | (m³)   | Cap.   |
| 1.000 | ROAD 3    | 15 Winter | 10     | +0%     |           |           |           |          | 77.309     | -0.476  | 0.000  | 0.04   |
| 1.001 | BAFFLE 15 | Winter    | 10     | +0%     | 10/15     | Winter    |           |          | 77.039     | 0.009   | 0.000  | 1.00   |
| 1.002 | ROAD 2    | 30 Winter | 10     | +0%     |           |           |           |          | 76.410     | -0.590  | 0.000  | 0.01   |
| 1.003 | BAFFLE 30 | Winter    | 10     | +0%     | 10/30     | Summer    |           |          | 76.050     | 0.020   | 0.000  | 1.04   |
| 1.004 | ROAD 2    | 60 Winter | 10     | +0%     |           |           |           |          | 75.503     | -0.497  | 0.000  | 0.03   |
| 1.005 | BAFFLE 60 | Winter    | 10     | +0%     | 10/15     | Winter    |           |          | 75.491     | 0.031   | 0.000  | 1.20   |
| 2.000 | CP01      | 30 Winter | 10     | +0%     |           |           |           |          | 75.431     | -0.419  | 0.000  | 0.08   |
| 1.006 | ROAD 2    | 30 Winter | 10     | +0%     |           |           |           |          | 75.227     | -0.483  | 0.000  | 0.06   |
| 1.007 | CP02      | 30 Winter | 10     | +0%     |           |           |           |          | 75.100     | -0.075  | 0.000  | 0.78   |
| 1.008 | CP03      | 30 Winter | 10     | +0%     |           |           |           |          | 74.866     | -0.109  | 0.000  | 0.52   |
| 3.000 | CP27      | 15 Winter | 10     | +0%     |           |           |           |          | 75.934     | -0.526  | 0.000  | 0.02   |
| 3.001 | CP26      | 15 Winter | 10     | +0%     |           |           |           |          | 75.506     | -0.494  | 0.000  | 0.06   |
| 3.002 | CP25      | 15 Winter | 10     | +0%     |           |           |           |          | 75.440     | -0.570  | 0.000  | 0.04   |
| 1.009 | CP04      | 15 Winter | 10     | +0%     |           |           |           |          | 74.187     | -0.583  | 0.000  | 0.06   |
| 1.010 | CP05      | 15 Winter | 10     | +0%     |           |           |           |          | 73.144     | -0.081  | 0.000  | 0.72   |
| 4.000 | CP26      | 15 Winter | 10     | +0%     |           |           |           |          | 72.747     | -0.108  | 0.000  | 0.23   |
| 4.001 | CP25      | 15 Winter | 10     | +0%     | 10/15     | Summer    |           |          | 72.729     | 0.009   | 0.000  | 1.05   |
| 5.000 | CP29      | 15 Winter | 10     | +0%     |           |           |           |          | 72.917     | -0.053  | 0.000  | 0.29   |
| 6.000 | CP31      | 15 Winter | 10     | +0%     |           |           |           |          | 73.112     | -0.068  | 0.000  | 0.57   |
| 6.001 | CP30      | 15 Winter | 10     | +0%     |           |           |           |          | 72.981     | -0.134  | 0.000  | 0.58   |
| 5.001 | CP28      | 15 Winter | 10     | +0%     |           |           |           |          | 72.893     | -0.032  | 0.000  | 0.82   |
| 5.002 | CP27      | 15 Summer | 10     | +0%     |           |           |           |          | 72.810     | 0.000   | 0.000  | 1.01   |
| 1.011 | CP06      | 15 Winter | 10     | +0%     |           |           |           |          | 72.569     | -0.491  | 0.000  | 0.11   |
| 1.012 | CP07      | 15 Winter | 10     | +0%     |           |           |           |          | 70.761     | -0.349  | 0.000  | 0.25   |
| 7.000 | CP24      | 15 Winter | 10     | +0%     |           |           |           |          | 75.226     | -0.584  | 0.000  | 0.01   |
| 7.001 | CP23      | 15 Winter | 10     | +0%     |           |           |           |          | 74.241     | -0.569  | 0.000  | 0.02   |
| 7.002 | CP22      | 15 Winter | 10     | +0%     |           |           |           |          | 72.014     | -0.111  | 0.000  | 0.50   |
| 7.003 | CP21      | 15 Winter | 10     | +0%     |           |           |           |          | 71.549     | -0.511  | 0.000  | 0.08   |
| 7.004 | CP20      | 15 Winter | 10     | +0%     |           |           |           |          | 71.106     | -0.404  | 0.000  | 0.12   |
| 7.005 | CP19      | 15 Winter | 10     | +0%     |           |           |           |          | 71.002     | -0.308  | 0.000  | 0.16   |
| 7.006 | CP09      | 15 Winter | 10     | +0%     |           |           |           |          | 70.660     | -0.275  | 0.000  | 0.26   |

Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH<br>Name | Overflow<br>(l/s) | Half Drain     |  | Pipe<br>Flow<br>(l/s) | Status     | Level<br>Exceeded |
|-------|---------------|-------------------|----------------|--|-----------------------|------------|-------------------|
|       |               |                   | Time<br>(mins) |  |                       |            |                   |
| 1.000 | ROAD 3        |                   | 8              |  | 12.5                  | OK         |                   |
| 1.001 | BAFFLE        |                   |                |  | 10.8                  | SURCHARGED |                   |
| 1.002 | ROAD 2        |                   | 16             |  | 12.1                  | OK         |                   |
| 1.003 | BAFFLE        |                   |                |  | 11.3                  | SURCHARGED |                   |
| 1.004 | ROAD 2        |                   | 13             |  | 13.1                  | OK         |                   |
| 1.005 | BAFFLE        |                   |                |  | 13.1                  | FLOOD RISK |                   |
| 2.000 | CP01          |                   | 12             |  | 26.2                  | OK         |                   |
| 1.006 | ROAD 2        |                   | 13             |  | 40.1                  | OK         |                   |
| 1.007 | CP02          |                   |                |  | 40.1                  | OK         |                   |
| 1.008 | CP03          |                   |                |  | 40.1                  | OK         |                   |
| 3.000 | CP27          |                   | 6              |  | 14.1                  | OK         |                   |
| 3.001 | CP26          |                   | 6              |  | 20.4                  | OK         |                   |
| 3.002 | CP25          |                   | 7              |  | 48.5                  | OK         |                   |
| 1.009 | CP04          |                   | 9              |  | 74.3                  | OK         |                   |
| 1.010 | CP05          |                   |                |  | 75.6                  | OK         |                   |
| 4.000 | CP26          |                   |                |  | 8.6                   | OK         |                   |
| 4.001 | CP25          |                   |                |  | 31.3                  | SURCHARGED |                   |
| 5.000 | CP29          |                   |                |  | 10.6                  | OK         |                   |
| 6.000 | CP31          |                   |                |  | 11.4                  | OK         |                   |
| 6.001 | CP30          |                   |                |  | 45.2                  | OK         |                   |
| 5.001 | CP28          |                   |                |  | 60.2                  | OK         |                   |
| 5.002 | CP27          |                   |                |  | 61.9                  | OK         |                   |
| 1.011 | CP06          |                   | 8              |  | 171.7                 | OK         |                   |
| 1.012 | CP07          |                   | 6              |  | 178.9                 | OK         |                   |
| 7.000 | CP24          |                   | 5              |  | 11.0                  | OK         |                   |
| 7.001 | CP23          |                   | 5              |  | 29.2                  | OK         |                   |
| 7.002 | CP22          |                   |                |  | 45.2                  | OK         |                   |
| 7.003 | CP21          |                   | 6              |  | 54.6                  | OK         |                   |
| 7.004 | CP20          |                   | 6              |  | 62.1                  | OK         |                   |
| 7.005 | CP19          |                   | 7              |  | 66.0                  | OK         |                   |
| 7.006 | CP09          |                   | 7              |  | 70.2                  | OK         |                   |

Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH Name | Storm      | Return Period | Climate Change | First (X) Surge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) |
|-------|------------|------------|---------------|----------------|-----------------|-----------------|--------------------|---------------|-----------------|----------------------|---------------------|
| 8.000 | CP18       | 15 Winter  | 10            | +0%            |                 |                 |                    |               | 74.217          | -0.593               | 0.000               |
| 8.001 | CP17       | 15 Winter  | 10            | +0%            |                 |                 |                    |               | 73.232          | -0.578               | 0.000               |
| 8.002 | CP16       | 15 Winter  | 10            | +0%            |                 |                 |                    |               | 72.547          | -0.128               | 0.000               |
| 8.003 | CP15       | 15 Winter  | 10            | +0%            |                 |                 |                    |               | 72.261          | -0.549               | 0.000               |
| 8.004 | CP14       | 15 Winter  | 10            | +0%            |                 |                 |                    |               | 72.017          | -0.543               | 0.000               |
| 8.005 | CP13       | 15 Winter  | 10            | +0%            |                 |                 |                    |               | 71.488          | -0.522               | 0.000               |
| 8.006 | CP12       | 15 Winter  | 10            | +0%            |                 |                 |                    |               | 71.375          | -0.535               | 0.000               |
| 8.007 | CP11       | 15 Winter  | 10            | +0%            |                 |                 |                    |               | 70.926          | -0.484               | 0.000               |
| 1.013 | CP08       | 15 Winter  | 10            | +0%            | 10/15 Summer    |                 |                    |               | 70.184          | 0.189                | 0.000               |
| 1.014 | CP10       | 15 Winter  | 10            | +0%            | 10/15 Summer    |                 |                    |               | 70.017          | 0.102                | 0.000               |
| 1.015 | POND       | 240 Winter | 10            | +0%            | 10/60 Winter    |                 |                    |               | 69.888          | 0.238                | 0.000               |
| 1.016 | DUMMY PIPE | 240 Winter | 10            | +0%            | 10/15 Summer    |                 |                    |               | 71.200          | 1.700                | 0.000               |

| PN    | US/MH Name | Flow / Overflow Cap. | Half Drain Time (mins) | Pipe Flow (l/s) | Status      | Level Exceeded |
|-------|------------|----------------------|------------------------|-----------------|-------------|----------------|
| 8.000 | CP18       | 0.00                 | 4                      | 6.6             | OK          |                |
| 8.001 | CP17       | 0.01                 | 5                      | 17.9            | OK          |                |
| 8.002 | CP16       | 0.39                 |                        | 26.0            | OK          |                |
| 8.003 | CP15       | 0.04                 | 5                      | 30.1            | OK          |                |
| 8.004 | CP14       | 0.04                 | 6                      | 47.7            | OK          |                |
| 8.005 | CP13       | 0.07                 | 6                      | 49.4            | OK          |                |
| 8.006 | CP12       | 0.05                 | 7                      | 51.8            | OK          |                |
| 8.007 | CP11       | 0.12                 | 6                      | 72.6            | OK          |                |
| 1.013 | CP08       | 1.25                 |                        | 311.5           | SURCHARGED  |                |
| 1.014 | CP10       | 1.49                 |                        | 311.3           | SURCHARGED  |                |
| 1.015 | POND       | 0.59                 | 396                    | 19.2            | SURCHARGED  |                |
| 1.016 | DUMMY PIPE | 0.00                 |                        | 0.0             | FLOOD RISK* |                |

## **30 YEAR RETURN PERIOD**

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0  
Number of Online Controls 1 Number of Storage Structures 25 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point  
FEH Rainfall Version 2013 Cv (Summer) 0.750  
Site Location GB 519261 227584 TL 19261 27584 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0  
Analysis Timestep 2.5 Second Increment (Extended)  
DTS Status OFF  
DVD Status ON  
Inertia Status ON

Profile(s) Summer and Winter  
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,  
1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080  
Return Period(s) (years) 30  
Climate Change (%) 0

|       |        |           |        |         |              |           |           |          | Water  | Surcharged | Flooded |        |
|-------|--------|-----------|--------|---------|--------------|-----------|-----------|----------|--------|------------|---------|--------|
|       | US/MH  |           | Return | Climate | First (X)    | First (Y) | First (Z) | Overflow | Level  | Depth      | Volume  | Flow / |
| PN    | Name   | Storm     | Period | Change  | Surcharge    | Flood     | Overflow  | Act.     | (m)    | (m)        | (m³)    | Cap.   |
| 1.000 | ROAD 3 | 15 Winter | 30     | +0%     |              |           |           |          | 77.319 | -0.466     | 0.000   | 0.04   |
| 1.001 | BAFFLE | 15 Winter | 30     | +0%     | 30/15 Summer |           |           |          | 77.076 | 0.046      | 0.000   | 1.39   |
| 1.002 | ROAD 2 | 30 Winter | 30     | +0%     |              |           |           |          | 76.414 | -0.586     | 0.000   | 0.01   |
| 1.003 | BAFFLE | 30 Winter | 30     | +0%     | 30/15 Summer |           |           |          | 76.077 | 0.047      | 0.000   | 1.41   |
| 1.004 | ROAD 2 | 30 Winter | 30     | +0%     |              |           |           |          | 75.529 | -0.471     | 0.000   | 0.04   |
| 1.005 | BAFFLE | 30 Winter | 30     | +0%     | 30/15 Summer |           |           |          | 75.521 | 0.061      | 0.000   | 1.57   |
| 2.000 | CP01   | 30 Winter | 30     | +0%     |              |           |           |          | 75.445 | -0.405     | 0.000   | 0.11   |
| 1.006 | ROAD 2 | 30 Winter | 30     | +0%     |              |           |           |          | 75.241 | -0.469     | 0.000   | 0.08   |
| 1.007 | CP02   | 30 Winter | 30     | +0%     |              |           |           |          | 75.143 | -0.032     | 0.000   | 1.00   |
| 1.008 | CP03   | 30 Winter | 30     | +0%     |              |           |           |          | 74.885 | -0.090     | 0.000   | 0.67   |
| 3.000 | CP27   | 15 Winter | 30     | +0%     |              |           |           |          | 75.940 | -0.520     | 0.000   | 0.02   |
| 3.001 | CP26   | 15 Winter | 30     | +0%     |              |           |           |          | 75.520 | -0.480     | 0.000   | 0.08   |
| 3.002 | CP25   | 15 Winter | 30     | +0%     |              |           |           |          | 75.451 | -0.559     | 0.000   | 0.05   |
| 1.009 | CP04   | 15 Winter | 30     | +0%     |              |           |           |          | 74.203 | -0.567     | 0.000   | 0.08   |
| 1.010 | CP05   | 15 Winter | 30     | +0%     |              |           |           |          | 73.174 | -0.051     | 0.000   | 0.95   |
| 4.000 | CP26   | 15 Winter | 30     | +0%     |              |           |           |          | 72.795 | -0.060     | 0.000   | 0.33   |
| 4.001 | CP25   | 15 Winter | 30     | +0%     | 30/15 Summer |           |           |          | 72.769 | 0.049      | 0.000   | 1.47   |
| 5.000 | CP29   | 15 Winter | 30     | +0%     | 30/15 Summer |           |           |          | 73.028 | 0.058      | 0.000   | 0.40   |
| 6.000 | CP31   | 15 Winter | 30     | +0%     |              |           |           |          | 73.151 | -0.029     | 0.000   | 0.72   |
| 6.001 | CP30   | 15 Winter | 30     | +0%     |              |           |           |          | 73.086 | -0.029     | 0.000   | 0.71   |
| 5.001 | CP28   | 15 Winter | 30     | +0%     | 30/15 Summer |           |           |          | 72.998 | 0.073      | 0.000   | 1.08   |
| 5.002 | CP27   | 15 Winter | 30     | +0%     | 30/15 Summer |           |           |          | 72.859 | 0.049      | 0.000   | 1.40   |
| 1.011 | CP06   | 15 Winter | 30     | +0%     |              |           |           |          | 72.592 | -0.468     | 0.000   | 0.15   |
| 1.012 | CP07   | 15 Winter | 30     | +0%     |              |           |           |          | 70.793 | -0.317     | 0.000   | 0.33   |
| 7.000 | CP24   | 15 Winter | 30     | +0%     |              |           |           |          | 75.230 | -0.580     | 0.000   | 0.01   |
| 7.001 | CP23   | 15 Winter | 30     | +0%     |              |           |           |          | 74.248 | -0.562     | 0.000   | 0.02   |
| 7.002 | CP22   | 15 Winter | 30     | +0%     |              |           |           |          | 72.035 | -0.090     | 0.000   | 0.65   |
| 7.003 | CP21   | 15 Winter | 30     | +0%     |              |           |           |          | 71.567 | -0.493     | 0.000   | 0.11   |
| 7.004 | CP20   | 15 Winter | 30     | +0%     |              |           |           |          | 71.123 | -0.387     | 0.000   | 0.16   |
| 7.005 | CP19   | 15 Winter | 30     | +0%     |              |           |           |          | 71.018 | -0.292     | 0.000   | 0.21   |
| 7.006 | CP09   | 15 Winter | 30     | +0%     |              |           |           |          | 70.682 | -0.253     | 0.000   | 0.33   |

Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH<br>Name | Overflow<br>(l/s) | Half Drain     |  | Pipe<br>Flow<br>(l/s) | Status     | Level<br>Exceeded |
|-------|---------------|-------------------|----------------|--|-----------------------|------------|-------------------|
|       |               |                   | Time<br>(mins) |  |                       |            |                   |
| 1.000 | ROAD 3        |                   | 7              |  | 15.3                  | OK         |                   |
| 1.001 | BAFFLE        |                   |                |  | 15.1                  | FLOOD RISK |                   |
| 1.002 | ROAD 2        |                   | 14             |  | 15.4                  | OK         |                   |
| 1.003 | BAFFLE        |                   |                |  | 15.3                  | SURCHARGED |                   |
| 1.004 | ROAD 2        |                   | 12             |  | 17.1                  | OK         |                   |
| 1.005 | BAFFLE        |                   |                |  | 17.0                  | FLOOD RISK |                   |
| 2.000 | CP01          |                   | 12             |  | 34.3                  | OK         |                   |
| 1.006 | ROAD 2        |                   | 13             |  | 52.1                  | OK         |                   |
| 1.007 | CP02          |                   |                |  | 51.4                  | OK         |                   |
| 1.008 | CP03          |                   |                |  | 51.4                  | OK         |                   |
| 3.000 | CP27          |                   | 6              |  | 18.3                  | OK         |                   |
| 3.001 | CP26          |                   | 6              |  | 26.4                  | OK         |                   |
| 3.002 | CP25          |                   | 7              |  | 63.4                  | OK         |                   |
| 1.009 | CP04          |                   | 9              |  | 97.4                  | OK         |                   |
| 1.010 | CP05          |                   |                |  | 99.2                  | OK         |                   |
| 4.000 | CP26          |                   |                |  | 12.0                  | OK         |                   |
| 4.001 | CP25          |                   |                |  | 43.9                  | SURCHARGED |                   |
| 5.000 | CP29          |                   |                |  | 14.3                  | SURCHARGED |                   |
| 6.000 | CP31          |                   |                |  | 14.5                  | OK         |                   |
| 6.001 | CP30          |                   |                |  | 55.8                  | OK         |                   |
| 5.001 | CP28          |                   |                |  | 79.4                  | SURCHARGED |                   |
| 5.002 | CP27          |                   |                |  | 86.1                  | SURCHARGED |                   |
| 1.011 | CP06          |                   | 7              |  | 227.3                 | OK         |                   |
| 1.012 | CP07          |                   | 6              |  | 238.5                 | OK         |                   |
| 7.000 | CP24          |                   | 5              |  | 14.2                  | OK         |                   |
| 7.001 | CP23          |                   | 5              |  | 38.0                  | OK         |                   |
| 7.002 | CP22          |                   |                |  | 58.8                  | OK         |                   |
| 7.003 | CP21          |                   | 6              |  | 69.6                  | OK         |                   |
| 7.004 | CP20          |                   | 6              |  | 80.0                  | OK         |                   |
| 7.005 | CP19          |                   | 6              |  | 83.9                  | OK         |                   |
| 7.006 | CP09          |                   | 6              |  | 89.2                  | FLOOD RISK |                   |

Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH Name | Storm      | Return Period | Climate Change | First (X) Surge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) |
|-------|------------|------------|---------------|----------------|-----------------|-----------------|--------------------|---------------|-----------------|----------------------|---------------------|
| 8.000 | CP18       | 15 Winter  | 30            | +0%            |                 |                 |                    |               | 74.220          | -0.590               | 0.000               |
| 8.001 | CP17       | 15 Winter  | 30            | +0%            |                 |                 |                    |               | 73.237          | -0.573               | 0.000               |
| 8.002 | CP16       | 15 Winter  | 30            | +0%            |                 |                 |                    |               | 72.564          | -0.111               | 0.000               |
| 8.003 | CP15       | 15 Winter  | 30            | +0%            |                 |                 |                    |               | 72.271          | -0.539               | 0.000               |
| 8.004 | CP14       | 15 Winter  | 30            | +0%            |                 |                 |                    |               | 72.028          | -0.532               | 0.000               |
| 8.005 | CP13       | 15 Winter  | 30            | +0%            |                 |                 |                    |               | 71.503          | -0.507               | 0.000               |
| 8.006 | CP12       | 15 Winter  | 30            | +0%            |                 |                 |                    |               | 71.387          | -0.523               | 0.000               |
| 8.007 | CP11       | 15 Winter  | 30            | +0%            |                 |                 |                    |               | 70.948          | -0.462               | 0.000               |
| 1.013 | CP08       | 15 Winter  | 30            | +0%            | 30/15 Summer    |                 |                    |               | 70.402          | 0.407                | 0.000               |
| 1.014 | CP10       | 15 Winter  | 30            | +0%            | 30/15 Summer    |                 |                    |               | 70.127          | 0.212                | 0.000               |
| 1.015 | POND       | 360 Winter | 30            | +0%            | 30/30 Winter    |                 |                    |               | 70.051          | 0.401                | 0.000               |
| 1.016 | DUMMY PIPE | 960 Winter | 30            | +0%            | 30/15 Summer    |                 |                    |               | 71.200          | 1.700                | 0.000               |

| PN    | US/MH Name | Flow / Overflow Cap. | Half Drain Time (mins) | Pipe Flow (l/s) | Status      | Level Exceeded |
|-------|------------|----------------------|------------------------|-----------------|-------------|----------------|
| 8.000 | CP18       | 0.01                 | 5                      | 8.6             | OK          |                |
| 8.001 | CP17       | 0.02                 | 5                      | 23.3            | OK          |                |
| 8.002 | CP16       | 0.50                 |                        | 33.7            | OK          |                |
| 8.003 | CP15       | 0.05                 | 5                      | 39.2            | OK          |                |
| 8.004 | CP14       | 0.06                 | 6                      | 61.8            | OK          |                |
| 8.005 | CP13       | 0.09                 | 6                      | 64.0            | OK          |                |
| 8.006 | CP12       | 0.07                 | 6                      | 67.0            | OK          |                |
| 8.007 | CP11       | 0.16                 | 5                      | 94.4            | OK          |                |
| 1.013 | CP08       | 1.62                 |                        | 403.6           | SURCHARGED  |                |
| 1.014 | CP10       | 1.92                 |                        | 402.3           | SURCHARGED  |                |
| 1.015 | POND       | 1.96                 | 526                    | 63.8            | SURCHARGED  |                |
| 1.016 | DUMMY PIPE | 4.14                 |                        | 74.7            | FLOOD RISK* |                |

**100 YEAR RETURN PERIOD + 40% CLIMATE CHANGE**



|                                                                |                                       |                                                                                     |
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH<br>Name | Flooded        |                               | Half Drain<br>Time<br>(mins) | Pipe          |            | Status | Level<br>Exceeded |
|-------|---------------|----------------|-------------------------------|------------------------------|---------------|------------|--------|-------------------|
|       |               | Volume<br>(m³) | Flow / Overflow<br>Cap. (l/s) |                              | Flow<br>(l/s) |            |        |                   |
| 1.000 | ROAD 3        | 0.000          | 0.07                          | 7                            | 25.0          |            | OK     |                   |
| 1.001 | BAFFLE        | 0.000          | 2.25                          |                              | 24.5          | FLOOD RISK |        |                   |
| 1.002 | ROAD 2        | 0.000          | 0.02                          | 18                           | 25.8          |            | OK     |                   |
| 1.003 | BAFFLE        | 0.000          | 2.34                          |                              | 25.3          | SURCHARGED |        |                   |
| 1.004 | ROAD 2        | 0.000          | 0.07                          | 13                           | 29.1          |            | OK     |                   |
| 1.005 | BAFFLE        | 0.000          | 2.67                          |                              | 28.9          | FLOOD RISK |        |                   |
| 2.000 | CP01          | 0.000          | 0.16                          | 13                           | 50.8          |            | OK     |                   |
| 1.006 | ROAD 2        | 0.000          | 0.12                          | 10                           | 78.3          |            | OK     |                   |
| 1.007 | CP02          | 0.000          | 1.51                          |                              | 77.6          | FLOOD RISK |        |                   |
| 1.008 | CP03          | 0.000          | 1.00                          |                              | 76.7          | OK         |        |                   |
| 3.000 | CP27          | 0.000          | 0.04                          | 6                            | 33.0          |            | OK     |                   |
| 3.001 | CP26          | 0.000          | 0.15                          | 5                            | 47.7          |            | OK     |                   |
| 3.002 | CP25          | 0.000          | 0.09                          | 7                            | 114.2         |            | OK     |                   |
| 1.009 | CP04          | 0.000          | 0.12                          | 6                            | 152.2         |            | OK     |                   |
| 1.010 | CP05          | 0.000          | 1.36                          |                              | 141.8         | FLOOD RISK |        |                   |
| 4.000 | CP26          | 0.000          | 0.61                          |                              | 22.1          | FLOOD RISK |        |                   |

|                                                                |                                       |                                                                                     |
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH<br>Name | Storm      | Return<br>Period | Climate<br>Change | First (X)<br>Surcharge | First (Y)<br>Flood | First (Z)<br>Overflow | Overflow<br>Act. | Water<br>Level<br>(m) |
|-------|---------------|------------|------------------|-------------------|------------------------|--------------------|-----------------------|------------------|-----------------------|
| 4.001 | CP25          | 15 Winter  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 72.995                |
| 5.000 | CP29          | 15 Winter  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 73.497                |
| 6.000 | CP31          | 15 Winter  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 73.980                |
| 6.001 | CP30          | 15 Winter  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 73.778                |
| 5.001 | CP28          | 15 Winter  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 73.486                |
| 5.002 | CP27          | 15 Winter  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 73.089                |
| 1.011 | CP06          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 72.635                |
| 1.012 | CP07          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 70.900                |
| 7.000 | CP24          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 75.242                |
| 7.001 | CP23          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 74.268                |
| 7.002 | CP22          | 15 Winter  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 72.224                |
| 7.003 | CP21          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 71.609                |
| 7.004 | CP20          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 71.175                |
| 7.005 | CP19          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 71.066                |
| 7.006 | CP09          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 70.935                |
| 8.000 | CP18          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 74.229                |
| 8.001 | CP17          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 73.253                |
| 8.002 | CP16          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 72.619                |
| 8.003 | CP15          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 72.302                |
| 8.004 | CP14          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 72.062                |
| 8.005 | CP13          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 71.548                |
| 8.006 | CP12          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 71.426                |
| 8.007 | CP11          | 15 Winter  | 100              | +40%              |                        |                    |                       |                  | 71.015                |
| 1.013 | CP08          | 15 Winter  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 70.850                |
| 1.014 | CP10          | 360 Winter | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 70.651                |
| 1.015 | POND          | 360 Winter | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 70.653                |
| 1.016 | DUMMY PIPE    | 15 Summer  | 100              | +40%              | 100/15 Summer          |                    |                       |                  | 71.200                |

| PN    | US/MH<br>Name | Surcharged<br>Depth<br>(m) | Flooded<br>Volume<br>(m³) | Flow /<br>Cap. | Overflow<br>(l/s) | Half Drain<br>Time<br>(mins) | Pipe<br>Flow<br>(l/s) | Status     | Level<br>Exceeded |
|-------|---------------|----------------------------|---------------------------|----------------|-------------------|------------------------------|-----------------------|------------|-------------------|
| 4.001 | CP25          | 0.275                      | 0.000                     | 2.61           |                   |                              | 78.1                  | FLOOD RISK |                   |
| 5.000 | CP29          | 0.527                      | 0.000                     | 0.88           |                   |                              | 31.9                  | FLOOD RISK |                   |
| 6.000 | CP31          | 0.800                      | 0.000                     | 1.32           |                   |                              | 26.7                  | SURCHARGED |                   |
| 6.001 | CP30          | 0.663                      | 0.000                     | 1.21           |                   |                              | 94.6                  | SURCHARGED |                   |
| 5.001 | CP28          | 0.561                      | 0.000                     | 1.82           |                   |                              | 133.9                 | FLOOD RISK |                   |
| 5.002 | CP27          | 0.279                      | 0.000                     | 2.39           |                   |                              | 146.7                 | FLOOD RISK |                   |
| 1.011 | CP06          | -0.425                     | 0.000                     | 0.24           |                   | 9                            | 357.3                 | OK         |                   |
| 1.012 | CP07          | -0.210                     | 0.000                     | 0.51           |                   | 8                            | 368.0                 | FLOOD RISK |                   |
| 7.000 | CP24          | -0.568                     | 0.000                     | 0.02           |                   | 6                            | 25.7                  | OK         |                   |
| 7.001 | CP23          | -0.542                     | 0.000                     | 0.05           |                   | 6                            | 68.7                  | OK         |                   |
| 7.002 | CP22          | 0.099                      | 0.000                     | 1.10           |                   |                              | 99.9                  | SURCHARGED |                   |
| 7.003 | CP21          | -0.451                     | 0.000                     | 0.18           |                   | 5                            | 118.3                 | OK         |                   |
| 7.004 | CP20          | -0.335                     | 0.000                     | 0.27           |                   | 6                            | 137.6                 | OK         |                   |
| 7.005 | CP19          | -0.244                     | 0.000                     | 0.32           |                   | 7                            | 129.5                 | FLOOD RISK |                   |
| 7.006 | CP09          | 0.000                      | 0.000                     | 0.60           |                   | 4                            | 165.1                 | FLOOD RISK |                   |
| 8.000 | CP18          | -0.581                     | 0.000                     | 0.01           |                   | 5                            | 15.5                  | OK         |                   |

|                                                                |                                       |                                                                                     |
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Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN    | US/MH<br>Name | Surcharged Flooded |                | Flow / Overflow |       | Half Drain     | Pipe          | Status      | Level<br>Exceeded |
|-------|---------------|--------------------|----------------|-----------------|-------|----------------|---------------|-------------|-------------------|
|       |               | Depth<br>(m)       | Volume<br>(m³) | Cap.            | (l/s) | Time<br>(mins) | Flow<br>(l/s) |             |                   |
| 8.001 | CP17          | -0.557             | 0.000          | 0.03            |       | 5              | 42.1          | OK          |                   |
| 8.002 | CP16          | -0.056             | 0.000          | 0.91            |       |                | 60.9          | OK          |                   |
| 8.003 | CP15          | -0.508             | 0.000          | 0.09            |       | 5              | 70.8          | OK          |                   |
| 8.004 | CP14          | -0.498             | 0.000          | 0.10            |       | 5              | 112.5         | OK          |                   |
| 8.005 | CP13          | -0.462             | 0.000          | 0.17            |       | 5              | 115.3         | OK          |                   |
| 8.006 | CP12          | -0.484             | 0.000          | 0.13            |       | 5              | 122.6         | OK          |                   |
| 8.007 | CP11          | -0.395             | 0.000          | 0.20            |       | 5              | 117.9         | OK          |                   |
| 1.013 | CP08          | 0.855              | 0.000          | 2.18            |       |                | 543.0         | FLOOD RISK  |                   |
| 1.014 | CP10          | 0.736              | 0.000          | 0.73            |       |                | 151.8         | FLOOD RISK  |                   |
| 1.015 | POND          | 1.003              | 0.000          | 2.94            |       | 1063           | 95.8          | FLOOD RISK  |                   |
| 1.016 | DUMMY PIPE    | 1.700              | 0.000          | 3.16            |       |                | 57.1          | FLOOD RISK* |                   |

## Appendix C – Terms & Definitions

### Carbon Equivalent

Carbon equivalent is the unit of measurement of the global warming potential measured in units of kgCO<sub>2</sub>e (CO<sub>2</sub> equivalent) and includes the effect of all greenhouse gases (GHGs) measured relative to the effects of carbon dioxide.

### Embodied Carbon (EC)

The embodied carbon of a building, component or product is defined as the GHG emissions associated with its creation, manufacture, fabrication and installation, expressed in units of kgCO<sub>2</sub>e. This consists of emissions during material procurement (A1-A3), transportation to site (A4), construction and installation (A5), in-use emissions (B1), maintenance (B2), repair (B3), replacement (B4), refurbishment (B5), demolition (C1), transport to processing site (C2), waste processing (C3) and disposal (C4).

### Embodied Carbon Factor (ECF)

An embodied carbon factor refers to the global warming potential or the equivalent carbon emissions of a product or material, expressed in terms of a unit quantity of the product; for example, kgCO<sub>2</sub>e/kg, kgCO<sub>2</sub>e/m<sup>2</sup> or kgCO<sub>2</sub>e/km. The ECF is multiplied with the specified material quantity, distance, etc., to give the EC of that material for a specific module.

### End-of-Life (EoL)

The end-of-life stage of a façade is when the facade is no longer intended for further use. At this point, the facade is dismantled or demolished, and materials or components are taken for waste processing, disposal, or potential reuse, recovery or recycling. Assumptions are made for EoL calculations based on likely scenarios.

### Environmental Product Declarations (EPD)

An Environmental Product Declaration is a document which presents the environmental performance of a product based on a Life Cycle Inventory (LCI) analysis in line with ISO 14040:2006, which is generally valid for five years. EPDs for products are formed on the basis of ISO 14025: Environmental labels and declarations—Type III environmental declarations. Global warming potential values are extracted for calculation from Type-III EPDs, and project verified EPDs. EPDs must reference ISO 14025, 14040, 14044 and BS EN 15804 or ISO 21930 and summarise the results of an LCA of the product.

### Façade Surface Area (FSA)

The façade surface area is the total surface area of the external building fabric that is exposed to the external atmosphere.

### Façade System

A façade system is defined as an assembly of components that form a building's external fabric and delivers a prescribed functional performance to the building envelope. A building may consist of one or more façade systems.

### Factory-assembled Façade System

A factory-assembled facade system refers to a facade system comprised of materials and components installed together off site and then transported to site for installation.

### Global Warming Potential (GWP)

The global warming potential is a metric of the impact of a material on the atmospheric temperature due to the GHG emissions it causes. It compares the ability of each greenhouse gas to trap heat in the atmosphere and is expressed relative to carbon dioxide (CO<sub>2</sub>) (IPCC). This is expressed in terms of kilograms of CO<sub>2</sub> equivalent (kgCO<sub>2</sub>e) and can be found in EPDs.

### Gross Internal Area (GIA)

The gross internal area of a building is the internal floor area of a building measured to the internal face of the perimeter walls at each floor level.

### Life Cycle Assessment (LCA)

A life cycle assessment is the process of determining the potential environmental impact of products, processes or services throughout their life cycle by compiling and evaluating inputs and outputs (GDRC, BS EN ISO 14040:2006).

### Operational Carbon

The operational carbon of a building is defined as the CO<sub>2</sub>e or GHG emissions associated with the operational phase of the building. This consists of all emissions caused due to the operation of the building, namely: heating, cooling, powering, water supply, etc (UKGBC, 2015). This consists of life cycle modules B6 (operational energy use) and B7 (operational water use) (BS EN 15978:2011).

### Reference Study Period (RSP)

The reference study period is the period of time over which the time-dependent characteristics of the object of assessment are analysed. For the purpose of this report, the reference study period refers to the design life of the proposed façade.

### Site-assembled Façade System

A site-assembled façade system refers to a façade system comprised of materials and components installed into the façade at the project construction site.

### Whole Life Carbon

A whole life carbon assessment must account for all CO<sub>2</sub>e emissions across the entire life of the product or building element and for its reusability or recyclability (A-D) (RICS WLC guidance, BS EN 15978:2011).

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