## APPENDIX B

- GREENFIELD RUN-OFF CALCULATIONS
- INFILTRATION TANK CALCULATIONS
- PERMEABLE CAR PARK CALCULATIONS

## ICP SUDS Mean Annual Flood

Input

| | | | |
|---|---|---|---|
| Return Period (years) | 2 | Soil | 0.150 |
| Area (ha) | 6.500 | Urban | 0.000 |
| SAAR (mm) | 672 | Region Number | Region 6 |

| **Results** | **l/s** |
|---|---|
| QBAR Rural | 2.5 |
| QBAR Urban | 2.5 |
| Q2 years | 2.2 |
| Q1 year | 2.1 |
| Q30 years | 5.7 |
| Q100 years | 8.0 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 4 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 68.674 | 0.174 | 70.2 | 30.0 | O K |
| 30 min Summer | 68.671 | 0.171 | 70.2 | 29.3 | O K |
| 60 min Summer | 68.634 | 0.134 | 70.2 | 20.5 | O K |
| 120 min Summer | 68.591 | 0.091 | 63.7 | 9.9 | O K |
| 180 min Summer | 68.572 | 0.072 | 50.7 | 6.4 | O K |
| 240 min Summer | 68.560 | 0.060 | 42.3 | 4.4 | O K |
| 360 min Summer | 68.548 | 0.048 | 32.0 | 2.8 | O K |
| 480 min Summer | 68.543 | 0.043 | 25.7 | 2.2 | O K |
| 600 min Summer | 68.539 | 0.039 | 21.6 | 1.9 | O K |
| 720 min Summer | 68.537 | 0.037 | 19.0 | 1.6 | O K |
| 960 min Summer | 68.533 | 0.033 | 15.1 | 1.3 | O K |
| 1440 min Summer | 68.528 | 0.028 | 10.8 | 0.9 | O K |
| 2160 min Summer | 68.524 | 0.024 | 7.9 | 0.7 | O K |
| 2880 min Summer | 68.521 | 0.021 | 6.3 | 0.6 | O K |
| 4320 min Summer | 68.518 | 0.018 | 4.4 | 0.4 | O K |
| 5760 min Summer | 68.516 | 0.016 | 3.7 | 0.3 | O K |
| 7200 min Summer | 68.515 | 0.015 | 3.1 | 0.3 | O K |
| 8640 min Summer | 68.514 | 0.014 | 2.7 | 0.2 | O K |
| 10080 min Summer | 68.513 | 0.013 | 2.3 | 0.2 | O K |
| 15 min Winter | 68.692 | 0.192 | 70.2 | 34.5 | O K |
| 30 min Winter | 68.677 | 0.177 | 70.2 | 30.9 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 0.0 | 13 |
| 30 min Summer | 84.226 | 0.0 | 21 |
| 60 min Summer | 52.662 | 0.0 | 36 |
| 120 min Summer | 31.800 | 0.0 | 66 |
| 180 min Summer | 23.353 | 0.0 | 94 |
| 240 min Summer | 18.644 | 0.0 | 124 |
| 360 min Summer | 13.543 | 0.0 | 184 |
| 480 min Summer | 10.792 | 0.0 | 246 |
| 600 min Summer | 9.043 | 0.0 | 302 |
| 720 min Summer | 7.823 | 0.0 | 368 |
| 960 min Summer | 6.219 | 0.0 | 482 |
| 1440 min Summer | 4.493 | 0.0 | 726 |
| 2160 min Summer | 3.241 | 0.0 | 1092 |
| 2880 min Summer | 2.568 | 0.0 | 1428 |
| 4320 min Summer | 1.847 | 0.0 | 2128 |
| 5760 min Summer | 1.461 | 0.0 | 2840 |
| 7200 min Summer | 1.217 | 0.0 | 3568 |
| 8640 min Summer | 1.048 | 0.0 | 4296 |
| 10080 min Summer | 0.923 | 0.0 | 5088 |
| 15 min Winter | 128.285 | 0.0 | 13 |
| 30 min Winter | 84.226 | 0.0 | 22 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 68.617 | 0.117 | 70.2 | 16.3 | O K |
| 120 min Winter | 68.575 | 0.075 | 52.5 | 6.8 | O K |
| 180 min Winter | 68.557 | 0.057 | 39.8 | 3.9 | O K |
| 240 min Winter | 68.548 | 0.048 | 32.0 | 2.7 | O K |
| 360 min Winter | 68.541 | 0.041 | 23.3 | 2.0 | O K |
| 480 min Winter | 68.536 | 0.036 | 18.4 | 1.6 | O K |
| 600 min Winter | 68.533 | 0.033 | 15.5 | 1.4 | O K |
| 720 min Winter | 68.531 | 0.031 | 13.7 | 1.2 | O K |
| 960 min Winter | 68.528 | 0.028 | 10.8 | 0.9 | O K |
| 1440 min Winter | 68.524 | 0.024 | 7.9 | 0.7 | O K |
| 2160 min Winter | 68.520 | 0.020 | 5.8 | 0.5 | O K |
| 2880 min Winter | 68.518 | 0.018 | 4.4 | 0.4 | O K |
| 4320 min Winter | 68.515 | 0.015 | 3.3 | 0.3 | O K |
| 5760 min Winter | 68.514 | 0.014 | 2.7 | 0.2 | O K |
| 7200 min Winter | 68.513 | 0.013 | 2.3 | 0.2 | O K |
| 8640 min Winter | 68.512 | 0.012 | 1.9 | 0.2 | O K |
| 10080 min Winter | 68.511 | 0.011 | 1.6 | 0.2 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 0.0 | 38 |
| 120 min Winter | 31.800 | 0.0 | 66 |
| 180 min Winter | 23.353 | 0.0 | 94 |
| 240 min Winter | 18.644 | 0.0 | 126 |
| 360 min Winter | 13.543 | 0.0 | 180 |
| 480 min Winter | 10.792 | 0.0 | 246 |
| 600 min Winter | 9.043 | 0.0 | 306 |
| 720 min Winter | 7.823 | 0.0 | 358 |
| 960 min Winter | 6.219 | 0.0 | 478 |
| 1440 min Winter | 4.493 | 0.0 | 710 |
| 2160 min Winter | 3.241 | 0.0 | 1084 |
| 2880 min Winter | 2.568 | 0.0 | 1456 |
| 4320 min Winter | 1.847 | 0.0 | 2192 |
| 5760 min Winter | 1.461 | 0.0 | 2864 |
| 7200 min Winter | 1.217 | 0.0 | 3664 |
| 8640 min Winter | 1.048 | 0.0 | 4368 |
| 10080 min Winter | 0.923 | 0.0 | 5040 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Time Area Diagram

Total Area (ha) 0.292

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.292 |

## Time Area Diagram

Total Area (ha) 0.000

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.000 |

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## Model Details

Storage is Online Cover Level (m) 69.100

## Porous Car Park Structure

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.46800 | Width (m) | 16.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 50.0 |
| Max Percolation (l/s) | 225.0 | Slope (1:X) | 500.0 |
| Safety Factor | 1.5 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 68.500 | Cap Volume Depth (m) | 0.500 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 60 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.816 | 0.416 | 13.2 | 55.3 | FLOOD |
| 30 min Summer | 69.950 | 0.550 | 13.2 | 73.2 | FLOOD |
| 60 min Summer | 69.994 | 0.594 | 13.2 | 79.0 | FLOOD |
| 120 min Summer | 69.964 | 0.564 | 13.2 | 75.0 | FLOOD |
| 180 min Summer | 69.928 | 0.528 | 13.2 | 70.3 | FLOOD |
| 240 min Summer | 69.878 | 0.478 | 13.2 | 63.6 | FLOOD |
| 360 min Summer | 69.787 | 0.387 | 13.2 | 51.4 | Flood Risk |
| 480 min Summer | 69.708 | 0.308 | 12.9 | 40.9 | Flood Risk |
| 600 min Summer | 69.640 | 0.240 | 12.6 | 31.9 | Flood Risk |
| 720 min Summer | 69.584 | 0.184 | 12.4 | 24.5 | Flood Risk |
| 960 min Summer | 69.503 | 0.103 | 12.1 | 13.7 | Flood Risk |
| 1440 min Summer | 69.447 | 0.047 | 11.1 | 6.2 | O K |
| 2160 min Summer | 69.434 | 0.034 | 8.0 | 4.5 | O K |
| 2880 min Summer | 69.427 | 0.027 | 6.3 | 3.6 | O K |
| 4320 min Summer | 69.419 | 0.019 | 4.6 | 2.6 | O K |
| 5760 min Summer | 69.415 | 0.015 | 3.6 | 2.0 | O K |
| 7200 min Summer | 69.413 | 0.013 | 3.0 | 1.7 | O K |
| 8640 min Summer | 69.411 | 0.011 | 2.7 | 1.5 | O K |
| 10080 min Summer | 69.410 | 0.010 | 2.3 | 1.3 | O K |
| 15 min Winter | 69.907 | 0.507 | 13.2 | 67.4 | FLOOD |
| 30 min Winter | 70.041 | 0.641 | 13.2 | 85.3 | FLOOD |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 2.1 | 17 |
| 30 min Summer | 84.226 | 20.0 | 33 |
| 60 min Summer | 52.662 | 25.8 | 56 |
| 120 min Summer | 31.800 | 21.8 | 88 |
| 180 min Summer | 23.353 | 17.1 | 122 |
| 240 min Summer | 18.644 | 10.4 | 156 |
| 360 min Summer | 13.543 | 0.0 | 222 |
| 480 min Summer | 10.792 | 0.0 | 284 |
| 600 min Summer | 9.043 | 0.0 | 346 |
| 720 min Summer | 7.823 | 0.0 | 404 |
| 960 min Summer | 6.219 | 0.0 | 514 |
| 1440 min Summer | 4.493 | 0.0 | 734 |
| 2160 min Summer | 3.241 | 0.0 | 1088 |
| 2880 min Summer | 2.568 | 0.0 | 1460 |
| 4320 min Summer | 1.847 | 0.0 | 2200 |
| 5760 min Summer | 1.461 | 0.0 | 2848 |
| 7200 min Summer | 1.217 | 0.0 | 3664 |
| 8640 min Summer | 1.048 | 0.0 | 4320 |
| 10080 min Summer | 0.923 | 0.0 | 4976 |
| 15 min Winter | 128.285 | 14.2 | 19 |
| 30 min Winter | 84.226 | 32.1 | 33 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 70.092 | 0.692 | 13.2 | 92.1 | FLOOD |
| 120 min Winter | 70.067 | 0.667 | 13.2 | 88.7 | FLOOD |
| 180 min Winter | 69.999 | 0.599 | 13.2 | 79.6 | FLOOD |
| 240 min Winter | 69.922 | 0.522 | 13.2 | 69.4 | FLOOD |
| 360 min Winter | 69.781 | 0.381 | 13.2 | 50.7 | Flood Risk |
| 480 min Winter | 69.665 | 0.265 | 12.7 | 35.3 | Flood Risk |
| 600 min Winter | 69.572 | 0.172 | 12.3 | 22.8 | Flood Risk |
| 720 min Winter | 69.500 | 0.100 | 12.1 | 13.3 | Flood Risk |
| 960 min Winter | 69.447 | 0.047 | 11.1 | 6.2 | O K |
| 1440 min Winter | 69.434 | 0.034 | 8.0 | 4.5 | O K |
| 2160 min Winter | 69.425 | 0.025 | 5.9 | 3.3 | O K |
| 2880 min Winter | 69.420 | 0.020 | 4.7 | 2.6 | O K |
| 4320 min Winter | 69.414 | 0.014 | 3.4 | 1.9 | O K |
| 5760 min Winter | 69.411 | 0.011 | 2.7 | 1.5 | O K |
| 7200 min Winter | 69.409 | 0.009 | 2.2 | 1.2 | O K |
| 8640 min Winter | 69.408 | 0.008 | 2.0 | 1.1 | O K |
| 10080 min Winter | 69.407 | 0.007 | 1.7 | 0.9 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 38.9 | 60 |
| 120 min Winter | 31.800 | 35.5 | 96 |
| 180 min Winter | 23.353 | 26.4 | 132 |
| 240 min Winter | 18.644 | 16.2 | 170 |
| 360 min Winter | 13.543 | 0.0 | 236 |
| 480 min Winter | 10.792 | 0.0 | 300 |
| 600 min Winter | 9.043 | 0.0 | 358 |
| 720 min Winter | 7.823 | 0.0 | 408 |
| 960 min Winter | 6.219 | 0.0 | 490 |
| 1440 min Winter | 4.493 | 0.0 | 734 |
| 2160 min Winter | 3.241 | 0.0 | 1092 |
| 2880 min Winter | 2.568 | 0.0 | 1456 |
| 4320 min Winter | 1.847 | 0.0 | 2140 |
| 5760 min Winter | 1.461 | 0.0 | 2864 |
| 7200 min Winter | 1.217 | 0.0 | 3664 |
| 8640 min Winter | 1.048 | 0.0 | 4240 |
| 10080 min Winter | 0.923 | 0.0 | 5176 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Pipe Network

| | | | |
|---|---|---|---|
| Volume in Pipe Network ($m^3$) | 5 | Dia of Outfall Pipe (m) | 0.2 |
| Slope of Outfall Pipe (1:X) | 100 | Roughness of Outfall Pipe (mm) | 0.600 |

## Time Area Diagram

Total Area (ha) 0.303

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.303 |

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## Model Details

Storage is Online Cover Level (m) 69.800

## Cellular Storage Structure

Invert Level (m) 69.400 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.45000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.45000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 140.0 | 140.0 | 1.300 | 140.0 | 201.5 |
| 0.100 | 140.0 | 144.7 | 1.400 | 140.0 | 206.3 |
| 0.200 | 140.0 | 149.5 | 1.500 | 140.0 | 211.0 |
| 0.300 | 140.0 | 154.2 | 1.600 | 140.0 | 215.7 |
| 0.400 | 140.0 | 158.9 | 1.700 | 140.0 | 220.5 |
| 0.500 | 140.0 | 163.7 | 1.800 | 140.0 | 225.2 |
| 0.600 | 140.0 | 168.4 | 1.900 | 140.0 | 229.9 |
| 0.700 | 140.0 | 173.1 | 2.000 | 140.0 | 234.7 |
| 0.800 | 140.0 | 177.9 | 2.100 | 140.0 | 239.4 |
| 0.900 | 140.0 | 182.6 | 2.200 | 140.0 | 244.1 |
| 1.000 | 140.0 | 187.3 | 2.300 | 140.0 | 248.9 |
| 1.100 | 140.0 | 192.1 | 2.400 | 140.0 | 253.6 |
| 1.200 | 140.0 | 196.8 | 2.500 | 140.0 | 258.3 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 20 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.644 | 0.244 | 28.5 | 47.2 | O K |
| 30 min Summer | 69.670 | 0.270 | 28.5 | 53.5 | O K |
| 60 min Summer | 69.664 | 0.264 | 28.5 | 52.0 | O K |
| 120 min Summer | 69.620 | 0.220 | 28.5 | 41.2 | O K |
| 180 min Summer | 69.575 | 0.175 | 28.5 | 30.5 | O K |
| 240 min Summer | 69.539 | 0.139 | 28.5 | 21.7 | O K |
| 360 min Summer | 69.498 | 0.098 | 28.0 | 11.8 | O K |
| 480 min Summer | 69.483 | 0.083 | 23.6 | 8.3 | O K |
| 600 min Summer | 69.472 | 0.072 | 20.4 | 6.3 | O K |
| 720 min Summer | 69.463 | 0.063 | 18.0 | 4.9 | O K |
| 960 min Summer | 69.452 | 0.052 | 14.7 | 3.2 | O K |
| 1440 min Summer | 69.443 | 0.043 | 10.7 | 2.3 | O K |
| 2160 min Summer | 69.437 | 0.037 | 7.7 | 1.6 | O K |
| 2880 min Summer | 69.433 | 0.033 | 6.1 | 1.3 | O K |
| 4320 min Summer | 69.428 | 0.028 | 4.4 | 0.9 | O K |
| 5760 min Summer | 69.425 | 0.025 | 3.5 | 0.8 | O K |
| 7200 min Summer | 69.423 | 0.023 | 3.0 | 0.6 | O K |
| 8640 min Summer | 69.421 | 0.021 | 2.6 | 0.6 | O K |
| 10080 min Summer | 69.420 | 0.020 | 2.2 | 0.5 | O K |
| 15 min Winter | 69.676 | 0.276 | 28.5 | 54.9 | O K |
| 30 min Winter | 69.705 | 0.305 | 28.5 | 61.9 | Flood Risk |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 0.0 | 15 |
| 30 min Summer | 84.226 | 0.0 | 24 |
| 60 min Summer | 52.662 | 0.0 | 42 |
| 120 min Summer | 31.800 | 0.0 | 76 |
| 180 min Summer | 23.353 | 0.0 | 106 |
| 240 min Summer | 18.644 | 0.0 | 136 |
| 360 min Summer | 13.543 | 0.0 | 190 |
| 480 min Summer | 10.792 | 0.0 | 250 |
| 600 min Summer | 9.043 | 0.0 | 308 |
| 720 min Summer | 7.823 | 0.0 | 368 |
| 960 min Summer | 6.219 | 0.0 | 488 |
| 1440 min Summer | 4.493 | 0.0 | 734 |
| 2160 min Summer | 3.241 | 0.0 | 1100 |
| 2880 min Summer | 2.568 | 0.0 | 1444 |
| 4320 min Summer | 1.847 | 0.0 | 2152 |
| 5760 min Summer | 1.461 | 0.0 | 2928 |
| 7200 min Summer | 1.217 | 0.0 | 3552 |
| 8640 min Summer | 1.048 | 0.0 | 4352 |
| 10080 min Summer | 0.923 | 0.0 | 5112 |
| 15 min Winter | 128.285 | 0.0 | 16 |
| 30 min Winter | 84.226 | 0.0 | 26 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.691 | 0.291 | 28.5 | 58.6 | O K |
| 120 min Winter | 69.620 | 0.220 | 28.5 | 41.2 | O K |
| 180 min Winter | 69.552 | 0.152 | 28.5 | 24.9 | O K |
| 240 min Winter | 69.506 | 0.106 | 28.5 | 13.7 | O K |
| 360 min Winter | 69.479 | 0.079 | 22.6 | 7.6 | O K |
| 480 min Winter | 69.464 | 0.064 | 18.3 | 5.0 | O K |
| 600 min Winter | 69.454 | 0.054 | 15.5 | 3.6 | O K |
| 720 min Winter | 69.449 | 0.049 | 13.5 | 2.9 | O K |
| 960 min Winter | 69.443 | 0.043 | 10.7 | 2.3 | O K |
| 1440 min Winter | 69.437 | 0.037 | 7.7 | 1.7 | O K |
| 2160 min Winter | 69.431 | 0.031 | 5.6 | 1.2 | O K |
| 2880 min Winter | 69.428 | 0.028 | 4.4 | 0.9 | O K |
| 4320 min Winter | 69.424 | 0.024 | 3.2 | 0.7 | O K |
| 5760 min Winter | 69.421 | 0.021 | 2.6 | 0.5 | O K |
| 7200 min Winter | 69.419 | 0.019 | 2.1 | 0.5 | O K |
| 8640 min Winter | 69.418 | 0.018 | 1.8 | 0.4 | O K |
| 10080 min Winter | 69.417 | 0.017 | 1.6 | 0.3 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 0.0 | 46 |
| 120 min Winter | 31.800 | 0.0 | 80 |
| 180 min Winter | 23.353 | 0.0 | 110 |
| 240 min Winter | 18.644 | 0.0 | 134 |
| 360 min Winter | 13.543 | 0.0 | 190 |
| 480 min Winter | 10.792 | 0.0 | 250 |
| 600 min Winter | 9.043 | 0.0 | 308 |
| 720 min Winter | 7.823 | 0.0 | 364 |
| 960 min Winter | 6.219 | 0.0 | 490 |
| 1440 min Winter | 4.493 | 0.0 | 734 |
| 2160 min Winter | 3.241 | 0.0 | 1080 |
| 2880 min Winter | 2.568 | 0.0 | 1468 |
| 4320 min Winter | 1.847 | 0.0 | 2160 |
| 5760 min Winter | 1.461 | 0.0 | 2888 |
| 7200 min Winter | 1.217 | 0.0 | 3472 |
| 8640 min Winter | 1.048 | 0.0 | 4288 |
| 10080 min Winter | 0.923 | 0.0 | 5048 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Time Area Diagram

Total Area (ha) 0.292

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.292 |

## Time Area Diagram

Total Area (ha) 0.000

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.000 |

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## Model Details

Storage is Online Cover Level (m) 70.000

## Porous Car Park Structure

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.19000 | Width (m) | 16.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 50.0 |
| Max Percolation (l/s) | 225.0 | Slope (1:X) | 500.0 |
| Safety Factor | 1.5 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 69.400 | Cap Volume Depth (m) | 0.500 |

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## Summary of Results for 30 year Return Period

Half Drain Time : 407 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.572 | 0.172 | 1.8 | 38.4 | Flood Risk |
| 30 min Summer | 69.628 | 0.228 | 1.8 | 51.0 | Flood Risk |
| 60 min Summer | 69.677 | 0.277 | 1.9 | 61.9 | Flood Risk |
| 120 min Summer | 69.727 | 0.327 | 1.9 | 72.9 | Flood Risk |
| 180 min Summer | 69.742 | 0.342 | 1.9 | 76.3 | Flood Risk |
| 240 min Summer | 69.746 | 0.346 | 1.9 | 77.3 | Flood Risk |
| 360 min Summer | 69.742 | 0.342 | 1.9 | 76.4 | Flood Risk |
| 480 min Summer | 69.736 | 0.336 | 1.9 | 75.0 | Flood Risk |
| 600 min Summer | 69.728 | 0.328 | 1.9 | 73.2 | Flood Risk |
| 720 min Summer | 69.720 | 0.320 | 1.9 | 71.4 | Flood Risk |
| 960 min Summer | 69.703 | 0.303 | 1.9 | 67.6 | Flood Risk |
| 1440 min Summer | 69.668 | 0.268 | 1.9 | 59.9 | Flood Risk |
| 2160 min Summer | 69.621 | 0.221 | 1.8 | 49.3 | Flood Risk |
| 2880 min Summer | 69.579 | 0.179 | 1.8 | 40.0 | Flood Risk |
| 4320 min Summer | 69.514 | 0.114 | 1.8 | 25.5 | Flood Risk |
| 5760 min Summer | 69.472 | 0.072 | 1.8 | 16.1 | O K |
| 7200 min Summer | 69.451 | 0.051 | 1.8 | 11.4 | O K |
| 8640 min Summer | 69.445 | 0.045 | 1.6 | 10.0 | O K |
| 10080 min Summer | 69.440 | 0.040 | 1.4 | 8.9 | O K |
| 15 min Winter | 69.603 | 0.203 | 1.8 | 45.3 | Flood Risk |
| 30 min Winter | 69.660 | 0.260 | 1.9 | 58.0 | Flood Risk |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 76.035 | 0.0 | 23 |
| 30 min Summer | 49.499 | 0.0 | 37 |
| 60 min Summer | 30.811 | 0.0 | 66 |
| 120 min Summer | 18.615 | 0.0 | 124 |
| 180 min Summer | 13.715 | 0.0 | 184 |
| 240 min Summer | 10.995 | 0.0 | 242 |
| 360 min Summer | 8.034 | 0.0 | 320 |
| 480 min Summer | 6.428 | 0.0 | 384 |
| 600 min Summer | 5.404 | 0.0 | 448 |
| 720 min Summer | 4.687 | 0.0 | 514 |
| 960 min Summer | 3.743 | 0.0 | 648 |
| 1440 min Summer | 2.723 | 0.0 | 922 |
| 2160 min Summer | 1.979 | 0.0 | 1320 |
| 2880 min Summer | 1.577 | 0.0 | 1700 |
| 4320 min Summer | 1.143 | 0.0 | 2420 |
| 5760 min Summer | 0.910 | 0.0 | 3064 |
| 7200 min Summer | 0.762 | 0.0 | 3680 |
| 8640 min Summer | 0.659 | 0.0 | 4416 |
| 10080 min Summer | 0.583 | 0.0 | 5144 |
| 15 min Winter | 76.035 | 0.0 | 23 |
| 30 min Winter | 49.499 | 0.0 | 36 |

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## Summary of Results for 30 year Return Period

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.722 | 0.322 | 1.9 | 72.0 | Flood Risk |
| 120 min Winter | 69.771 | 0.371 | 1.9 | 82.9 | Flood Risk |
| 180 min Winter | 69.791 | 0.391 | 1.9 | 87.4 | Flood Risk |
| 240 min Winter | 69.799 | 0.399 | 1.9 | 89.1 | Flood Risk |
| 360 min Winter | 69.799 | 0.399 | 1.9 | 89.1 | Flood Risk |
| 480 min Winter | 69.790 | 0.390 | 1.9 | 87.0 | Flood Risk |
| 600 min Winter | 69.779 | 0.379 | 1.9 | 84.6 | Flood Risk |
| 720 min Winter | 69.768 | 0.368 | 1.9 | 82.2 | Flood Risk |
| 960 min Winter | 69.744 | 0.344 | 1.9 | 76.7 | Flood Risk |
| 1440 min Winter | 69.692 | 0.292 | 1.9 | 65.2 | Flood Risk |
| 2160 min Winter | 69.620 | 0.220 | 1.8 | 49.1 | Flood Risk |
| 2880 min Winter | 69.558 | 0.158 | 1.8 | 35.2 | Flood Risk |
| 4320 min Winter | 69.470 | 0.070 | 1.8 | 15.7 | O K |
| 5760 min Winter | 69.445 | 0.045 | 1.6 | 10.1 | O K |
| 7200 min Winter | 69.438 | 0.038 | 1.3 | 8.5 | O K |
| 8640 min Winter | 69.433 | 0.033 | 1.2 | 7.4 | O K |
| 10080 min Winter | 69.429 | 0.029 | 1.0 | 6.5 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 30.811 | 0.0 | 64 |
| 120 min Winter | 18.615 | 0.0 | 122 |
| 180 min Winter | 13.715 | 0.0 | 180 |
| 240 min Winter | 10.995 | 0.0 | 236 |
| 360 min Winter | 8.034 | 0.0 | 346 |
| 480 min Winter | 6.428 | 0.0 | 446 |
| 600 min Winter | 5.404 | 0.0 | 476 |
| 720 min Winter | 4.687 | 0.0 | 554 |
| 960 min Winter | 3.743 | 0.0 | 706 |
| 1440 min Winter | 2.723 | 0.0 | 1000 |
| 2160 min Winter | 1.979 | 0.0 | 1408 |
| 2880 min Winter | 1.577 | 0.0 | 1792 |
| 4320 min Winter | 1.143 | 0.0 | 2424 |
| 5760 min Winter | 0.910 | 0.0 | 2960 |
| 7200 min Winter | 0.762 | 0.0 | 3688 |
| 8640 min Winter | 0.659 | 0.0 | 4416 |
| 10080 min Winter | 0.583 | 0.0 | 5136 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 30 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +0 |

## Pipe Network

| | | | |
|---|---|---|---|
| Volume in Pipe Network ($m^3$) | 5 | Dia of Outfall Pipe (m) | 0.2 |
| Slope of Outfall Pipe (1:X) | 100 | Roughness of Outfall Pipe (mm) | 0.600 |

## Time Area Diagram

Total Area (ha) 0.301

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.301 |

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## Model Details

Storage is Online Cover Level (m) 69.800

## Cellular Storage Structure

Invert Level (m) 69.400 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.04000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.04000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 235.0 | 235.0 | 1.300 | 235.0 | 314.7 |
| 0.100 | 235.0 | 241.1 | 1.400 | 235.0 | 320.8 |
| 0.200 | 235.0 | 247.3 | 1.500 | 235.0 | 327.0 |
| 0.300 | 235.0 | 253.4 | 1.600 | 235.0 | 333.1 |
| 0.400 | 235.0 | 259.5 | 1.700 | 235.0 | 339.2 |
| 0.500 | 235.0 | 265.7 | 1.800 | 235.0 | 345.4 |
| 0.600 | 235.0 | 271.8 | 1.900 | 235.0 | 351.5 |
| 0.700 | 235.0 | 277.9 | 2.000 | 235.0 | 357.6 |
| 0.800 | 235.0 | 284.1 | 2.100 | 235.0 | 363.8 |
| 0.900 | 235.0 | 290.2 | 2.200 | 235.0 | 369.9 |
| 1.000 | 235.0 | 296.3 | 2.300 | 235.0 | 376.0 |
| 1.100 | 235.0 | 302.5 | 2.400 | 235.0 | 382.2 |
| 1.200 | 235.0 | 308.6 | 2.500 | 235.0 | 388.3 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 14 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 68.449 | 0.249 | 43.6 | 53.1 | O K |
| 30 min Summer | 68.468 | 0.268 | 43.6 | 58.6 | O K |
| 60 min Summer | 68.452 | 0.252 | 43.6 | 54.1 | O K |
| 120 min Summer | 68.396 | 0.196 | 43.6 | 38.6 | O K |
| 180 min Summer | 68.349 | 0.149 | 43.6 | 25.4 | O K |
| 240 min Summer | 68.318 | 0.118 | 43.6 | 16.9 | O K |
| 360 min Summer | 68.293 | 0.093 | 35.7 | 10.5 | O K |
| 480 min Summer | 68.277 | 0.077 | 29.5 | 7.3 | O K |
| 600 min Summer | 68.267 | 0.067 | 25.5 | 5.4 | O K |
| 720 min Summer | 68.258 | 0.058 | 22.3 | 4.1 | O K |
| 960 min Summer | 68.249 | 0.049 | 18.2 | 2.9 | O K |
| 1440 min Summer | 68.241 | 0.041 | 13.0 | 2.1 | O K |
| 2160 min Summer | 68.235 | 0.035 | 9.5 | 1.5 | O K |
| 2880 min Summer | 68.231 | 0.031 | 7.5 | 1.2 | O K |
| 4320 min Summer | 68.227 | 0.027 | 5.5 | 0.9 | O K |
| 5760 min Summer | 68.224 | 0.024 | 4.3 | 0.7 | O K |
| 7200 min Summer | 68.222 | 0.022 | 3.6 | 0.6 | O K |
| 8640 min Summer | 68.220 | 0.020 | 3.1 | 0.5 | O K |
| 10080 min Summer | 68.219 | 0.019 | 2.7 | 0.4 | O K |
| 15 min Winter | 68.480 | 0.280 | 43.6 | 61.8 | O K |
| 30 min Winter | 68.500 | 0.300 | 43.6 | 67.3 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 0.0 | 14 |
| 30 min Summer | 84.226 | 0.0 | 23 |
| 60 min Summer | 52.662 | 0.0 | 40 |
| 120 min Summer | 31.800 | 0.0 | 72 |
| 180 min Summer | 23.353 | 0.0 | 102 |
| 240 min Summer | 18.644 | 0.0 | 130 |
| 360 min Summer | 13.543 | 0.0 | 188 |
| 480 min Summer | 10.792 | 0.0 | 248 |
| 600 min Summer | 9.043 | 0.0 | 308 |
| 720 min Summer | 7.823 | 0.0 | 368 |
| 960 min Summer | 6.219 | 0.0 | 490 |
| 1440 min Summer | 4.493 | 0.0 | 714 |
| 2160 min Summer | 3.241 | 0.0 | 1084 |
| 2880 min Summer | 2.568 | 0.0 | 1452 |
| 4320 min Summer | 1.847 | 0.0 | 2204 |
| 5760 min Summer | 1.461 | 0.0 | 2888 |
| 7200 min Summer | 1.217 | 0.0 | 3624 |
| 8640 min Summer | 1.048 | 0.0 | 4368 |
| 10080 min Summer | 0.923 | 0.0 | 5064 |
| 15 min Winter | 128.285 | 0.0 | 15 |
| 30 min Winter | 84.226 | 0.0 | 25 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 68.470 | 0.270 | 43.6 | 58.9 | O K |
| 120 min Winter | 68.380 | 0.180 | 43.6 | 34.1 | O K |
| 180 min Winter | 68.318 | 0.118 | 43.6 | 16.8 | O K |
| 240 min Winter | 68.297 | 0.097 | 37.2 | 11.5 | O K |
| 360 min Winter | 68.273 | 0.073 | 27.8 | 6.4 | O K |
| 480 min Winter | 68.259 | 0.059 | 22.5 | 4.2 | O K |
| 600 min Winter | 68.250 | 0.050 | 18.9 | 3.0 | O K |
| 720 min Winter | 68.246 | 0.046 | 16.4 | 2.6 | O K |
| 960 min Winter | 68.241 | 0.041 | 13.0 | 2.1 | O K |
| 1440 min Winter | 68.235 | 0.035 | 9.5 | 1.5 | O K |
| 2160 min Winter | 68.230 | 0.030 | 6.8 | 1.1 | O K |
| 2880 min Winter | 68.227 | 0.027 | 5.5 | 0.9 | O K |
| 4320 min Winter | 68.223 | 0.023 | 4.0 | 0.6 | O K |
| 5760 min Winter | 68.220 | 0.020 | 3.1 | 0.5 | O K |
| 7200 min Winter | 68.218 | 0.018 | 2.5 | 0.4 | O K |
| 8640 min Winter | 68.217 | 0.017 | 2.3 | 0.4 | O K |
| 10080 min Winter | 68.216 | 0.016 | 2.0 | 0.3 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 0.0 | 44 |
| 120 min Winter | 31.800 | 0.0 | 76 |
| 180 min Winter | 23.353 | 0.0 | 102 |
| 240 min Winter | 18.644 | 0.0 | 130 |
| 360 min Winter | 13.543 | 0.0 | 188 |
| 480 min Winter | 10.792 | 0.0 | 246 |
| 600 min Winter | 9.043 | 0.0 | 300 |
| 720 min Winter | 7.823 | 0.0 | 356 |
| 960 min Winter | 6.219 | 0.0 | 476 |
| 1440 min Winter | 4.493 | 0.0 | 716 |
| 2160 min Winter | 3.241 | 0.0 | 1064 |
| 2880 min Winter | 2.568 | 0.0 | 1448 |
| 4320 min Winter | 1.847 | 0.0 | 2208 |
| 5760 min Winter | 1.461 | 0.0 | 2920 |
| 7200 min Winter | 1.217 | 0.0 | 3624 |
| 8640 min Winter | 1.048 | 0.0 | 4256 |
| 10080 min Winter | 0.923 | 0.0 | 4944 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Time Area Diagram

Total Area (ha) 0.355

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.355 |

## Time Area Diagram

Total Area (ha) 0.000

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.000 |

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## Model Details

Storage is Online Cover Level (m) 69.400

## Porous Car Park Structure

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.25500 | Width (m) | 16.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 57.0 |
| Max Percolation (l/s) | 256.5 | Slope (1:X) | 500.0 |
| Safety Factor | 1.5 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 68.200 | Cap Volume Depth (m) | 0.500 |

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## Summary of Results for 30 year Return Period

Half Drain Time : 31 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.631 | 0.231 | 18.4 | 41.7 | Flood Risk |
| 30 min Summer | 69.664 | 0.264 | 18.6 | 47.6 | Flood Risk |
| 60 min Summer | 69.665 | 0.265 | 18.6 | 47.8 | Flood Risk |
| 120 min Summer | 69.623 | 0.223 | 18.4 | 40.2 | Flood Risk |
| 180 min Summer | 69.596 | 0.196 | 18.2 | 35.4 | Flood Risk |
| 240 min Summer | 69.559 | 0.159 | 18.0 | 28.7 | Flood Risk |
| 360 min Summer | 69.500 | 0.100 | 17.7 | 18.1 | Flood Risk |
| 480 min Summer | 69.464 | 0.064 | 17.6 | 11.5 | O K |
| 600 min Summer | 69.448 | 0.048 | 16.9 | 8.7 | O K |
| 720 min Summer | 69.443 | 0.043 | 15.0 | 7.7 | O K |
| 960 min Summer | 69.435 | 0.035 | 12.2 | 6.2 | O K |
| 1440 min Summer | 69.426 | 0.026 | 9.0 | 4.6 | O K |
| 2160 min Summer | 69.419 | 0.019 | 6.6 | 3.3 | O K |
| 2880 min Summer | 69.415 | 0.015 | 5.2 | 2.7 | O K |
| 4320 min Summer | 69.411 | 0.011 | 3.8 | 1.9 | O K |
| 5760 min Summer | 69.409 | 0.009 | 3.1 | 1.6 | O K |
| 7200 min Summer | 69.407 | 0.007 | 2.5 | 1.3 | O K |
| 8640 min Summer | 69.406 | 0.006 | 2.2 | 1.1 | O K |
| 10080 min Summer | 69.406 | 0.006 | 2.0 | 1.0 | O K |
| 15 min Winter | 69.670 | 0.270 | 18.6 | 48.7 | Flood Risk |
| 30 min Winter | 69.714 | 0.314 | 18.8 | 56.6 | Flood Risk |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 76.035 | 0.0 | 18 |
| 30 min Summer | 49.499 | 0.0 | 29 |
| 60 min Summer | 30.811 | 0.0 | 46 |
| 120 min Summer | 18.615 | 0.0 | 78 |
| 180 min Summer | 13.715 | 0.0 | 112 |
| 240 min Summer | 10.995 | 0.0 | 144 |
| 360 min Summer | 8.034 | 0.0 | 202 |
| 480 min Summer | 6.428 | 0.0 | 256 |
| 600 min Summer | 5.404 | 0.0 | 310 |
| 720 min Summer | 4.687 | 0.0 | 370 |
| 960 min Summer | 3.743 | 0.0 | 492 |
| 1440 min Summer | 2.723 | 0.0 | 734 |
| 2160 min Summer | 1.979 | 0.0 | 1096 |
| 2880 min Summer | 1.577 | 0.0 | 1464 |
| 4320 min Summer | 1.143 | 0.0 | 2192 |
| 5760 min Summer | 0.910 | 0.0 | 2848 |
| 7200 min Summer | 0.762 | 0.0 | 3624 |
| 8640 min Summer | 0.659 | 0.0 | 4344 |
| 10080 min Summer | 0.583 | 0.0 | 4968 |
| 15 min Winter | 76.035 | 0.0 | 18 |
| 30 min Winter | 49.499 | 0.0 | 30 |

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## Summary of Results for 30 year Return Period

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.707 | 0.307 | 18.8 | 55.3 | Flood Risk |
| 120 min Winter | 69.655 | 0.255 | 18.5 | 46.1 | Flood Risk |
| 180 min Winter | 69.591 | 0.191 | 18.2 | 34.5 | Flood Risk |
| 240 min Winter | 69.534 | 0.134 | 17.9 | 24.2 | Flood Risk |
| 360 min Winter | 69.459 | 0.059 | 17.5 | 10.6 | O K |
| 480 min Winter | 69.443 | 0.043 | 15.1 | 7.8 | O K |
| 600 min Winter | 69.436 | 0.036 | 12.7 | 6.6 | O K |
| 720 min Winter | 69.432 | 0.032 | 11.1 | 5.7 | O K |
| 960 min Winter | 69.425 | 0.025 | 8.8 | 4.6 | O K |
| 1440 min Winter | 69.419 | 0.019 | 6.6 | 3.3 | O K |
| 2160 min Winter | 69.414 | 0.014 | 4.8 | 2.4 | O K |
| 2880 min Winter | 69.411 | 0.011 | 3.8 | 1.9 | O K |
| 4320 min Winter | 69.408 | 0.008 | 2.7 | 1.4 | O K |
| 5760 min Winter | 69.406 | 0.006 | 2.2 | 1.1 | O K |
| 7200 min Winter | 69.405 | 0.005 | 1.8 | 0.9 | O K |
| 8640 min Winter | 69.405 | 0.005 | 1.7 | 0.8 | O K |
| 10080 min Winter | 69.404 | 0.004 | 1.5 | 0.7 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 30.811 | 0.0 | 48 |
| 120 min Winter | 18.615 | 0.0 | 86 |
| 180 min Winter | 13.715 | 0.0 | 120 |
| 240 min Winter | 10.995 | 0.0 | 150 |
| 360 min Winter | 8.034 | 0.0 | 200 |
| 480 min Winter | 6.428 | 0.0 | 250 |
| 600 min Winter | 5.404 | 0.0 | 312 |
| 720 min Winter | 4.687 | 0.0 | 370 |
| 960 min Winter | 3.743 | 0.0 | 492 |
| 1440 min Winter | 2.723 | 0.0 | 730 |
| 2160 min Winter | 1.979 | 0.0 | 1124 |
| 2880 min Winter | 1.577 | 0.0 | 1444 |
| 4320 min Winter | 1.143 | 0.0 | 2200 |
| 5760 min Winter | 0.910 | 0.0 | 2904 |
| 7200 min Winter | 0.762 | 0.0 | 3568 |
| 8640 min Winter | 0.659 | 0.0 | 4288 |
| 10080 min Winter | 0.583 | 0.0 | 4768 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 30 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +0 |

## Pipe Network

| | | | |
|---|---|---|---|
| Volume in Pipe Network ($m^3$) | 5 | Dia of Outfall Pipe (m) | 0.2 |
| Slope of Outfall Pipe (1:X) | 100 | Roughness of Outfall Pipe (mm) | 0.600 |

## Time Area Diagram

Total Area (ha) 0.403

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.403 |

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## Model Details

Storage is Online Cover Level (m) 69.800

## Cellular Storage Structure

Invert Level (m) 69.400 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.49000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.49000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 190.0 | 190.0 | 1.300 | 190.0 | 261.7 |
| 0.100 | 190.0 | 195.5 | 1.400 | 190.0 | 267.2 |
| 0.200 | 190.0 | 201.0 | 1.500 | 190.0 | 272.7 |
| 0.300 | 190.0 | 206.5 | 1.600 | 190.0 | 278.2 |
| 0.400 | 190.0 | 212.1 | 1.700 | 190.0 | 283.7 |
| 0.500 | 190.0 | 217.6 | 1.800 | 190.0 | 289.2 |
| 0.600 | 190.0 | 223.1 | 1.900 | 190.0 | 294.8 |
| 0.700 | 190.0 | 228.6 | 2.000 | 190.0 | 300.3 |
| 0.800 | 190.0 | 234.1 | 2.100 | 190.0 | 305.8 |
| 0.900 | 190.0 | 239.6 | 2.200 | 190.0 | 311.3 |
| 1.000 | 190.0 | 245.1 | 2.300 | 190.0 | 316.8 |
| 1.100 | 190.0 | 250.6 | 2.400 | 190.0 | 322.3 |
| 1.200 | 190.0 | 256.2 | 2.500 | 190.0 | 327.8 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 4 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.176 | 0.191 | 83.8 | 37.2 | O K |
| 30 min Summer | 69.174 | 0.189 | 83.8 | 36.6 | O K |
| 60 min Summer | 69.136 | 0.151 | 83.8 | 26.1 | O K |
| 120 min Summer | 69.089 | 0.104 | 76.3 | 13.1 | O K |
| 180 min Summer | 69.068 | 0.083 | 61.2 | 8.4 | O K |
| 240 min Summer | 69.055 | 0.070 | 51.3 | 5.9 | O K |
| 360 min Summer | 69.038 | 0.053 | 38.8 | 3.4 | O K |
| 480 min Summer | 69.031 | 0.046 | 31.4 | 2.6 | O K |
| 600 min Summer | 69.027 | 0.042 | 26.2 | 2.2 | O K |
| 720 min Summer | 69.024 | 0.039 | 22.6 | 1.9 | O K |
| 960 min Summer | 69.020 | 0.035 | 18.3 | 1.5 | O K |
| 1440 min Summer | 69.015 | 0.030 | 13.0 | 1.1 | O K |
| 2160 min Summer | 69.010 | 0.025 | 9.4 | 0.8 | O K |
| 2880 min Summer | 69.008 | 0.023 | 7.6 | 0.6 | O K |
| 4320 min Summer | 69.004 | 0.019 | 5.4 | 0.5 | O K |
| 5760 min Summer | 69.002 | 0.017 | 4.4 | 0.4 | O K |
| 7200 min Summer | 69.001 | 0.016 | 3.6 | 0.3 | O K |
| 8640 min Summer | 69.000 | 0.015 | 3.2 | 0.3 | O K |
| 10080 min Summer | 68.999 | 0.014 | 2.8 | 0.2 | O K |
| 15 min Winter | 69.197 | 0.212 | 83.8 | 42.9 | O K |
| 30 min Winter | 69.182 | 0.197 | 83.8 | 38.8 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 0.0 | 13 |
| 30 min Summer | 84.226 | 0.0 | 21 |
| 60 min Summer | 52.662 | 0.0 | 36 |
| 120 min Summer | 31.800 | 0.0 | 66 |
| 180 min Summer | 23.353 | 0.0 | 94 |
| 240 min Summer | 18.644 | 0.0 | 124 |
| 360 min Summer | 13.543 | 0.0 | 184 |
| 480 min Summer | 10.792 | 0.0 | 244 |
| 600 min Summer | 9.043 | 0.0 | 300 |
| 720 min Summer | 7.823 | 0.0 | 366 |
| 960 min Summer | 6.219 | 0.0 | 478 |
| 1440 min Summer | 4.493 | 0.0 | 718 |
| 2160 min Summer | 3.241 | 0.0 | 1068 |
| 2880 min Summer | 2.568 | 0.0 | 1464 |
| 4320 min Summer | 1.847 | 0.0 | 2192 |
| 5760 min Summer | 1.461 | 0.0 | 2896 |
| 7200 min Summer | 1.217 | 0.0 | 3672 |
| 8640 min Summer | 1.048 | 0.0 | 4264 |
| 10080 min Summer | 0.923 | 0.0 | 5048 |
| 15 min Winter | 128.285 | 0.0 | 13 |
| 30 min Winter | 84.226 | 0.0 | 22 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.119 | 0.134 | 83.8 | 21.3 | O K |
| 120 min Winter | 69.071 | 0.086 | 63.4 | 9.1 | O K |
| 180 min Winter | 69.050 | 0.065 | 48.0 | 5.2 | O K |
| 240 min Winter | 69.038 | 0.053 | 38.8 | 3.4 | O K |
| 360 min Winter | 69.029 | 0.044 | 28.1 | 2.3 | O K |
| 480 min Winter | 69.024 | 0.039 | 22.6 | 1.9 | O K |
| 600 min Winter | 69.021 | 0.036 | 19.3 | 1.6 | O K |
| 720 min Winter | 69.019 | 0.034 | 16.7 | 1.4 | O K |
| 960 min Winter | 69.015 | 0.030 | 13.0 | 1.1 | O K |
| 1440 min Winter | 69.010 | 0.025 | 9.4 | 0.8 | O K |
| 2160 min Winter | 69.007 | 0.022 | 7.0 | 0.6 | O K |
| 2880 min Winter | 69.004 | 0.019 | 5.4 | 0.5 | O K |
| 4320 min Winter | 69.001 | 0.016 | 3.9 | 0.3 | O K |
| 5760 min Winter | 69.000 | 0.015 | 3.2 | 0.3 | O K |
| 7200 min Winter | 68.998 | 0.013 | 2.6 | 0.2 | O K |
| 8640 min Winter | 68.998 | 0.013 | 2.4 | 0.2 | O K |
| 10080 min Winter | 68.997 | 0.012 | 2.0 | 0.2 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 0.0 | 38 |
| 120 min Winter | 31.800 | 0.0 | 66 |
| 180 min Winter | 23.353 | 0.0 | 96 |
| 240 min Winter | 18.644 | 0.0 | 124 |
| 360 min Winter | 13.543 | 0.0 | 186 |
| 480 min Winter | 10.792 | 0.0 | 240 |
| 600 min Winter | 9.043 | 0.0 | 306 |
| 720 min Winter | 7.823 | 0.0 | 370 |
| 960 min Winter | 6.219 | 0.0 | 472 |
| 1440 min Winter | 4.493 | 0.0 | 704 |
| 2160 min Winter | 3.241 | 0.0 | 1108 |
| 2880 min Winter | 2.568 | 0.0 | 1456 |
| 4320 min Winter | 1.847 | 0.0 | 2184 |
| 5760 min Winter | 1.461 | 0.0 | 2864 |
| 7200 min Winter | 1.217 | 0.0 | 3672 |
| 8640 min Winter | 1.048 | 0.0 | 4336 |
| 10080 min Winter | 0.923 | 0.0 | 4872 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Time Area Diagram

Total Area (ha) 0.355

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.355 |

## Time Area Diagram

Total Area (ha) 0.000

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.000 |

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## Model Details

Storage is Online Cover Level (m) 69.585

## Porous Car Park Structure

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.49000 | Width (m) | 16.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 57.0 |
| Max Percolation (l/s) | 256.5 | Slope (1:X) | 500.0 |
| Safety Factor | 1.5 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 68.985 | Cap Volume Depth (m) | 0.500 |

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## Summary of Results for 30 year Return Period

Half Drain Time : 82 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.637 | 0.237 | 7.5 | 45.0 | Flood Risk |
| 30 min Summer | 69.692 | 0.292 | 7.6 | 55.6 | Flood Risk |
| 60 min Summer | 69.726 | 0.326 | 7.7 | 61.9 | Flood Risk |
| 120 min Summer | 69.723 | 0.323 | 7.7 | 61.4 | Flood Risk |
| 180 min Summer | 69.713 | 0.313 | 7.7 | 59.5 | Flood Risk |
| 240 min Summer | 69.694 | 0.294 | 7.6 | 55.9 | Flood Risk |
| 360 min Summer | 69.657 | 0.257 | 7.5 | 48.8 | Flood Risk |
| 480 min Summer | 69.622 | 0.222 | 7.5 | 42.1 | Flood Risk |
| 600 min Summer | 69.589 | 0.189 | 7.4 | 36.0 | Flood Risk |
| 720 min Summer | 69.561 | 0.161 | 7.4 | 30.5 | Flood Risk |
| 960 min Summer | 69.514 | 0.114 | 7.3 | 21.6 | Flood Risk |
| 1440 min Summer | 69.458 | 0.058 | 7.2 | 11.1 | O K |
| 2160 min Summer | 69.441 | 0.041 | 5.8 | 7.7 | O K |
| 2880 min Summer | 69.433 | 0.033 | 4.7 | 6.2 | O K |
| 4320 min Summer | 69.424 | 0.024 | 3.5 | 4.6 | O K |
| 5760 min Summer | 69.419 | 0.019 | 2.7 | 3.6 | O K |
| 7200 min Summer | 69.416 | 0.016 | 2.3 | 3.0 | O K |
| 8640 min Summer | 69.414 | 0.014 | 2.0 | 2.7 | O K |
| 10080 min Summer | 69.412 | 0.012 | 1.7 | 2.3 | O K |
| 15 min Winter | 69.642 | 0.242 | 7.5 | 46.1 | Flood Risk |
| 30 min Winter | 69.714 | 0.314 | 7.7 | 59.7 | Flood Risk |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 76.035 | 0.0 | 20 |
| 30 min Summer | 49.499 | 0.0 | 33 |
| 60 min Summer | 30.811 | 0.0 | 60 |
| 120 min Summer | 18.615 | 0.0 | 94 |
| 180 min Summer | 13.715 | 0.0 | 128 |
| 240 min Summer | 10.995 | 0.0 | 162 |
| 360 min Summer | 8.034 | 0.0 | 230 |
| 480 min Summer | 6.428 | 0.0 | 294 |
| 600 min Summer | 5.404 | 0.0 | 358 |
| 720 min Summer | 4.687 | 0.0 | 420 |
| 960 min Summer | 3.743 | 0.0 | 534 |
| 1440 min Summer | 2.723 | 0.0 | 752 |
| 2160 min Summer | 1.979 | 0.0 | 1104 |
| 2880 min Summer | 1.577 | 0.0 | 1468 |
| 4320 min Summer | 1.143 | 0.0 | 2200 |
| 5760 min Summer | 0.910 | 0.0 | 2896 |
| 7200 min Summer | 0.762 | 0.0 | 3648 |
| 8640 min Summer | 0.659 | 0.0 | 4352 |
| 10080 min Summer | 0.583 | 0.0 | 5088 |
| 15 min Winter | 76.035 | 0.0 | 17 |
| 30 min Winter | 49.499 | 0.0 | 31 |

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## Summary of Results for 30 year Return Period

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.779 | 0.379 | 7.8 | 72.1 | Flood Risk |
| 120 min Winter | 69.779 | 0.379 | 7.8 | 72.1 | Flood Risk |
| 180 min Winter | 69.758 | 0.358 | 7.7 | 68.0 | Flood Risk |
| 240 min Winter | 69.730 | 0.330 | 7.7 | 62.7 | Flood Risk |
| 360 min Winter | 69.672 | 0.272 | 7.6 | 51.7 | Flood Risk |
| 480 min Winter | 69.618 | 0.218 | 7.5 | 41.5 | Flood Risk |
| 600 min Winter | 69.570 | 0.170 | 7.4 | 32.3 | Flood Risk |
| 720 min Winter | 69.528 | 0.128 | 7.3 | 24.4 | Flood Risk |
| 960 min Winter | 69.468 | 0.068 | 7.2 | 12.9 | O K |
| 1440 min Winter | 69.441 | 0.041 | 5.8 | 7.8 | O K |
| 2160 min Winter | 69.430 | 0.030 | 4.2 | 5.7 | O K |
| 2880 min Winter | 69.424 | 0.024 | 3.4 | 4.5 | O K |
| 4320 min Winter | 69.417 | 0.017 | 2.5 | 3.3 | O K |
| 5760 min Winter | 69.414 | 0.014 | 2.0 | 2.6 | O K |
| 7200 min Winter | 69.412 | 0.012 | 1.7 | 2.2 | O K |
| 8640 min Winter | 69.410 | 0.010 | 1.5 | 1.9 | O K |
| 10080 min Winter | 69.409 | 0.009 | 1.3 | 1.7 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 30.811 | 0.0 | 60 |
| 120 min Winter | 18.615 | 0.0 | 100 |
| 180 min Winter | 13.715 | 0.0 | 138 |
| 240 min Winter | 10.995 | 0.0 | 176 |
| 360 min Winter | 8.034 | 0.0 | 248 |
| 480 min Winter | 6.428 | 0.0 | 316 |
| 600 min Winter | 5.404 | 0.0 | 378 |
| 720 min Winter | 4.687 | 0.0 | 436 |
| 960 min Winter | 3.743 | 0.0 | 538 |
| 1440 min Winter | 2.723 | 0.0 | 746 |
| 2160 min Winter | 1.979 | 0.0 | 1108 |
| 2880 min Winter | 1.577 | 0.0 | 1480 |
| 4320 min Winter | 1.143 | 0.0 | 2208 |
| 5760 min Winter | 0.910 | 0.0 | 2920 |
| 7200 min Winter | 0.762 | 0.0 | 3544 |
| 8640 min Winter | 0.659 | 0.0 | 4304 |
| 10080 min Winter | 0.583 | 0.0 | 5088 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 30 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +0 |

## Pipe Network

| | | | |
|---|---|---|---|
| Volume in Pipe Network ($m^3$) | 5 | Dia of Outfall Pipe (m) | 0.2 |
| Slope of Outfall Pipe (1:X) | 100 | Roughness of Outfall Pipe (mm) | 0.600 |

## Time Area Diagram

Total Area (ha) 0.367

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.367 |

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## Model Details

Storage is Online Cover Level (m) 69.800

## Cellular Storage Structure

Invert Level (m) 69.400 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.19000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.19000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 200.0 | 200.0 | 1.300 | 200.0 | 273.5 |
| 0.100 | 200.0 | 205.7 | 1.400 | 200.0 | 279.2 |
| 0.200 | 200.0 | 211.3 | 1.500 | 200.0 | 284.9 |
| 0.300 | 200.0 | 217.0 | 1.600 | 200.0 | 290.5 |
| 0.400 | 200.0 | 222.6 | 1.700 | 200.0 | 296.2 |
| 0.500 | 200.0 | 228.3 | 1.800 | 200.0 | 301.8 |
| 0.600 | 200.0 | 233.9 | 1.900 | 200.0 | 307.5 |
| 0.700 | 200.0 | 239.6 | 2.000 | 200.0 | 313.1 |
| 0.800 | 200.0 | 245.3 | 2.100 | 200.0 | 318.8 |
| 0.900 | 200.0 | 250.9 | 2.200 | 200.0 | 324.5 |
| 1.000 | 200.0 | 256.6 | 2.300 | 200.0 | 330.1 |
| 1.100 | 200.0 | 262.2 | 2.400 | 200.0 | 335.8 |
| 1.200 | 200.0 | 267.9 | 2.500 | 200.0 | 341.4 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 432 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.357 | 0.317 | 2.6 | 57.0 | Flood Risk |
| 30 min Summer | 69.443 | 0.403 | 2.6 | 74.7 | Flood Risk |
| 60 min Summer | 69.523 | 0.483 | 2.6 | 91.3 | Flood Risk |
| 120 min Summer | 69.641 | 0.601 | 2.6 | 104.7 | FLOOD |
| 180 min Summer | 69.645 | 0.605 | 2.6 | 109.3 | FLOOD |
| 240 min Summer | 69.646 | 0.606 | 2.6 | 110.1 | FLOOD |
| 360 min Summer | 69.644 | 0.604 | 2.6 | 107.6 | FLOOD |
| 480 min Summer | 69.640 | 0.600 | 2.6 | 104.3 | FLOOD |
| 600 min Summer | 69.576 | 0.536 | 2.6 | 100.8 | Flood Risk |
| 720 min Summer | 69.553 | 0.513 | 2.6 | 97.5 | Flood Risk |
| 960 min Summer | 69.521 | 0.481 | 2.6 | 91.0 | Flood Risk |
| 1440 min Summer | 69.463 | 0.423 | 2.6 | 78.9 | Flood Risk |
| 2160 min Summer | 69.383 | 0.343 | 2.6 | 62.3 | Flood Risk |
| 2880 min Summer | 69.313 | 0.273 | 2.6 | 47.9 | O K |
| 4320 min Summer | 69.208 | 0.168 | 2.6 | 26.0 | O K |
| 5760 min Summer | 69.146 | 0.106 | 2.6 | 13.1 | O K |
| 7200 min Summer | 69.122 | 0.082 | 2.5 | 8.2 | O K |
| 8640 min Summer | 69.112 | 0.072 | 2.2 | 6.3 | O K |
| 10080 min Summer | 69.104 | 0.064 | 1.9 | 4.9 | O K |
| 15 min Winter | 69.393 | 0.353 | 2.6 | 64.5 | Flood Risk |
| 30 min Winter | 69.490 | 0.450 | 2.6 | 84.5 | Flood Risk |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 0.0 | 19 |
| 30 min Summer | 84.226 | 0.0 | 33 |
| 60 min Summer | 52.662 | 0.0 | 62 |
| 120 min Summer | 31.800 | 0.9 | 122 |
| 180 min Summer | 23.353 | 5.5 | 182 |
| 240 min Summer | 18.644 | 6.4 | 240 |
| 360 min Summer | 13.543 | 3.9 | 338 |
| 480 min Summer | 10.792 | 0.5 | 392 |
| 600 min Summer | 9.043 | 0.0 | 452 |
| 720 min Summer | 7.823 | 0.0 | 516 |
| 960 min Summer | 6.219 | 0.0 | 654 |
| 1440 min Summer | 4.493 | 0.0 | 922 |
| 2160 min Summer | 3.241 | 0.0 | 1316 |
| 2880 min Summer | 2.568 | 0.0 | 1700 |
| 4320 min Summer | 1.847 | 0.0 | 2380 |
| 5760 min Summer | 1.461 | 0.0 | 3048 |
| 7200 min Summer | 1.217 | 0.0 | 3672 |
| 8640 min Summer | 1.048 | 0.0 | 4408 |
| 10080 min Summer | 0.923 | 0.0 | 5136 |
| 15 min Winter | 128.285 | 0.0 | 18 |
| 30 min Winter | 84.226 | 0.0 | 33 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.612 | 0.572 | 2.6 | 103.6 | Flood Risk |
| 120 min Winter | 69.656 | 0.616 | 2.6 | 119.6 | FLOOD |
| 180 min Winter | 69.662 | 0.622 | 2.6 | 125.8 | FLOOD |
| 240 min Winter | 69.664 | 0.624 | 2.6 | 127.8 | FLOOD |
| 360 min Winter | 69.663 | 0.623 | 2.6 | 126.8 | FLOOD |
| 480 min Winter | 69.659 | 0.619 | 2.6 | 122.9 | FLOOD |
| 600 min Winter | 69.654 | 0.614 | 2.6 | 118.2 | FLOOD |
| 720 min Winter | 69.650 | 0.610 | 2.6 | 113.8 | FLOOD |
| 960 min Winter | 69.641 | 0.601 | 2.6 | 104.8 | FLOOD |
| 1440 min Winter | 69.500 | 0.460 | 2.6 | 86.6 | Flood Risk |
| 2160 min Winter | 69.378 | 0.338 | 2.6 | 61.4 | Flood Risk |
| 2880 min Winter | 69.275 | 0.235 | 2.6 | 39.9 | O K |
| 4320 min Winter | 69.140 | 0.100 | 2.6 | 11.9 | O K |
| 5760 min Winter | 69.113 | 0.073 | 2.2 | 6.5 | O K |
| 7200 min Winter | 69.101 | 0.061 | 1.8 | 4.5 | O K |
| 8640 min Winter | 69.093 | 0.053 | 1.6 | 3.4 | O K |
| 10080 min Winter | 69.088 | 0.048 | 1.4 | 2.8 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 0.0 | 62 |
| 120 min Winter | 31.800 | 15.9 | 120 |
| 180 min Winter | 23.353 | 22.0 | 178 |
| 240 min Winter | 18.644 | 24.0 | 236 |
| 360 min Winter | 13.543 | 23.1 | 346 |
| 480 min Winter | 10.792 | 19.2 | 450 |
| 600 min Winter | 9.043 | 14.4 | 486 |
| 720 min Winter | 7.823 | 10.1 | 558 |
| 960 min Winter | 6.219 | 1.0 | 712 |
| 1440 min Winter | 4.493 | 0.0 | 1008 |
| 2160 min Winter | 3.241 | 0.0 | 1408 |
| 2880 min Winter | 2.568 | 0.0 | 1784 |
| 4320 min Winter | 1.847 | 0.0 | 2376 |
| 5760 min Winter | 1.461 | 0.0 | 2960 |
| 7200 min Winter | 1.217 | 0.0 | 3672 |
| 8640 min Winter | 1.048 | 0.0 | 4400 |
| 10080 min Winter | 0.923 | 0.0 | 4976 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Time Area Diagram

Total Area (ha) 0.260

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.260 |

## Time Area Diagram

Total Area (ha) 0.000

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.000 |

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## Model Details

Storage is Online Cover Level (m) 69.640

## Porous Car Park Structure

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.02000 | Width (m) | 16.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 42.7 |
| Max Percolation (l/s) | 192.2 | Slope (1:X) | 500.0 |
| Safety Factor | 1.5 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 69.040 | Cap Volume Depth (m) | 0.500 |

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## Summary of Results for 30 year Return Period

Half Drain Time : 54 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.601 | 0.201 | 8.8 | 34.3 | Flood Risk |
| 30 min Summer | 69.652 | 0.252 | 9.0 | 43.2 | Flood Risk |
| 60 min Summer | 69.668 | 0.268 | 9.0 | 45.9 | Flood Risk |
| 120 min Summer | 69.649 | 0.249 | 9.0 | 42.6 | Flood Risk |
| 180 min Summer | 69.650 | 0.250 | 9.0 | 42.7 | Flood Risk |
| 240 min Summer | 69.626 | 0.226 | 8.9 | 38.7 | Flood Risk |
| 360 min Summer | 69.582 | 0.182 | 8.8 | 31.1 | Flood Risk |
| 480 min Summer | 69.544 | 0.144 | 8.7 | 24.6 | Flood Risk |
| 600 min Summer | 69.512 | 0.112 | 8.6 | 19.2 | Flood Risk |
| 720 min Summer | 69.487 | 0.087 | 8.6 | 14.9 | O K |
| 960 min Summer | 69.456 | 0.056 | 8.5 | 9.6 | O K |
| 1440 min Summer | 69.440 | 0.040 | 6.8 | 6.9 | O K |
| 2160 min Summer | 69.430 | 0.030 | 5.0 | 5.1 | O K |
| 2880 min Summer | 69.424 | 0.024 | 4.0 | 4.1 | O K |
| 4320 min Summer | 69.418 | 0.018 | 3.0 | 3.0 | O K |
| 5760 min Summer | 69.414 | 0.014 | 2.3 | 2.4 | O K |
| 7200 min Summer | 69.412 | 0.012 | 2.0 | 2.0 | O K |
| 8640 min Summer | 69.410 | 0.010 | 1.7 | 1.7 | O K |
| 10080 min Summer | 69.409 | 0.009 | 1.6 | 1.5 | O K |
| 15 min Winter | 69.624 | 0.224 | 8.9 | 38.3 | Flood Risk |
| 30 min Winter | 69.702 | 0.302 | 9.1 | 51.7 | Flood Risk |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 76.035 | 0.0 | 19 |
| 30 min Summer | 49.499 | 0.0 | 32 |
| 60 min Summer | 30.811 | 0.0 | 52 |
| 120 min Summer | 18.615 | 0.0 | 84 |
| 180 min Summer | 13.715 | 0.0 | 120 |
| 240 min Summer | 10.995 | 0.0 | 154 |
| 360 min Summer | 8.034 | 0.0 | 218 |
| 480 min Summer | 6.428 | 0.0 | 280 |
| 600 min Summer | 5.404 | 0.0 | 338 |
| 720 min Summer | 4.687 | 0.0 | 394 |
| 960 min Summer | 3.743 | 0.0 | 502 |
| 1440 min Summer | 2.723 | 0.0 | 738 |
| 2160 min Summer | 1.979 | 0.0 | 1104 |
| 2880 min Summer | 1.577 | 0.0 | 1472 |
| 4320 min Summer | 1.143 | 0.0 | 2196 |
| 5760 min Summer | 0.910 | 0.0 | 2936 |
| 7200 min Summer | 0.762 | 0.0 | 3656 |
| 8640 min Summer | 0.659 | 0.0 | 4360 |
| 10080 min Summer | 0.583 | 0.0 | 5088 |
| 15 min Winter | 76.035 | 0.0 | 17 |
| 30 min Winter | 49.499 | 0.0 | 32 |

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## Summary of Results for 30 year Return Period

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.725 | 0.325 | 9.1 | 55.5 | Flood Risk |
| 120 min Winter | 69.710 | 0.310 | 9.1 | 53.0 | Flood Risk |
| 180 min Winter | 69.676 | 0.276 | 9.0 | 47.2 | Flood Risk |
| 240 min Winter | 69.639 | 0.239 | 8.9 | 41.0 | Flood Risk |
| 360 min Winter | 69.571 | 0.171 | 8.8 | 29.3 | Flood Risk |
| 480 min Winter | 69.516 | 0.116 | 8.6 | 19.8 | Flood Risk |
| 600 min Winter | 69.474 | 0.074 | 8.5 | 12.6 | O K |
| 720 min Winter | 69.450 | 0.050 | 8.5 | 8.6 | O K |
| 960 min Winter | 69.441 | 0.041 | 6.9 | 6.9 | O K |
| 1440 min Winter | 69.430 | 0.030 | 5.0 | 5.1 | O K |
| 2160 min Winter | 69.422 | 0.022 | 3.7 | 3.7 | O K |
| 2880 min Winter | 69.417 | 0.017 | 2.9 | 3.0 | O K |
| 4320 min Winter | 69.413 | 0.013 | 2.2 | 2.1 | O K |
| 5760 min Winter | 69.410 | 0.010 | 1.7 | 1.7 | O K |
| 7200 min Winter | 69.409 | 0.009 | 1.5 | 1.5 | O K |
| 8640 min Winter | 69.407 | 0.007 | 1.2 | 1.2 | O K |
| 10080 min Winter | 69.407 | 0.007 | 1.1 | 1.1 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 30.811 | 0.0 | 58 |
| 120 min Winter | 18.615 | 0.0 | 94 |
| 180 min Winter | 13.715 | 0.0 | 130 |
| 240 min Winter | 10.995 | 0.0 | 166 |
| 360 min Winter | 8.034 | 0.0 | 232 |
| 480 min Winter | 6.428 | 0.0 | 292 |
| 600 min Winter | 5.404 | 0.0 | 344 |
| 720 min Winter | 4.687 | 0.0 | 380 |
| 960 min Winter | 3.743 | 0.0 | 498 |
| 1440 min Winter | 2.723 | 0.0 | 738 |
| 2160 min Winter | 1.979 | 0.0 | 1080 |
| 2880 min Winter | 1.577 | 0.0 | 1476 |
| 4320 min Winter | 1.143 | 0.0 | 2204 |
| 5760 min Winter | 0.910 | 0.0 | 2912 |
| 7200 min Winter | 0.762 | 0.0 | 3584 |
| 8640 min Winter | 0.659 | 0.0 | 4264 |
| 10080 min Winter | 0.583 | 0.0 | 5240 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 30 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +0 |

## Pipe Network

| | | | |
|---|---|---|---|
| Volume in Pipe Network ($m^3$) | 5 | Dia of Outfall Pipe (m) | 0.2 |
| Slope of Outfall Pipe (1:X) | 100 | Roughness of Outfall Pipe (mm) | 0.600 |

## Time Area Diagram

Total Area (ha) 0.315

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.315 |

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## Model Details

Storage is Online Cover Level (m) 69.800

## Cellular Storage Structure

Invert Level (m) 69.400 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.25000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.25000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 180.0 | 180.0 | 1.300 | 180.0 | 249.8 |
| 0.100 | 180.0 | 185.4 | 1.400 | 180.0 | 255.1 |
| 0.200 | 180.0 | 190.7 | 1.500 | 180.0 | 260.5 |
| 0.300 | 180.0 | 196.1 | 1.600 | 180.0 | 265.9 |
| 0.400 | 180.0 | 201.5 | 1.700 | 180.0 | 271.2 |
| 0.500 | 180.0 | 206.8 | 1.800 | 180.0 | 276.6 |
| 0.600 | 180.0 | 212.2 | 1.900 | 180.0 | 282.0 |
| 0.700 | 180.0 | 217.6 | 2.000 | 180.0 | 287.3 |
| 0.800 | 180.0 | 222.9 | 2.100 | 180.0 | 292.7 |
| 0.900 | 180.0 | 228.3 | 2.200 | 180.0 | 298.1 |
| 1.000 | 180.0 | 233.7 | 2.300 | 180.0 | 303.4 |
| 1.100 | 180.0 | 239.0 | 2.400 | 180.0 | 308.8 |
| 1.200 | 180.0 | 244.4 | 2.500 | 180.0 | 314.2 |

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## Summary of Results for 30 year Return Period

Half Drain Time : 223 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.398 | 0.198 | 2.6 | 32.2 | O K |
| 30 min Summer | 69.444 | 0.244 | 2.6 | 41.8 | O K |
| 60 min Summer | 69.485 | 0.285 | 2.6 | 50.3 | O K |
| 120 min Summer | 69.511 | 0.311 | 2.6 | 55.7 | Flood Risk |
| 180 min Summer | 69.514 | 0.314 | 2.6 | 56.3 | Flood Risk |
| 240 min Summer | 69.511 | 0.311 | 2.6 | 55.6 | Flood Risk |
| 360 min Summer | 69.500 | 0.300 | 2.6 | 53.4 | O K |
| 480 min Summer | 69.488 | 0.288 | 2.6 | 50.8 | O K |
| 600 min Summer | 69.475 | 0.275 | 2.6 | 48.2 | O K |
| 720 min Summer | 69.462 | 0.262 | 2.6 | 45.5 | O K |
| 960 min Summer | 69.437 | 0.237 | 2.6 | 40.3 | O K |
| 1440 min Summer | 69.392 | 0.192 | 2.6 | 30.9 | O K |
| 2160 min Summer | 69.338 | 0.138 | 2.6 | 19.8 | O K |
| 2880 min Summer | 69.303 | 0.103 | 2.6 | 12.4 | O K |
| 4320 min Summer | 69.275 | 0.075 | 2.3 | 6.8 | O K |
| 5760 min Summer | 69.262 | 0.062 | 1.9 | 4.7 | O K |
| 7200 min Summer | 69.253 | 0.053 | 1.6 | 3.4 | O K |
| 8640 min Summer | 69.248 | 0.048 | 1.4 | 2.8 | O K |
| 10080 min Summer | 69.245 | 0.045 | 1.2 | 2.5 | O K |
| 15 min Winter | 69.419 | 0.219 | 2.6 | 36.6 | O K |
| 30 min Winter | 69.472 | 0.272 | 2.6 | 47.6 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 76.035 | 0.0 | 18 |
| 30 min Summer | 49.499 | 0.0 | 33 |
| 60 min Summer | 30.811 | 0.0 | 62 |
| 120 min Summer | 18.615 | 0.0 | 120 |
| 180 min Summer | 13.715 | 0.0 | 174 |
| 240 min Summer | 10.995 | 0.0 | 200 |
| 360 min Summer | 8.034 | 0.0 | 262 |
| 480 min Summer | 6.428 | 0.0 | 330 |
| 600 min Summer | 5.404 | 0.0 | 398 |
| 720 min Summer | 4.687 | 0.0 | 464 |
| 960 min Summer | 3.743 | 0.0 | 598 |
| 1440 min Summer | 2.723 | 0.0 | 854 |
| 2160 min Summer | 1.979 | 0.0 | 1212 |
| 2880 min Summer | 1.577 | 0.0 | 1552 |
| 4320 min Summer | 1.143 | 0.0 | 2208 |
| 5760 min Summer | 0.910 | 0.0 | 2936 |
| 7200 min Summer | 0.762 | 0.0 | 3672 |
| 8640 min Summer | 0.659 | 0.0 | 4336 |
| 10080 min Summer | 0.583 | 0.0 | 5096 |
| 15 min Winter | 76.035 | 0.0 | 18 |
| 30 min Winter | 49.499 | 0.0 | 32 |

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## Summary of Results for 30 year Return Period

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.519 | 0.319 | 2.6 | 57.4 | Flood Risk |
| 120 min Winter | 69.553 | 0.353 | 2.6 | 64.4 | Flood Risk |
| 180 min Winter | 69.560 | 0.360 | 2.6 | 65.8 | Flood Risk |
| 240 min Winter | 69.556 | 0.356 | 2.6 | 65.0 | Flood Risk |
| 360 min Winter | 69.541 | 0.341 | 2.6 | 61.9 | Flood Risk |
| 480 min Winter | 69.524 | 0.324 | 2.6 | 58.4 | Flood Risk |
| 600 min Winter | 69.505 | 0.305 | 2.6 | 54.4 | Flood Risk |
| 720 min Winter | 69.485 | 0.285 | 2.6 | 50.3 | O K |
| 960 min Winter | 69.447 | 0.247 | 2.6 | 42.4 | O K |
| 1440 min Winter | 69.378 | 0.178 | 2.6 | 28.0 | O K |
| 2160 min Winter | 69.304 | 0.104 | 2.6 | 12.7 | O K |
| 2880 min Winter | 69.278 | 0.078 | 2.3 | 7.3 | O K |
| 4320 min Winter | 69.258 | 0.058 | 1.7 | 4.0 | O K |
| 5760 min Winter | 69.248 | 0.048 | 1.4 | 2.8 | O K |
| 7200 min Winter | 69.244 | 0.044 | 1.2 | 2.4 | O K |
| 8640 min Winter | 69.241 | 0.041 | 1.0 | 2.0 | O K |
| 10080 min Winter | 69.238 | 0.038 | 0.9 | 1.8 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 30.811 | 0.0 | 62 |
| 120 min Winter | 18.615 | 0.0 | 118 |
| 180 min Winter | 13.715 | 0.0 | 174 |
| 240 min Winter | 10.995 | 0.0 | 228 |
| 360 min Winter | 8.034 | 0.0 | 282 |
| 480 min Winter | 6.428 | 0.0 | 360 |
| 600 min Winter | 5.404 | 0.0 | 434 |
| 720 min Winter | 4.687 | 0.0 | 508 |
| 960 min Winter | 3.743 | 0.0 | 648 |
| 1440 min Winter | 2.723 | 0.0 | 908 |
| 2160 min Winter | 1.979 | 0.0 | 1232 |
| 2880 min Winter | 1.577 | 0.0 | 1524 |
| 4320 min Winter | 1.143 | 0.0 | 2208 |
| 5760 min Winter | 0.910 | 0.0 | 2904 |
| 7200 min Winter | 0.762 | 0.0 | 3672 |
| 8640 min Winter | 0.659 | 0.0 | 4408 |
| 10080 min Winter | 0.583 | 0.0 | 5136 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 30 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +0 |

## Time Area Diagram

Total Area (ha) 0.263

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.263 |

## Time Area Diagram

Total Area (ha) 0.000

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.000 |

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## Model Details

Storage is Online Cover Level (m) 69.800

## Porous Car Park Structure

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.02000 | Width (m) | 16.2 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 42.7 |
| Max Percolation (l/s) | 192.2 | Slope (1:X) | 500.0 |
| Safety Factor | 1.5 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 69.200 | Cap Volume Depth (m) | 0.500 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 246 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.739 | 0.339 | 4.0 | 57.9 | Flood Risk |
| 30 min Summer | 69.848 | 0.448 | 4.1 | 76.6 | FLOOD |
| 60 min Summer | 69.919 | 0.519 | 4.1 | 88.8 | FLOOD |
| 120 min Summer | 69.991 | 0.591 | 4.1 | 101.1 | FLOOD |
| 180 min Summer | 69.991 | 0.591 | 4.1 | 101.1 | FLOOD |
| 240 min Summer | 69.982 | 0.582 | 4.1 | 99.5 | FLOOD |
| 360 min Summer | 69.953 | 0.553 | 4.1 | 94.5 | FLOOD |
| 480 min Summer | 69.925 | 0.525 | 4.1 | 89.8 | FLOOD |
| 600 min Summer | 69.898 | 0.498 | 4.1 | 85.1 | FLOOD |
| 720 min Summer | 69.871 | 0.471 | 4.1 | 80.6 | FLOOD |
| 960 min Summer | 69.821 | 0.421 | 4.1 | 71.9 | FLOOD |
| 1440 min Summer | 69.731 | 0.331 | 4.0 | 56.6 | Flood Risk |
| 2160 min Summer | 69.621 | 0.221 | 3.9 | 37.8 | Flood Risk |
| 2880 min Summer | 69.541 | 0.141 | 3.8 | 24.1 | Flood Risk |
| 4320 min Summer | 69.457 | 0.057 | 3.7 | 9.7 | O K |
| 5760 min Summer | 69.442 | 0.042 | 3.1 | 7.3 | O K |
| 7200 min Summer | 69.435 | 0.035 | 2.6 | 6.1 | O K |
| 8640 min Summer | 69.431 | 0.031 | 2.3 | 5.2 | O K |
| 10080 min Summer | 69.427 | 0.027 | 2.0 | 4.6 | O K |
| 15 min Winter | 69.789 | 0.389 | 4.1 | 66.5 | Flood Risk |
| 30 min Winter | 69.880 | 0.480 | 4.1 | 82.0 | FLOOD |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 0.0 | 21 |
| 30 min Summer | 84.226 | 8.2 | 35 |
| 60 min Summer | 52.662 | 20.4 | 64 |
| 120 min Summer | 31.800 | 32.7 | 122 |
| 180 min Summer | 23.353 | 32.7 | 180 |
| 240 min Summer | 18.644 | 31.1 | 210 |
| 360 min Summer | 13.543 | 26.1 | 272 |
| 480 min Summer | 10.792 | 21.4 | 338 |
| 600 min Summer | 9.043 | 16.7 | 406 |
| 720 min Summer | 7.823 | 12.2 | 472 |
| 960 min Summer | 6.219 | 3.5 | 608 |
| 1440 min Summer | 4.493 | 0.0 | 868 |
| 2160 min Summer | 3.241 | 0.0 | 1236 |
| 2880 min Summer | 2.568 | 0.0 | 1584 |
| 4320 min Summer | 1.847 | 0.0 | 2212 |
| 5760 min Summer | 1.461 | 0.0 | 2936 |
| 7200 min Summer | 1.217 | 0.0 | 3672 |
| 8640 min Summer | 1.048 | 0.0 | 4384 |
| 10080 min Summer | 0.923 | 0.0 | 5104 |
| 15 min Winter | 128.285 | 0.0 | 21 |
| 30 min Winter | 84.226 | 13.6 | 32 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.986 | 0.586 | 4.1 | 100.2 | FLOOD |
| 120 min Winter | 70.081 | 0.681 | 4.1 | 116.4 | FLOOD |
| 180 min Winter | 70.095 | 0.695 | 4.1 | 118.9 | FLOOD |
| 240 min Winter | 70.084 | 0.684 | 4.1 | 117.0 | FLOOD |
| 360 min Winter | 70.045 | 0.645 | 4.1 | 110.3 | FLOOD |
| 480 min Winter | 70.008 | 0.608 | 4.1 | 104.0 | FLOOD |
| 600 min Winter | 69.969 | 0.569 | 4.1 | 97.2 | FLOOD |
| 720 min Winter | 69.929 | 0.529 | 4.1 | 90.5 | FLOOD |
| 960 min Winter | 69.852 | 0.452 | 4.1 | 77.3 | FLOOD |
| 1440 min Winter | 69.717 | 0.317 | 4.0 | 54.1 | Flood Risk |
| 2160 min Winter | 69.561 | 0.161 | 3.8 | 27.5 | Flood Risk |
| 2880 min Winter | 69.465 | 0.065 | 3.7 | 11.1 | O K |
| 4320 min Winter | 69.439 | 0.039 | 2.9 | 6.6 | O K |
| 5760 min Winter | 69.431 | 0.031 | 2.3 | 5.2 | O K |
| 7200 min Winter | 69.426 | 0.026 | 1.9 | 4.4 | O K |
| 8640 min Winter | 69.422 | 0.022 | 1.7 | 3.8 | O K |
| 10080 min Winter | 69.420 | 0.020 | 1.5 | 3.3 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 31.8 | 62 |
| 120 min Winter | 31.800 | 48.0 | 120 |
| 180 min Winter | 23.353 | 50.5 | 178 |
| 240 min Winter | 18.644 | 48.6 | 232 |
| 360 min Winter | 13.543 | 41.9 | 292 |
| 480 min Winter | 10.792 | 35.6 | 366 |
| 600 min Winter | 9.043 | 28.8 | 442 |
| 720 min Winter | 7.823 | 22.1 | 516 |
| 960 min Winter | 6.219 | 8.9 | 658 |
| 1440 min Winter | 4.493 | 0.0 | 926 |
| 2160 min Winter | 3.241 | 0.0 | 1280 |
| 2880 min Winter | 2.568 | 0.0 | 1564 |
| 4320 min Winter | 1.847 | 0.0 | 2204 |
| 5760 min Winter | 1.461 | 0.0 | 2944 |
| 7200 min Winter | 1.217 | 0.0 | 3648 |
| 8640 min Winter | 1.048 | 0.0 | 4320 |
| 10080 min Winter | 0.923 | 0.0 | 5112 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Pipe Network

| | | | |
|---|---|---|---|
| Volume in Pipe Network ($m^3$) | 5 | Dia of Outfall Pipe (m) | 0.2 |
| Slope of Outfall Pipe (1:X) | 100 | Roughness of Outfall Pipe (mm) | 0.600 |

## Time Area Diagram

Total Area (ha) 0.266

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.266 |

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## Model Details

Storage is Online Cover Level (m) 69.800

## Cellular Storage Structure

Invert Level (m) 69.400 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.11000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.11000

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|
| 0.000 | 180.0 | 180.0 | 1.300 | 180.0 | 249.8 |
| 0.100 | 180.0 | 185.4 | 1.400 | 180.0 | 255.1 |
| 0.200 | 180.0 | 190.7 | 1.500 | 180.0 | 260.5 |
| 0.300 | 180.0 | 196.1 | 1.600 | 180.0 | 265.9 |
| 0.400 | 180.0 | 201.5 | 1.700 | 180.0 | 271.2 |
| 0.500 | 180.0 | 206.8 | 1.800 | 180.0 | 276.6 |
| 0.600 | 180.0 | 212.2 | 1.900 | 180.0 | 282.0 |
| 0.700 | 180.0 | 217.6 | 2.000 | 180.0 | 287.3 |
| 0.800 | 180.0 | 222.9 | 2.100 | 180.0 | 292.7 |
| 0.900 | 180.0 | 228.3 | 2.200 | 180.0 | 298.1 |
| 1.000 | 180.0 | 233.7 | 2.300 | 180.0 | 303.4 |
| 1.100 | 180.0 | 239.0 | 2.400 | 180.0 | 308.8 |
| 1.200 | 180.0 | 244.4 | 2.500 | 180.0 | 314.2 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 10 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 69.565 | 0.415 | 74.4 | 55.6 | Flood Risk |
| 30 min Summer | 69.587 | 0.437 | 78.4 | 61.7 | Flood Risk |
| 60 min Summer | 69.570 | 0.420 | 75.4 | 57.0 | Flood Risk |
| 120 min Summer | 69.514 | 0.364 | 65.2 | 42.7 | Flood Risk |
| 180 min Summer | 69.467 | 0.317 | 56.8 | 32.3 | Flood Risk |
| 240 min Summer | 69.429 | 0.279 | 50.1 | 25.1 | Flood Risk |
| 360 min Summer | 69.376 | 0.226 | 40.5 | 16.4 | O K |
| 480 min Summer | 69.340 | 0.190 | 34.0 | 11.6 | O K |
| 600 min Summer | 69.314 | 0.164 | 29.5 | 8.7 | O K |
| 720 min Summer | 69.295 | 0.145 | 26.0 | 6.8 | O K |
| 960 min Summer | 69.267 | 0.117 | 21.0 | 4.4 | O K |
| 1440 min Summer | 69.235 | 0.085 | 15.3 | 2.4 | O K |
| 2160 min Summer | 69.212 | 0.062 | 11.1 | 1.2 | O K |
| 2880 min Summer | 69.200 | 0.050 | 8.9 | 0.8 | O K |
| 4320 min Summer | 69.192 | 0.042 | 6.3 | 0.6 | O K |
| 5760 min Summer | 69.187 | 0.037 | 5.0 | 0.5 | O K |
| 7200 min Summer | 69.184 | 0.034 | 4.2 | 0.4 | O K |
| 8640 min Summer | 69.182 | 0.032 | 3.6 | 0.3 | O K |
| 10080 min Summer | 69.180 | 0.030 | 3.2 | 0.3 | O K |
| 15 min Winter | 69.593 | 0.443 | 79.5 | 63.4 | Flood Risk |
| 30 min Winter | 69.608 | 0.458 | 82.2 | 67.9 | Flood Risk |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 0.0 | 13 |
| 30 min Summer | 84.226 | 0.0 | 22 |
| 60 min Summer | 52.662 | 0.0 | 38 |
| 120 min Summer | 31.800 | 0.0 | 70 |
| 180 min Summer | 23.353 | 0.0 | 100 |
| 240 min Summer | 18.644 | 0.0 | 130 |
| 360 min Summer | 13.543 | 0.0 | 190 |
| 480 min Summer | 10.792 | 0.0 | 248 |
| 600 min Summer | 9.043 | 0.0 | 308 |
| 720 min Summer | 7.823 | 0.0 | 368 |
| 960 min Summer | 6.219 | 0.0 | 490 |
| 1440 min Summer | 4.493 | 0.0 | 734 |
| 2160 min Summer | 3.241 | 0.0 | 1100 |
| 2880 min Summer | 2.568 | 0.0 | 1440 |
| 4320 min Summer | 1.847 | 0.0 | 2200 |
| 5760 min Summer | 1.461 | 0.0 | 2840 |
| 7200 min Summer | 1.217 | 0.0 | 3544 |
| 8640 min Summer | 1.048 | 0.0 | 4312 |
| 10080 min Summer | 0.923 | 0.0 | 4984 |
| 15 min Winter | 128.285 | 0.0 | 14 |
| 30 min Winter | 84.226 | 0.0 | 23 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 69.575 | 0.425 | 76.2 | 58.2 | Flood Risk |
| 120 min Winter | 69.494 | 0.344 | 61.7 | 38.1 | Flood Risk |
| 180 min Winter | 69.433 | 0.283 | 50.7 | 25.8 | Flood Risk |
| 240 min Winter | 69.388 | 0.238 | 42.7 | 18.4 | O K |
| 360 min Winter | 69.331 | 0.181 | 32.5 | 10.6 | O K |
| 480 min Winter | 69.297 | 0.147 | 26.3 | 6.9 | O K |
| 600 min Winter | 69.274 | 0.124 | 22.2 | 4.9 | O K |
| 720 min Winter | 69.257 | 0.107 | 19.2 | 3.7 | O K |
| 960 min Winter | 69.236 | 0.086 | 15.4 | 2.4 | O K |
| 1440 min Winter | 69.212 | 0.062 | 11.1 | 1.2 | O K |
| 2160 min Winter | 69.197 | 0.047 | 8.0 | 0.7 | O K |
| 2880 min Winter | 69.192 | 0.042 | 6.4 | 0.6 | O K |
| 4320 min Winter | 69.186 | 0.036 | 4.6 | 0.4 | O K |
| 5760 min Winter | 69.182 | 0.032 | 3.6 | 0.3 | O K |
| 7200 min Winter | 69.179 | 0.029 | 3.0 | 0.3 | O K |
| 8640 min Winter | 69.177 | 0.027 | 2.6 | 0.2 | O K |
| 10080 min Winter | 69.175 | 0.025 | 2.3 | 0.2 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 0.0 | 40 |
| 120 min Winter | 31.800 | 0.0 | 72 |
| 180 min Winter | 23.353 | 0.0 | 102 |
| 240 min Winter | 18.644 | 0.0 | 132 |
| 360 min Winter | 13.543 | 0.0 | 190 |
| 480 min Winter | 10.792 | 0.0 | 248 |
| 600 min Winter | 9.043 | 0.0 | 308 |
| 720 min Winter | 7.823 | 0.0 | 368 |
| 960 min Winter | 6.219 | 0.0 | 486 |
| 1440 min Winter | 4.493 | 0.0 | 728 |
| 2160 min Winter | 3.241 | 0.0 | 1072 |
| 2880 min Winter | 2.568 | 0.0 | 1456 |
| 4320 min Winter | 1.847 | 0.0 | 2160 |
| 5760 min Winter | 1.461 | 0.0 | 2944 |
| 7200 min Winter | 1.217 | 0.0 | 3608 |
| 8640 min Winter | 1.048 | 0.0 | 4440 |
| 10080 min Winter | 0.923 | 0.0 | 5008 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Time Area Diagram

Total Area (ha) 0.420

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.420 |

## Time Area Diagram

Total Area (ha) 0.000

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.000 |

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## Model Details

Storage is Online Cover Level (m) 69.705

## Porous Car Park Structure

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.45000 | Width (m) | 28.7 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 82.0 |
| Max Percolation (l/s) | 653.7 | Slope (1:X) | 75.0 |
| Safety Factor | 1.5 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 69.150 | Cap Volume Depth (m) | 0.550 |

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## Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 67 minutes.

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 15 min Summer | 70.417 | 0.187 | 20.7 | 91.3 | O K |
| 30 min Summer | 70.447 | 0.217 | 20.7 | 116.5 | O K |
| 60 min Summer | 70.464 | 0.234 | 20.7 | 131.3 | O K |
| 120 min Summer | 70.468 | 0.238 | 20.7 | 134.0 | O K |
| 180 min Summer | 70.460 | 0.230 | 20.7 | 128.0 | O K |
| 240 min Summer | 70.450 | 0.220 | 20.7 | 119.1 | O K |
| 360 min Summer | 70.428 | 0.198 | 20.7 | 101.2 | O K |
| 480 min Summer | 70.410 | 0.180 | 20.7 | 85.5 | O K |
| 600 min Summer | 70.394 | 0.164 | 20.7 | 72.5 | O K |
| 720 min Summer | 70.383 | 0.153 | 20.4 | 62.9 | O K |
| 960 min Summer | 70.366 | 0.136 | 18.1 | 49.9 | O K |
| 1440 min Summer | 70.341 | 0.111 | 14.8 | 33.5 | O K |
| 2160 min Summer | 70.318 | 0.088 | 11.7 | 20.8 | O K |
| 2880 min Summer | 70.303 | 0.073 | 9.7 | 14.3 | O K |
| 4320 min Summer | 70.284 | 0.054 | 7.2 | 7.9 | O K |
| 5760 min Summer | 70.277 | 0.047 | 5.8 | 5.8 | O K |
| 7200 min Summer | 70.272 | 0.042 | 4.8 | 4.8 | O K |
| 8640 min Summer | 70.269 | 0.039 | 4.1 | 4.1 | O K |
| 10080 min Summer | 70.267 | 0.037 | 3.6 | 3.6 | O K |
| 15 min Winter | 70.433 | 0.203 | 20.7 | 105.0 | O K |
| 30 min Winter | 70.468 | 0.238 | 20.7 | 134.3 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 15 min Summer | 128.285 | 0.0 | 17 |
| 30 min Summer | 84.226 | 0.0 | 31 |
| 60 min Summer | 52.662 | 0.0 | 54 |
| 120 min Summer | 31.800 | 0.0 | 86 |
| 180 min Summer | 23.353 | 0.0 | 122 |
| 240 min Summer | 18.644 | 0.0 | 154 |
| 360 min Summer | 13.543 | 0.0 | 220 |
| 480 min Summer | 10.792 | 0.0 | 282 |
| 600 min Summer | 9.043 | 0.0 | 342 |
| 720 min Summer | 7.823 | 0.0 | 398 |
| 960 min Summer | 6.219 | 0.0 | 520 |
| 1440 min Summer | 4.493 | 0.0 | 762 |
| 2160 min Summer | 3.241 | 0.0 | 1120 |
| 2880 min Summer | 2.568 | 0.0 | 1472 |
| 4320 min Summer | 1.847 | 0.0 | 2200 |
| 5760 min Summer | 1.461 | 0.0 | 2920 |
| 7200 min Summer | 1.217 | 0.0 | 3672 |
| 8640 min Summer | 1.048 | 0.0 | 4320 |
| 10080 min Summer | 0.923 | 0.0 | 5112 |
| 15 min Winter | 128.285 | 0.0 | 17 |
| 30 min Winter | 84.226 | 0.0 | 31 |

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## Summary of Results for 100 year Return Period (+30%)

| Storm Event | Max Level (m) | Max Depth (m) | Max Infiltration (l/s) | Max Volume (m³) | Status |
|---|---|---|---|---|---|
| 60 min Winter | 70.490 | 0.260 | 20.7 | 152.7 | O K |
| 120 min Winter | 70.491 | 0.261 | 20.7 | 153.3 | O K |
| 180 min Winter | 70.479 | 0.249 | 20.7 | 143.5 | O K |
| 240 min Winter | 70.463 | 0.233 | 20.7 | 130.0 | O K |
| 360 min Winter | 70.430 | 0.200 | 20.7 | 102.7 | O K |
| 480 min Winter | 70.403 | 0.173 | 20.7 | 79.7 | O K |
| 600 min Winter | 70.383 | 0.153 | 20.4 | 63.4 | O K |
| 720 min Winter | 70.370 | 0.140 | 18.7 | 53.2 | O K |
| 960 min Winter | 70.350 | 0.120 | 16.0 | 38.7 | O K |
| 1440 min Winter | 70.322 | 0.092 | 12.3 | 22.9 | O K |
| 2160 min Winter | 70.298 | 0.068 | 9.1 | 12.6 | O K |
| 2880 min Winter | 70.285 | 0.055 | 7.3 | 8.0 | O K |
| 4320 min Winter | 70.274 | 0.044 | 5.2 | 5.3 | O K |
| 5760 min Winter | 70.270 | 0.040 | 4.2 | 4.2 | O K |
| 7200 min Winter | 70.266 | 0.036 | 3.5 | 3.5 | O K |
| 8640 min Winter | 70.263 | 0.033 | 2.9 | 3.0 | O K |
| 10080 min Winter | 70.261 | 0.031 | 2.6 | 2.6 | O K |

| Storm Event | Rain (mm/hr) | Flooded Volume (m³) | Time-Peak (mins) |
|---|---|---|---|
| 60 min Winter | 52.662 | 0.0 | 58 |
| 120 min Winter | 31.800 | 0.0 | 94 |
| 180 min Winter | 23.353 | 0.0 | 132 |
| 240 min Winter | 18.644 | 0.0 | 168 |
| 360 min Winter | 13.543 | 0.0 | 236 |
| 480 min Winter | 10.792 | 0.0 | 298 |
| 600 min Winter | 9.043 | 0.0 | 352 |
| 720 min Winter | 7.823 | 0.0 | 412 |
| 960 min Winter | 6.219 | 0.0 | 532 |
| 1440 min Winter | 4.493 | 0.0 | 766 |
| 2160 min Winter | 3.241 | 0.0 | 1124 |
| 2880 min Winter | 2.568 | 0.0 | 1468 |
| 4320 min Winter | 1.847 | 0.0 | 2204 |
| 5760 min Winter | 1.461 | 0.0 | 2912 |
| 7200 min Winter | 1.217 | 0.0 | 3648 |
| 8640 min Winter | 1.048 | 0.0 | 4248 |
| 10080 min Winter | 0.923 | 0.0 | 5040 |

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## Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Winter Storms | Yes |
| Return Period (years) | 100 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 20.000 | Shortest Storm (mins) | 15 |
| Ratio R | 0.400 | Longest Storm (mins) | 10080 |
| Summer Storms | Yes | Climate Change % | +30 |

## Time Area Diagram

Total Area (ha) 0.490

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.490 |

## Time Area Diagram

Total Area (ha) 0.000

| Time (mins) From: | To: | Area (ha) |
|---|---|---|
| 0 | 4 | 0.000 |

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## Model Details

Storage is Online Cover Level (m) 70.880

## Porous Car Park Structure

| | | | |
|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.04000 | Width (m) | 30.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 93.0 |
| Max Percolation (l/s) | 775.0 | Slope (1:X) | 600.0 |
| Safety Factor | 1.5 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 70.230 | Cap Volume Depth (m) | 0.550 |

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## APPENDIX C

- ENVIRONMENTAL AGENCY FLOOD MAP
- GROUNDWATER VULNERABILITY PLAN
- AQUIFER PLAN
- THAMES WATER RECORD DRAINAGE PLAN

N

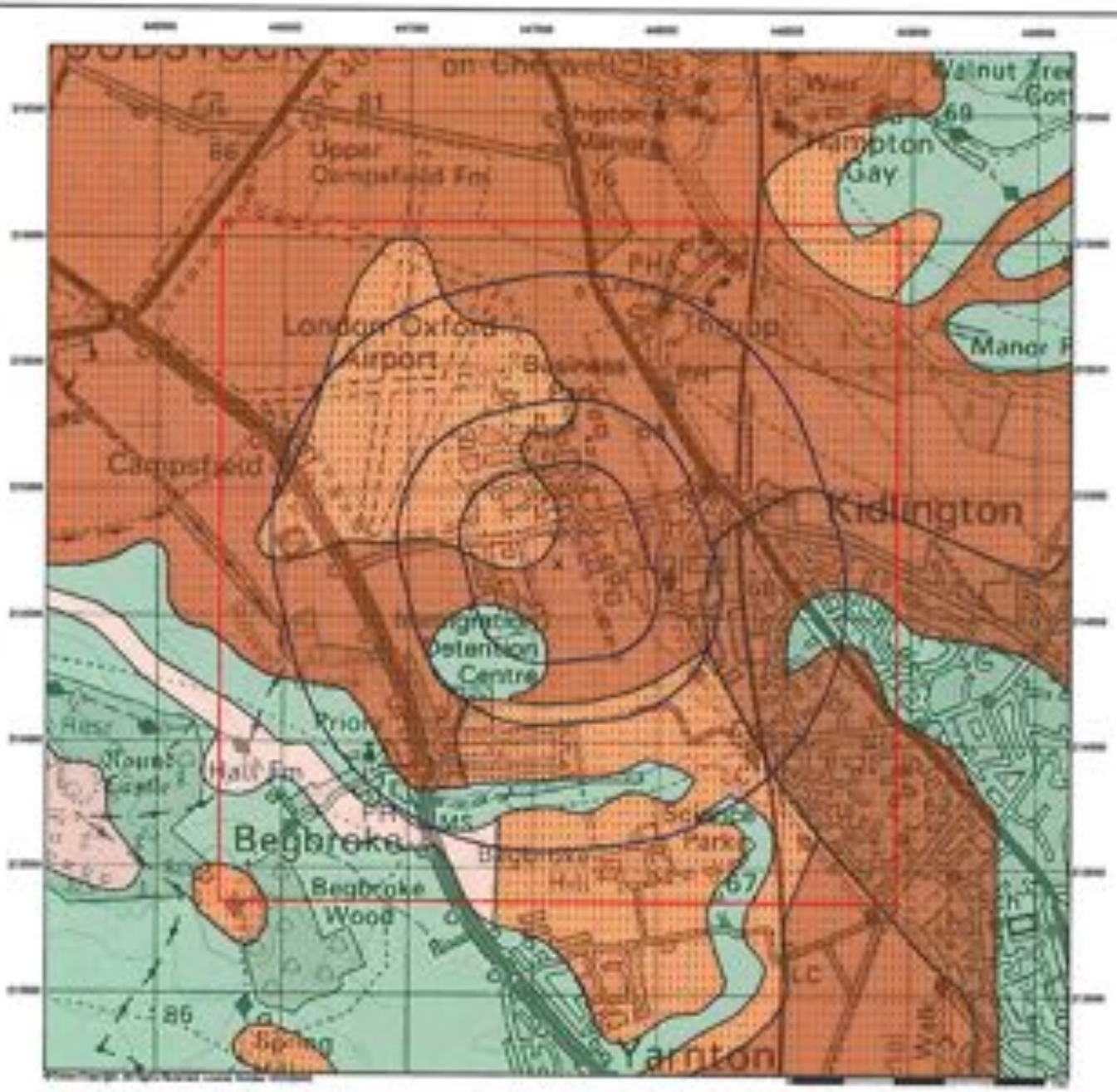
- Flooding from rivers or sea without defences
- Extent of extreme flood
- Flood defences (Not all may be shown*)
- Areas benefiting from flood defences (Not all may be shown*)
- Main rivers

- Site Location

X: 447546
Y: 214823

Langford Lane
Kidlington
Oxfordshire
OX5 1RE

| | | | |
|---|---|---|---|
| Baynham Meikle Partnership consulting structural + civil engineers | | Checked by | NSB |
| | | Drawn by | JH |
| | | Proj. No. | 12076 |
| Project | OXFORD TECHNOLOGY PARK, KIDLINGTON | Date | FEB 15 |
| | | Scale | NTS A3 |
| Title | EA FLOOD MAP | Dwg.No. | SK101 Rev. - |




Envirocheck®

## Groundwater Vulnerability

General

Agency and Hydrological

Geological Classes | Soil Classes

Site Sensitivity Context Map - Slice A

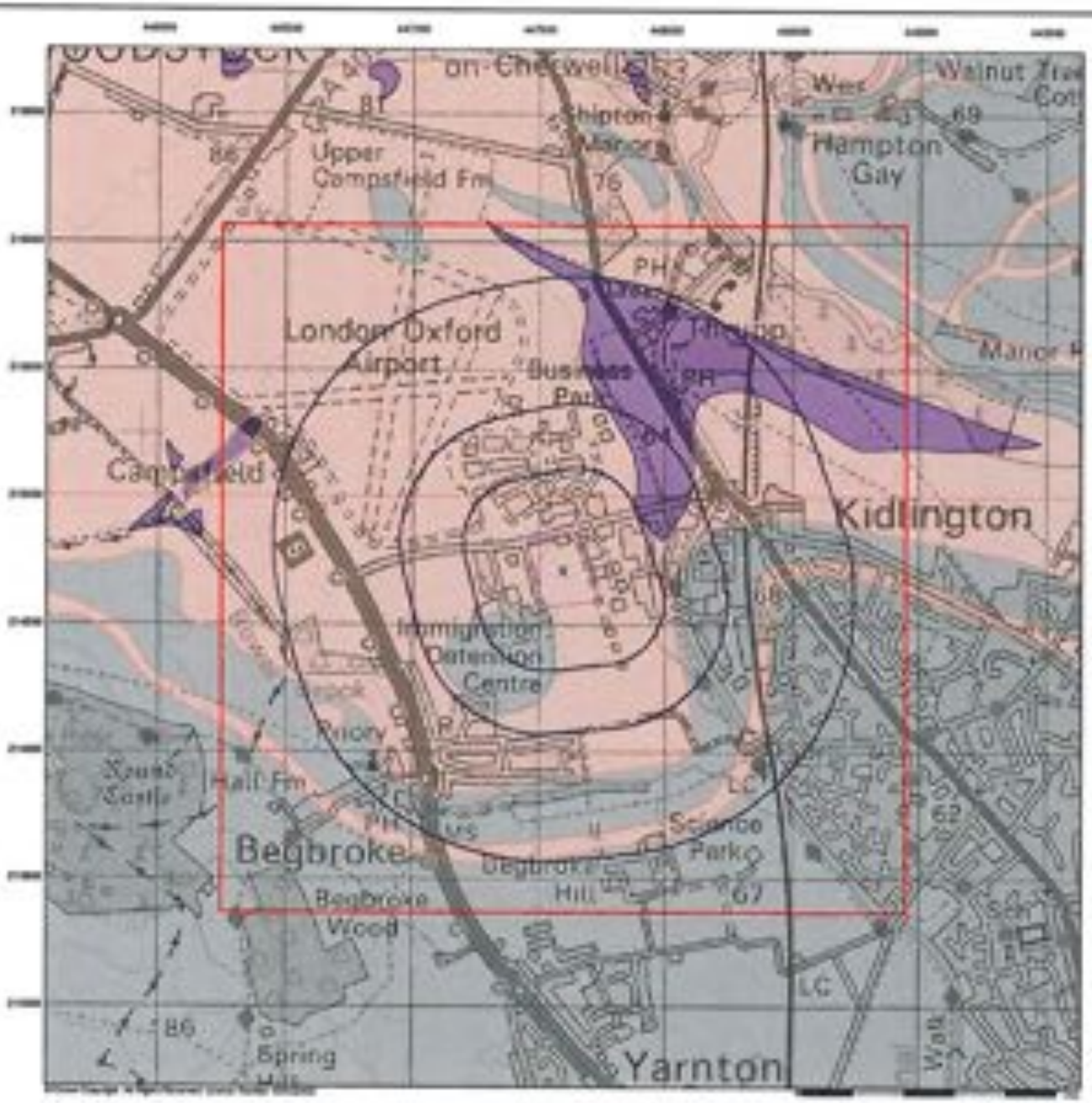
### Order Details

| | |
|---|---|
| Order Number | [illegible] |
| Customer Ref | [illegible] |
| National Grid Reference | [illegible] |
| Slice | A |
| Site Area (Ha) | [illegible] |
| Search Buffer (m) | 1000 |

### Site Details

[illegible]

Landmark




Envirocheck®

## Bedrock Aquifer Designation

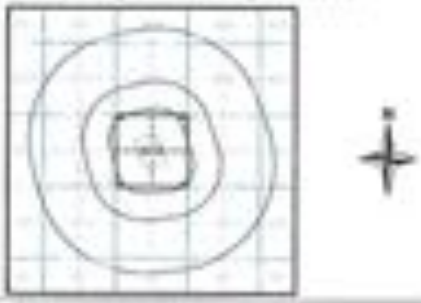
**General**

**Agency and Hydrological**

**Geological Classes**

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

**Site Sensitivity Context Map - Slice A**



**Order Details**

| | |
|---|---|
| Order Number | [illegible] |
| Customer Ref | [illegible] |
| National Grid Reference | [illegible] |
| Slice | A |
| Site Area (Ha) | 0.5 |
| Search Buffer (m) | 1000 |

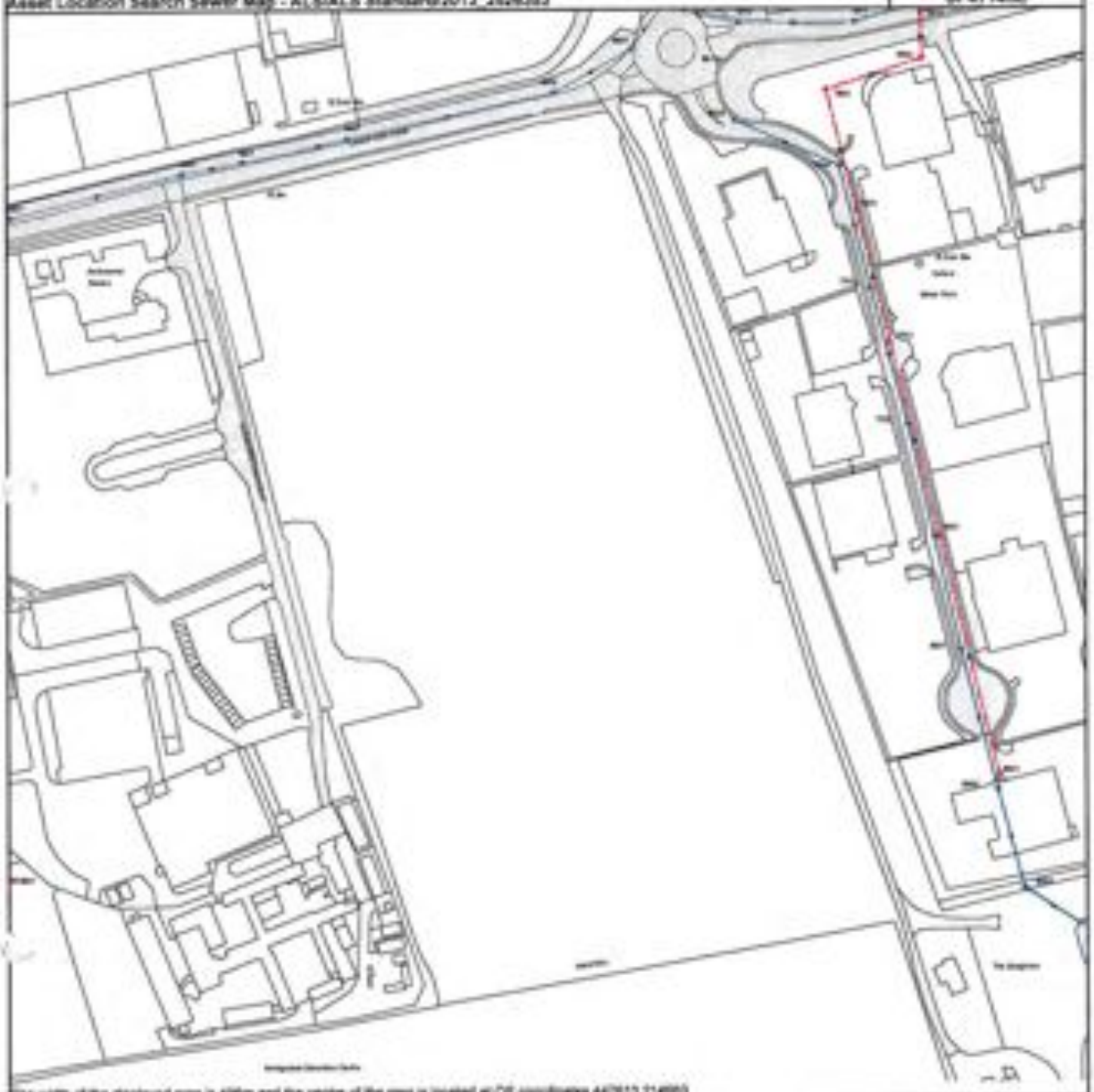
**Site Details**

[illegible] Woodstock Road West, Begbroke, KIDLINGTON, Oxfordshire, OX5 1RU

Landmark

Asset Location Search Sewer Map - ALS/ALS Standard/2013_2026353

SP4774NE



The width of the displayed area is 498m and the centre of the map is located at OS coordinates 447613,214993

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service plans are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the sanction of the controller of H.M. Stationery Office. Licence no. 100019567 ©Crown Copyright Reserved

## APPENDIX D

- TRIAL PIT LOCATION PLAN
- SITE INVESTIGATION DATA
- SOAKAWAY TEST RESULTS

NOTES:

1. DO NOT SCALE, WORK TO FIGURED DIMENSIONS ONLY.

## KEY

TP1 TRIAL PIT LOCATION

S3 SOAKAGE TEST LOCATION

SITE BOUNDARY

| REV | DATE | BY | REVISION | CHKD |
|---|---|---|---|---|

| | | | |
|---|---|---|---|
| STATUS | REPORT | APPR | DATE |
| PROJECT | LANGFORD LANE<br>KIDLINGTON | | |
| CLIENT | LEA INVESTMENTS LTD | | |

Haydn Evans Consulting
31-37 St Helens Street, Ipswich, Suffolk, IP4 2JL
Tel: 01473 236550 Fax: 01473 233097
Email: mail@evansconsult.co.uk

TITLE: SITE INVESTIGATION: TRIAL PIT & SOAKAGE TEST LAYOUT

| BY | DATE | DRAWING No. | REV. |
|---|---|---|---|
| MSP | JUL 2013 | 159/017/08 | – |
| CHKD | SCALE 1:500 | | |

© Haydn Evans Consulting

# Haydn Evans Consulting

Civil and Structural Design Engineers

**LEA Investments**

**Langford Lane, Kidlington**

**ENGINEERING APPRAISAL**

November 2013

**159/017**

| Document Status | Date | Checked | Approved |
|---|---|---|---|
| Preliminary | November 2013 | | |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Suffolk IP4 2JL

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Fax: 01473 233097

6.8 The Designing for Deliveries document produced by the Freight Transport Association provides design recommendations for the use of heavy goods vehicles. The advice is principally concerned with the layout of facilities off the public highway. However for a straight section of access road it is recommended to have 1.3m between opposing vehicles and clearances of 0.5m between the vehicles and the carriageway edges. On the basis a standard heavy goods vehicle is 2.55m wide the total carriageway width would be 7.4m. The standard width of a two way access road is typically 7.3m which has generally been adequate for the heavy goods vehicles in current use. It is therefore recommended the central access road within the site is 7.3m wide with 1.5m wide footpaths each side.

6.9 Vehicle Manoeuvres within the service yards have been 'Autotracked'. The swept paths are shown on drawing 159/017/07. The area is quite restricted for 16.5m long articulated vehicles. More detailed consideration will be necessary to improve the layout and to make it easier for articulated vehicles to enter and exit the loading bays.

6.10 Permeable paving is not considered to be suitable for service yards or other areas where heavy goods vehicles regularly turn due to the scrubbing action of the manoeuvre. These areas either need to be concrete, heavy duty macadam or heavy duty block paving laid to falls with positive drainage. Both concrete and heavy duty macadam need to be laid a number of weeks before they are actually used.

## 7.0 GROUND INVESTIGATION

7.1 The ground investigation was carried out on 9th July 2013 and comprised the excavation of 9 trial pits using a JCB excavator. The pits were spread across the site with the primary purpose of establishing parameters for foundation design and road construction. A view was also taken as to whether a return visit would be made to test percolation rates for the design of soakaways.

7.2 Weather

The day was hot and sunny. The preceding fortnight has also been dry and sunny although previously there had been an above average amount of rainfall.

7.3 Trial Pits

The locations of the trial pits are shown on drawing number 159/017/08.

**TP1**

| | |
|---|---|
| 0-250 | Topsoil |
| 250-1000 | Fractured ROCK with interstitial stiff mid-brown sandy clay |
| 1000-1500 | Fractured ROCK |
| 1500-2200 | Stiff light grey with streaks of orange SAND<br>Water trickling at 2100 |
| 2200-2300 | ROCK |
| 2300 | Bottom of pit. Unable to progress any further with excavator. Depth to water; 1900 after 5 hours. |

**TP2**

| | |
|---|---|
| 0–200 | Topsoil |
| 200-300 | Stiff mid brown sandy CLAY |
| 300-1700 | Fractured ROCK broken into cobbles up to 200mm across when excavated with interstitial stiff mid brown sandy clay.<br>Becoming wet at 1600 |
| 1700-1800 | ROCK. Water trickling in at 1750 |
| 1800 | Bottom of pit. Unable to progress any further with excavator.<br>Depth to water; 1600 after 4 hours |

**TP3**

| | |
|---|---|
| 0-250 | Topsoil |
| 250-550 | Stiff dark brown sandy silty CLAY with rootlets |
| 550-1600 | Fractured ROCK with interstitial stiff mid brown sandy clay |
| 1600-1700 | ROCK |
| 1700 | Bottom of pit. Unable to progress any further with excavator.<br>No water. |

**TP4**

| | |
|---|---|
| 0-200 | Topsoil |
| 200-300 | Stiff mid brown sandy CLAY |
| 300-1600 | Fractured ROCK broken into cobbles up to 200mm across when excavated with interstitial stiff mid brown sandy clay |
| 1600-1850 | ROCK |
| 1850 | Bottom of pit. Unable to progress any further with excavator<br>No water |

**TP5**

| | |
|---|---|
| 0-200 | Topsoil |
| 200-450 | Stiff dark brown silty CLAY |
| 450-1400 | Fractured ROCK with interstitial stiff mid brown sandy clay |
| 1400-2000 | Very stiff grey brown CLAY |
| 2000-2100 | ROCK |
| 2100 | Bottom of pit. Unable to progress any further with excavator |
| | No water |

**TP6**

| | |
|---|---|
| 0-300 | Topsoil |
| 300-550 | Fractured ROCK with interstitial stiff mid brown clay |
| 550-850 | Stiff mid brown CLAY |
| 850-1600 | Fractured ROCK with interstitial stiff mid brown clay |
| 1600-2000 | Stuff grey/mid brown CLAY |
| 2000-2100 | ROCK |
| 2100 | Bottom of pit. Unable to progress any further with excavator |
| | 50mm water in pit after 1 hour |

**TP7**

| | |
|---|---|
| 0-300 | Topsoil |
| 300-500 | Stiff dark brown silty CLAY |
| 500-1250 | Fractured ROCK with interstitial stiff mid brown clay |
| 1250-1500 | Stiff light brown clay |
| 1500-1900 | Rock in layers 30-40mm thick when broken out |
| 1900-2000 | ROCK |
| 2000 | Bottom of pit. Unable to progress any further with excavator |
| | No water |

**TP8**

| | |
|---|---|
| 0-400 | Topsoil |
| 400-1500 | Fractured ROCK with interstitial stiff mid brown clay |
| 1500-1800 | ROCK |
| 1800 | Bottom of pit. Unable to progress any further with excavator |
| | No water |

**TP9**

| | |
|---|---|
| 0-250 | Topsoil |
| 250-800 | Stiff orangey mid brown silty CLAY |
| 800-1900 | Fractured ROCK with interstitial stiff mid brown clay |
| | Pocket of mid brown stiff clay with streaks of orange sand at 1500 |
| 1900-2000 | ROCK |
| 2000 | Bottom of pit. Unable to progress any further with excavator |
| | No water |

7.4 Ground Conditions

Across the site is a layer of topsoil 200-400mm deep. In some areas is a thin layer of mid or dark brown silty clay; in places the two layers can be difficult to distinguish.

Across the majority of the site fractured rock was then encountered. Although this could be excavated with the JCB it was tough digging with the rock being raised in angular pieces up to 200mm across. Any voids between these angular cobbles have been filled with stiff clay with these pockets of clay being up to 200mm across. In some of the pits a layer of stiff clay up to 600mm thick was found at depth.

Between 1500 and 2200 a non-fractured rock was encountered. This could not be excavated with the JCB and hence none of the trial pits penetrated into this layer more than 300mm.

Two layers of clay were found in trial pit 6 near the west boundary and soakage test 4 found firm/stiff clay to a depth of 2650mm before any rock was encountered. This shows there are variations in soil strata across the site particularly in the western section.

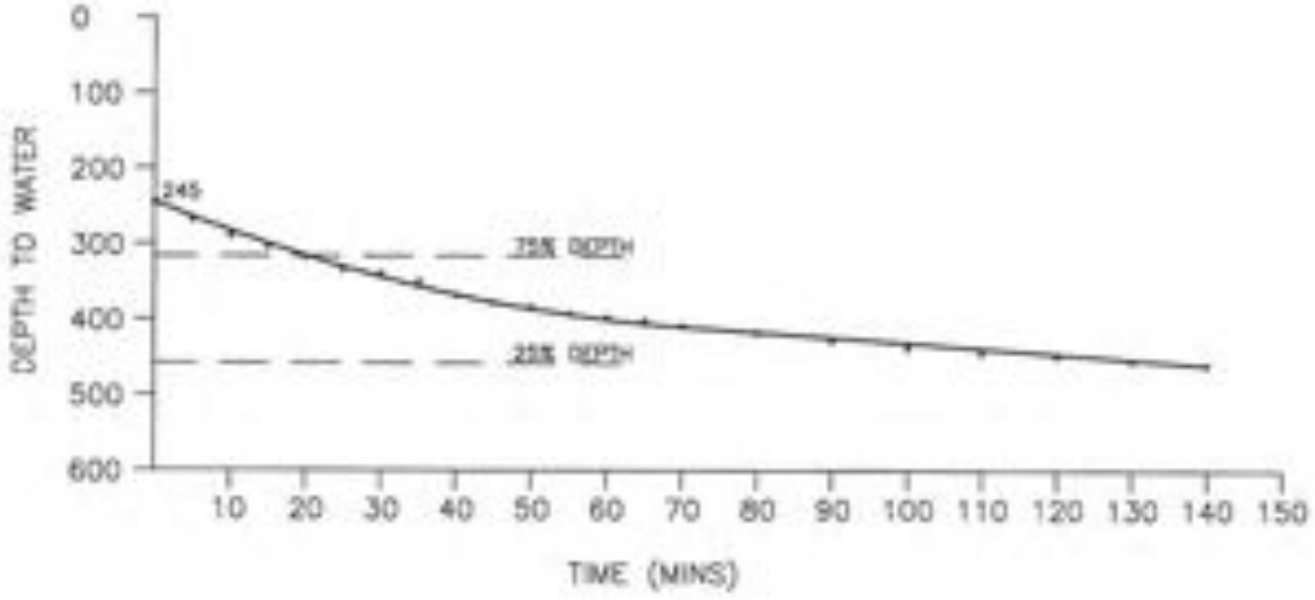
7.5 Laboratory Analysis

Four samples were analysed for shrinkage potential and found to have a plasticity index ranging from 16-39%. This represents a soil of low to medium volume change potential.

There were no visual signs of any contamination on site and hence a selection of three near surface soil samples and one ground water sample were tested for the CLEA suite of contaminants. None of the contaminants tested were above soil guideline values for commercial developments. However there were slightly elevated levels of Arsenic and Chromium if the upper layer was to be exported for a residential (with plant uptake) land use.

There are some small spoil heaps around the old pavilion car park. These together with the car park surfacing materials may contain some contamination and therefore any allowance should be made to remove these to an approved landfill facility.

SIZE OF PIT: LENGTH 1250mm
WIDTH 650mm
DEPTH 530mm




STORAGE VOLUME BETWEEN 75% AND 25% DEPTH: 0.115m³
INTERNAL SURFACE AREA UP TO 50% EFFECTIVE DEPTH INCLUDING BASE: 1.35m²

TIME WHEN PIT 75% FULL: 19mins

TIME WHEN PIT 25% FULL: 137mins

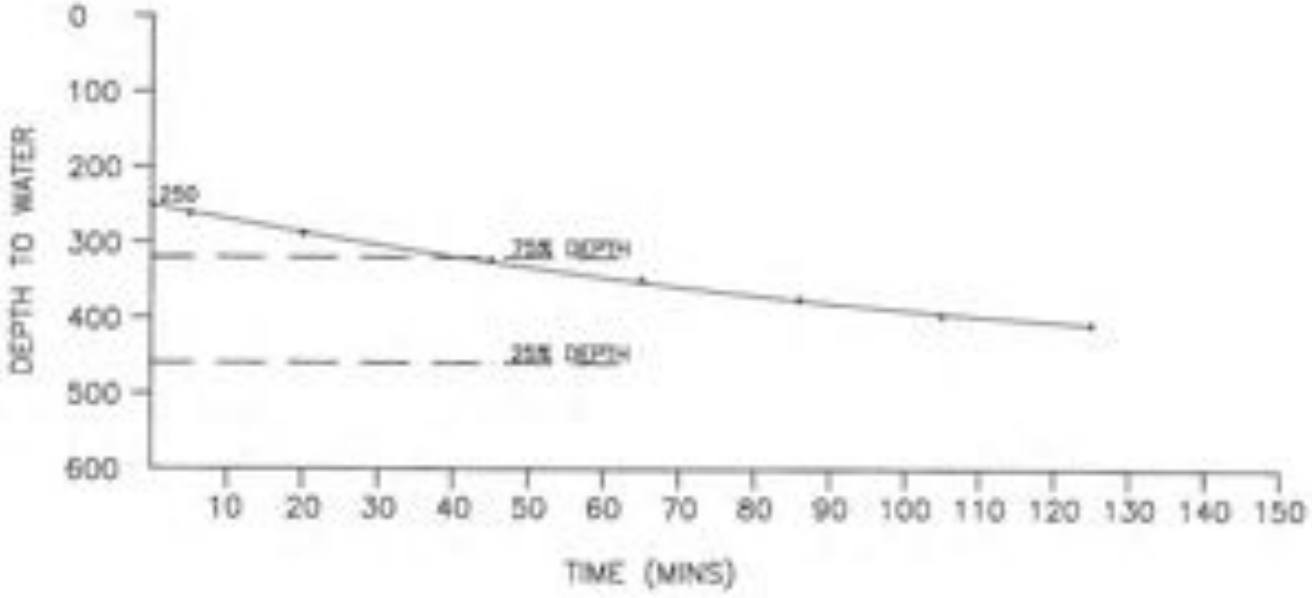
TIME FOR WATER LEVEL TO DROP FROM 75% TO 25% DEPTH: 118mins

SOIL INFILTRATION RATE: 43.3mm/HOUR

SOAKAGE PIT 1 TEST 1

LANGFORD LANE KIDDLINGTON

SIZE OF PIT: LENGTH 1250mm
WIDTH 650mm
DEPTH 530mm




STORAGE VOLUME BETWEEN 75% AND 25% DEPTH: 0.114m³
INTERNAL SURFACE AREA UP TO 50% EFFECTIVE DEPTH INCLUDING BASE: 1.350m²

TIME WHEN PIT 75% FULL: 41mins

TIME WHEN PIT 25% FULL: 190mins

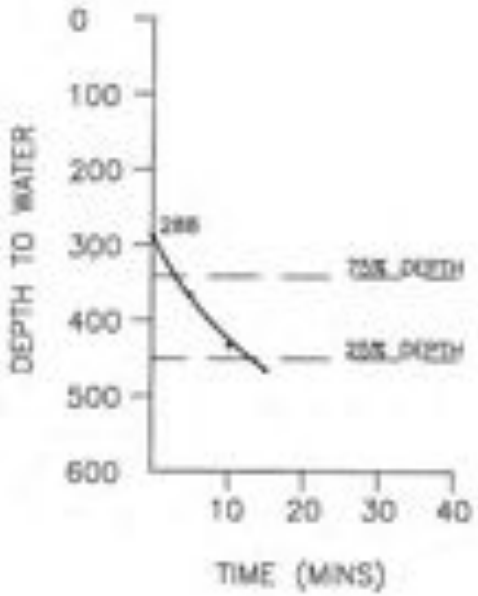
TIME FOR WATER LEVEL TO DROP FROM 75% TO 25% DEPTH: 149mins

SOIL INFILTRATION RATE: 34mm/HOUR

SOAKAGE PIT 1 TEST 2

LANGFORD LANE KIDDLINGTON

SIZE OF PIT: LENGTH 1350mm
WIDTH 600mm
DEPTH 505mm




STORAGE VOLUME BETWEEN 75% AND 25% DEPTH: 0.088m³
INTERNAL SURFACE AREA UP TO 50% EFFECTIVE DEPTH INCLUDING BASE: 1.24m²

TIME WHEN PIT 75% FULL: 3mins

TIME WHEN PIT 25% FULL: 13mins

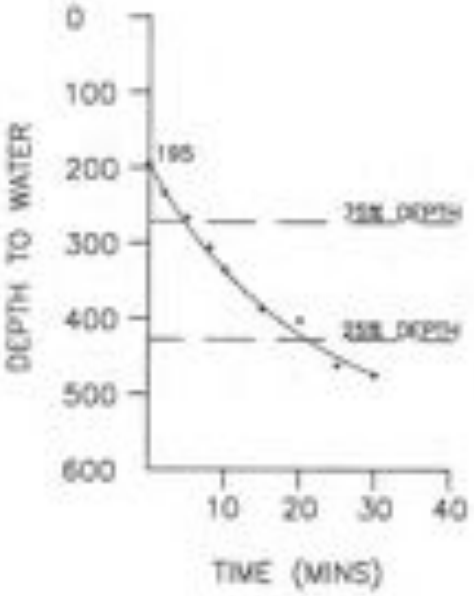
TIME FOR WATER LEVEL TO DROP FROM 75% TO 25% DEPTH: 10mins

SOIL INFILTRATION RATE: 425.81mm/HOUR

SOAKAGE PIT 2/1 TEST 1

LANGFORD LANE KIDDLINGTON

SIZE OF PIT: LENGTH 1350mm
WIDTH 600mm
DEPTH 505mm




STORAGE VOLUME BETWEEN 75% AND 25% DEPTH: 0.126m³
INTERNAL SURFACE AREA UP TO 50% EFFECTIVE DEPTH INCLUDING BASE: 1.41m²

TIME WHEN PIT 75% FULL: 5mins

TIME WHEN PIT 25% FULL: 21mins

TIME FOR WATER LEVEL TO DROP FROM 75% TO 25% DEPTH: 16mins

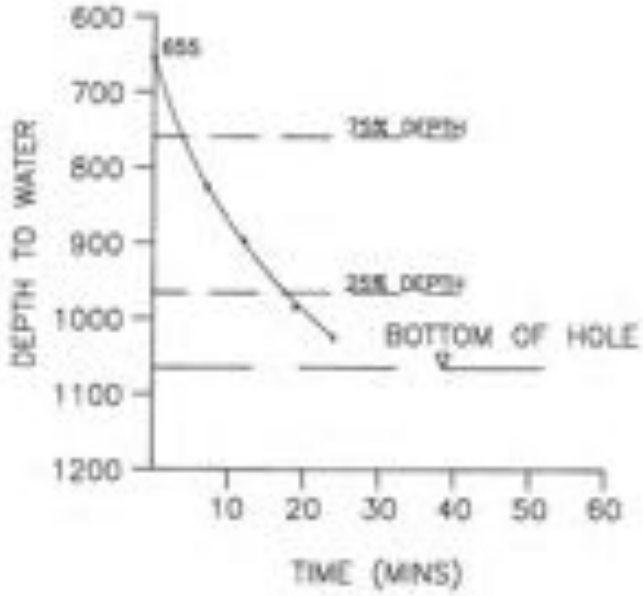
SOIL INFILTRATION RATE: 335.11mm/HOUR

SOAKAGE PIT 2/1 TEST 2

LANGFORD LANE KIDDLINGTON

SIZE OF PIT:

| | |
|---|---|
| LENGTH | 1250mm |
| WIDTH | 630mm |
| DEPTH | 1070mm |




STORAGE VOLUME BETWEEN 75% AND 25% DEPTH: $0.163m^3$

INTERNAL SURFACE AREA UP TO 50% EFFECTIVE DEPTH INCLUDING BASE: $1.57m^2$

TIME WHEN PIT 75% FULL: 4mins

TIME WHEN PIT 25% FULL: 18mins

TIME FOR WATER LEVEL TO DROP FROM 75% TO 25% DEPTH: 14mins

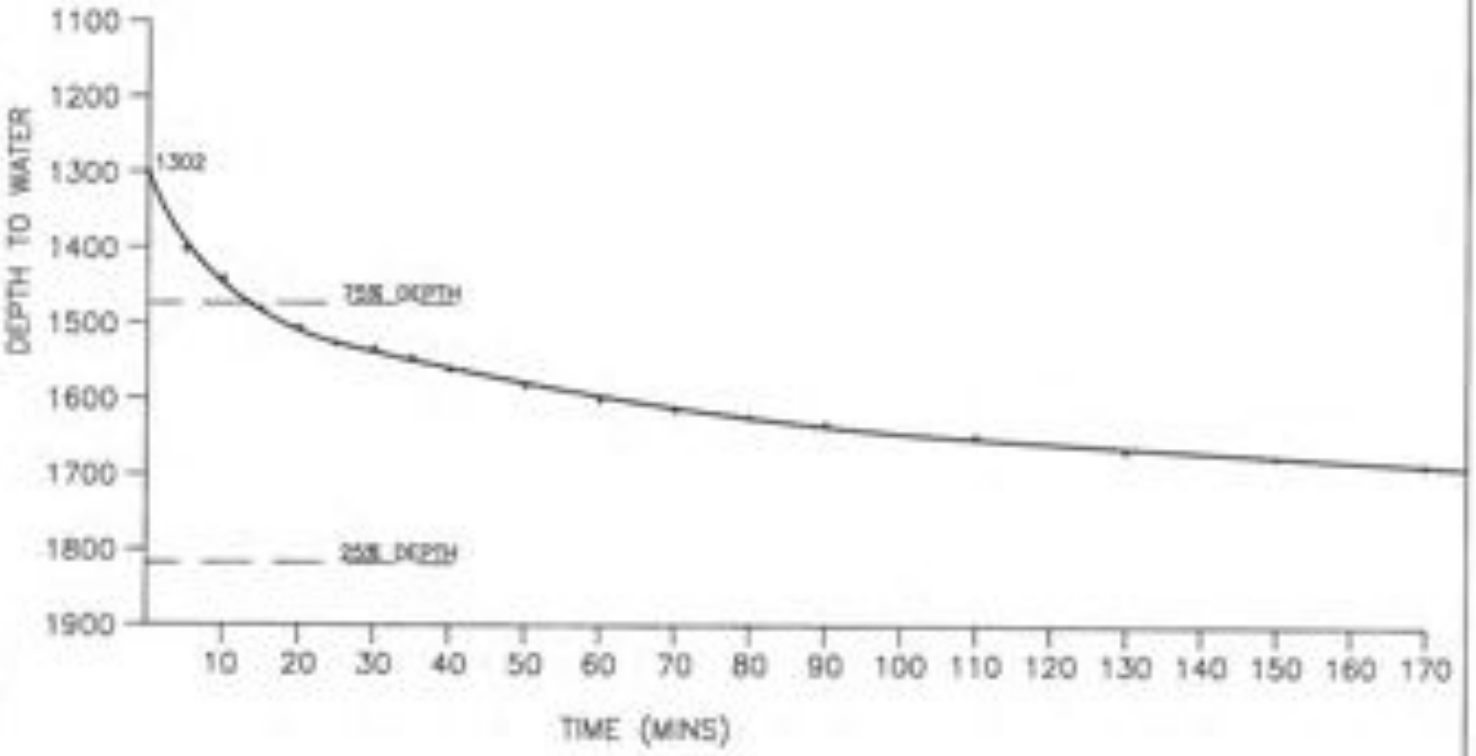
SOIL INFILTRATION RATE: 444.95mm/HOUR

SOAKAGE PIT 3

TEST 2

LANGFORD LANE KIDDLINGTON

SIZE OF PIT: LENGTH 1250mm
WIDTH 600mm
DEPTH 1990mm




STORAGE VOLUME BETWEEN 75% AND 25% DEPTH: 0.258m³
INTERNAL SURFACE AREA UP TO 50% EFFECTIVE DEPTH INCLUDING BASE: 2.02m²

TIME WHEN PIT 75% FULL: 13mins

TIME WHEN PIT 25% FULL: 400mins

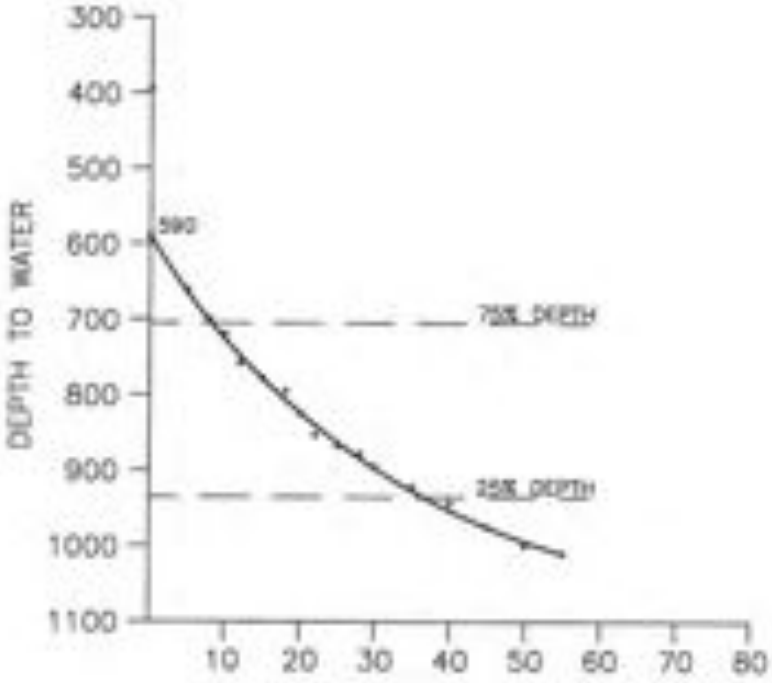
TIME FOR WATER LEVEL TO DROP FROM 75% TO 25% DEPTH: 387mins

SOIL INFILTRATION RATE: 19.8mm/HOUR

SOAKAGE PIT 5 TEST 1

LANGFORD LANE KIDDLINGTON

SIZE OF PIT: LENGTH 1100mm
WIDTH 640mm
DEPTH 1050mm




STORAGE VOLUME BETWEEN 75% AND 25% DEPTH: 0.162m³
INTERNAL SURFACE AREA UP TO 50% EFFECTIVE DEPTH INCLUDING BASE: 1.50m²

TIME WHEN PIT 75% FULL: 8mins

TIME WHEN PIT 25% FULL: 36mins

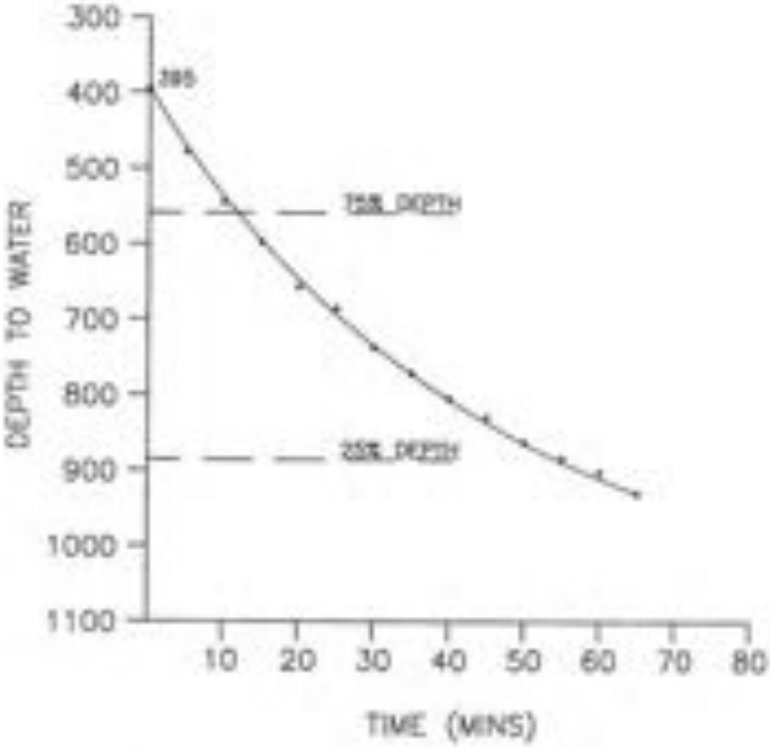
TIME FOR WATER LEVEL TO DROP FROM 75% TO 25% DEPTH: 28mins

SOIL INFILTRATION RATE: 231.43mm/HOUR

SOAKAGE PIT 6 TEST 1

LANGFORD LANE KIDDLINGTON

SIZE OF PIT: LENGTH 1100mm
WIDTH 640mm
DEPTH 1050mm




STORAGE VOLUME BETWEEN 75% AND 25% DEPTH: 0.230m³
INTERNAL SURFACE AREA UP TO 50% EFFECTIVE DEPTH INCLUDING BASE: 2.395m²

TIME WHEN PIT 75% FULL: 12mins

TIME WHEN PIT 25% FULL: 54mins

TIME FOR WATER LEVEL TO DROP FROM 75% TO 25% DEPTH: 42mins

SOIL INFILTRATION RATE: 137.19mm/HOUR

SOAKAGE PIT 6 TEST 2

LANGFORD LANE KIDDLINGTON