

## "L'Apache" Westergate Street, Woodgate, CHICHESTER PO20 3SQ -- Planning Reference AL/50/21/PL

### **The Design Parameters for the Proposed Geocellular Structure Soakaway Installations S/A #1 & S/A #2 located in the Rear Gardens are as follows :-**

The Soil Infiltration Rate for the Sides is 5.195E-6 metres / second.  
The Soil Infiltration Rate for the Base is 5.195E-6 metres / second.  
The Installation consists of a GeoCellular Structure of 6.60 metres Long by 2.40 metres Wide and 0.347 metres in Depth.  
With a Cover Depth of 0.35 metres.  
Percentage Void Space of 95%.  
Impermeable Area specified as 64 square metres.  
Using a Safety Factor of 2.0  
The Design adopts a Factored Soil Infiltration Rate for the Sides of 2.598E-6 metres / second.  
And a Factored Soil Infiltration Rate for the Base of 2.598E-6 metres / second.  
Both the Side Areas and the Base Area are Included in the Calculations.  
The Rainfall Ratio for the Location is  $r=0.36$   
Rainfall Base Rate M5-60min the 5 Year Return Period Rainfall of 60 minutes Duration is 19.0mm.  
Lowest Incoming Pipe Invert Height is 162mm above the Installation Base.

All Levels are referenced to 'Above Ordinance Datum' (AOD)  
The Highest Recorded Groundwater at the Location of the Proposed Soakaway is 9.039 metres at a depth of 0.751 metres Below Ground Level (BGL)  
The Ground Level at the Location of the Proposed Soakaway is 9.790 metres.  
The Soffit Level of the Proposed Soakaway is 9.440 metres.  
The Invert Level of the Lowest Incoming Pipe on the Proposed Soakaway is 9.255 metres  
The Base Level of the Proposed Soakaway is 9.093 metres  
The Base of the Soakaway Structure is 0.054 metres above the Highest Recorded Groundwater at the location of the Soakaway. This meets Building Regulations.

### **The Design Summary for the Proposed Geocellular Structure Soakaway Installation S/A#1 & S/A#2 is as follows :-**

For a 10 Year Return Storm with No Increase for Climate Change.  
The Design requires storage of 1.57 cubic metres out of 2.44 cubic metres available.  
Therefore Storage is Passed with a Critical Storm occurring at 3 hours.  
And the Half Drain Time is OK within the Allowable 24 hours Period at 5.01 hours.

For a 100 Year Return Storm Includes a 40% Increase for Climate Change.  
The Design requires storage of 4.54 cubic metres out of 5.22 cubic metres available.  
Therefore Storage is Passed with a Critical Storm occurring at 6 hours.  
And the Half Drain Time is OK within the Allowable 24 hours Period at 13.07 hours.

**10 Year Return Storm with No Increase for Climate Change.**

| Storm Duration | Factor Z1-5  | M5 Return Rainfall | Factor Z2-10 | M10 Return Rainfall | Inflow Cu Metres | Outflow Cu Metres | Internal Water Level | Required Storage | Soakaway Status |
|----------------|--------------|--------------------|--------------|---------------------|------------------|-------------------|----------------------|------------------|-----------------|
| 5 minutes      | 0.360        | 6.80               | 1.190        | 8.10                | 0.521            | 0.013             | 34                   | 0.507            | -OK-            |
| 10 minutes     | 0.510        | 9.70               | 1.220        | 11.80               | 0.757            | 0.027             | 48                   | 0.730            | -OK-            |
| 15 minutes     | 0.620        | 11.80              | 1.220        | 14.40               | 0.920            | 0.040             | 58                   | 0.879            | -OK-            |
| 30 minutes     | 0.790        | 15.00              | 1.240        | 18.60               | 1.191            | 0.081             | 74                   | 1.110            | -OK-            |
| 1 hour         | 1.000        | 19.00              | 1.250        | 23.80               | 1.520            | 0.162             | 90                   | 1.358            | -OK-            |
| 2 hours        | 1.216        | 23.10              | 1.240        | 28.60               | 1.834            | 0.324             | 100                  | 1.510            | -OK-            |
| <b>3 hours</b> | <b>1.364</b> | <b>25.90</b>       | <b>1.240</b> | <b>32.10</b>        | <b>2.057</b>     | <b>0.485</b>      | <b>104</b>           | <b>1.571</b>     | <b>-OK-</b>     |
| 4 hours        | 1.495        | 28.40              | 1.220        | 34.70               | 2.218            | 0.647             | 104                  | 1.571            | -OK-            |
| 5 hours        | 1.593        | 30.30              | 1.220        | 36.90               | 2.363            | 0.809             | 103                  | 1.554            | -OK-            |
| 6 hours        | 1.670        | 31.70              | 1.220        | 38.70               | 2.477            | 0.971             | 100                  | 1.507            | -OK-            |
| 7 hours        | 1.745        | 33.20              | 1.203        | 39.90               | 2.553            | 1.132             | 94                   | 1.420            | -OK-            |
| 8 hours        | 1.805        | 34.30              | 1.203        | 41.30               | 2.640            | 1.294             | 89                   | 1.346            | -OK-            |
| 9 hours        | 1.863        | 35.40              | 1.203        | 42.60               | 2.725            | 1.456             | 84                   | 1.270            | -OK-            |
| 10 hours       | 1.915        | 36.40              | 1.203        | 43.80               | 2.801            | 1.618             | 79                   | 1.184            | -OK-            |
| 11 hours       | 1.960        | 37.20              | 1.203        | 44.80               | 2.867            | 1.779             | 72                   | 1.088            | -OK-            |
| 12 hours       | 2.005        | 38.10              | 1.190        | 45.30               | 2.901            | 1.941             | 64                   | 0.960            | -OK-            |
| 14 hours       | 2.085        | 39.60              | 1.190        | 47.10               | 3.017            | 2.265             | 50                   | 0.753            | -OK-            |
| 16 hours       | 2.155        | 40.90              | 1.190        | 48.70               | 3.118            | 2.588             | 35                   | 0.530            | -OK-            |
| 18 hours       | 2.225        | 42.30              | 1.190        | 50.30               | 3.220            | 2.912             | 20                   | 0.308            | -OK-            |
| 20 hours       | 2.295        | 43.60              | 1.180        | 51.50               | 3.293            | 3.235             | 4                    | 0.058            | -OK-            |
| 22 hours       | 2.360        | 44.80              | 1.180        | 52.90               | 3.386            | 3.559             | empty                | none             | -OK-            |
| 24 hours       | 2.430        | 46.20              | 1.180        | 54.50               | 3.487            | 3.882             | empty                | none             | -OK-            |

Effective Volume of the Geocellular Structure Soakaway Installation for an M10 Return Period is 2.44 cubic metres.

Maximum Available (Effective) Outflow Surface Area at M10 Return is 17.30 square metres referenced to the Invert of the lowest incoming pipe.

Maximum Allowable Pre-Flood Water Level for 10 Year Return (Lowest Pipe Invert Level for Building Control) is 162mm.

For a 10 Year Return Period the Critical Storm occurs at 3 hours.

With a Maximum Internal Structure Critical Water Level of 104mm.

Requiring a Maximum (Critical) Storage Capacity of 1.57 cubic metres.

The Outflow Surface Area for the Critical Storm Duration for the M10 Return is 16.78 square metres referenced to the Critical Water Level.

Half Drain Time for a 10 Year Return Critical Storm is 5.01 hours.

**100 Year Return Storm Includes a 40% Increase for Climate Change.**

| Storm Duration | Factor Z1-5 | M5 Return Rainfall | Factor Z2-100 | M100 Return Rainfall | Inflow Cu Metres | Outflow Cu Metres | Internal Water Level | Required Storage | Soakaway Status |
|----------------|-------------|--------------------|---------------|----------------------|------------------|-------------------|----------------------|------------------|-----------------|
| 5 minutes      | 0.360       | 6.80               | 1.790         | 17.10                | 1.097            | 0.015             | 72                   | 1.082            | -OK-            |
| 10 minutes     | 0.510       | 9.70               | 1.910         | 25.90                | 1.658            | 0.030             | 108                  | 1.629            | -OK-            |
| 15 minutes     | 0.620       | 11.80              | 1.910         | 31.50                | 2.016            | 0.044             | 131                  | 1.972            | -OK-            |
| 30 minutes     | 0.790       | 15.00              | 1.990         | 41.80                | 2.676            | 0.089             | 172                  | 2.588            | -OK-            |
| 1 hour         | 1.000       | 19.00              | 2.030         | 54.00                | 3.456            | 0.177             | 218                  | 3.279            | -OK-            |
| 2 hours        | 1.216       | 23.10              | 2.010         | 65.00                | 4.161            | 0.355             | 253                  | 3.806            | -OK-            |
| 3 hours        | 1.364       | 25.90              | 2.010         | 72.90                | 4.667            | 0.532             | 275                  | 4.135            | -OK-            |
| 4 hours        | 1.495       | 28.40              | 1.970         | 78.30                | 5.014            | 0.709             | 286                  | 4.305            | -OK-            |
| 5 hours        | 1.593       | 30.30              | 1.970         | 83.50                | 5.342            | 0.887             | 296                  | 4.456            | -OK-            |
| 6 hours        | 1.670       | 31.70              | 1.970         | 87.50                | 5.601            | 1.064             | 301                  | 4.537            | -OK-            |
| 7 hours        | 1.745       | 33.20              | 1.930         | 89.60                | 5.733            | 1.241             | 299                  | 4.492            | -OK-            |
| 8 hours        | 1.805       | 34.30              | 1.930         | 92.70                | 5.931            | 1.419             | 300                  | 4.512            | -OK-            |
| 9 hours        | 1.863       | 35.40              | 1.930         | 95.60                | 6.121            | 1.596             | 301                  | 4.525            | -OK-            |
| 10 hours       | 1.915       | 36.40              | 1.930         | 98.30                | 6.292            | 1.773             | 300                  | 4.519            | -OK-            |
| 11 hours       | 1.960       | 37.20              | 1.930         | 100.60               | 6.440            | 1.951             | 298                  | 4.489            | -OK-            |
| 12 hours       | 2.005       | 38.10              | 1.890         | 100.80               | 6.451            | 2.128             | 287                  | 4.323            | -OK-            |
| 14 hours       | 2.085       | 39.60              | 1.890         | 104.80               | 6.709            | 2.483             | 281                  | 4.226            | -OK-            |
| 16 hours       | 2.155       | 40.90              | 1.890         | 108.30               | 6.934            | 2.837             | 272                  | 4.097            | -OK-            |
| 18 hours       | 2.225       | 42.30              | 1.890         | 111.90               | 7.159            | 3.192             | 264                  | 3.967            | -OK-            |
| 20 hours       | 2.295       | 43.60              | 1.855         | 113.20               | 7.247            | 3.546             | 246                  | 3.701            | -OK-            |
| 22 hours       | 2.360       | 44.80              | 1.855         | 116.40               | 7.453            | 3.901             | 236                  | 3.552            | -OK-            |
| 24 hours       | 2.430       | 46.20              | 1.855         | 119.90               | 7.674            | 4.256             | 227                  | 3.418            | -OK-            |

Effective Volume of the Geocellular Structure Soakaway Installation for an M100 Return Period is 5.22 cubic metres.

Maximum Available (Effective) Outflow Surface Area at M100 Return is 18.96 square metres referenced to the top of the GeoCell Installation.

Maximum Allowable Pre-Flood Water Level for 100 Year Return (Soakaway Height) is 347mm.

For a 100 Year Return Period the Critical Storm occurs at 6 hours.

With a Maximum Internal Structure Critical Water Level of 301mm.

Requiring a Maximum (Critical) Storage Capacity of 4.54 cubic metres.

The Outflow Surface Area for the Critical Storm Duration for the M100 Return is 18.55 square metres referenced to the Critical Water Level.

Half Drain Time for a 100 Year Return Critical Storm is 13.07 hours.

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