

## **Supporting Statement for Stormwater Soakaway**

### **Land to the South of Sundown Littleheath Road Fontwell BN18 0SR**

#### Introduction

This statement is in support of an application to for a replacement design for the approved dwelling under Appeal Ref PP/C3810/W/19/3241407 (Original Application Reference AL/62/19/PL), on land to the South of Sundown, Littleheath Road Fontwell West Sussex BN18 0SR. This is an update on the information issued to discharge condition 3 under the above references.



#### **Aerial Image (Site within Red Line)**

The application site is a parcel of land which formed a portion of the garden to Sundown located at the semi rural junction of Littleheath Road and Dukes Road in the Parish of Aldingbourne. Access to the site is gained directly off Littleheath Road on the Western Boundary, South West corner, though an existing vehicular gate access point.

The site has two distinct levels, an upper level for the front portion (West) of the site and a lower section to the rear (East) which has a number of tall self-seeded trees and a steep bushed embankment.

The lower level is to accommodate the surface water drainage soakaway (Refer to drawing 17-1197- DR 501) issued to support the application to discharge the condition. (Westwards View)



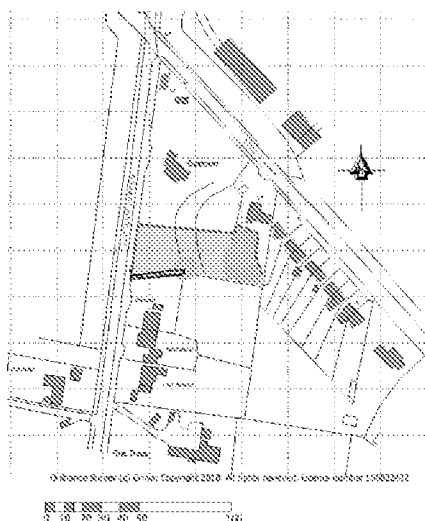
View Eastwards



View Westwards

The site is also confirmed to be:

- Within a Flood Zone 1 with no specific flood issues



**Site Location Plan** (Application Site noted with red boundary and shading)

A programme of winter ground water table monitoring has been undertaken from 25 November 2019 to 11 April 2020. Two locations were chosen, and these are plotted on drawing 17-1197-DR 501, one on the upper level and one in the lower level with the depth of the access pipe being 2.4m below current site ground level. A series of 9 checks were carried out to check the position of any ground water. The result of the monitoring was that no water was encountered within the test pipe holes.

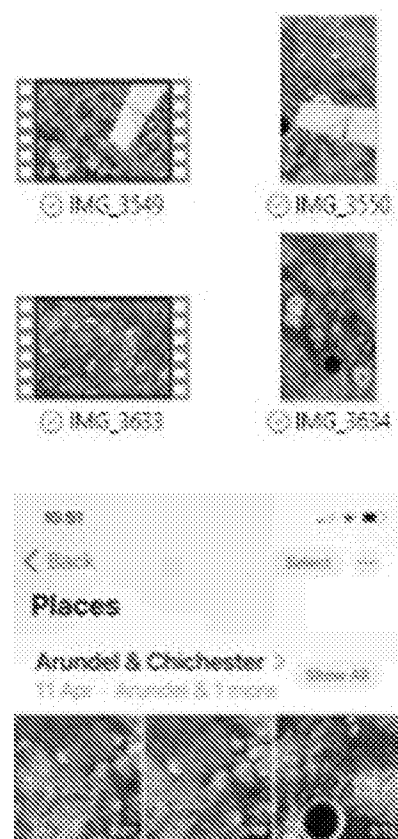
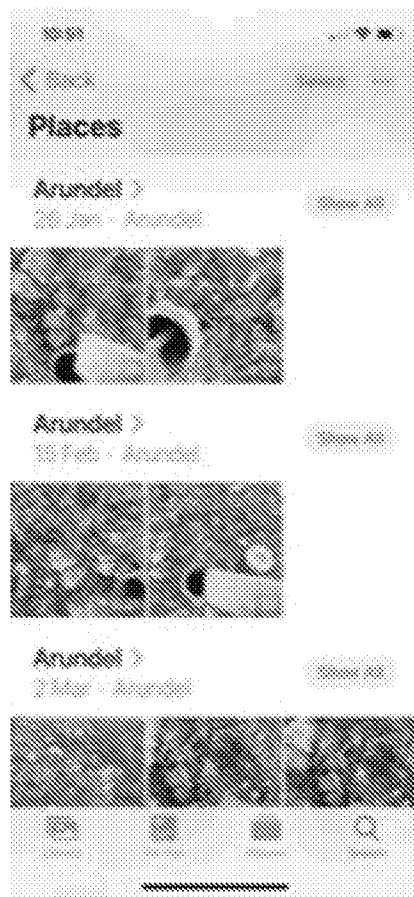
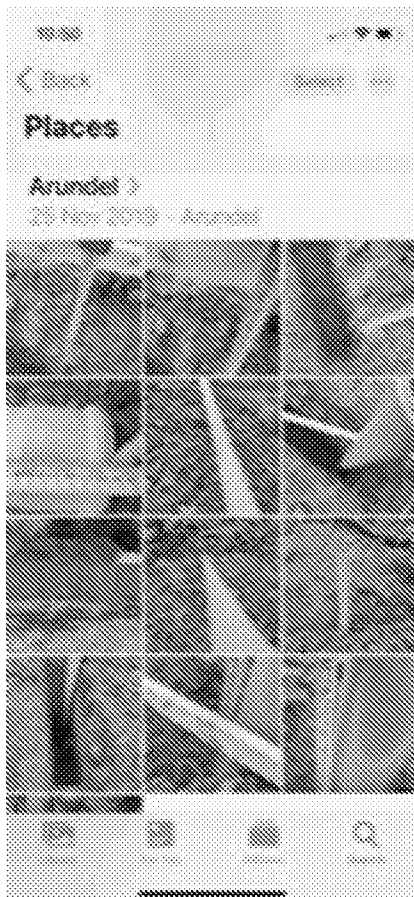
Surface Water Drainage Proposal Checklist

| Ground Investigation Results                                                                 |                                                                                                                                   |                                                                 |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Results Required                                                                             | Results Provided?                                                                                                                 |                                                                 |
| Winter groundwater monitoring results <small>(Please refer to guidance note 1 below)</small> | Yes                                                                                                                               | <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| Period of winter groundwater monitoring <small>(Week 1)</small>                              | From                                                                                                                              | 28/11/2020                                                      |
|                                                                                              | To                                                                                                                                | 13/04/2021                                                      |
| Maximum recorded groundwater level                                                           | None Encountered mAOB                                                                                                             |                                                                 |
|                                                                                              | None Encountered mBSL                                                                                                             |                                                                 |
| Winter infiltration test results <small>(Week 1)</small>                                     | Yes                                                                                                                               | <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| Date of winter infiltration testing                                                          | 29-11-2020<br>05-12-2020<br>27-12-2020<br>09-01-2021<br>05-02-2021<br>13-02-2021<br>09-03-2021<br>04-04-2021<br>11-04-2021-Week 2 |                                                                 |
| Details of the location and depth of the infiltration testing <small>(Week 1)</small>        | Yes                                                                                                                               | <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| Minimum infiltration rate <small>(Week 1)</small>                                            | 6.02 x 10 <sup>-6</sup> m/s                                                                                                       |                                                                 |



**Winter Ground Water Dates and Image of installation of monitoring pipe (1 of 2 pipes installed)**  
(See drawing 17-1179-PL 401A for location)

A series of videos and mobile phone images were captured and some are noted below



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The results are also backed up by historic BGS data logs for the area which note that the boreholes taken in 1986 resulted in a dry borehole to a depth of 9.0m. You can see the AOD depth is relative to the site level (See drawing 17-1197-PL 401) AOD 37.10 at the main access gate location.

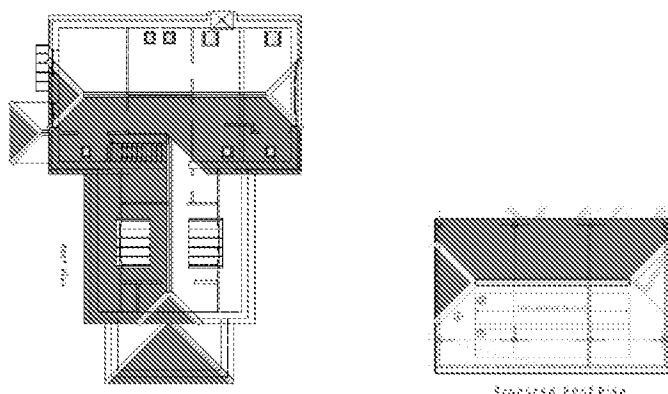
|                    |  |                                                                                                                              |  |                        |  |                                                                                                        |  |
|--------------------|--|------------------------------------------------------------------------------------------------------------------------------|--|------------------------|--|--------------------------------------------------------------------------------------------------------|--|
| Contract Name      |  | FONMELL                                                                                                                      |  | Borehole No.           |  | SU 90 NW 79                                                                                            |  |
| Method of boring   |  | Light cable percussion                                                                                                       |  | Ground level           |  | 37.03m O.D.                                                                                            |  |
| Diameter           |  | 200mm                                                                                                                        |  | Start                  |  | 2.9.86.                                                                                                |  |
| Co-ordinates       |  | 494910E 107654N                                                                                                              |  | Finish                 |  | 2.9.86.                                                                                                |  |
| Date               |  | 2/9                                                                                                                          |  | Time                   |  | 14.00                                                                                                  |  |
| Depth (m)          |  | 0.20                                                                                                                         |  | Reduced level (m O.D.) |  | 36.81                                                                                                  |  |
| Thickness (m)      |  | 0.20                                                                                                                         |  | Description of Strata  |  | Moist Ground (Siltsandstone material)                                                                  |  |
| 3.80               |  |                                                                                                                              |  |                        |  | Brown clayey slightly sandy coarse to fine subangular GRAVEL.                                          |  |
| 4.00               |  | 33.01                                                                                                                        |  |                        |  |                                                                                                        |  |
| 4.80               |  | 32.21                                                                                                                        |  |                        |  | Coarse to fine subangular GRAVEL in a matrix of silty sandy clay.                                      |  |
| 6.10               |  | 30.91                                                                                                                        |  |                        |  | Brown slightly clayey SAND and coarse to fine subangular GRAVEL.                                       |  |
| 7.40               |  | 29.61                                                                                                                        |  |                        |  | Fine brown silty CLAY with occasional flints.                                                          |  |
| 9.00               |  | 28.01                                                                                                                        |  |                        |  | CHALK fragments in a matrix of soft consolidated chalk, becomes rubbly at depth, some thin clay seams. |  |
| Bottom of Borehole |  |                                                                                                                              |  |                        |  |                                                                                                        |  |
| Notes              |  | Spoking out - 1 1/2 hours<br>Chiselling hard strata from 0.20 to 4.0m - 2 hours<br>Borehole remained dry throughout drilling |  |                        |  |                                                                                                        |  |
| Torrsearch Limited |  | Report No.                                                                                                                   |  | S.36/696               |  | Appendix 1 Sheet 2                                                                                     |  |

|                                                                                                                                       |                        |                          |                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------|-------------------------------------------------------------------------------------------------------|
| Contract Name                                                                                                                         |                        | Borehole No.             |                                                                                                       |
| FONMELL                                                                                                                               |                        | Sheet 1 of 1             |                                                                                                       |
| Method of boring Light cable percussion                                                                                               |                        | Ground level 37.03m O.D. |                                                                                                       |
| Diameter 200mm                                                                                                                        |                        | Start 3.9.86.            |                                                                                                       |
| Co-ordinates 494512E 107660N                                                                                                          |                        | Finish 2.9.86.           |                                                                                                       |
| Depth (m)                                                                                                                             | Reduced level (m O.D.) | Thickness (m)            | Description of Strata                                                                                 |
| 0.20                                                                                                                                  | 36.89                  | 0.20                     | Moist ground (siltsandstone material)                                                                 |
| 3.80                                                                                                                                  |                        |                          | Medium dense brown slightly clayey sandy coarse to fine subangular flint GRAVEL                       |
| 4.00                                                                                                                                  | 33.09                  |                          | Coarse to fine angular FLINTS in a matrix of brown silty clay                                         |
| 4.80                                                                                                                                  | 32.29                  |                          | Brown slightly clayey SAND with occasional flints                                                     |
| 6.10                                                                                                                                  | 30.99                  |                          | Firm brown silty sandy CLAY with bands of sand                                                        |
| 7.25                                                                                                                                  | 29.84                  |                          | CHALK fragments in a matrix of soft consolidated chalk, becomes rubbly at depth, some thin clay seams |
| 8.00                                                                                                                                  |                        | 1.75                     | Bottom of Borehole                                                                                    |
| Notes<br>Reaming out - 1 1/2 hours<br>Chiselling hard strata from 0.20 to 4.0m - 2 hours<br>Borehole remained dry throughout drilling |                        |                          |                                                                                                       |
| Torrsearch Limited                                                                                                                    |                        | Report No. S.36/696      | Appendix 1 Sheet 1                                                                                    |

| Contract Name                                                                           |                        | Borehole No.              |                                                                                |                    |
|-----------------------------------------------------------------------------------------|------------------------|---------------------------|--------------------------------------------------------------------------------|--------------------|
| FONMELL                                                                                 |                        | SU 90 NW 78               |                                                                                |                    |
| Method of boring: Light cable percussion                                                |                        | Ground level: 36.52m O.D. |                                                                                |                    |
| Diameter: 200mm                                                                         |                        | Start: 1.9.86.            |                                                                                |                    |
| Co-ordinates: 494510E 107659N                                                           |                        | Finish: 1.9.86.           |                                                                                |                    |
| Depth (m)                                                                               | Reduced level (m O.D.) | Thickness (m)             | Description of Strata                                                          | Legend             |
| 0.20                                                                                    | 36.73                  | 0.20                      | Moist ground (siltsandstone material)                                          |                    |
| 5.50                                                                                    |                        |                           | Brown clayey SAND with coarse to fine subangular fine gravel                   |                    |
| 5.70                                                                                    | 31.23                  |                           |                                                                                |                    |
| 2.10                                                                                    |                        |                           | Brown SAND with bands of brown silty clay and traces of gravel and flints      |                    |
| 7.80                                                                                    | 29.13                  |                           |                                                                                |                    |
| 8.00                                                                                    | 28.93                  | 0.20                      | Fine brown CLAY with bands of sand                                             |                    |
| 8.40                                                                                    | 28.53                  | 0.40                      | Large FLINTS                                                                   |                    |
| 1.60                                                                                    |                        |                           | Hard CHALK fragments in a matrix of soft consolidated chalk, occasional flints |                    |
| 10.00                                                                                   | 26.93                  |                           |                                                                                |                    |
| Notes                                                                                   |                        |                           |                                                                                | Bottom of Borehole |
| Chiselling from 0.20 to 5.0m - 2 1/2 hours<br>Borehole remained dry throughout drilling |                        |                           |                                                                                |                    |
| Torrsearch Limited                                                                      |                        | Report No. S.36/696       | Appendix 1                                                                     | Sheet              |

| Item   | Roof Slope Area (m <sup>2</sup> ) | Urban Creep (10%) (m <sup>2</sup> ) | Total (m <sup>2</sup> ) |
|--------|-----------------------------------|-------------------------------------|-------------------------|
| House  | 234.5                             | 23.5                                | 258                     |
| Garage | 88                                | 9                                   | 97                      |
| Total  | 322.5                             | 26                                  | 355                     |

The above table tabulates the impermeable roof area and includes 10% Urban Creep and the area is the slope area of the roof. The figure of 355m<sup>2</sup> has been used in the soakaway BRE365 spreadsheet to calculate the soakaway required using Wavin Aquacells (see separate sheet). The Wavin Eco AquaCell has been used due to the remote location at the end of the garden (Refer to manufacturers details).

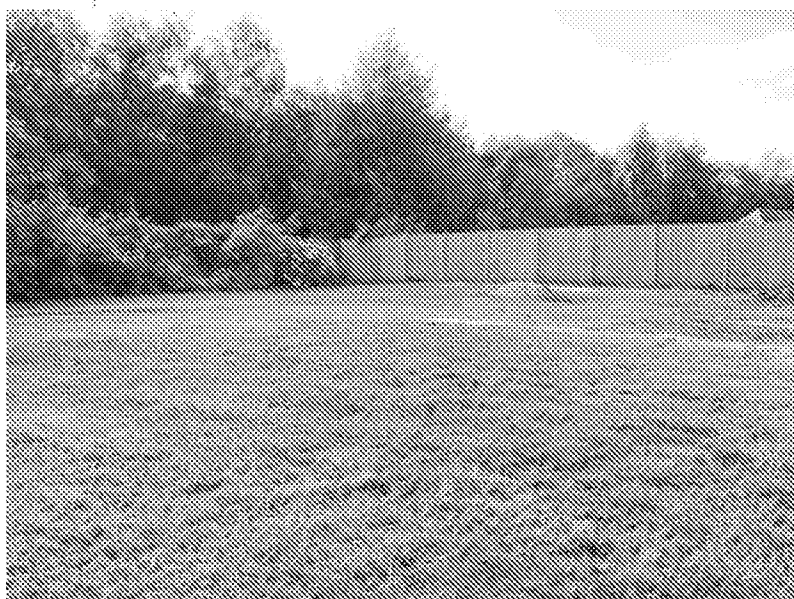


**Proposed Roof Plan for Dwelling and detached Garage**

(Refer to application drawings for full details)

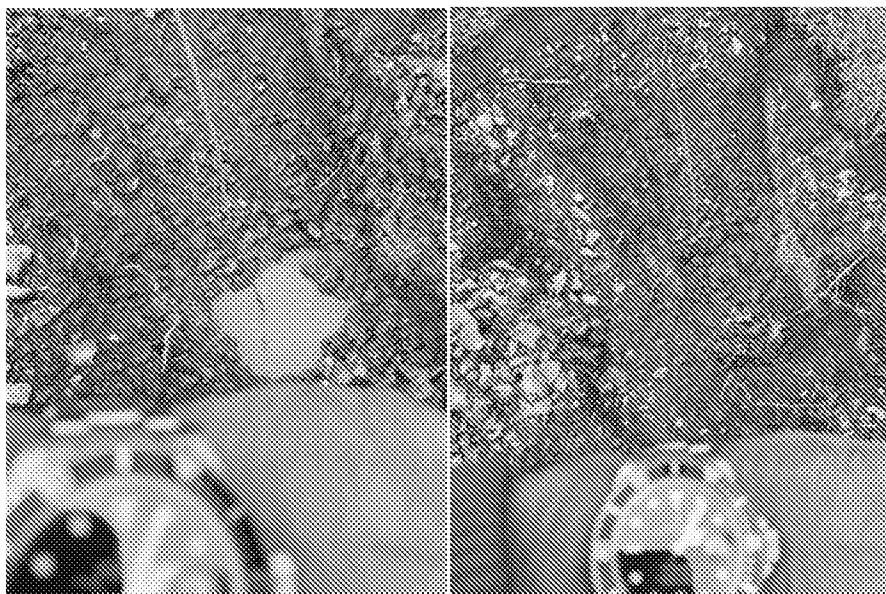
It is also proposed to install a GRAF rainwater harvester (or equal approved) to store and reuse some of the rainfall water for garden uses. The final harvester is yet to be confirmed, A provisional size of 6500 Litres has been used based on the data inputted into the Graf online sizing calculator (Roof areas indicated above). Prior to the roof rain water harvester a manhole with a silt trap is positioned and a second silt trap located at the point of entry into the soakaway. It's position will stop the harvester from becoming silted, thus the overflow from the harvester and the second ensure the life of the soakaway is maximised. This will ensure the minimum amount of silt is deposited into the aquacell soakaway. The volume of the harvester has not been included within the volume of the soakaway, thus allowing for a degree of attenuation. This also assists in reducing the amount of surface water discharging back to the soil and assists in reducing the amount of potable water used by each occupant.

The drive is to be of a migratory gravel (thus a permeable surface), therefore no allowance for this has been included in the soakaway design. Any paths will discharge into the surrounding soil as will the deck to the rear of the dwelling



View North West of main building area (Former Sundown garden area) Position of house and garage)

Initially a 300 x 300 soakaway test was undertaken to estimate the size of the storm water soakaway and also to aid in the provisional design of the foul drainage field. Thus ensuring both can be accommodated on site and to also gauge the overall size of the storm soakaway, which then provides guidance on the size of the BRE DG365 full infiltration test



Images of initial test taken on site within a 300 x 300 test hole at 800mm depth in

The average time taken to empty hole was approximately 3 minutes (180 seconds). Filtration was videoed and the water can be seen dispersing very quickly. Following a submission to ADC to discharge condition 3 of the previous approved application, the Drainage Engineer for ADC commented that this was not an acceptable form of test and that a full BRE DG365 test must be carried out and the application was refused.



On the 28<sup>th</sup> April 2021 a full BRE DG365 test was undertaken in the vicinity of the proposed soakaway (see *drawing 17-1179-PL401A*) and the results of this along with the design are presented in a separate document. The soil infiltration rate (as tested) was  $6.99 \times 10^{-5}$  m/s, applying a FOS of 2 provides a design rate of  $3.495 \times 10^{-5}$  m/s which is used in conjunction with a 10% urban growth, a 1:100 year events and a 40% climate change and a rainfall ratio (r) of 0.35. The climate change 40% basically increases the r ratio and rainfall amount. The sized soakaway is illustrated on drawings 17-1179-PL4014A with details DR501A.

*Arun District Council Drainage Engineers has requested that a factor of safety (FOS) of 2 is also applied to any infiltration rate used to design the storm soakaway under the BRE DG365.*

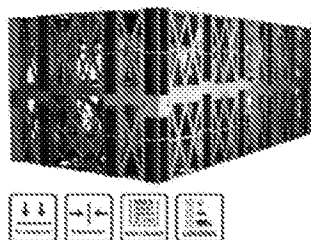
**Soakaway Test excavation hole**

#### AquaCell Eco

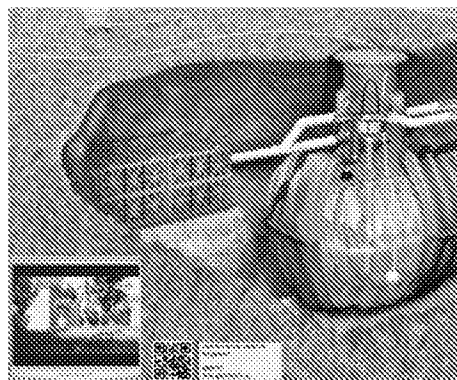
AquaCell Eco is manufactured from specially reinforced, recycled concrete and has been specifically designed for use in gardens, open or difficult areas, yards, sports grounds, gardens and other landscaped areas. It is not suitable for footpaths, roads or heavy traffic areas.

It is suitable for installation to a maximum depth of 1.0m, with a maximum cover depth of 0.75m (max. 1.0m).

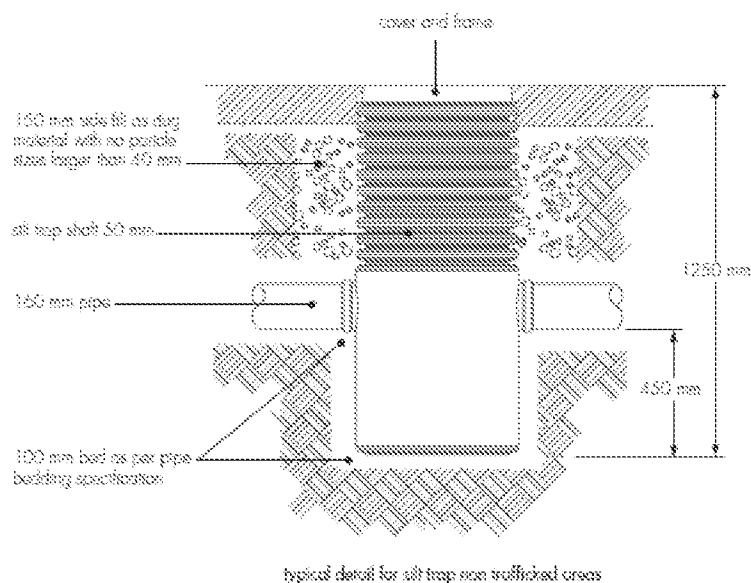
Approved by the British Board of Agrément under Certificate No. 110/010. AquaCell Eco has a proven vertical loading of 11.0 tonnes/m<sup>2</sup> and a lateral loading of 1.0 tonnes/m<sup>2</sup>.



**Soakaway Aquacells by Wavin or equivalent**



**GRAF Rain Harvester tank (6500 litre tank)**



### **Silt trap before harvester and soakaway by Wavin or equivalent**

(Dimensions may vary depending on levels and manufacturer)

Due to the trees on site a tree impact assessment has been undertaken with trial trenches excavated under the supervision of a qualified arboricultural consultant (Beechdown) to ensure that the drainage trench roots and the soakaway and field drain do not impact on the trees RPA's (Root protection Areas) and that mitigation is in place to protect the trees during the construction phase.

### **Conclusion**

The presented documents (*this statement, drawings and calculations*) provide evidence that Policy ECC SP1(g) of Section 13 Design of the Adopted Arun Local Plan 2011 – 2031 (July 2018) has been fully considered and complied with, to ensure that surface water is safely dealt with and will not cause issues for adjoining properties and provides for future climate change and additional growth at the property, along with a SuDs sustainable reuse of some of the rainfall water from the buildings roof elements.



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## APPENDIX A

### Storm Soakaway Design



|                                   |             |              |
|-----------------------------------|-------------|--------------|
| Project: LAND TO SOUTH OF SUNDOWN | Project No. | Sheet No. 01 |
| Item STORM SOAKAWAY               |             |              |
| Prepared <del>HA</del>            | Date MAY 21 | Checked      |
|                                   | Revision    | Date         |

## CALCULATIONS

BRE DG-365 Rev 2016

### SOIL INFILTRATION

TEST HOLE SIZE  $W = 425\text{mm}$   $L = 1200\text{mm}$   $D_p 1350\text{mm}$   
 WATER DEPTH  $700\text{mm}$  (IL TO FORMATION)

$$0.75d = 700 \times 0.75 = 525\text{mm}$$

$$0.25d = 700 \times 0.25 = 175\text{mm}$$

$$V_{p75-25} = 0.425 \times 1.2 (0.525 - 0.175) = 0.1785\text{m}^3$$

$$A_{s50} = 2(1.2 \times 0.35) + 2(0.425 \times 0.35) + (0.425 \times 1.2) = 1.6475\text{m}^2$$

### TEST FILTRATION

3 TESTS FOLLOWING PRESENT

| TEST | 0.75d<br>T(sec) | 0.25d<br>T(sec) | T<br>(sec) |
|------|-----------------|-----------------|------------|
| 1    | 94              | 1259            | 1165       |
| 2    | 147             | 1293            | 1146       |
| 3    | 265             | 2599            | 2334       |
|      |                 |                 | 4645 SEC   |

$$\therefore \text{Av} = \frac{4645}{3} = 1548\text{SEC}$$

### SOIL INFILTRATION (f)

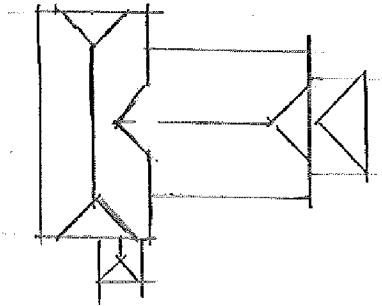
$$f = \frac{0.1785}{1.6475 \times 1548} = 0.0000699 \quad (6.99 \times 10^{-5} \text{ M/SEC})$$

$$\therefore f = \text{APPLY FDS OF 2 (REQUESTED BY ADC)} = 3.495 \times 10^{-5} \text{ M/SEC}$$

|                                   |             |              |
|-----------------------------------|-------------|--------------|
| Project: LAND TO SOUTH OF SUNDOWN | Project No. | Sheet No. 02 |
| Item STORM SOAKAWAY               |             |              |
| Prepared PA                       | Date MAY 21 | Checked      |
|                                   | Revision    | Date         |

CALCULATIONS

DWELLING ROOF AREA ROOF PITCH = 40°



ROOF AREA (SLOPE LENGTH\*)

$$= (12.35 \times 5.8)^* + (7.5 \times 5.4)^* + (3.5 \times 6.5) + (1.9 \times 1.9)^* \div 2 = \frac{234.5 \text{ M}^2}{(H)}$$

GARAGE ROOF AREA ROOF PITCH = 40°



ROOF AREA (SLOPE LENGTH\*)

$$= 10.4 \times 3.3^* + 10.4 \times 5.1^* = \frac{88 \text{ M}^2}{(G)}$$

$$\Sigma \text{ AREA} = H + G = 322.5 \text{ M}^2$$

$$\text{ALLOW 10\% URBAN CREEP} = 322.50 \times 1.1 = \underline{355 \text{ M}^2} \text{ DESIGN AREA}$$

|          |                          |             |        |           |      |
|----------|--------------------------|-------------|--------|-----------|------|
| Project: | LAND TO SOUTH OF SUNDOWN | Project No. |        | Sheet No. | 03   |
| Item     | STORM SOAKAWAY           |             |        |           |      |
| Prepared | JH                       | Date        | MAY 21 | Checked   |      |
|          |                          |             |        | Revision  |      |
|          |                          |             |        |           | Date |

## CALCULATIONS

### DESIGN DATA

IMPERMEABLE AREA  $355m^2$  (INCL 10% URBAN GROWTH)

INFILTRATION RATE  $3.495 \times 10^{-5} m/sec$  (INCL F.O.S. 2)

$P = 0.35$  (ADC REQUEST)

CLIMATE CHANGE 40% (INCL IN RAINFALLS MM)

DESIGN BASED ON 1:100yr (M100-D) [BASELINE M10-D]

SOAKAWAY FILL - AQUACELL BY KAVIN (DD EQUAL APPROVED)

VOID RATIO 95%.

CRATES  $1.0 \times 0.5 \times 0.4 Dp$  EACH.