



## **SURFACE WATER DRAINAGE CALCULATIONS**

for

**Proposed Residential Development  
at  
Villa Maria  
Campbell Road  
Bognor Regis**

**Client:**  
SCG Properties Ltd

**Architect:**  
Vivid Design Studio  
The Barn  
Calcot Mount Business Park  
Calcot Lane  
Curdridge  
Southampton  
Hampshire SO32 2BN

| Issue       |               | A | B |
|-------------|---------------|---|---|
| Issued By   | Daniel Waddup |   |   |
| Date        | June 2017     |   |   |
| Purpose     | Information   |   |   |
| Approved By |               |   |   |

**Project No: VIV 024**

The Town House, St.George's Square, Bishops Walkham, Southampton, Hampshire, SO32 1AF



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## **1.0     Introduction**

The following calculations have been used to size the soakaway required for the proposed scheme.

It is assumed that building roofs would be drained to a local soakaway constructed using a modular crate system. Parking and access would be constructed in permeable paving.

The following calculations are provided in accordance with the site ground conditions and SuDS criteria.

## **2.0     Surface Water Drainage Design**

Ground investigations were carried out on the site on 7<sup>th</sup> February 2017.

Infiltration testing during these investigations has recorded an infiltration rate of  $1.8 \times 10^{-5}$  m/s which will be adopted for the soakaway design.

The soakaway will be designed to contain surface water runoff for the 1 in 100 year storm + 40% climate change allowance. In accordance with the SuDS Manual Ciria 753, a factor of 1.5 will be applied.

## **3.0     Proposed Surface Water Drainage**

Due to the constraints of the site layout it is not possible to locate the required 8.5m x 2.0m x 0.8m deep (below incoming invert) soakaway the necessary 5m from adjacent structures and a reasonable distance from the highway.

It is proposed that, subject to authorisation by the relevant authorities, surface water run-off from roofs of the development will be discharged into the local sewer in Campbell Road via the existing connection.

## **APPENDICES**

- A.** Site Plan
- B.** Drainage Calculations

## **APPENDIX A**

### **Site Plan**



PROPOSED SITE PLAN  
(1:100)

Notes

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DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCING WORK AND ANY DISCREPANCIES SHALL BE REPORTED TO THE DESIGNER. FIGURED DIMENSIONS MUST BE TAKEN IN PREFERENCE TO SCALED DIMENSIONS.

| Rev:- | Description:- | Date:- | Chkd by:- |
|-------|---------------|--------|-----------|
|       |               |        |           |

Schedule of Areas

Total Site Area  
= 760sqm/0.08hectares/0.2acres

Existing Ground Floor NFA  
= 262sqm/2820sqft  
Existing First Floor NFA  
= 185sqm/1991sqft  
Existing Second Floor NFA  
= 137sqm/1475sqft

Total Existing NFA = 584sqm/6286sqft

Demolition NFA = 48sqm/517sqft

Proposed Ground Floor NFA  
= 366sqm/3940sqft  
Proposed First Floor NFA  
= 212sqm/2256sqft  
Proposed Second Floor NFA  
= 149sqm/1604sqft

Total Proposed NFA = 727sqm/7825sqft



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Project:-

Proposed Conversion  
Villa Maria  
Campbell Road  
Bognor Regis

Title:-

Proposed Site Plan

Client:-

SCG Properties Ltd

Scale:-

1:100 (@A1)

Drawn By:-

PJD

Checked By:-

Date:-

27/09/16

Date:-

Job.No:-

160035

Drg.No:-

03

Rev:-

## **APPENDIX B**

### **Drainage Calculations**



# ARCH ASSOCIATES

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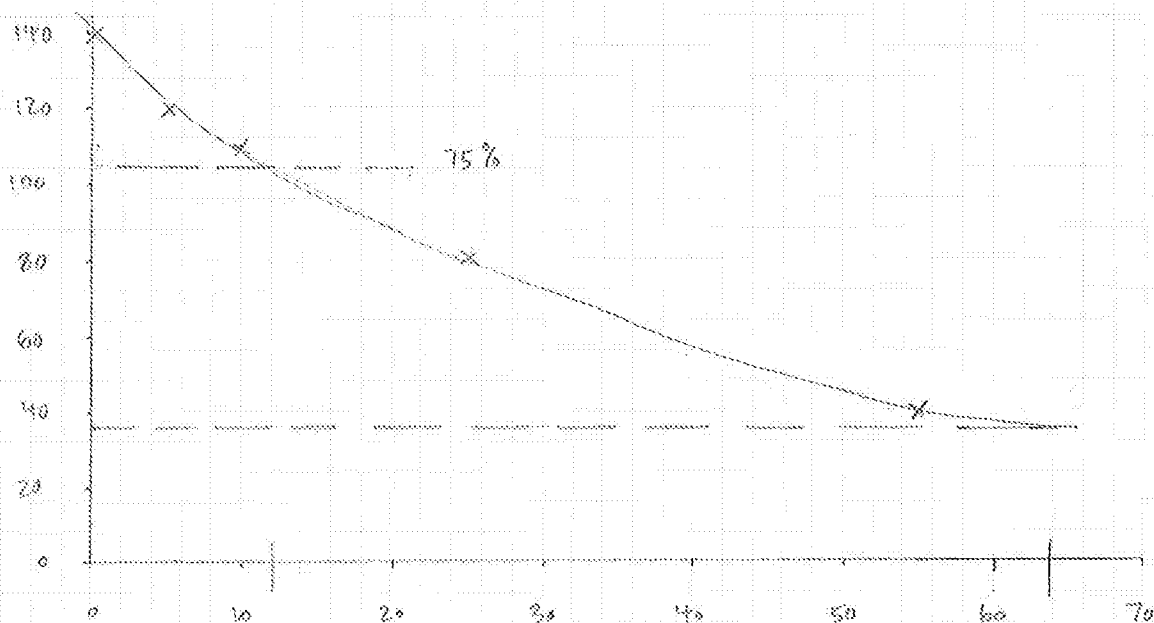
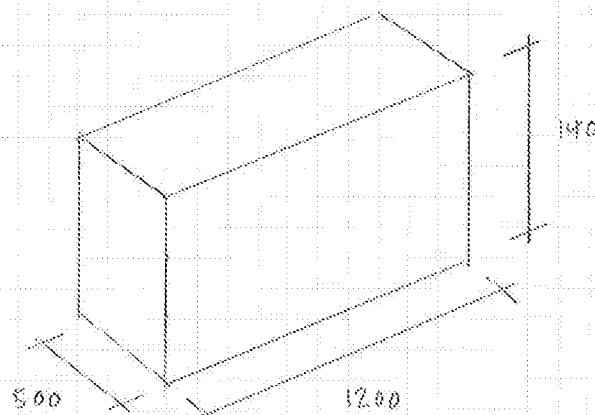
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## CALCULATIONS

|                          |                   |                         |
|--------------------------|-------------------|-------------------------|
| Job Title<br>VILLA MARIA | Job No.<br>V14024 | Sht. No.<br>001         |
| Element<br>SOAKAWAY TEST | Prepared<br>JW    | Date<br>Checked<br>Date |

### TRIAL HOLE RESULTS.

| DEPTH | TIME (MINS) |
|-------|-------------|
| 140   | 0           |
| 120   | 5           |
| 110   | 10          |
| 80    | 25          |
| 40    | 55          |
| 0     | 65          |



$$\text{EFFECTIVE VOL} = 1.2 \times 0.5 \times 0.07 = 0.042 \text{ m}^3$$

$$\text{INTERNAL SURFACE AREA} = 1.2 \times 0.5 + 0.07(1.2 + 0.5) = 0.72 \text{ m}^2$$

$$\text{TIME 75\% TO 25\% EFFECTIVE DEPTH} = 55 \text{ mins} = 3180 \text{ s}$$

$$\text{INFILTRATION RATE, } f = 0.042 / (0.72 \times 3180) = 1.6 \times 10^{-5} \text{ m/s}$$

$$\text{WITH 1.5 F.O.S, } f = \underline{\underline{1.2 \times 10^{-5} \text{ m/s}}}$$



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## CALCULATIONS

|                          |                   |                |      |
|--------------------------|-------------------|----------------|------|
| Job Title<br>VILLA MARIA | Job No.<br>V13024 | ShL No.<br>C02 |      |
| Element<br>SOAKAWAY SIZE | Prepared<br>DLW   | Checked        | Date |

SIZE SOAKAWAY FOR NEW BUILDINGS ONLY, NEW PAVING ASSUMED TO BE PERMEABLE

$$\text{IMPERMEABLE AREA} = (27 \times 5) + (10 \times 3) = 165 \text{ m}^2$$

SEE TEDDS OUTPUT, FOLLOWING SHEETS.

$$\text{PER SOAKAWAY} = 0.15 \text{ m L} \times 2.0 \text{ m W} \times 0.8 \text{ m D (BELOW INCOMING INVERT, 500 mm BELOW GRADE)}$$

|                                                                                                                                                                                         |                                      |                          |            |              |                              |               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------------|------------|--------------|------------------------------|---------------|
| <br><b>Tekla</b><br>Tedds<br>Rushby Brewster<br>The Town House<br>St George's Square<br>Bishops Waltham | Project<br>Villa Maria, Bognor Regis |                          |            |              | Job no.<br>VIV024            |               |
|                                                                                                                                                                                         | Calcs for<br>Soakaway                |                          |            |              | Start page no./Revision<br>1 |               |
|                                                                                                                                                                                         | Calcs by<br>DW                       | Calcs date<br>16/06/2017 | Checked by | Checked date | Approved by                  | Approved date |

## SOAKAWAY DESIGN

### In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.02

#### Design rainfall intensity

Location of catchment area Brighton  
 Impermeable area drained to the system  $A = 165.0 \text{ m}^2$   
 Return period Period = 100 yr  
 Ratio 60 min to 2 day rainfall of 5 yr return period  $r = 0.350$   
 5-year return period rainfall of 60 minutes duration  $M5_{60\text{min}} = 20.0 \text{ mm}$   
 Increase of rainfall intensity due to global warming  $p_{\text{climate}} = 40 \%$

#### Soakaway / infiltration trench details

Soakaway type Rectangular  
 Minimum depth of pit (below incoming invert)  $d = 800 \text{ mm}$   
 Width of pit  $w = 2000 \text{ mm}$   
 Length of pit  $l = 8207 \text{ mm}$   
 Percentage free volume  $V_{\text{free}} = 95 \%$   
 Soil infiltration rate  $f = 12.0 \times 10^{-6} \text{ m/s}$   
 Wetted area of pit 50% full  $a_{s50} = l \times d + w \times d = 8165868 \text{ mm}^2$

#### Table equations

Inflow  $I = M100 \times A$   
 Outflow  $O = a_{s50} \times f \times D$   
 Storage  $S = I - O$

| Duration, D (min) | Growth factor Z1 | M5 rainfalls (mm) | Growth factor Z2 | 100 year rainfall, M100 (mm) | Inflow (m³) | Outflow (m³) | Storage required (m³) |
|-------------------|------------------|-------------------|------------------|------------------------------|-------------|--------------|-----------------------|
| 5                 | 0.36             | 10.0              | 1.91             | 19.1                         | 3.15        | 0.03         | 3.12                  |
| 10                | 0.51             | 14.2              | 1.98             | 28.0                         | 4.63        | 0.06         | 4.57                  |
| 15                | 0.62             | 17.3              | 2.01             | 34.7                         | 5.72        | 0.09         | 5.63                  |
| 30                | 0.79             | 22.0              | 2.02             | 44.5                         | 7.35        | 0.18         | 7.17                  |
| 60                | 1.00             | 28.0              | 1.99             | 55.6                         | 9.18        | 0.35         | 8.82                  |
| 120               | 1.22             | 34.3              | 1.94             | 66.3                         | 10.94       | 0.71         | 10.24                 |
| 240               | 1.50             | 41.9              | 1.87             | 78.6                         | 12.96       | 1.41         | 11.55                 |
| 360               | 1.69             | 47.3              | 1.83             | 86.7                         | 14.30       | 2.12         | 12.18                 |
| 600               | 1.95             | 54.5              | 1.78             | 97.0                         | 16.00       | 3.53         | 12.48                 |
| 1440              | 2.48             | 69.4              | 1.68             | 116.5                        | 19.22       | 8.47         | 10.76                 |

Required storage volume  $S_{\text{req}} = 12.48 \text{ m}^3$

Soakaway storage volume  $S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 12.48 \text{ m}^3$

**PASS - Soakaway storage volume**

Time for emptying soakaway to half volume  $t_{s50} = S_{\text{req}} \times 0.5 / (a_{s50} \times f) = 17\text{hr } 41\text{min } 20\text{s}$

**PASS - Soakaway discharge time less than or equal to 24 hours**