

PANELAGH ROAD, HANAT

SURFACE WATER

|               |                   |            |
|---------------|-------------------|------------|
| Date<br>11/14 | Job No<br>16/2240 | Page<br>01 |
| Office<br>EN  | Engineer<br>BH    | Checked    |

Reference: Hdr Drawing No.

14-2240-902 CI FOR

Along at foot of HALDSTAND.

HALDSTAND ALIAS

HALDSTAND ALIAS ADJACENT

to PLOTS LAID TO FAN TO

DISCHARGE SURFACE WATER

TO ACRES ROAD FOLLOWS

PAVED WHICH DISCHARGES TO

DETENTION BASIN

Foot Alias.

SURFACE WATER RUN OFF

From PLOTS SHOWN ON

HDR DRAWING NO. 14-2240-902 CI

ATTACHED DISCHARGES TO

SOAKAWAYS:-

SOAKAWAYS DESIGNED TO

BRE DIRECT 365

1 IN 100 YEAR STORM

30% CLIMATE CHANGE ALLOWANCE

SOIL INFILTRATION RATE = 0.0000137 m/s

PANVELAACH ROAD, HAWAT

SULLAGE WATER

Date  
1/10

Job No  
16/240

Page  
02

Office  
GN

Engineer  
BTH

Checked

Area 1 (Plot 10)

Foot Area =  $90.85 \text{ m}^2$

30% CLIMATE CHANGE

$90.85 \times 1.3 = 118.1 \text{ m}^2$

SOACANAY SIZE

$8.0 \text{ m} \times 2.5 \text{ m} \times 0.0 \text{ m}$  below in wet

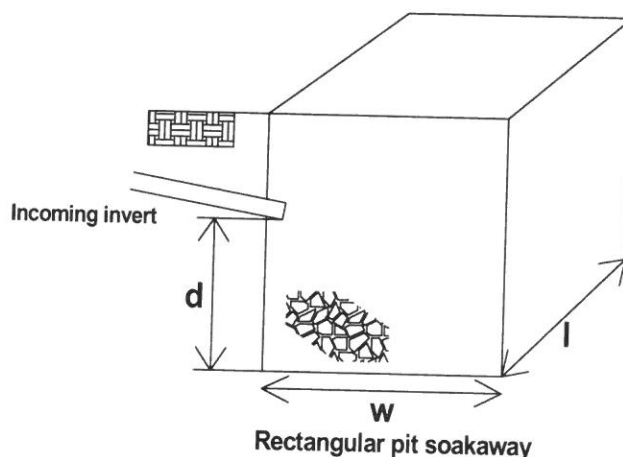
from concrete put out

adequate

|                                                                                      |                                           |                    |          |      |                      |      |
|--------------------------------------------------------------------------------------|-------------------------------------------|--------------------|----------|------|----------------------|------|
| <b>CSC TEDDS</b><br>Hamill Davies Limited<br>Ivydale<br>Lower Chase Road<br>Swanmore | Project<br>Ranelagh Road, Havant          |                    |          |      | Job Ref.<br>14-2260  |      |
|                                                                                      | Section<br>Independent Soakaways - Area 1 |                    |          |      | Sheet no./rev.<br>03 |      |
|                                                                                      | Calc. by<br>B.H.                          | Date<br>04/11/2016 | Chk'd by | Date | App'd by             | Date |

# SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



## Rectangular Pit Design

|                                                                                        |                         |                        |                             |
|----------------------------------------------------------------------------------------|-------------------------|------------------------|-----------------------------|
| Pit length                                                                             | $l = 8000 \text{ mm}$ ✓ | Pit width              | $w = 2500 \text{ mm}$ ✓     |
| Pit depth below invert                                                                 | $d = 800 \text{ mm}$ ✓  | Free volume            | $V_{\text{free}} = 95.0 \%$ |
| Location of soakaway                                                                   | England and Wales       | Return period          | 100 years                   |
| Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1) |                         | Soil infiltration rate | $r = 0.35$                  |
| Impermeable area                                                                       | $A = 118.1 \text{ m}^2$ |                        | $f = 0.0000137 \text{ m/s}$ |
| Surface area of soakaway to 50% storage depth                                          |                         |                        |                             |

$$A_{s50} = 2 \times (l + w) \times d / 2 = 8.400 \text{ m}^2$$

$$\text{Outflow factor} \quad AF = A_{s50} \times f = 115. \times 10^{-6} \text{ m}^3/\text{s}$$

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

| Duration | M5 rainfalls | Growth factor Z2 | 100 year rainfall | Inflow              | Outflow            | Storage required   |
|----------|--------------|------------------|-------------------|---------------------|--------------------|--------------------|
| 5 mins   | 7.1 mm       | 1.84             | 13.1 mm           | 1.6 m <sup>3</sup>  | 0.0 m <sup>3</sup> | 1.5 m <sup>3</sup> |
| 10 mins  | 10.1 mm      | 1.91             | 19.4 mm           | 2.3 m <sup>3</sup>  | 0.1 m <sup>3</sup> | 2.2 m <sup>3</sup> |
| 15 mins  | 12.3 mm      | 1.95             | 24.0 mm           | 2.8 m <sup>3</sup>  | 0.1 m <sup>3</sup> | 2.7 m <sup>3</sup> |
| 30 mins  | 15.7 mm      | 2.00             | 31.4 mm           | 3.7 m <sup>3</sup>  | 0.2 m <sup>3</sup> | 3.5 m <sup>3</sup> |
| 1 hour   | 20.0 mm      | 2.03             | 40.6 mm           | 4.8 m <sup>3</sup>  | 0.4 m <sup>3</sup> | 4.4 m <sup>3</sup> |
| 2 hours  | 24.5 mm      | 2.01             | 49.2 mm           | 5.8 m <sup>3</sup>  | 0.8 m <sup>3</sup> | 5.0 m <sup>3</sup> |
| 4 hours  | 29.9 mm      | 1.97             | 59.0 mm           | 7.0 m <sup>3</sup>  | 1.7 m <sup>3</sup> | 5.3 m <sup>3</sup> |
| 6 hours  | 33.8 mm      | 1.94             | 65.6 mm           | 7.7 m <sup>3</sup>  | 2.5 m <sup>3</sup> | 5.3 m <sup>3</sup> |
| 10 hours | 38.9 mm      | 1.90             | 73.9 mm           | 8.7 m <sup>3</sup>  | 4.1 m <sup>3</sup> | 4.6 m <sup>3</sup> |
| 24 hours | 49.6 mm      | 1.81             | 89.9 mm           | 10.6 m <sup>3</sup> | 9.9 m <sup>3</sup> | 0.7 m <sup>3</sup> |

Required storage volume  $S_{\text{reqd}} = 5.3 \text{ m}^3$

Soakaway storage volume  $S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 15.2 \text{ m}^3$

Time for emptying soakaway to half volume

$$T_{s50} = S_{\text{reqd}} \times 0.5 / (A_{s50} \times f) = 6 \text{ hr } 24 \text{ min } 26 \text{ s}$$

Soakaway storage volume- OK

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Hamill Davies Limited

Ivydale

Lower Chase Road

Swanmore

Project

Ranelagh Road, Havant

Job Ref.

14-2260

Section

Independent Soakaways - Area 1

Sheet no./rev.

2 04

Calc. by

B.H.

Date

04/11/2016

Chk'd by

Date

App'd by

Date

**Soakaway discharge time - OK**

✓

RAN ELACH ROAD, HART

Date  
11/16

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16/2260

Page  
05

surface water

Office  
SW

Engineer  
BHI

Checked

AREA 2 (Plot 76)

Plot AREA = 41.74 m<sup>2</sup>

30% URBAN CHANGE

$$41.74 \times 1.3 = 54.26 \text{ m}^2$$

SOAKAWAY SIZE

25 x 25 x 0.8 m BELOW GROUND

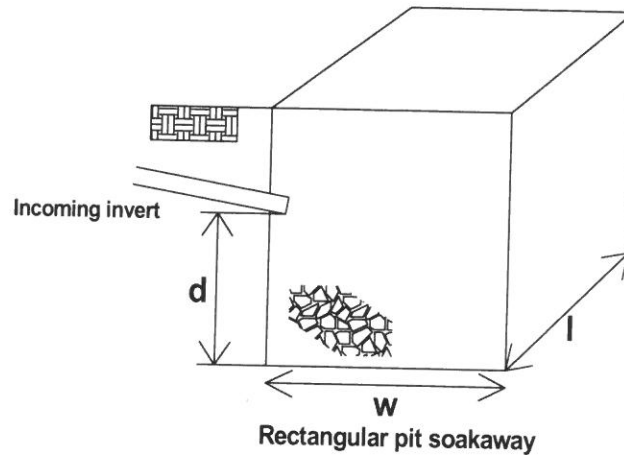
from concrete plot out

ADEQUATE

|                                                                                        |          |            |                                |      |                |      |         |  |
|----------------------------------------------------------------------------------------|----------|------------|--------------------------------|------|----------------|------|---------|--|
| <b>CSC ▶ TEDDS</b><br>Hamill Davies Limited<br>Ivydale<br>Lower Chase Road<br>Swanmore | Project  |            | Ranelagh Road, Havant          |      | Job Ref.       |      | 14-2260 |  |
|                                                                                        | Section  |            | Independent Soakaways - Area 2 |      | Sheet no./rev. |      | 001     |  |
|                                                                                        | Calc. by | Date       | Chk'd by                       | Date | App'd by       | Date |         |  |
|                                                                                        | B.H.     | 04/11/2016 |                                |      |                |      |         |  |

### SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



#### Rectangular Pit Design

|                                                                                        |                          |                        |                               |
|----------------------------------------------------------------------------------------|--------------------------|------------------------|-------------------------------|
| Pit length                                                                             | $l = 2500 \text{ mm}$ ✓  | Pit width              | $w = 2500 \text{ mm}$ ✓       |
| Pit depth below invert                                                                 | $d = 800 \text{ mm}$ ✓   | Free volume            | $V_{\text{free}} = 95.0 \%$ ✓ |
| Location of soakaway                                                                   | <b>England and Wales</b> | Return period          | <b>100 years</b> ✓            |
| Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1) |                          | Soil infiltration rate | $r = 0.35$ ✓                  |
| Impermeable area                                                                       | $A = 80.3 \text{ m}^2$ ✓ |                        | $f = 0.0000137 \text{ m/s}$ ✓ |
| Surface area of soakaway to 50% storage depth                                          |                          |                        |                               |

$$A_{s50} = 2 \times (l + w) \times d / 2 = 4.000 \text{ m}^2$$

$$\text{Outflow factor} \quad AF = A_{s50} \times f = 54.8 \times 10^{-6} \text{ m}^3/\text{s}$$

**M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1**

| Duration | M5 rainfalls | Growth factor Z2 | 100 year rainfall | Inflow             | Outflow            | Storage required   |
|----------|--------------|------------------|-------------------|--------------------|--------------------|--------------------|
| 5 mins   | 7.1 mm       | 1.84             | 13.1 mm           | 1.1 m <sup>3</sup> | 0.0 m <sup>3</sup> | 1.0 m <sup>3</sup> |
| 10 mins  | 10.1 mm      | 1.91             | 19.4 mm           | 1.6 m <sup>3</sup> | 0.0 m <sup>3</sup> | 1.5 m <sup>3</sup> |
| 15 mins  | 12.3 mm      | 1.95             | 24.0 mm           | 1.9 m <sup>3</sup> | 0.0 m <sup>3</sup> | 1.9 m <sup>3</sup> |
| 30 mins  | 15.7 mm      | 2.00             | 31.4 mm           | 2.5 m <sup>3</sup> | 0.1 m <sup>3</sup> | 2.4 m <sup>3</sup> |
| 1 hour   | 20.0 mm      | 2.03             | 40.6 mm           | 3.3 m <sup>3</sup> | 0.2 m <sup>3</sup> | 3.1 m <sup>3</sup> |
| 2 hours  | 24.5 mm      | 2.01             | 49.2 mm           | 4.0 m <sup>3</sup> | 0.4 m <sup>3</sup> | 3.6 m <sup>3</sup> |
| 4 hours  | 29.9 mm      | 1.97             | 59.0 mm           | 4.7 m <sup>3</sup> | 0.8 m <sup>3</sup> | 3.9 m <sup>3</sup> |
| 6 hours  | 33.8 mm      | 1.94             | 65.6 mm           | 5.3 m <sup>3</sup> | 1.2 m <sup>3</sup> | 4.1 m <sup>3</sup> |
| 10 hours | 38.9 mm      | 1.90             | 73.9 mm           | 5.9 m <sup>3</sup> | 2.0 m <sup>3</sup> | 4.0 m <sup>3</sup> |
| 24 hours | 49.6 mm      | 1.81             | 89.9 mm           | 7.2 m <sup>3</sup> | 4.7 m <sup>3</sup> | 2.5 m <sup>3</sup> |

Required storage volume  $S_{\text{reqd}} = 4.1 \text{ m}^3$

Soakaway storage volume  $S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 4.8 \text{ m}^3$

Time for emptying soakaway to half volume

$$T_{s50} = S_{\text{reqd}} \times 0.5 / (A_{s50} \times f) = 10 \text{ hr } 20 \text{ min } 32 \text{ s}$$

**Soakaway storage volume- OK**

|                                                                                        |                       |          |      |                                                                                     |                |  |
|----------------------------------------------------------------------------------------|-----------------------|----------|------|-------------------------------------------------------------------------------------|----------------|--|
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|                                                                                        | Ranelagh Road, Havant |          |      |                                                                                     | 14-2260        |  |
|                                                                                        | Section               |          |      |                                                                                     | Sheet no./rev. |  |
| Independent Soakaways - Area 2                                                         |                       |          |      |  |                |  |
| Calc. by                                                                               | Date                  | Chk'd by | Date | App'd by                                                                            | Date           |  |
| B.H.                                                                                   | 04/11/2016            |          |      |                                                                                     |                |  |

**Soakaway discharge time - OK**

RAW ELAQH ROAD, HANAT

Date  
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Page  
00

SURFACE WATER

Office  
EW

Engineer  
ZHI

Checked

AREA 3 (PLOT 71)

Roof AREA = 83.85 m<sup>2</sup>

30% CLIMATE CHANGE

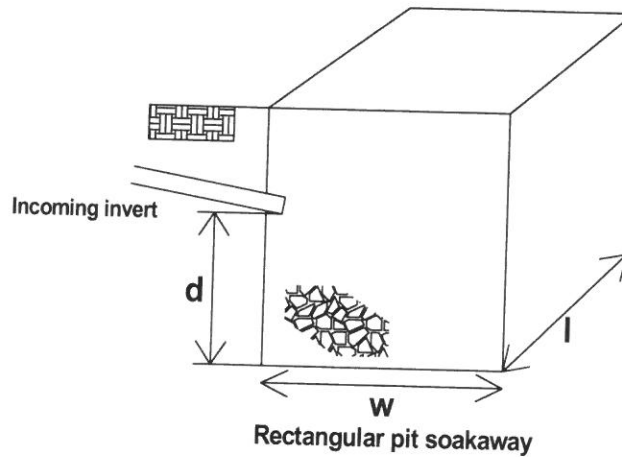
$83.85 \times 1.3 = 109.0 \text{ m}^2$

Soak Away Size

3.0 x 3.0 x 0.8m below invert

# SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



## Rectangular Pit Design

Pit length

 $l = 3000 \text{ mm}$ 

Pit width

 $w = 3000 \text{ mm}$ 

Pit depth below invert

 $d = 800 \text{ mm}$ 

Free volume

 $V_{\text{free}} = 95.0 \%$ 

Location of soakaway

England and Wales

Return period

100 years

Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1)

 $r = 0.35$ 

Impermeable area

 $A = 109.0 \text{ m}^2$ 

Soil infiltration rate

 $f = 0.0000137 \text{ m/s}$ 

Surface area of soakaway to 50% storage depth

$$A_{s50} = 2 \times (l + w) \times d / 2 = 4.800 \text{ m}^2$$

Outflow factor

$$AF = A_{s50} \times f = 65.8 \times 10^{-6} \text{ m}^3/\text{s}$$

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

| Duration | M5 rainfalls | Growth factor Z2 | 100 year rainfall | Inflow             | Outflow            | Storage required   |
|----------|--------------|------------------|-------------------|--------------------|--------------------|--------------------|
| 5 mins   | 7.1 mm       | 1.84             | 13.1 mm           | 1.4 m <sup>3</sup> | 0.0 m <sup>3</sup> | 1.4 m <sup>3</sup> |
| 10 mins  | 10.1 mm      | 1.91             | 19.4 mm           | 2.1 m <sup>3</sup> | 0.0 m <sup>3</sup> | 2.1 m <sup>3</sup> |
| 15 mins  | 12.3 mm      | 1.95             | 24.0 mm           | 2.6 m <sup>3</sup> | 0.1 m <sup>3</sup> | 2.6 m <sup>3</sup> |
| 30 mins  | 15.7 mm      | 2.00             | 31.4 mm           | 3.4 m <sup>3</sup> | 0.1 m <sup>3</sup> | 3.3 m <sup>3</sup> |
| 1 hour   | 20.0 mm      | 2.03             | 40.6 mm           | 4.4 m <sup>3</sup> | 0.2 m <sup>3</sup> | 4.2 m <sup>3</sup> |
| 2 hours  | 24.5 mm      | 2.01             | 49.2 mm           | 5.4 m <sup>3</sup> | 0.5 m <sup>3</sup> | 4.9 m <sup>3</sup> |
| 4 hours  | 29.9 mm      | 1.97             | 59.0 mm           | 6.4 m <sup>3</sup> | 0.9 m <sup>3</sup> | 5.5 m <sup>3</sup> |
| 6 hours  | 33.8 mm      | 1.94             | 65.6 mm           | 7.1 m <sup>3</sup> | 1.4 m <sup>3</sup> | 5.7 m <sup>3</sup> |
| 10 hours | 38.9 mm      | 1.90             | 73.9 mm           | 8.1 m <sup>3</sup> | 2.4 m <sup>3</sup> | 5.7 m <sup>3</sup> |
| 24 hours | 49.6 mm      | 1.81             | 89.9 mm           | 9.8 m <sup>3</sup> | 5.7 m <sup>3</sup> | 4.1 m <sup>3</sup> |

Required storage volume

$$S_{\text{reqd}} = 5.7 \text{ m}^3$$

Soakaway storage volume

$$S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 6.8 \text{ m}^3$$

Time for emptying soakaway to half volume

Soakaway storage volume- OK

$$T_{s50} = S_{\text{reqd}} \times 0.5 / (A_{s50} \times f) = 12 \text{ hr } 5 \text{ min } 33 \text{ s}$$

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Ivydale

Lower Chase Road

Swanmore

Project

Ranelagh Road, Havant

Job Ref.

14-2260

Section

Independent Soakaways - Area 3

Sheet no./rev.

24/10

Calc. by

B.H.

Date

04/11/2016

Chk'd by

Date

App'd by

Date

**Soakaway discharge time - OK**

RAN ELAHI ROAD, HANAT

Date  
11/10

Job No  
14/2240

Page  
11

SULTANE WARE.

Office  
6W

Engineer  
BH

Checked

Area 4 (Plots 22-25)

Plot Area = 236.73 m<sup>2</sup>.

30% URMATE CHANGE

$236.73 \times 1.3 = 307.7 \text{ m}^2.$

SOAKAWAY SIZE

12.0 m x 2.0 m x 0.8 m BELOW INLET

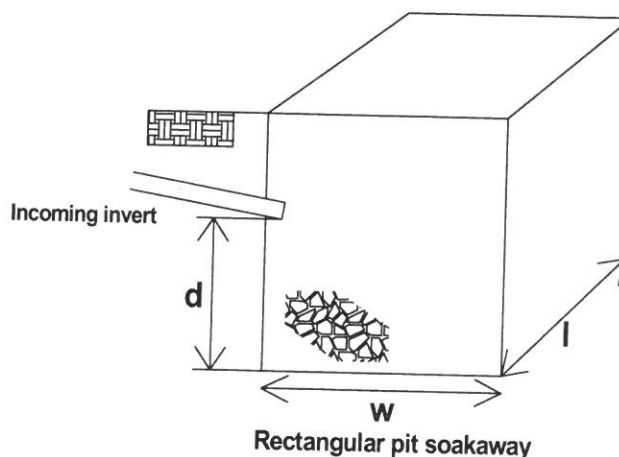
FROM COMPLE PLANT OUT

ADEQUATE

|                                                                                         |                                           |                    |          |      |                      |      |
|-----------------------------------------------------------------------------------------|-------------------------------------------|--------------------|----------|------|----------------------|------|
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|                                                                                         | Section<br>Independent Soakaways - Area 4 |                    |          |      | Sheet no./rev.<br>12 |      |
|                                                                                         | Calc. by<br>B.H.                          | Date<br>04/11/2016 | Chk'd by | Date | App'd by             | Date |
|                                                                                         |                                           |                    |          |      |                      |      |

### SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



#### Rectangular Pit Design

|                                                                                        |                          |                        |                               |
|----------------------------------------------------------------------------------------|--------------------------|------------------------|-------------------------------|
| Pit length                                                                             | $l = 12000 \text{ mm}$ ✓ | Pit width              | $w = 2000 \text{ mm}$ ✓       |
| Pit depth below invert                                                                 | $d = 800 \text{ mm}$ ✓   | Free volume            | $V_{\text{free}} = 95.0 \%$ ✓ |
| Location of soakaway                                                                   | England and Wales        | Return period          | 100 years                     |
| Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1) |                          | Soil infiltration rate | $r = 0.35$                    |
| Impermeable area                                                                       | $A = 307.7 \text{ m}^2$  |                        | $f = 0.0000137 \text{ m/s}$ ✓ |
| Surface area of soakaway to 50% storage depth                                          |                          |                        |                               |

$$A_{s50} = 2 \times (l + w) \times d / 2 = 11.200 \text{ m}^2$$

$$\text{Outflow factor} \quad AF = A_{s50} \times f = 153. \times 10^{-6} \text{ m}^3/\text{s}$$

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

| Duration | M5 rainfalls | Growth factor Z2 | 100 year rainfall | Inflow              | Outflow             | Storage required    |
|----------|--------------|------------------|-------------------|---------------------|---------------------|---------------------|
| 5 mins   | 7.1 mm       | 1.84             | 13.1 mm           | 4.0 m <sup>3</sup>  | 0.0 m <sup>3</sup>  | 4.0 m <sup>3</sup>  |
| 10 mins  | 10.1 mm      | 1.91             | 19.4 mm           | 6.0 m <sup>3</sup>  | 0.1 m <sup>3</sup>  | 5.9 m <sup>3</sup>  |
| 15 mins  | 12.3 mm      | 1.95             | 24.0 mm           | 7.4 m <sup>3</sup>  | 0.1 m <sup>3</sup>  | 7.3 m <sup>3</sup>  |
| 30 mins  | 15.7 mm      | 2.00             | 31.4 mm           | 9.7 m <sup>3</sup>  | 0.3 m <sup>3</sup>  | 9.4 m <sup>3</sup>  |
| 1 hour   | 20.0 mm      | 2.03             | 40.6 mm           | 12.5 m <sup>3</sup> | 0.6 m <sup>3</sup>  | 11.9 m <sup>3</sup> |
| 2 hours  | 24.5 mm      | 2.01             | 49.2 mm           | 15.1 m <sup>3</sup> | 1.1 m <sup>3</sup>  | 14.0 m <sup>3</sup> |
| 4 hours  | 29.9 mm      | 1.97             | 59.0 mm           | 18.1 m <sup>3</sup> | 2.2 m <sup>3</sup>  | 15.9 m <sup>3</sup> |
| 6 hours  | 33.8 mm      | 1.94             | 65.6 mm           | 20.2 m <sup>3</sup> | 3.3 m <sup>3</sup>  | 16.9 m <sup>3</sup> |
| 10 hours | 38.9 mm      | 1.90             | 73.9 mm           | 22.7 m <sup>3</sup> | 5.5 m <sup>3</sup>  | 17.2 m <sup>3</sup> |
| 24 hours | 49.6 mm      | 1.81             | 89.9 mm           | 27.7 m <sup>3</sup> | 13.3 m <sup>3</sup> | 14.4 m <sup>3</sup> |

Required storage volume  $S_{\text{reqd}} = 17.2 \text{ m}^3$

Soakaway storage volume  $S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 18.2 \text{ m}^3$

Time for emptying soakaway to half volume

$$T_{s50} = S_{\text{reqd}} \times 0.5 / (A_{s50} \times f) = 15 \text{ hr } 35 \text{ min } 14 \text{ s}$$

Soakaway storage volume- OK

|                                                                                         |  |          |            |                                |      |                |      |         |  |
|-----------------------------------------------------------------------------------------|--|----------|------------|--------------------------------|------|----------------|------|---------|--|
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|                                                                                         |  | Section  |            | Independent Soakaways - Area 4 |      | Sheet no./rev. |      | 13      |  |
|                                                                                         |  | Calc. by | Date       | Chk'd by                       | Date | App'd by       | Date |         |  |
|                                                                                         |  | B.H.     | 04/11/2016 |                                |      |                |      |         |  |

**Soakaway discharge time - OK**

✓

RANELAGH ROAD, HA 2T

|               |                    |            |
|---------------|--------------------|------------|
| Date<br>11/16 | Job No.<br>14/2260 | Page<br>14 |
| Office<br>GW  | Engineer<br>BTI    | Checked    |

SURFACE WATER

AREA 5 (PLOTS 32-41)

Roof AREA = 569.56 m<sup>2</sup>

30% CLIMATE CHANGE

$$569.56 \times 1.3 = 740.4 \text{ m}^2$$

SOAKAWAY SIZE

24.0 x 2.5 x 0.8m BELOW INLET.

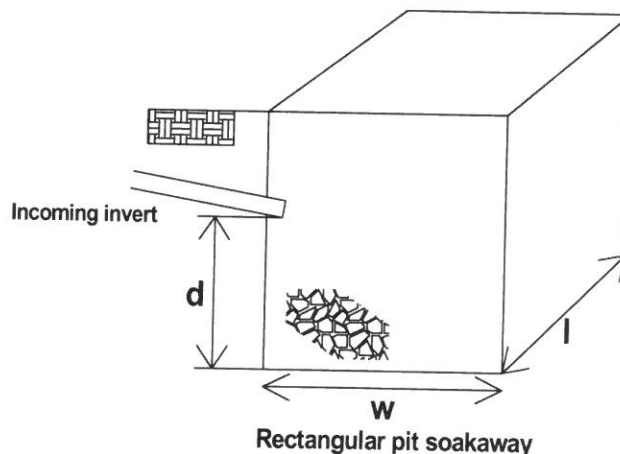
FROM COMPUTE FLUT OUT

ADEQUATE

|                                                                                         |                                           |                    |          |      |                      |      |
|-----------------------------------------------------------------------------------------|-------------------------------------------|--------------------|----------|------|----------------------|------|
| <b>CSC ▶ TEDDS®</b><br>Hamill Davies Limited<br>Ivydale<br>Lower Chase Road<br>Swanmore | Project<br>Ranelagh Road, Havant          |                    |          |      | Job Ref.<br>14-2260  |      |
|                                                                                         | Section<br>Independent Soakaways - Area 5 |                    |          |      | Sheet no./rev.<br>15 |      |
|                                                                                         | Calc. by<br>B.H.                          | Date<br>04/11/2016 | Chk'd by | Date | App'd by             | Date |

### SOAKAWAY DESIGN – BRE DIGEST 365

TEDDS calculation version 1.0.01



#### Rectangular Pit Design

|                                                                                        |                           |                        |                             |
|----------------------------------------------------------------------------------------|---------------------------|------------------------|-----------------------------|
| Pit length                                                                             | $l = 24000 \text{ mm}$ ✓  | Pit width              | $w = 2500 \text{ mm}$ ✓     |
| Pit depth below invert                                                                 | $d = 800 \text{ mm}$ ✓    | Free volume            | $V_{\text{free}} = 95.0 \%$ |
| Location of soakaway                                                                   | <b>England and Wales</b>  | Return period          | <b>100 years</b>            |
| Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1) |                           | Soil infiltration rate | $r = 0.35$                  |
| Impermeable area                                                                       | $A = 740.4 \text{ m}^2$ ✓ |                        | $f = 0.0000137 \text{ m/s}$ |
| Surface area of soakaway to 50% storage depth                                          |                           |                        |                             |

$$A_{s50} = 2 \times (l + w) \times d / 2 = 21.200 \text{ m}^2$$

$$\text{Outflow factor} \quad AF = A_{s50} \times f = 290. \times 10^{-6} \text{ m}^3/\text{s}$$

**M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1**

| Duration | M5 rainfalls | Growth factor Z2 | 100 year rainfall | Inflow              | Outflow             | Storage required    |
|----------|--------------|------------------|-------------------|---------------------|---------------------|---------------------|
| 5 mins   | 7.1 mm       | 1.84             | 13.1 mm           | 9.7 m <sup>3</sup>  | 0.1 m <sup>3</sup>  | 9.6 m <sup>3</sup>  |
| 10 mins  | 10.1 mm      | 1.91             | 19.4 mm           | 14.3 m <sup>3</sup> | 0.2 m <sup>3</sup>  | 14.2 m <sup>3</sup> |
| 15 mins  | 12.3 mm      | 1.95             | 24.0 mm           | 17.8 m <sup>3</sup> | 0.3 m <sup>3</sup>  | 17.5 m <sup>3</sup> |
| 30 mins  | 15.7 mm      | 2.00             | 31.4 mm           | 23.2 m <sup>3</sup> | 0.5 m <sup>3</sup>  | 22.7 m <sup>3</sup> |
| 1 hour   | 20.0 mm      | 2.03             | 40.6 mm           | 30.1 m <sup>3</sup> | 1.0 m <sup>3</sup>  | 29.0 m <sup>3</sup> |
| 2 hours  | 24.5 mm      | 2.01             | 49.2 mm           | 36.5 m <sup>3</sup> | 2.1 m <sup>3</sup>  | 34.4 m <sup>3</sup> |
| 4 hours  | 29.9 mm      | 1.97             | 59.0 mm           | 43.7 m <sup>3</sup> | 4.2 m <sup>3</sup>  | 39.5 m <sup>3</sup> |
| 6 hours  | 33.8 mm      | 1.94             | 65.6 mm           | 48.5 m <sup>3</sup> | 6.3 m <sup>3</sup>  | 42.3 m <sup>3</sup> |
| 10 hours | 38.9 mm      | 1.90             | 73.9 mm           | 54.7 m <sup>3</sup> | 10.5 m <sup>3</sup> | 44.3 m <sup>3</sup> |
| 24 hours | 49.6 mm      | 1.81             | 89.9 mm           | 66.6 m <sup>3</sup> | 25.1 m <sup>3</sup> | 41.5 m <sup>3</sup> |

Required storage volume  $S_{\text{reqd}} = 44.3 \text{ m}^3$

Soakaway storage volume  $S_{\text{act}} = l \times d \times w \times V_{\text{free}} = 45.6 \text{ m}^3$

Time for emptying soakaway to half volume

$$T_{s50} = S_{\text{reqd}} \times 0.5 / (A_{s50} \times f) = 21 \text{ hr } 10 \text{ min } 15 \text{ s}$$

**Soakaway storage volume- OK**

✓

|                                                                                        |            |                                |      |                |      |
|----------------------------------------------------------------------------------------|------------|--------------------------------|------|----------------|------|
| <b>CSC ► TEDDS</b><br>Hamill Davies Limited<br>Ivydale<br>Lower Chase Road<br>Swanmore |            | Project                        |      | Job Ref.       |      |
|                                                                                        |            | Ranelagh Road, Havant          |      | 14-2260        |      |
|                                                                                        |            | Section                        |      | Sheet no./rev. |      |
|                                                                                        |            | Independent Soakaways - Area 5 |      | 2/4            |      |
| Calc. by                                                                               | Date       | Chk'd by                       | Date | App'd by       | Date |
| B.H.                                                                                   | 04/11/2016 |                                |      |                |      |

**Soakaway discharge time - OK**

✓