



1 Croft Stairs  
Newcastle upon Tyne  
NE1 2HG

Our Ref: 251009.R.001.MH  
4 December 2025

**Mr R Laybourne,**  
**Key Property Solutions Ltd.,**  
KPS House  
Lumley Court  
DH2 1AN

**Re: BRE 365 Infiltration Assessment – St. Mary's Primary School, Shirley Avenue, Cleckheaton, BD19 4NA**

Dear Rob,

Further to your instruction, we have carried out an investigation into soil infiltration rates at the site known as St Mary's Primary School, in Gomersal, West Yorkshire.

**Project Instruction**

REL received instruction from Key Property Solutions Ltd ("**the Client**") to undertake soakaway tests at St. Mary's Primary School, Shirley Avenue, Cleckheaton, BD19 4NA ("**the Site**") to provide clarification regarding the infiltration properties of the ground conditions beneath the site areas of interest.

We understand that you require information relating to the soil drainage characteristics for the design of soakaways for the disposal of surface water on the subject site. Therefore, the purpose of the site investigation was to establish soil percolation rates to inform the design parameters of SUDs.

This letter report specifically excludes comment and / or advice relating to contamination and / or contaminated land.

**BGS Recorded Geology**

The British Geological Survey (BGS) 1:50000 scale mapping for the area shows that the site is in an area free from drift and the bedrock is named as the Pennine Lower Coal Measures Formation, comprising of mudstone, siltstone and sandstone (PMCM).

Archive borehole records are available for the subject site and have been reviewed; the boreholes have recorded firm to stiff stoney clay to depths of approximately 1.50m, at which depth weathered bedrock has been encountered comprising of clay sandstone.

### Site Description

The site comprised an irregular parcel of land, with the main school positioned on the northern and western portions of the site, the eastern and southern areas comprise soft landscaping, used for play areas and playing fields respectively. Car parking and temporary classrooms were present in the northwest of the site.

The site is located in an area characterised by residential dwellings with the eastern and northern boundaries bounded by Shirley Avenue, and the south bounded by Thoresby Drive.

### Site Investigation Works

The works were undertaken over one day on the 27th of October 2025, the trial pits were situated according to the client's specifications, to suit likely positions for soakaways in the final design. A trial pit location plan is attached with this letter.

The site works comprised the progression of three trial pits using a mechanical excavator, the pits were squared off and rapidly filled with clean water. Once filled, the falling water levels were monitored at regular intervals over the test period, the tests were undertaken in general accordance with BRE 365 Special Digest guidance .

A summary of the ground conditions encountered is presented in the following table.

| Strata   | Strata Depths (mbgl*) |              |             |
|--|-----------------------|--------------|-------------|
|  | TP1                   | TP2          | TP3         |
| Grass over topsoil   | 0 - 0.30              | 0 – 0.60m.   | 0 - 0.30    |
| Sandy Clay   | 0.60 – 1.80           | 0.60 – 2.40m | 0.60 – 1.20 |
| Sandy gravelly CLAY, gravel comprising weathered sandstone | 1.80 – 2.20           |              | 1.20 – 1.78 |
| Termination Depth  | 2.20                  | 2.40         | 1.78        |

\*mbgl = metres below ground level

The test pit dimensions and fill depths are presented in the table below.

| Location   | Dimensions |           |           |                    |                     |
|------------|------------|-----------|-----------|--------------------|---------------------|
|            | Length (m) | Width (m) | Depth (m) | Fill Depth (m bgl) | Effective Depth (m) |
| TP1 Test 1 | 1.52       | 0.60      | 2.20      | 1.34               | 0.86                |
| TP2 Test 1 | 1.40       | 0.60      | 2.40      | 1.38               | 1.02                |
| TP3 Test 1 | 1.60       | 0.60      | 1.78      | 0.95               | 0.83                |

### Infiltration Rate – Pit Soakaways

Percolation tests were carried out in all three trial pits in general accordance with BRE Special Digest 365. However, percolation rates were very slow, and only one filling of each pit was possible within the time available. The results tables and graphical representation of the results are appended to this letter.

A summary of the test results is presented below.

| Soakaway Pit (Depth) | Test Pit                        |  |                                     |   |
|----------------------|---------------------------------|--|-------------------------------------|---|
|                      | Outflow Vol<br>( $V_{p75-25}$ ) | Internal Surface<br>Area ( $A_{p50}$ ) | Infiltration Time<br>secs (tp75-25) | Soil Infiltration<br>rate ( $m\cdot s^{-1}$ ) |
| TP 1 (2.20m)         | 0.4742m <sup>3</sup>            | 3.1168m <sup>2</sup>                   | 11,000                              | 1.15x10 <sup>-5</sup>                         |
| TP 2 (2.40m)         | 0.4284m <sup>3</sup>            | 2.88m <sup>2</sup>                     | *                                   | *   |
| TP 3 (1.78m)         | 0.3984m <sup>3</sup>            | 2.786m <sup>2</sup>                    | *                                   | *   |

\*Water levels did not fall to a level to allow a calculation to be completed.

### Discussion on Infiltration Rate

The water levels within TP2 and TP3 did not fall to a level to allow the coefficient of permeability to be calculated for these test pits, therefore the soils tested are potentially not suitable for supporting soakaways.

For TP1, an Infiltration (f) rate of 1.15x10<sup>-5</sup> m/s has been calculated which falls at the lower end of the 'Good' range of Soil Drainage Characteristics and within the 'Medium' classification for Permeability Classification, in accordance with the Permeability Classification of Soils within K. Head Soil Technicians' Hand Book.

The attached results should be passed on to a drainage design engineer so that they can determine an appropriate strategy for future drainage infrastructure.

Furthermore, if, during construction, different ground conditions are encountered, further work could be carried out to establish the suitability of alternative areas of the site.

We trust that this information is satisfactory. If you have any queries, or would like any further information, please do not hesitate to contact us.

Yours sincerely,



**Mike Hay BSc(Hons) MSc**

Director

**For and on behalf of Roberts Environmental Ltd**

Tel: 0191 230 4521

Mobile: 07557511292

## Appendices



# Legend

- Coal Tar Samples
- Soakaways
- Site Boundary

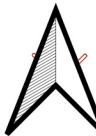
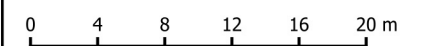


Figure Indicative Coal Tar Sampling and Soakaway Location Plan

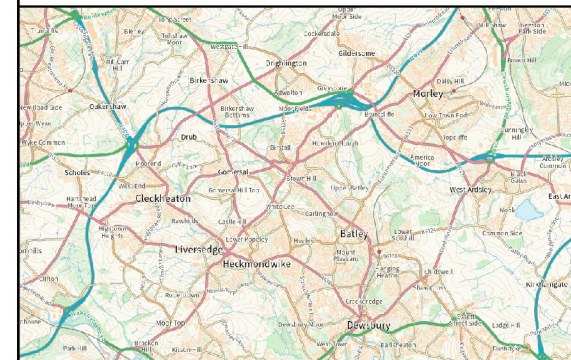
Job Gomersall, St Marys Primary School

Client KPS

| Figure No. | Revision | Date             |
|------------|----------|------------------|
| 1          | 1        | 04 December 2025 |

| Drawn by | Checked by | Scale     |
|----------|------------|-----------|
| CD       | MH         | 1:450.325 |

Job No. 251009



DO NOT SCALE. NOT FOR CONSTRUCTION

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BRE Digest 365: Soakaway Design



|                    |  |
|--------------------|--|
| Job Name:          | Gomersal   |
| Job Reference:     | 251009   |
| Test Date:         | 29/10/2025   |
| Client:            |  |
| Test Methodology : | The aim of a soakaway test is to determine a representative soil percolation rate for the area where it is proposed to site the soakaway. This is achieved by:<br>1 Excavating a trial pit of sufficient size to represent a section of the design soakaway. The trial pit should be 0.3 to 1 m wide and 1 to 3 m long. It should have vertical sides trimmed square and, if necessary for stability, should be filled with granular material. When granular fill is used, a full-height, perforated, vertical observation tube should be positioned in the pit so that water levels can be monitored with a dip tape<br>2 Fill the pit and allow it to drain three times to near empty; each time record the water level and time from filling, at intervals sufficiently close to clearly define water level versus time . |

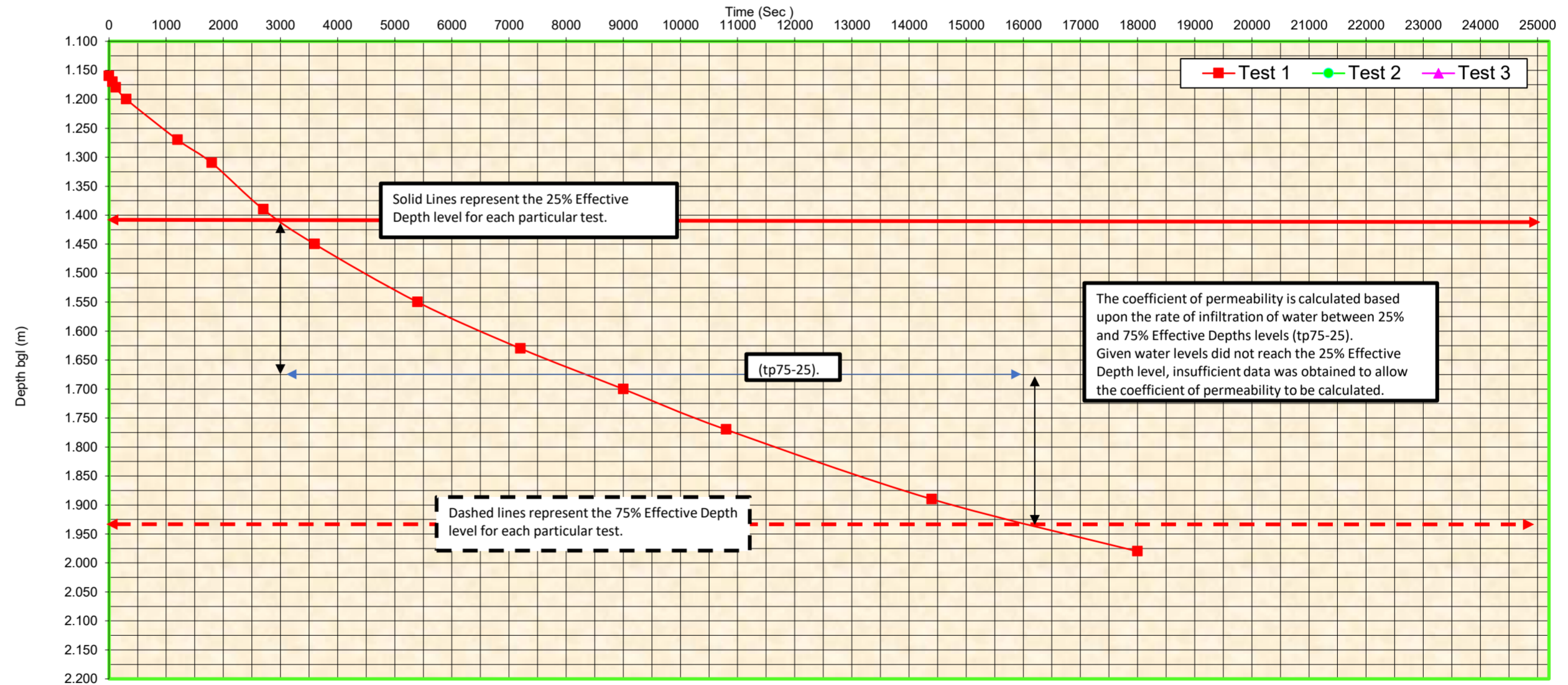
|                    |       |       |       |
|--------------------|-------|-------|-------|
| Test Pit Reference | TP1   |       |       |
| Test pit dimesions | L     | W     | D     |
|                    | 1.520 | 0.600 | 2.200 |

| Determination of Effective Depth (ED): |                   |         |                                |
|--|-------------------|---------|--------------------------------|
|  | Depth of pit mbgl | (minus) | Water level at start mbgl = ED |
| Test 1                                 | 2.200             | -       | 1.160                          |
| Test 2                                 |                   | -       | 0                              |
| Test 3                                 |                   | -       | 0                              |

|        | 75% of ED = | Depth bgl = | m bgl | $V_{p75-25}$           | $a_{p50}$             |
|--------|-------------|-------------|-------|------------------------|-----------------------|
| Test 1 | 0.78        | 1.42        | m bgl | 0.47424 m <sup>3</sup> | 3.1168 m <sup>2</sup> |
|        | 50% of ED = | Depth bgl = | m bgl |                        |                       |
|        | 0.52        | 1.68        | m bgl |                        |                       |
|        | 25% of ED = | Depth bgl = | m bgl |                        |                       |
|        | 0.26        | 1.94        | m bgl |                        |                       |
| Test 2 | 0           | 0           | m bgl | 0 m <sup>3</sup>       | 0.912 m <sup>2</sup>  |
|        | 50% of ED = | Depth bgl = | m bgl |                        |                       |
|        | 0           | 0           | m bgl |                        |                       |
|        | 25% of ED = | Depth bgl = | m bgl |                        |                       |
|        | 0           | 0           | m bgl |                        |                       |
| Test 3 | 0           | 0           | m bgl | 0 m <sup>3</sup>       | 0.912 m <sup>2</sup>  |
|        | 50% of ED = | Depth bgl = | m bgl |                        |                       |
|        | 0           | 0           | m bgl |                        |                       |
|        | 25% of ED = | Depth bgl = | m bgl |                        |                       |
|        | 0           | 0           | m bgl |                        |                       |

Fig 1: Depth v's Time - Infiltration Rates

| min | Time (sec)      | Depth bgl (m) |   |   |
|-----|-----------------|---------------|---|---|
|     |                 | Test No.      |   |   |
|     | dt <sub>0</sub> | 1             | 2 | 3 |
| 0   | 0               | 1.160         |   |   |
| 1   | 60              | 1.170         |   |   |
| 2   | 120             | 1.180         |   |   |
| 5   | 300             | 1.200         |   |   |
| 6   | 360             |               |   |   |
| 8   | 480             |               |   |   |
| 10  | 600             |               |   |   |
| 15  | 900             |               |   |   |
| 20  | 1200            | 1.270         |   |   |
| 25  | 1500            |               |   |   |
| 30  | 1800            | 1.310         |   |   |
| 35  | 2100            |               |   |   |
| 40  | 2400            |               |   |   |
| 45  | 2700            | 1.390         |   |   |
| 50  | 3000            |               |   |   |
| 55  | 3300            |               |   |   |
| 60  | 3600            | 1.450         |   |   |
| 90  | 5400            | 1.550         |   |   |
| 120 | 7200            | 1.630         |   |   |
| 150 | 9000            | 1.700         |   |   |
| 180 | 10800           | 1.770         |   |   |
| 210 | 12600           |               |   |   |
| 240 | 14400           | 1.89          |   |   |
| 300 | 18000           | 1.98          |   |   |
| 360 | 21600           |               |   |   |
| 390 | 23400           |               |   |   |
| 480 | 28800           |               |   |   |



OBSERVATIONS:

Pit side walls remianed stable on completion and no water ingress noted.

Approximate filling rate 100litres/min

|        | Time @ 25% ED | Time @ 75%ED |
|--------|---------------|--------------|
| Test 1 | 3000          | 16250        |
| Test 2 |               |              |
| Test 3 |               |              |

| Soil Infiltration Calculations               |                           |         |         |
|--|---------------------------|---------|---------|
| tp75-25 = time for infiltration (from fig 1) |                           |         |         |
|  | Test 1                    | Test 2  | Test 3  |
| $t_{p75-25}$                                 | 13250                     | 0       | 0       |
| infiltration $V_{p75-25}$                    |                           |         |         |
| $a_{p50} \times t_{p75-25}$                  |                           |         |         |
| $f =$  | 1.15E-05                  | #DIV/0! | #DIV/0! |
| <b>Average</b>                               | 1.15E-05 ms <sup>-1</sup> |         |         |

BRE Digest 365: Soakaway Design



|                    |  |
|--------------------|--|
| Job Name:          | Gomersal   |
| Job Reference:     | 251009   |
| Test Date          | 29/10/2025   |
| Client:            |  |
| Test Methodology : | The aim of a soakaway test is to determine a representative soil percolation rate for the area where it is proposed to site the soakaway. This is achieved by:<br>1 Excavating a trial pit of sufficient size to represent a section of the design soakaway. The trial pit should be 0.3 to 1 m wide and 1 to 3 m long. It should have vertical sides trimmed square and, if necessary for stability, should be filled with granular material. When granular fill is used, a full-height, perforated, vertical observation tube should be positioned in the pit so that water levels can be monitored with a dip tape<br>2 Fill the pit and allow it to drain three times to near empty; each time record the water level and time from filling, at intervals sufficiently close to clearly define water level versus time . |

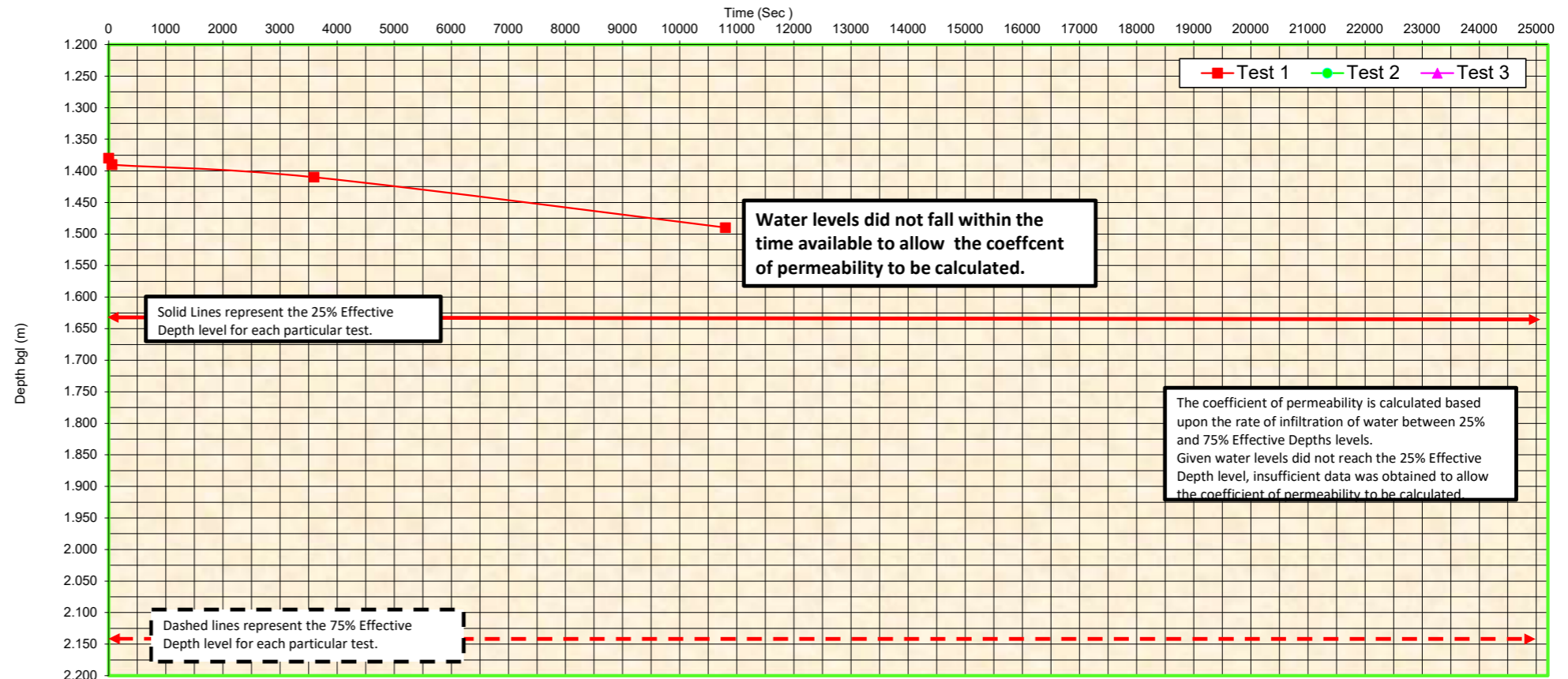
|                    |       |       |       |
|--------------------|-------|-------|-------|
| Test Pit Reference | TP2   |       |       |
| Test pit dimesions | L     | W     | D     |
|                    | 1.400 | 0.600 | 2.400 |

| Determination of Effective Depth (ED): |                   |         |                                |
|--|-------------------|---------|--------------------------------|
|  | Depth of pit mbgl | (minus) | Water level at start mbgl = ED |
| Test 1                                 | 2.400             | -       | 1.380                          |
| Test 2                                 |                   | -       | 0                              |
| Test 3                                 |                   | -       | 0                              |

|        |             |      |             |  |   |
|--------|-------------|------|-------------|--|---|
|        |             |      |             | Vp75-25  | a <sub>p50</sub>  |
| Test 1 | 75% of ED = | 0.77 | Depth bgl = | 1.635  | m bgl   |
|        | 50% of ED = | 0.51 | Depth bgl = | 1.89   | m bgl   |
|        | 25% of ED = | 0.26 | Depth bgl = | 2.145  | m bgl   |
|        |             |      |             | =outflow vol between 75% & 25% effective depth (based on 0% voids) | = 50% internal surface area of effective depth and the base |
|        |             |      |             | V <sub>p75-25</sub> =  | 0.4284 m <sup>3</sup>                                       |
|        |             |      |             | a <sub>p50</sub> =   | 2.88 m <sup>2</sup>   |
| Test 2 | 75% of ED = | 0    | Depth bgl = | 0  | m bgl   |
|        | 50% of ED = | 0    | Depth bgl = | 0  | m bgl   |
|        | 25% of ED = | 0    | Depth bgl = | 0  | m bgl   |
|        |             |      |             | V <sub>p75-25</sub> =  | 0 m <sup>3</sup>  |
|        |             |      |             | a <sub>p50</sub> =   | 0.84 m <sup>2</sup>   |
| Test 3 | 75% of ED = | 0    | Depth bgl = | 0  | m bgl   |
|        | 50% of ED = | 0    | Depth bgl = | 0  | m bgl   |
|        | 25% of ED = | 0    | Depth bgl = | 0  | m bgl   |
|        |             |      |             | V <sub>p75-25</sub> =  | 0 m <sup>3</sup>  |
|        |             |      |             | a <sub>p50</sub> =   | 0.84 m <sup>2</sup>   |

Fig 1: Depth v's Time - Infiltration Rates

| min | Time (sec)      | Depth bgl (m) |   |   |
|-----|-----------------|---------------|---|---|
|     |                 | Test No.      |   |   |
|     | dt <sub>0</sub> | 1             | 2 | 3 |
| 0   | 0               | 1.380         |   |   |
| 1   | 60              | 1.390         |   |   |
| 2   | 120             |               |   |   |
| 5   | 300             |               |   |   |
| 6   | 360             |               |   |   |
| 8   | 480             |               |   |   |
| 10  | 600             |               |   |   |
| 15  | 900             |               |   |   |
| 20  | 1200            |               |   |   |
| 25  | 1500            |               |   |   |
| 30  | 1800            |               |   |   |
| 35  | 2100            |               |   |   |
| 40  | 2400            |               |   |   |
| 45  | 2700            |               |   |   |
| 50  | 3000            |               |   |   |
| 55  | 3300            |               |   |   |
| 60  | 3600            | 1.410         |   |   |
| 90  | 5400            |               |   |   |
| 120 | 7200            |               |   |   |
| 150 | 9000            |               |   |   |
| 180 | 10800           | 1.490         |   |   |
| 210 | 12600           |               |   |   |
| 240 | 14400           |               |   |   |
| 300 | 18000           |               |   |   |
| 360 | 21600           |               |   |   |
| 390 | 23400           |               |   |   |
| 480 | 28800           |               |   |   |



**OBSERVATIONS:**  
Pit side walls remiaed stable on completion and no water ingress noted.  
Approximate filling rate 100litres/min

|        |               |              |
|--------|---------------|--------------|
|        | Time @ 25% ED | Time @ 75%ED |
| Test 1 |               |              |
| Test 2 |               |              |
| Test 3 |               |              |

| Soil Infiltration Calculations               |         |         |                  |
|--|---------|---------|------------------|
| tp75-25 = time for infiltration (from fig 1) |         |         |                  |
|  | Test 1  | Test 2  | Test 3           |
| t <sub>p75-25</sub> =                        | 0       | 0       | 0                |
| infiltration V <sub>p75-25</sub>             |         |         |                  |
| a <sub>p50</sub> x t <sub>p75-25</sub>       |         |         |                  |
| f =  | #DIV/0! | #DIV/0! | #DIV/0!          |
|  | Average | #DIV/0! | ms <sup>-1</sup> |

BRE Digest 365: Soakaway Design



|                    |  |
|--------------------|--|
| Job Name:          | Gomersal   |
| Job Reference:     | 251009   |
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| Client:            |  |
| Test Methodology : | The aim of a soakaway test is to determine a representative soil percolation rate for the area where it is proposed to site the soakaway. This is achieved by:<br>1 Excavating a trial pit of sufficient size to represent a section of the design soakaway. The trial pit should be 0.3 to 1 m wide and 1 to 3 m long. It should have vertical sides trimmed square and, if necessary for stability, should be filled with granular material. When granular fill is used, a full-height, perforated, vertical observation tube should be positioned in the pit so that water levels can be monitored with a dip tape<br>2 Fill the pit and allow it to drain three times to near empty; each time record the water level and time from filling, at intervals sufficiently close to clearly define water level versus time . |

|                    |       |       |       |
|--------------------|-------|-------|-------|
| Test Pit Reference | TP3   |       |       |
| Test pit dimesions | L     | W     | D     |
|                    | 1.600 | 0.600 | 1.780 |

| Determination of Effective Depth (ED): |                   |         |                                |
|--|-------------------|---------|--------------------------------|
|  | Depth of pit mbgl | (minus) | Water level at start mbgl = ED |
| Test 1                                 | 1.780             | -       | 0.950                          |
| Test 2                                 |                   | -       | 0                              |
| Test 3                                 |                   | -       | 0                              |

|        | 75% of ED = | Depth bgl = | m bgl | $V_{p75-25}$          | $a_{p50}$            |
|--------|-------------|-------------|-------|-----------------------|----------------------|
| Test 1 | 0.623       | 1.1575      | m bgl | 0.3984 m <sup>3</sup> | 2.786 m <sup>2</sup> |
|        | 50% of ED = | Depth bgl = | m bgl |                       |                      |
|        | 0.415       | 1.365       | m bgl |                       |                      |
|        | 25% of ED = | Depth bgl = | m bgl |                       |                      |
|        | 0.208       | 1.5725      | m bgl |                       |                      |
| Test 2 | 0           | 0           | m bgl | 0 m <sup>3</sup>      | 0.96 m <sup>2</sup>  |
|        | 50% of ED = | Depth bgl = | m bgl |                       |                      |
|        | 0           | 0           | m bgl |                       |                      |
|        | 25% of ED = | Depth bgl = | m bgl |                       |                      |
|        | 0           | 0           | m bgl |                       |                      |
| Test 3 | 0           | 0           | m bgl | 0 m <sup>3</sup>      | 0.96 m <sup>2</sup>  |
|        | 50% of ED = | Depth bgl = | m bgl |                       |                      |
|        | 0           | 0           | m bgl |                       |                      |
|        | 25% of ED = | Depth bgl = | m bgl |                       |                      |
|        | 0           | 0           | m bgl |                       |                      |

Fig 1: Depth v's Time - Infiltration Rates

| min | Time (sec) | Depth bgl (m) |   |   |
|-----|------------|---------------|---|---|
|     |            | Test No.      |   |   |
|     | $dt_0$     | 1             | 2 | 3 |
| 0   | 0          | 0.950         |   |   |
| 1   | 60         |               |   |   |
| 2   | 120        |               |   |   |
| 5   | 300        | 0.990         |   |   |
| 6   | 360        |               |   |   |
| 8   | 480        |               |   |   |
| 10  | 600        | 1.000         |   |   |
| 15  | 900        |               |   |   |
| 20  | 1200       |               |   |   |
| 25  | 1500       |               |   |   |
| 30  | 1800       |               |   |   |
| 35  | 2100       |               |   |   |
| 40  | 2400       |               |   |   |
| 45  | 2700       |               |   |   |
| 50  | 3000       |               |   |   |
| 55  | 3300       |               |   |   |
| 60  | 3600       |               |   |   |
| 90  | 5400       |               |   |   |
| 120 | 7200       | 1.100         |   |   |
| 150 | 9000       |               |   |   |
| 180 | 10800      | 1.200         |   |   |
| 210 | 12600      |               |   |   |
| 240 | 14400      |               |   |   |
| 300 | 18000      |               |   |   |
| 360 | 21600      |               |   |   |
| 390 | 23400      |               |   |   |
| 480 | 28800      |               |   |   |



**OBSERVATIONS:**  
Pit side walls remianed stable on completion and no water ingress noted.  
Approximate filling rate 100litres/min

|        | Time @ 25% ED | Time @ 75%ED |
|--------|---------------|--------------|
| Test 1 |               |              |
| Test 2 |               |              |
| Test 3 |               |              |

| Soil Infiltration Calculations                    |         |         |                        |
|---|---------|---------|------------------------|
| $t_{p75-25}$ = time for infiltration (from fig 1) |         |         |                        |
|   | Test 1  | Test 2  | Test 3                 |
| $t_{p75-25}$                                      | 0       | 0       | 0                      |
| infiltration $V_{p75-25}$                         |         |         |                        |
| $a_{p50} \times t_{p75-25}$                       |         |         |                        |
| $f =$   | #DIV/0! | #DIV/0! | #DIV/0!                |
| <b>Average</b>                                    | #DIV/0! |         | <b>ms<sup>-1</sup></b> |