



RHONDDA  
GEOTECHNICAL  
SERVICES

BRE365

PERMEABILITY TEST AND CALCULATIONS

R.C.T. PRE-PLANNING

PROPOSED RETAIL DEVELOPMENT

FORMER RETAIL SITE

LLANTRISANT ROAD

PENYCOEDCAE

CF37 1PL

18/12/2023

## INTRODUCTION

Planning permission is being sought from Rhondda Cynon Taf for retail development on land at Llantrisant Road, Penycoedcae. The site is currently occupied by former retail buildings. These will be demolished to make room for the proposed new buildings. The development has been identified by the agent as requiring S.A.B. consent. All new planning applications require a drainage scheme for surface and storm water within the site under SuDS regulations. The SuDS standards for Wales establish a preferred hierarchy for stormwater disposal. Currently Priority Level 1 is collection and re-use. Rhondda Geotechnical Services have been commissioned to investigate the possibility of ground infiltration (Priority Level 2). To investigate the possibility of effective ground infiltration the procedures outlined in BRE Digest 365 (soakaway design 2016 revision) must be followed. These involve obtaining the soil infiltration characteristics (permeability). The figure is then used to design a suitably sized soakaway if the ground permeability allows it. In its most simple form this is:-

$I=O+S$  where I is the inflow from the impermeable area to be drained, O is the outflow infiltrating into the soil in the soakaway during rainfall and S is the required storage of the soakaway to balance temporarily inflow and outflow.

The full SuDS application will be undertaken by a specialist firm. Only the field testing was to be undertaken by R.G.S.

The following calculations have been based on the figures recorded in the infiltration test. The pit was rectangular 1.0m x 0.5m x 1.5m. deep. There was a layer of Made Ground that would be unsuitable for infiltration. The trial pit was excavated down into stiff Glacial Till (Diamicton). Figure 1 is a photograph of the trial pit.

### BS5930:2015 SOIL DESCRIPTION

G.L.m-0.5m

MADE GROUND. Compact black sandy gravel with masonry, brick and concrete.

0.5m-1.5m

Firm to stiff yellowish brown and grey, slightly gravelly, slightly sandy, silty CLAY. Gravel is subangular to subrounded, fine to coarse of Pennant Sandstone.

40 gallon plastic drums were used to fill the pit. This meant the pit could be filled rapidly, which is a requirement of the guidance. Because the Made Ground would be unsuitable for infiltration the invert depth was assumed to be 0.5m for the purposes of the test. The pit was filled with water to the base of the Made Ground and the drop in levels measured and timed. The test can be seen underway in Figure 2 overleaf. The guidance requires measuring the time taken for the water to drop from 75% to 25% of the effective storage depth of the pit (the effective storage depth is the depth from the invert to the base of the pit). The test should be repeated three times, and the value from the third test used. This produces a more conservative infiltration rate for the purpose of soakaway design. However, in this case the test was not repeated. The initial test took over 6 hours by which time the level had not dropped to the 25% level. With such a low permeability from the first test it was pointless to carry out further tests which would inevitably produce even lower results. The infiltration calculations were done using the figures from the initial test on the recorded water level drop of 8cm. The calculations are shown below. The figure arrived at was  $8.66 \times 10^{-7} \text{m/s}$ . A soakaway would not be a viable solution for clayey soil with such a low permeability.

#### INFILTRATION CALCULATION

$$V_{p75-25} = 1.0 \times 0.5 \times 0.08 = 0.04 \text{m}^3$$

$$A_{p50} = (1 \times 0.5) \text{m}^2 + (3 \times 0.5) \text{m}^2 = 2.0 \text{m}^2$$

$$T_{p75-25} = 6 \text{ hours } 25 \text{ mins } (23,100 \text{ secs.})$$

$$f = \frac{0.04}{2.0 \times 23100}$$

$$= \frac{0.04}{46200}$$

$$= 8.66 \times 10^{-7}$$

$$f = 8.88 \times 10^{-7}$$

It should be noted that this figure, although low, is higher than the true infiltration value. Because the test did not fall the full distance value of  $T_{p75-25}$  would be considerably larger. It can be assumed on a second and third fill, the infiltration value would decrease from even this low value.



FIGURE 1  
TRIAL PIT AT LLANTRISANT ROAD, PENYCOEDCAE.





**FIGURE 2**  
**BRE365 TEST UNDERWAY AT PENYCOEDCAE.**