# Halewick Close
# Sompting
# West Sussex

## In Situ Infiltration Testing Report

**Report Beneficiary:**
Grand Land and Homes Ltd
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# 1. INTRODUCTION

It is understood that a surface water management strategy is to be implemented for a proposed new development adjacent to 1 Halewick Close, Sompting, West Sussex.

Ashdown Site Investigation Limited was requested to provide an estimate for carrying out in situ infiltration testing at the site by Jane Allen of Empire Land & Homes, on behalf of the client Grand Land & Homes, 8 Upton Avenue, Southwick, Sussex BN42 4WP. The scope of the works allowed for and the terms and conditions under which the works were to be undertaken were set out within the offer letter Q18-6799/Rev1, dated 25th January 2018. The instruction of the works was received on behalf of the client in an email dated 16th March 2018.

The objectives of the works were to:
a) Investigate the shallow ground and groundwater conditions at the single exploratory hole location; and
b) Undertake soakage testing and provide calculated soil infiltration rates to assist others in undertaking design of infiltration systems.

# 2. GROUND INVESTIGATION

The site work comprised undertaking in situ soakage testing within a trial pit excavated by others prior to our attendance on site. The testing was carried out on 15th May 2018. The exploratory hole location is shown on Figure 1.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole record that is appended to this report. Notes to assist interpretation of the record are also appended.

# 3. GROUND CONDITIONS

## 3.1 Stratigraphy

### *3.1.1 Surface Covering*

The trial pit had been excavated through a surface cover of topsoil some 200mm thick.

### *3.1.2 Head*

Underlying the topsoil, undisturbed very gravelly sandy clay deposits were noted to extend to the full depth of the pit at 1.30m below existing ground level.

These soils are considered to be representative of the Head deposits indicated to be present on the published geology map for the area.

## 3.2 Groundwater Conditions and Stability

The trial pit was dry and stable prior to commencing the in situ infiltration testing.

# 4. STORMWATER INFILTRATION SYSTEMS

In situ infiltration testing[1] was carried out in the trial pit. From the test results calculations were made to determine the infiltration rate that could be expected for infiltration systems constructed into the underlying Head deposits. It is noted that the full 1000 litres of water from the bowser was introduced into the pit for each test and as such the number of fills that could be achieved in the single day was limited.

For each test the soil infiltration rate (f) was calculated by dividing the volume of water lost between 75% and 25% of the initial test depth by the sum of the average surface area of the sides of the trial pit in contact with the water during the test monitoring period, and its base area. This figure was then divided by the test duration (time taken for the water level to fall between 75% and 25% of the initial test depth) to give the soil infiltration rate in metres per second.

The infiltration rates derived from the tests are summarised in the following table.

Table 1. Calculated Infiltration Rates

| Exploratory Hole | Test Response Zone Depth (m) | | Stratum | Infiltration Rate (f) (m/sec) |
|---|---|---|---|---|
| | Top | Bottom | | |
| **TP1 test 1** | 1.02 | 1.30 | Head | $3.4 \times 10^{-3}$ |
| **TP2 test 2** | 1.05 | 1.30 | Head | $8.9 \times 10^{-4}$ |

The value 'f' is equivalent to the soil infiltration coefficient 'q' quoted in the Construction Industry Research and Information Association (CIRIA) Report 156.

The results from the infiltration tests indicate that the Head deposits exposed within the trial pit possess good infiltration characteristics. The results from the infiltration tests should be provided to engineers responsible for the design of the drainage system.

To minimise the risk of subsidence, point discharging infiltration systems (conventional ring or trench soakaways) should be constructed a minimum of 5.0m away from proposed or existing buildings.

Whilst at the time of the intrusive works groundwater was not encountered within the pit (open to a depth 1.30m), the Local Authority or other regulators may still require monitoring of groundwater levels during the worst annual case (wetter periods) to have been undertaken prior to finalising the design of the infiltration system.

It is recommended that designers of the system provide for the prevention of pollution of groundwater. In this regard attention is drawn to guidance provided within BRE 365 and by the Environment Agency which requires a contamination risk assessment to be carried out in order to assess the potential risk to groundwater. Whilst no contamination testing has been carried

[1] Conducted in general accordance with the requirements of BRE 365, Soakaway Design.

out at the site, given that no made ground soils were encountered it is considered unlikely that there is a significant risk posed by the soils to groundwater at this site.

Appropriate consideration should be given to whether there is a need for inclusion of interceptors and oil separators. The Local Authority and/or relevant water company should be consulted in relation to consent for discharge of water from rooftops, areas of hardstanding and roadways to drains.

**Ashdown Site Investigation Ltd.**
**May 2018**

## FIGURES AND APPENDICES

Figure 1 Site Plan
Exploratory Hole Notes
Exploratory Hole Record
Summary of Trial Pit Falling Head Soakage Test Results




| | | | |
|---|---|---|---|
| ASHDOWN SITE INVESTIGATION LIMITED | Site: 1 Halewick Close, Sompting, West Sussex | Trial Pit Location Plan. Not To Scale | Figure 1 R17-12852 |

# NOTES FOR THE INTERPRETATION OF EXPLORATORY HOLE RECORDS

## 1 Symbols and abbreviations

*Samples*

U 'Undisturbed' Sample: - also known as 'U100' or 'U4' - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Uo Sample not obtained.
U* Full penetration of sample not obtained.
Pi Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D Disturbed Sample.
R Root Sample.
B Bulk Disturbed Sample.
W Water Sample.
J Jar Sample (sample taken in amber glass jar fitted with gas tight lid)
T Tub Sample
Vi Vial Sample

*In situ Testing*

S Standard penetration test (SPT): In the borehole record the depth of the test is that at the start of the normal 450mm penetration. The number of blows per 75mm penetration is recorded, with the initial 150mm for seating blows being recorded followed by the blows recorded for the remaining 300mm of the test. The total blows to achieve the standard penetration of 300mm, discounting the seating blows, is noted as the N value on the log. Where the full penetration of the test cannot be achieved (a refusal) the number of blows achieved and the penetration achieved will be reported.

C Standard Penetration Test (SPT) conducted usually in coarse grained soils or weak rocks using the same procedure as for the SPT but with a 50mm diameter, 60º apex solid cone fitted in place of the sampler. Variations in test results are indicated by the same symbols as for the SPT (above).

V Shear Vane Test: Undrained shear strength (cohesion) ($kN/m^2$) shown within the Vane/Pen Test and N Value column.

H Hand penetrometer Test: Undrained shear strength (cohesion) ($kN/m^2$) shown within the Vane/Pen Test and N Value column.

P Perth Penetrometer Test: See "In Situ Testing Notes" for full description. Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column. In sand the number of blows is approximately equivalent to the SPT "N" value.

*Excavation Method*

CP Cable Percussion Borehole
WLS Dynamic Sampler Borehole using windowless sampler tubes
WS Dynamic Sampler Borehole using window sampler tubes
TP Trial Pit excavated using mechanic excavator
HDP Trial Pit excavated using hand tools

## 2 Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002+A1:2013) and Part 2 Principles of classification (BS EN 14688-2:2004+A1:2013) as well as the BS5930:2015 code of Practice for Ground Investigations.

### *Fine Grained Soils*

The consistency of fine grained soils given in the report is based on visual inspection of the samples and the strength is based on results of in situ and/or laboratory undrained shear strength tests when carried out.

The consistency is determined on the following basis:

| **Consistency** | **Manual Test** |
|---|---|
| Very Soft | Soil exudes between fingers when squeezed in hand |
| Soft | Soils can be moulded by light finger pressure |
| Firm | Cannot be moulded by finger but rolled to 3mm threads without breaking/crumbling |
| Stiff | Crumbles/breaks when rolled to 3mm thick threads but can be moulded into a lump again |
| Very Stiff | Cannot be moulded and crumbles under pressure, can be indented by thumbnail |

The terms used for the designation of the undrained shear strength are as follows:

| **Undrained Shear Strength** | |
|---|---|
| Extremely to Very Low | <20 kPa |
| Low | 20-40 kPa |
| Medium | 40-75 kPa |
| High | 75-150 kPa |
| Very High | 150-300 kPa |
| Extremely high | 300-600 kPa |

**Note:** The undrained shear strength of the soils is measured either by laboratory testing or in the field using hand shear vane.

It is recognised that any coarse grained soil that has in excess of approximately 35% fine grained soil (clay and silt) can often be expected to behave as a fine grained soil despite the dominance of coarse grained material within the soil mass. To reflect this, it is the soil type that dominates the behaviour of the soil mass that appears on the exploratory hole records.

### *Coarse Grained Soils*

The relative densities of coarse grained soils (sand and gravel) given in the report are based on field estimations and the results of the Standard Penetration Test (SPT) and equivalent correlation from other testing. The classification in terms of "N" Values is as follows:

| **SPT 'N' Value** | **Relative Density** |
|---|---|
| 0-4 | Very Loose |
| 4-10 | Loose |
| 10-30 | Medium Dense |
| 30-50 | Dense |
| Greater than 50 | Very Dense |

## 3 Rock Description

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1:2003) as well as the BS5930:2015 code of Practice for Ground Investigations.

The description of rock mass includes the type of rock, structure, discontinuities and weathering.

The unconfined compressive strength of rock material is determined on the following basis:

| **Term** | **Field Identification** | **Unconfined Compressive Strength (MPa)** |
|---|---|---|
| Extremely Weak | Indented by thumbnail | Less than 1 |
| Very Weak | Crumbles under firm blows with point of geological hammer, peeled by pocket knife | 1 to 5 |
| Weak | Peeled by pocket knife with difficulty, shallow indentations made by firm blow with geological hammer | 5 to 25 |
| Medium Strong | Cannot be peeled or scraped with knife, can be fractured with single firm blow of geological hammer | 25 to 50 |
| Strong | Requires more than one blow of geological hammer to fracture | 50 to 100 |
| Very Strong | Requires may blows of geological hammer to fracture it | 100 to 250 |
| Extremely Strong | Can only be chipped with geological hammer | Greater and 250 |

The terms describing discontinuity and bedding spacing are as follows:

| **Bedding Thickness** | |
|---|---|
| Very Thick | >2000mm |
| Thick | 2000-600mm |
| Medium | 600-200mm |
| Thin | 200-60mm |
| Very Thin | 60-20mm |
| Thickly Laminated | 20-6mm |
| Thinly Laminated | <6mm |

| **Discontinuity Spacing** | |
|---|---|
| Very Wide | >2000mm |
| Wide | 2000-600mm |
| Medium | 600-200mm |
| Close | 200-60mm |
| Very Close | 60-20mm |
| Extremely Close | <20mm |

### *Chalk*

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk. See additional chalk classification notes.

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**Site Name:** 1 Halewick Close, Sompting, West Sussex

**Job Number:** R18-12852

**Start Date:** 15/05/2018

**End Date:** 15/05/2018

**Trial Pit Number:** **TP1**



| Samples and In Situ Testing | | | | Legend | Depth/ Reduced Level | Stratum Description |
|---|---|---|---|---|---|---|
| Sample/ Test Type | Depth From (m) | Depth To (m) | Test Result | | | |
| D | 0.10 | | | | 0.00 | Topsoil. |
| | | | | | 0.20 | Orange brown very gravelly sandy CLAY. Gravel is angular to subangular medium to coarse flint and flint cobbles. (Head) |
| B | 0.50 | 1.00 | | | | |
| | | | | | 1.30 | End of trial pit at 1.30m |

**Remarks**

**Groundwater:** Trial pit dry.

**Stability:** Trial pit stable.

**Notes:** n/a

**Excavation Method:** TP

**Pit Length:** 1.50m

**Pit Width:** 1.40m

**Made By:** PM

# ASHDOWN SITE INVESTIGATION LIMITED

| Site: 1 Halewick Close, Sompting, West Sussex | Report No.: R18-12852<br>Sheet No.: 1 of 1 |
|---|---|

## SUMMARY OF TRIAL PIT FALLING HEAD SOAKAGE TEST RESULTS

| TP1 (Test 1) | |
|---|---|
| Time (mins) | Depth to water (m bgl) |
| 0 | 1.02 |
| 1 | Dry* |
| Pit Length - 1.50m<br>Pit Width - 1.40m<br>Pit Depth - 1.30m bgl | |

| TP1 (Test 2) | |
|---|---|
| Time (mins) | Depth to water (m bgl) |
| 0 | 1.05 |
| 1 | 1.15 |
| 2 | 1.20 |
| 3 | Dry# |
| Pit Length - 1.50m<br>Pit Width - 1.40m<br>Pit Depth - 1.30m bgl | |

Remarks: bgl - below ground level.
*Test 1 – Approximately 1000 litres of water introduced to pit in 9 minutes.
#Test 2 – Approximately 1000 litres of water introduced to pit in 8 minutes.