

**A REPORT**

**ON A**

**GROUND INVESTIGATION**

**AT**

**13A QUEEN STREET**

**DEAL**

**KENT**

**CT14 6ET**

**FOR**

**WHITEACRE HOMES LIMITED**

**BY**

**SOILTEC LABORATORIES LIMITED**

**Soiltec House  
Langley Park  
Sutton Road  
Maidstone  
Kent  
ME17 3NQ**

**Date: September 2017**

**Report No: 07750/23**

**A REPORT ON A SITE INVESTIGATION AT 13A QUEEN STREET, DEAL, KENT.  
CT14 6ET FOR WHITEACRE HOMES LIMITED BY  
SOILTEC LABORATORIES LIMITED.**

Date : September 2017

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# FOREWORD

## General Conditions Relating to Site Investigation

The recommendations made and any opinions expressed in this report are based on the ground conditions revealed by the site works, an assessment of the site and laboratory test results together with other available information. The possibility of variations in ground conditions elsewhere on the site should not be overlooked. No liability can be accepted for such variations.

Unless otherwise stated in the report, drilling is undertaken using light percussive shell and auger equipment or continuous window sampler equipment. Whilst these methods are regarded as most reliable, some disturbance of the soils is inevitable.

The ground water conditions indicated on the borehole and/or trial pit records are those observed at the time of the investigation. The normal rate of excavation usually does not allow the recording of an equilibrium water level. Additionally, ground water levels are subject to seasonal variation or changes in local drainage conditions.

Boring and sampling methods are generally undertaken in accordance with B.S. 5930 : 1999, 'Code of practice for site investigations'. Laboratory testing is carried out in accordance with B. S. 1377 : 1990, 'Methods of Test for Soils for Civil Engineering Purposes', unless otherwise stated.

This report is produced for the benefit of the Client alone. It should be noted that the investigation was made for the form of development described and may be inappropriate to another form of development. No responsibility can be accepted for any consequences of this information being passed to a third party who may act upon its content.

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## 1.0 INTRODUCTION

It is proposed to re-develop a large plot of land to the rear of 13A Queen Street, Deal, Kent, CT14 6ET. At the request of Whiteacre Homes Limited, an investigation was carried out to provide information on ground conditions for a piled foundation design.

Soiltec Laboratories Limited was instructed to complete the required investigation work by email dated 22<sup>nd</sup> August 2017 in response to our quotation for the ground investigation.

At the time of this investigation details of the form of construction and foundation loads were not known.

The comments given and opinions expressed in this report are based on the ground conditions encountered during the site works, on the results of tests made in the field and in the laboratory together with other available information. The possibility of variations in ground conditions elsewhere on the site should not be overlooked.

## 2.0 DESCRIPTION AND GEOLOGY OF THE SITE

The site is located to the rear of Queen Street with access from Wellington Road to the south. The site comprises a roughly rectangular level plot of ground with some hardcover and broken tarmac hard standing. No significant vegetation is present on the site.

From an examination of the online BGS geological map for the area the solid geological deposit appears as the Seaford Chalk Formation. Superficial deposits are recorded to mantle the site and comprise Beach and Tidal Flat deposits.

**Seaford Nodular Chalk** is a soft white friable microporous limestone composed of coccolith biomicrites with a varying proportion of larger shell fragments. Flint characterises the Chalk, occurring as nodular courses, tabular beds and linings to fractures. At various levels clay sized material occurs as marl seams and partings. Close to the surface the upper few metres are invariably discoloured brown, due to leaching from the overlying strata. The interface with any overlying stratum is invariably extremely irregular as a result of localised weathering. Weathering by frost action may extend to a depth of several metres.

## 3.0 FIELD WORK

The fieldwork undertaken comprised the excavation of one borehole using shell & auger equipment. Site works was carried out during 29<sup>th</sup> to 30<sup>th</sup> August 2017. The table below indicates the number of boreholes and depths achieved.

Borehole	Depth (m bgl)
SA1	20.00

The borehole location is shown on the block plan included with this report.

A note of the strata encountered in the borehole together with a record of the ground water conditions are presented in the borehole records.

Small disturbed soil samples were taken at the depths shown on the records and were returned to the laboratory for examination and testing.

Standard Penetration Tests (SPT/CPT) were carried out generally in accordance with BS EN ISO 22476-3:2005 + A1:2011 to determine relative density or hardness of the soils encountered. The results of penetration resistance are shown on the borehole records and the un-corrected N values are included in tabular form in this report.

Equivalent undrained shear strengths ( $c_u$ ) derived from N values from cohesive soils are based on relationship suggested by Stroud, M. A. (1974) "The standard penetration test in insensitive clays and soft rock," Proceedings of the 1st European Symposium on Penetration Testing, Sweden: Stockholm, vol. 2(2), 367-375.

Plasticity Index	Equivalent $C_u$
<20	(6-7)N
>20 <30	( 4-5)N
>30	4.2 N

The angle of shearing resistance ( $\phi$ ) of the coarse grained soils has been derived from the uncorrected standard penetration resistance N value using the relationship after Peck, Hanson and Thorburn (1967).

On the basis of the inspection of recovered samples, the chalk has been classified in accordance with CIRIA Report C574 (2002), *Engineering in Chalk*, with the chalk generally comprising predominantly Dc to C5 grade chalk (informally known as 'putty chalk'). The sampling will have resulted in disturbance of the material and the recovered samples may not be entirely indicative of in-situ condition

#### 4.0 LABORATORY TESTING

A program of laboratory testing was carried out on selected soil samples as follows

Test	No.
Natural moisture content	2
Liquid & Plastic Limits	2
BRE SD-1 Suite	2

Liquid Limits (LL) of between 21% and 31% and Plastic Limits (PL) of between 16% and 21% were recorded for the samples tested. All results are summarised under Laboratory Test Results Table 1. Table 1 includes a classification of the soils in terms of B. S. 5930 plasticity and NHBC volume change potential. The latter utilises a modified Plasticity Index which takes into account the granular content of the clay where appropriate.

Low soluble sulphates together with near neutral pH levels were recorded.

The tests, unless otherwise stated, were carried out in accordance with British Standard 1377 : 1990 "methods of Test for Soils for Civil Engineering Purposes".

## **5.0 DISCUSSION**

### **5.1 General**

The investigation confirmed the anticipated solid deposit for the site. Below a significant mantle of made ground, 2.50m thick, firm orange brown sandy silty CLAY was encountered. The interface between this drift deposit is unclear as a mix of chalk and sandy clay was encountered from 3.50m bgl to 7.10m bgl. Clear CHALK was then penetrated to the full depth of the borehole at 20.00m bgl. Full descriptions of the strata encountered are shown on the borehole records.

### **5.2 Ground Water**

Ground water was encountered at 7.10m bgl and rose to 6.80m bgl in 20 mins. At the end of the first day the water was recorded at 8.50m bgl. At the start of the following day, the ground water was measured at 4.40m bgl.

### **5.3 Foundations**

The foundation design must be suitable for the conditions present at the site. Foundations should be taken through any topsoil or made ground, below any root zone, disturbed or desiccated soil. They should also extend below any former foundations located on the site and not impose additional loads on existing retaining structures or drainage.

As indicated above, it had previously been determined that a piled solution be adopted for the proposed development. Nothing encountered during this investigation would counter this assumption.

It is recommended that this report is presented to a specialist piling contractor to enable a full pile design to be worked up. Notice should be given to the thickness of made ground encountered on the site, the level of ground water encountered and the rather weak nature of the CHALK encountered throughout the borehole.

### **5.4 Ground floor slabs**

N.H.B.C. Chapter 5.1 recommends suspended floor construction where modified Plasticity Index is greater than 10%. The results of the laboratory tests indicate the site to be classified as shrinkable with modified PI greater than 10%. Therefore all ground floors must be suspended.

Where depth of fill is greater than 0.60m suspended ground floors must be adopted.

It is also standard to adopt suspended ground floor slabs when foundations exceed 1.50m bgl.

## 5.5 Sulphates and Acidity

A low concentration of soluble sulphate was found within the samples tested. It is therefore concluded that a Design Sulphate Class of DS-1 as indicated in Table C2 – Aggressive Chemical Environment for concrete (ACAC) Classification for Brownfield Locations may be taken for the site. The recorded pH values are between 7.8 and 7.9 and since ground water was encountered it can be assumed to be mobile, therefore, the ACEC site classification is AC-1.

A handwritten signature in black ink, appearing to read 'M King', is written over a faint, circular stamp or watermark.

Martin King  
Director

For and on behalf of

Soiltec Laboratories Limited

## **LABORATORY TEST RESULTS**





**SUMMARY OF LABORATORY TEST RESULTS**

Date : Sept. 2017

Client : Whiteacre Homes Ltd

Report Number : 07750/23

Location :. 13a Queen Street, Deal, Kent. CT14 6ET

BH/TP	Depth (m)	INDEX PROPERTIES					Plasticity Classification (BS 5930 : 1999)	Modified Plasticity Index(NHBC Ch. 4.2)	Volume Change Potential (NHBC 4.2)
		Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing 425µm sieve			
SA1	1.50	14.5	21	16	5	89	ML	4	NP
SA1	3.00	22.0	31	21	10	100	CL	10	NP

Abbreviations:

C – Clays/silty clays

M – Silts

O – Organic

L – Low plasticity

I - Intermediate plasticity

H – High plasticity

V – Very high plasticity

E – Extremely high plasticity

NP – Non plastic

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## CHEMICAL ANALYSIS REPORT

CLIENT: Whiteacre Homes  
SITE: 13a Queen Street, Deal, Kent  
DATE SAMPLED: 29/08/17  
SAMPLE REF: 07750/23  
DATE SAMPLES RECEIVED: 29/08/17  
SAMPLED BY: Soiltec  
TESTED BY: Soiltec (AH/RJ)

REPORT No: 07750/23  
REPORT DATE: 14/09/17

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### RESULTS

Sample Location	BH1	BH1
Depth (m)	1.5	3.0
Stone Content >2mm (% w/w)	<0.1	<0.1
pH	7.8	7.9
Water Soluble Sulphate (mg/l) as SO <sub>4</sub> <sup>2-</sup>	218	51
Water Soluble Chloride (mg/l) as Cl <sup>-</sup>	16.0	19.9
Water Soluble Nitrate (mg/l) as NO <sub>3</sub> <sup>-</sup>	5.2	<1.5
Water Soluble Magnesium (mg/l) as Mg <sup>2+</sup>	4.7	3.1

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**COMMENTS** The analysis was carried out in accordance with BS1377 Part3:1990 i.e. the sulphate determination was carried out on the material passing a 2mm sieve.

## **IN-SITU TEST RESULTS**

Soiltec			RESULTS OF STANDARD PENETRATION TESTS					
			Date : Sept. 2017			Report No: 07750/23		
Client : Whiteacre Homes Ltd			Location : 13a Queen Street, Deal, Kent.					
Borehole No.	Depth at start of Test (m)	Type of Test	Seating Drive	Test Drive				N-Value
			Blows for 150mm Penetration	Blows for 75mm penetration				
SA1	1.50	C	3	2	1	2	2	7
SA1	3.00	S	2	2	1	1	3	7
SA1	4.50	S	3	3	3	3	4	13
SA1	6.00	S	5	4	3	4	3	14
SA1	7.50	S	5	2	3	2	3	10
SA1	9.00	S	6	3	3	3	3	12
SA1	10.50	S	5	3	2	3	3	11
SA1	12.00	S	3	2	2	2	3	9
SA1	13.50	S	3	2	3	2	3	10
SA1	15.00	S	5	5	3	5	3	16
SA1	16.50	S	6	4	4	4	5	17
SA1	18.00	S	7	4	5	6	7	22
SA1	19.50	S	7	5	6	7	7	25

C denote Cone Penetration Test  
S denotes Standard Penetration Test

## **BOREHOLE LOG**

Carried out for : Whiteacre Homes Limited

Location : 13a Queen Street, Deal, Kent

Elevation :

Coordinates :

BH NO : SA1

Report No : 07750/23

Date : 29-30/08/17

Depth (m)	Legend	Description	Depth (m)	Sample Depth (m)	Sample No.	Type	N - Value	SPT/CPT				Installation	Remarks
								10	20	30	40		
0		Ground Surface	0										
		<b>MADE GROUND</b> Loose sand, brick and dark brown clay fill											
1				1.50	1	D							
2				1.50-1.95	2	SS	7	×					
			-2.5										
3		<b>SANDY CLAY</b> Soft to firm weathered brown sandy very silty CLAY		3.00	3	D							
				3.00-3.45	4	SS	7	×					
4		<b>CLAYEY CHALK</b> Soft to firm off white to light brown soft chalk in matrix of sandy CLAY. (Disturbed Seaford Formation)		4.50	5	D							
5				4.50-4.95	6	SS	13		×				
6				6.00	7	D							
				6.00-6.45	8	SS	14		×				
7													
			-7.1										
8		<b>CHALK</b> Off white moderately weak structureless CHALK with isolated flints. Locally with slightly stronger bands at 15.00m to 18.00m		7.50	9	D							
				7.50-7.95	10	SS	10		×				
9				9.00	11	D							
				9.00-9.45	12	SS	12		×				
10													
				10.50	13	D							
11				10.5-10.95	14	SS	11		×				
12													

Excavation Method : Shell & Auger

Borehole Diam : 150mm

Casing Depth : 19.50m

Ground Water : Water strike 7.10m

Soiltec Laboratories Limited

FIG : 1

Logged By : IM/MK

Sheet : 1 of 2

Carried out for : Whiteacre Homes Limited

Location : 13a Queen Street, Deal, Kent

Elevation :

Coordinates :

BH NO : SA1

Report No : 07750/23

Date : 29-30/08/17

Depth (m)	Legend	Description	Depth (m)	Sample Depth (m)	Sample No.	Type	N - Value	SPT/CPT				Installation	Remarks	
								10	20	30	40			
13		<b>CHALK</b> Off white moderately weak structureless CHALK with isolated flints. Locally with slightly stronger bands at 15.00m to 18.00m		12.00	15	D	9							
				12.0-12.45	16	SS		×						
				13.50	17	D								
				13.5-13.95	18	SS		10	×					
				15.00	19	D								
				15.0-15.50	20	SS		16		×				
				16.50	21	D								
				16.5-16.95	22	SS		17			×			
				-18										
				18										
19		<b>CHALK</b> White moderately strong structureless CHALK with few flints.		18.00	23	D	22							
				18.0-18.45	24	SS				×				
				19.50	25	D								
20			-19.95	19.5-19.95	26	SS	25			×				
21		End of Log												
21		<div style="border: 1px solid black; padding: 5px;"> <p>WATER OBSERVATIONS:</p> <p>29/8/17 Water strike at 7.10m Water level 6.80m after 20mins. Water level at end of day 8.50m</p> <p>30/8/17 Water level at start of day 4.40m Water level at end of day 6.00m</p> </div>												
22														
23														
24														

Excavation Method : Shell & Auger

Borehole Diam : 150mm

Casing Depth : 19.50m

Ground Water : Water strike 7.10m

Soiltec Laboratories Limited

FIG : 1

Logged By : IM/MK

Sheet : 2 of 2

## **SITE PLAN**



