

Date: 20th March 2015

Our Ref: LW26047

GEOTECHNICAL
AND
ENVIRONMENTAL
ENGINEERS

Jason Richardson
DART
The Old Stables
Ecclesden Lane
Angmering
West Sussex
BN16 4DQ

Head Office
The Old Dairy
Swanborough Farm
Swanborough
Lewes
East Sussex
BN7 3PF

Dear Jason,

**Hascombe, Tamarisk Way, East Preston, West Sussex
Ground Investigation**

Outlined below are the findings from the recent works carried out in connection with the development proposals for the above site, understood to comprise the remodelling and extension to the existing property.

The objectives of the works were to:

- a) Investigate the shallow ground and groundwater conditions prevailing at the site; and
- b) Provide advice to assist others in undertaking design of spread foundations and ground floors.

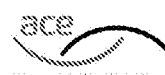
The scope of the commission and the terms and conditions under which the work was undertaken are set out within the offer letter Q15-0086 dated 6th February 2015. The instruction to proceed was received from the client in an email dated 6th February 2015.

The analysis and discussions contained in this report are based on the ground and groundwater conditions encountered during the site work and in situ testing procedures. The possibility of a variation in ground and groundwater conditions away from the points investigated should not be overlooked. Groundwater conditions can vary both seasonally and due to other effects.

It is noted that the groundworks were undertaken and the report was prepared specifically for the Client's project and the recommendations given may not be appropriate to alternative schemes. The copyright for the report and licence for use shall remain vested in Ashdown Site Investigation Ltd (the Company) who disclaim all responsibility or liability (whether at common law or under the express or implied terms of the Contract between the Company and the Client) for any loss or damage of whatever nature in the event that this report is relied on by a third party, or is issued in circumstances or for projects for which it was not originally commissioned, or where the exploratory records and test results contained therein are interpreted by anyone other than the Company.

Company Registration Number

242 6786



community improving lives environment

INVESTOR IN PEOPLE

Site Works

The site work was carried out on the 20th February 2015. Four boreholes (designated WS1 to WS4) were drilled by dynamic sampling techniques, each to a depth of 5m below ground level. In addition two hand dug pits were excavated to a depth of 0.8m to enable inspection of the existing foundations at the property. A site plan is presented as Figure 1.

Laboratory Testing

Geotechnical testing was undertaken by Ashdown Site Investigation Ltd in accordance with the methods given in BS1377:1990 Parts 1 to 8 'Methods of test for soils for civil engineering purposes'. Chemical testing to enable classification of the chemical environment of soils in accordance with BRE SD1 was undertaken by an external UKAS accredited laboratory. Notes to assist with the interpretation of the tests are appended to this report.

Ground Conditions

The exploratory hole logs, in situ and laboratory test results are attached to this report. Notes to assist in the interpretation of the records are also contained in this report.

Stratigraphy

Exploratory holes WS1, WS2, and TP1 were excavated through a surface cover of asphalt and/or concrete some 30mm to 130mm in thickness. Beneath the hardstanding a sandy gravel sub-base layer was noted in boreholes WS1 and WS2 persisting to depths of 500mm and 100mm, respectively. Within boreholes WS3 and WS4, topsoil some 100mm to 200mm thick was recorded. Trial pit TP2 encountered paving slabs over concrete some 180mm in total thickness.

Made ground, generally comprising sandy gravelly clay was recorded within trial pits TP1 and TP2 extending to depths of 0.6m and in excess of 0.8m below ground level, respectively. The gravel fraction comprised variable quantities of brick, flint, clinker, concrete and chalk.

Underlying the made ground/surfacing, the investigation progressed into undisturbed firm to stiff clay deposits containing a variable proportion of sand and gravel of flint and chalk. These soils were recorded to the full depths of exploratory holes WS1, WS2, TP1 and TP2 and to depths of 3.1m and 4.6m below ground level in boreholes WS3 and WS4, respectively. These soils are considered to be representative of the River Terrace Deposits indicated to be present on the geological map.

Beneath the River Terrace Deposits, boreholes WS3 and WS4 encountered chalk deposits to the full depth of investigation.

The undisturbed chalk deposits are considered to be representative of the White Chalk Subgroup indicated on the British Geological Survey 1:50,000 map.

Groundwater and Stability

Groundwater was recorded at depths of between 1.40m and 1.80m during the site works and at depths of 1.95m and 2.20m during subsequent monitoring visits. It is noted that the groundwater levels may be influenced by the tides.

Excavations beneath the water table are likely to require active groundwater control to maintain adequately dry working conditions and excavation stability.

It is to be expected that unsupported excavations within the fine grained River Terrace Deposits may remain stable for a short period of time. Where excavations are required to remain stable in the medium or long term within the fine grained River Terrace Deposits or in any case where stable excavations are required within any made ground or coarse grained soils, excavations should either be suitably supported or side slopes should be battered back to a safe angle of repose.

Where personnel access is required into any excavation, its stability must be assessed by a suitably qualified, experienced and responsible person. In any case where excavation sides are not battered back to a safe angle of repose, it is recommended that personnel access into unsupported excavations greater than 1.2m depth should be prohibited.

Particular attention must be paid to ensuring the stability of nearby structures, services and neighbouring sites as well as the road frontages.

Existing Foundations

Details of the foundations exposed within the foundation inspection pits are included as Figure 2 of this report.

The foundations appeared to comprise mass concrete spread foundations bearing at a depth of 0.8m below existing ground level.

The foundation exposed in trial pit TP1 was supported within the River Terrace Deposits. Within trial pit TP2 the foundation appeared to be founded within reworked natural deposits.

Geotechnical Assessment

The geotechnical assessment has been prepared in connection with the development proposals shown on the drawing produced by Neil Holland (Reference 04 revision F, dated December 2014).

In summary this drawing indicates the proposed development to comprise the construction of new extensions along the western and southern elevation of the existing building.

At the time of writing, no details were available concerning the specific loads likely to be applied to the foundations.

Foundations

Soil Shrinkage/Heave Potential

The fine grained soils of the River Terrace Deposits have been classified as clays of low to intermediate plasticity and with plasticity indices in the range of 13% to 27% the soils may be expected to exhibit a low to medium volume change potential.

It is recommended that the design of precautions against shrinkage and heave for any new foundation system should assume a medium volume change potential for the fine grained River Terrace Deposits soils and take into account current guidance such as that given by the Building Research Establishment (BRE) or the National House Builders Council (NHBC). The undisturbed chalk deposits of the White Chalk Subgroup may be considered to be non-plastic and hence non-shrinkable.

Whilst this report has been prepared to provide advice to assist designers in undertaking detailed design, the report itself does not represent a detailed design statement. Detailed foundation design, including assessment of minimum founding depths for spread foundations, requirements for sleeving or reinforcing of piled foundations and requirements for placement of void formers etc., should take into account the volume change potential of the soil and the presence of trees (previous, present and proposed).

It is recommended that an arboriculturalist should be consulted to establish the species and maturity of existing trees in the area of the proposed works. It would be prudent to review any available historical photographs or detailed site plans (if available) to establish the location of any felled trees that may affect foundation design. The information obtained from the arboricultural survey, information on proposed planting schemes and the findings of this report should be provided to the structural engineer responsible for the design of foundation systems.

Spread Foundations

Unless evidence exists to the contrary, all made ground and any soils disturbed by the construction or removal of any previously existing foundations or services should be regarded as being variable in nature and state of compaction and, as such, unsuitable as a founding medium for shallow footings. New footings should be constructed so as to bear below such soils and onto undisturbed, competent, natural deposits.

For design purposes, a net allowable bearing capacity of 100kN/m² may be assumed for spread (pad or strip) foundations up to 1.0m across bearing within the fine grained River Terrace Deposits of minimum firm consistency. The quoted bearing capacity is expected to limit settlement to less than 25mm. In general a minimum depth to formation of 0.9m should be adopted, although foundations should be deepened where made ground is found to extend below this depth or where there is a requirement to protect foundations against seasonal soil volume changes induced by trees.

Care must be taken to ensure that new foundations do not undermine or impose additional loading (vertical or lateral) on existing foundations. Similarly, the construction of new foundations should be undertaken carefully and monitored in those situations where temporary works could affect existing foundations.

Whilst an increased bearing capacity would be available should the foundations be deepened to bear within the chalk deposits, given the depth to the chalk and that groundwater was recorded at relatively shallow depths, it is considered that the construction of conventional deep spread foundations would be problematic. Alternatively consideration could be given to adopting a piled foundation solution.

Further investigation in the form of cable percussion boreholes would be required to provide soil parameters for the design of piled foundations.

Aggressivity to Concrete

Assessment of the chemical analysis of the soil indicates a sulphate content falling into Design Sulfate Class DS-1 of Table C1 of the Building Research Establishment Special Digest No 1 "Concrete in aggressive ground", 2005. The results of the pH tests indicate that the underlying soils are acidic to alkaline.

In accordance with the digest, a DS-1 Design Sulfate Class and an AC-1 ACEC classification should be assumed as a minimum for the design of concrete in contact with the ground.

Ground Floors

In view of the variable thickness of made ground and the presence of soils of medium volume change potential, it is recommended that ground floors for all sensitive structures should be suspended.

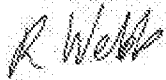
Current guidance suggests that ground bearing floor slabs may, however, be considered where made ground soils are not present or are to be removed from beneath building footprints and the depth of foundations required to protect against seasonal soil volume changes close to trees is less than 1.5m. In such circumstances further works should be undertaken to demonstrate, that close to the time of construction, no significant soil desiccation is present. If ground bearing floors are adopted it is recommended that the potential for differential movement, both between the floor slab and walls and across the floor slab itself, should be anticipated. Such floors should be fully debonded from walls. Formations should be adequately proof rolled and any excessively soft materials excavated and replaced with a suitable, well graded granular fill. The depth of any fill should be limited to a maximum of 600mm unless placed to an engineering specification designed to limit internal settlement of the fill materials to a tolerance to be advised by the designer.

The detailing of services through, or under, ground-bearing floors should incorporate flexible connections and, where appropriate, enhanced falls.

It is understood that a swimming pool is proposed as part of the proposed development, although no specific details were available at the time of writing. Consideration should be given to the relatively shallow groundwater table and the consequent requirements to consider measures to counteract hydrostatic uplift forces that may act on the swimming pool floor, both during construction and when in service but in an empty condition.

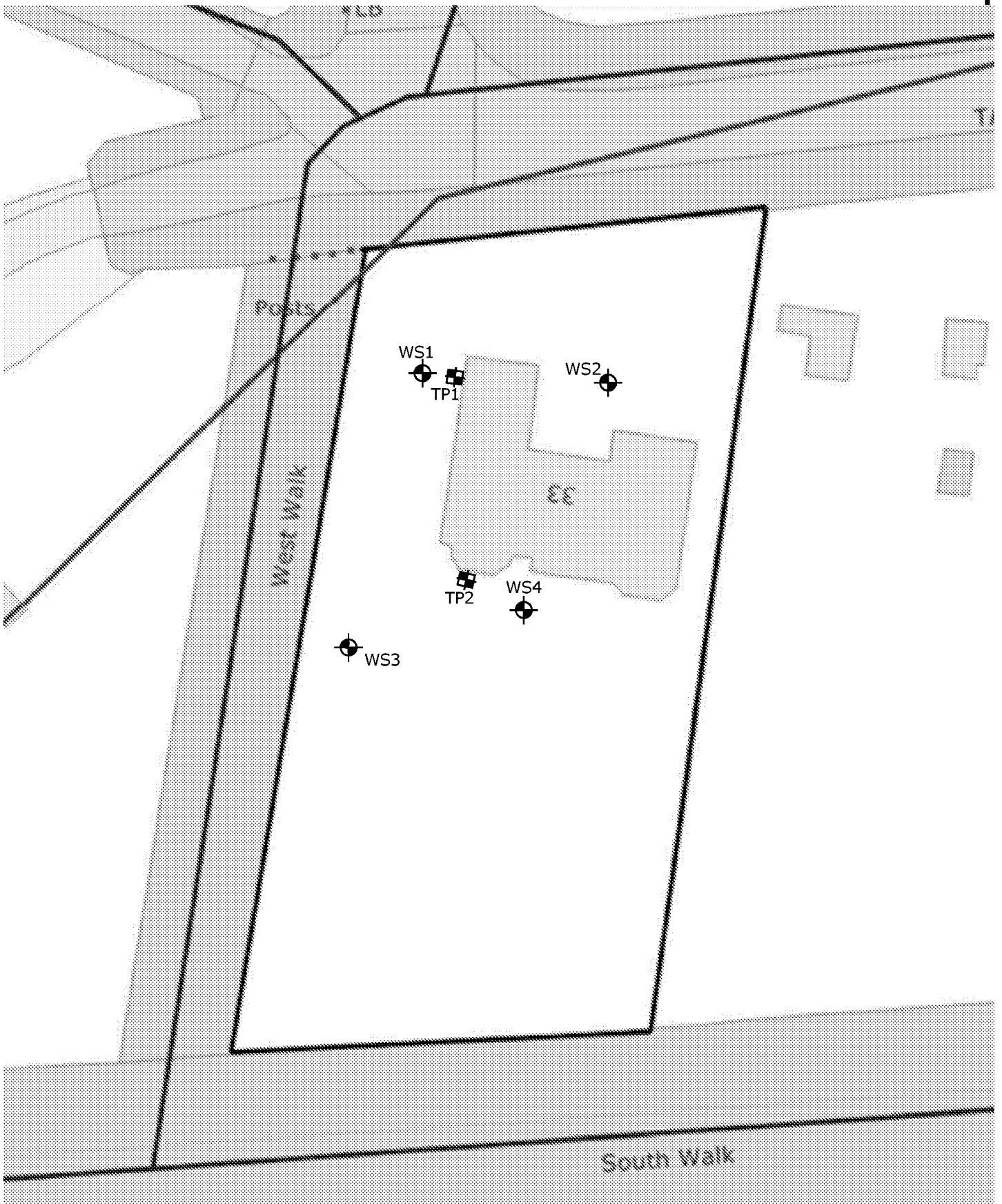
If you have any questions regarding the above, please do not hesitate to contact us.

Yours sincerely

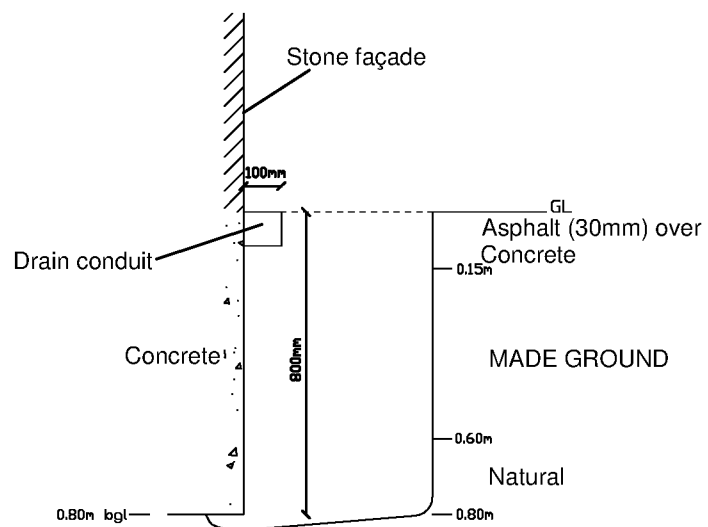


Rebecca Webb

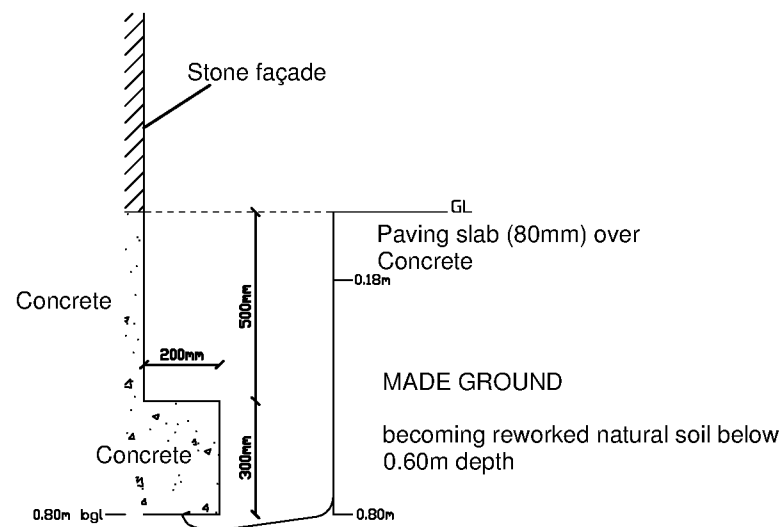
for Ashdown Site Investigation Limited
encl.



TP1



TP2



ASHDOWN SITE INVESTIGATION L · I · M · I · T · E · D The Old Dairy, Swanborough Farm, Swanborough, Lewes, East Sussex		
DRAWN BY: TSH	DATE: March 2015	SCALE (at A4): 1:20
SITE: Hascombe Tamarisk Way East Preston West Sussex		
REPORT REF.: LW26047	FIGURE NO.: 2	
DRAWING TITLE: Foundation Details		

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.
U**	Full penetration obtained but limited sample recovered.
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
E	Environmental Suite (including a jar sample, tub sample and 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 to achieve the standard penetration of 300mm (the 'N' value) is shown after the test index letter, but the seating blows through the initial 150mm penetration are not reported unless the full penetration of 450mm cannot be achieved. In the latter case, the symbols below are added to the test index letter:-
S(R)	Refusal of standard penetration test. Blow count reported includes seating blows. Total penetration of refused SPT reported in mm in brackets on borehole record.
So	'Split spoon' SPT sampler sank under its own weight. The test is usually completed when the number of blows reaches 50 (25 blows for seating count). The depths of both the top and bottom of the test drive are shown in the sample column on the Borehole Record. If a sample is not recovered in the sampler, a disturbed sample is taken over the depth of the test as boring continues.
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, 60° 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.

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) and Part 2 Principles of classification (BS EN 14688-2:2004) as well as the BS5930:1990 + A2:2010 code of Practice for Site 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

Based on BS EN ISO 14688-1:2002

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

Based on BS EN ISO 14688-2:2004

Note: The undrained shear strength of the soils is measured either by laboratory testing or in the field using hand penetrometer or 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 BS5930:1990 + A2:2010 code of Practice for Site 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 many blows of geological hammer to fracture it	100 to 250
Extremely Strong	Can only be chipped with geological hammer	Greater than 250

The terms describing discontinuity and bedding spacing are as follows:

Bedding Thickness

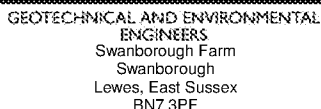
Very Thick	>2000mm
Thick	2000-600mm
Medium	600-200mm
Thin	200-60mm
Very Thin	60-20mm
Thickly Laminated	20-6mm
Thinly Laminated	<6mm

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.



Site Name: Hascombe, Tamarisk Way, East Preston, West Sussex

Job No.: LW26047

Start Date: 20/02/2015

End Date: 20/02/2015

Remarks: Groundwater encountered at 1.80m depth. Borehole stable on completion. Dynamic probe carried out adjacent to borehole.	Excavation Method: Dynamic Sampling
	Borehole Diameter: Various
	Made By: PM



Site Name: Hascombe, Tamarisk Way, East Preston, West Sussex

Job No.: LW26047

Start Date: 20/02/2015

End Date: 20/02/2015

Remarks:

Groundwater encountered at 1.80m depth.

Borehole stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampling

Borehole Diameter: Various

Made By: PM



GEOTECHNICAL AND ENVIRONMENTAL
ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Borehole No.: WS3

Site Name: Hascombe, Tamarisk Way, East Preston, West Sussex

Job No.: LW26047

Start Date: 20/02/2015

End Date: 20/02/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
							0.10	Topsoil.
	D	0.50						Firm to stiff orange brown mottled grey slightly gravelly CLAY. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	V	1.00		100				
	D H	1.50		115				
	H	1.80		140			1.80	
							2.10	Firm off white and brown gravelly CLAY. Gravel is angular medium to coarse flint and chalk. (River Terrace Deposits)
	D	2.50						Firm to stiff grey brown and off white slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse chalk and occasional flint. (River Terrace Deposits)
							3.10	
	D	3.50						Structureless CHALK recovered as very silty gravel. Clasts are very weak low to medium density off white with much orange staining. Matrix is off white with much orange staining. With occasional flints. (White Chalk Subgroup, Grade Dc)
	J T	3.80						
	J T	3.90						
	J T	4.10					4.20	
	D	4.50						Structured very weak low to medium density off white CHALK recovered as silt and gravel. With occasional flints. (White Chalk Subgroup, Grade C or better)
							5.00	

Remarks:

Groundwater encountered at 4.80m depth rising to 1.80m in 60 minutes.

Borehole stable on completion.

Dynamic probe carried out adjacent to borehole.

Standpipe installed to 5.00m depth; 5.00m to 1.00m slotted pipe with gravel surround; 1.00m to ground level plain pipe with bentonite seal; completed with end cap and security cover concreted flush with surface.

Excavation Method: Dynamic Sampling

Borehole Diameter: Various

Made By: PM



GEOTECHNICAL AND ENVIRONMENTAL
ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

Borehole No.: WS4

Site Name: Hascombe, Tamarisk Way, East Preston, West Sussex

Job No.: LW26047

Start Date: 20/02/2015

End Date: 20/02/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
							0.20	Topsoil.
	D	0.40						Firm brown sightly sandy gravelly CLAY. Gravel is angular to subangular fine to medium flint. (River Terrace Deposits)
	H	0.60		60			0.60	Firm to stiff orange brown slightly gravelly slightly sandy CLAY. Gravel is angular to subangular fine to meidum flint. (River Terrace Deposits)
	D H	0.80		90				
	V	1.00		130			1.10	Firm to stiff orange mottled grey slightly gravelly slightly sandy CLAY with occasional black iron staining. Gravel is fine to medium flint. (River Terrace Deposits)
	H	1.40		60				
	D	2.20						
	D	3.20					3.40	
	J T	3.50					3.80	Firm to stiff sandy gravelly CLAY with black iron staining. Gravel is subangular to rounded fine to coarse flint. (River Terrace Deposits)
	D	4.20					4.60	Firm to stiff grey brown and off white slightly gravelly slightly sandy CLAY. Gravel is subangular to subrounded fine to coarse chalk and occasional flint. (River Terrace Deposits)
	D	4.90					5.00	Structured off white very weak low to medium density CHALK recovered as comminuted chalk. (White Chalk Subgroup, Grade C or better)

Remarks:

Groundwater encountered at 1.40m depth.

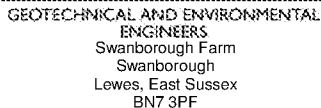
Borehole collapsed to 4.00m depth on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampling

Borehole Diameter: Various

Made By: PM



Site Name: Hascombe, Tamarisk Way, East Preston, West Sussex

Job No.: LW26047

Start Date: 20/02/2015

End Date: 20/02/2015

Samples and Testing				Strata		
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
D V P	0.70 0.80 0.80		100		0.13	Asphalt (30mm) over, Concrete.
					0.60	MADE GROUND: Light brown slightly sandy gravelly clay. Gravel is subangular to rounded fine to medium flint, brick and concrete.
					0.80	Stiff light brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint. (River Terrace Deposits)
P	0.80	1.25	12			End of Pit
P	1.25	1.55	12			

Trial pit dry and stable on completion.

Excavation Method: Hand Dug

Dimensions:

Made By: DE



GEOTECHNICAL AND ENVIRONMENTAL
ENGINEERS
Swanborough Farm
Swanborough
Lewes, East Sussex
BN7 3PF

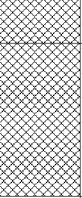
Trial Pit No.: TP2

Site Name: Hascombe, Tamarisk Way, East Preston, West Sussex

Job No.: LW26047

Start Date: 20/02/2015

End Date: 20/02/2015

Samples and Testing				Strata		
Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
	From (m)	To (m)				
					0.00	Ground Level
D V P					0.18	Paving Slab (80mm) over, Concrete.
						MADE GROUND: Light brown slightly sandy gravelly clay. Gravel is subangular to rounded fine to coarse brick, flint, clinker, concrete and chalk. becoming reworked/ natural below 0.60m depth.
	0.50		>130			
	0.80	1.25	18		0.80	
P	1.25	1.40	15			End of Pit

Remarks:

Trial pit dry and stable on completion.

P* - blow count for 150mm penetration only.

Excavation Method: Hand Dug

Dimensions:

Made By: DE

ASHDOWN SITE INVESTIGATION LTD

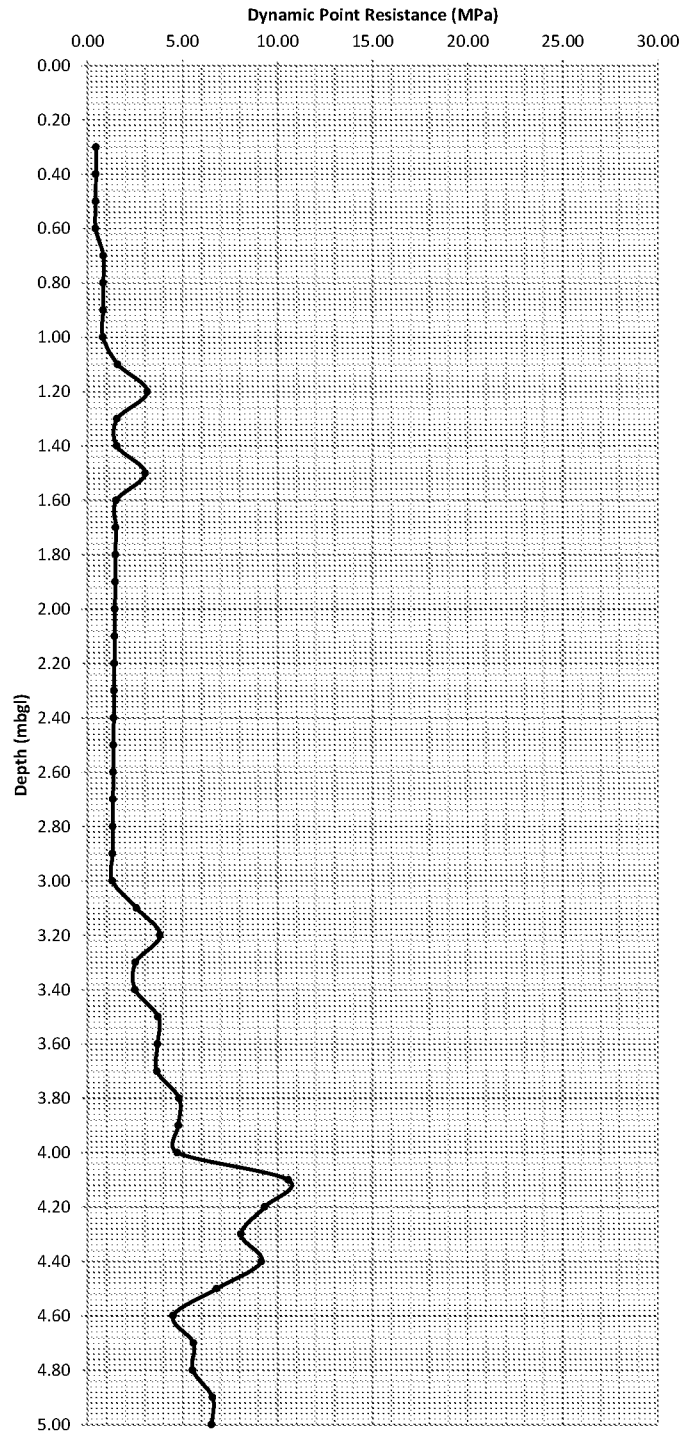
Dynamic Probe Record

SITE Hascombe, Tamarisk Way, East Preston, West Sussex

Report Ref.

LW26047

Test Location Reference		WS1		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	0.25	0.40	0.46	0.44
0.40	0.25	0.40	0.46	0.43
0.50	0.25	0.40	0.46	0.43
0.60	0.25	0.40	0.46	0.42
0.70	0.5	0.20	0.93	0.84
0.80	0.5	0.20	0.93	0.82
0.90	0.5	0.20	0.93	0.81
1.00	0.5	0.20	0.93	0.80
1.10	1	0.10	1.86	1.59
1.20	2	0.05	3.72	3.14
1.30	1	0.10	1.86	1.55
1.40	1	0.10	1.86	1.54
1.50	2	0.05	3.72	3.04
1.60	1	0.10	1.86	1.50
1.70	1	0.10	1.86	1.49
1.80	1	0.10	1.86	1.47
1.90	1	0.10	1.86	1.45
2.00	1	0.10	1.86	1.44
2.10	1	0.10	1.86	1.42
2.20	1	0.10	1.86	1.41
2.30	1	0.10	1.86	1.39
2.40	1	0.10	1.86	1.38
2.50	1	0.10	1.86	1.36
2.60	1	0.10	1.86	1.35
2.70	1	0.10	1.86	1.34
2.80	1	0.10	1.86	1.32
2.90	1	0.10	1.86	1.31
3.00	1	0.10	1.86	1.30
3.10	2	0.05	3.72	2.57
3.20	3	0.03	5.57	3.82
3.30	2	0.05	3.72	2.52
3.40	2	0.05	3.72	2.50
3.50	3	0.03	5.57	3.72
3.60	3	0.03	5.57	3.68
3.70	3	0.03	5.57	3.65
3.80	4	0.03	7.43	4.82
3.90	4	0.03	7.43	4.78
4.00	4	0.03	7.43	4.74
4.10	9	0.01	16.72	10.56
4.20	8	0.01	14.86	9.31
4.30	7	0.01	13.01	8.08
4.40	8	0.01	14.86	9.15
4.50	6	0.02	11.15	6.80
4.60	4	0.03	7.43	4.50
4.70	5	0.02	9.29	5.58
4.80	5	0.02	9.29	5.53
4.90	6	0.02	11.15	6.58
5.00	6	0.02	11.15	6.53



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.7457
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

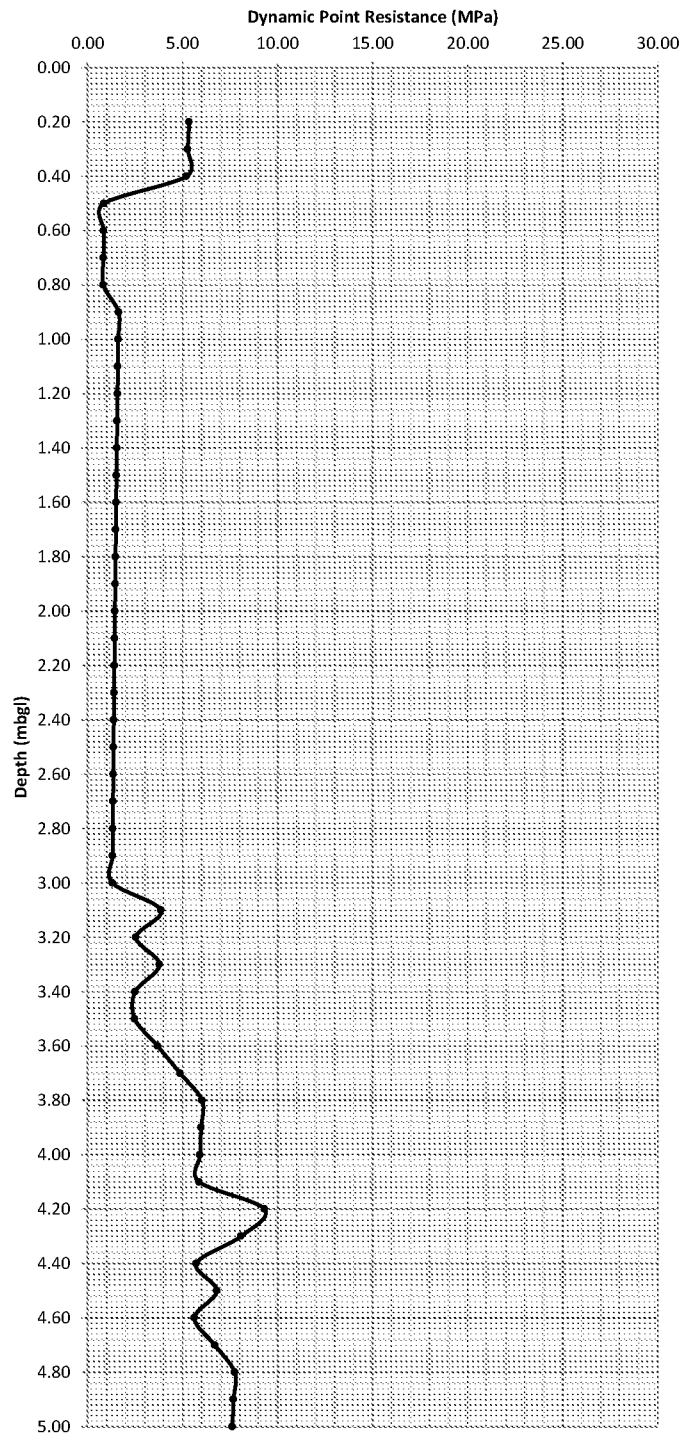
Dynamic Probe Record

SITE Hascombe, Tamarisk Way, East Preston, West Sussex

Report Ref.

LW26047

Test Location Reference			WS2	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	3	0.03	5.57	5.34
0.30	3	0.03	5.57	5.27
0.40	3	0.03	5.57	5.20
0.50	0.5	0.20	0.93	0.86
0.60	0.5	0.20	0.93	0.85
0.70	0.5	0.20	0.93	0.84
0.80	0.5	0.20	0.93	0.82
0.90	1	0.10	1.86	1.63
1.00	1	0.10	1.86	1.61
1.10	1	0.10	1.86	1.59
1.20	1	0.10	1.86	1.57
1.30	1	0.10	1.86	1.55
1.40	1	0.10	1.86	1.54
1.50	1	0.10	1.86	1.52
1.60	1	0.10	1.86	1.50
1.70	1	0.10	1.86	1.49
1.80	1	0.10	1.86	1.47
1.90	1	0.10	1.86	1.45
2.00	1	0.10	1.86	1.44
2.10	1	0.10	1.86	1.42
2.20	1	0.10	1.86	1.41
2.30	1	0.10	1.86	1.39
2.40	1	0.10	1.86	1.38
2.50	1	0.10	1.86	1.36
2.60	1	0.10	1.86	1.35
2.70	1	0.10	1.86	1.34
2.80	1	0.10	1.86	1.32
2.90	1	0.10	1.86	1.31
3.00	1	0.10	1.86	1.30
3.10	3	0.03	5.57	3.86
3.20	2	0.05	3.72	2.55
3.30	3	0.03	5.57	3.79
3.40	2	0.05	3.72	2.50
3.50	2	0.05	3.72	2.48
3.60	3	0.03	5.57	3.68
3.70	4	0.03	7.43	4.87
3.80	5	0.02	9.29	6.03
3.90	5	0.02	9.29	5.97
4.00	5	0.02	9.29	5.92
4.10	5	0.02	9.29	5.87
4.20	8	0.01	14.86	9.31
4.30	7	0.01	13.01	8.08
4.40	5	0.02	9.29	5.72
4.50	6	0.02	11.15	6.80
4.60	5	0.02	9.29	5.62
4.70	6	0.02	11.15	6.69
4.80	7	0.01	13.01	7.74
4.90	7	0.01	13.01	7.68
5.00	7	0.01	13.01	7.62



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.7457
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

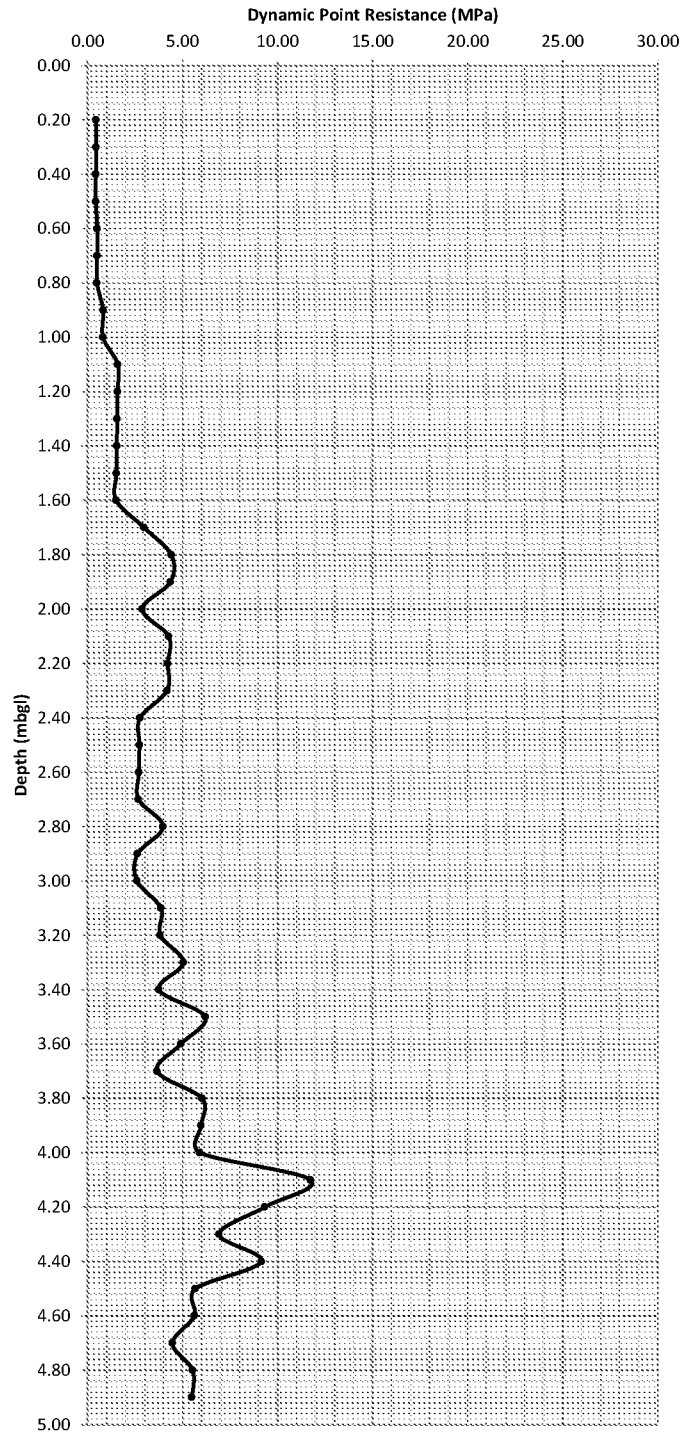
Dynamic Probe Record

SITE Hascombe, Tamarisk Way, East Preston, West Sussex

Report Ref.

LW26047

Test Location Reference			WS3	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	0.25	0.40	0.46	0.45
0.30	0.25	0.40	0.46	0.44
0.40	0.25	0.40	0.46	0.43
0.50	0.25	0.40	0.46	0.43
0.60	0.3	0.33	0.56	0.51
0.70	0.3	0.33	0.56	0.50
0.80	0.3	0.33	0.56	0.49
0.90	0.5	0.20	0.93	0.81
1.00	0.5	0.20	0.93	0.80
1.10	1	0.10	1.86	1.59
1.20	1	0.10	1.86	1.57
1.30	1	0.10	1.86	1.55
1.40	1	0.10	1.86	1.54
1.50	1	0.10	1.86	1.52
1.60	1	0.10	1.86	1.50
1.70	2	0.05	3.72	2.97
1.80	3	0.03	5.57	4.41
1.90	3	0.03	5.57	4.36
2.00	2	0.05	3.72	2.88
2.10	3	0.03	5.57	4.27
2.20	3	0.03	5.57	4.22
2.30	3	0.03	5.57	4.18
2.40	2	0.05	3.72	2.76
2.50	2	0.05	3.72	2.73
2.60	2	0.05	3.72	2.70
2.70	2	0.05	3.72	2.67
2.80	3	0.03	5.57	3.97
2.90	2	0.05	3.72	2.62
3.00	2	0.05	3.72	2.60
3.10	3	0.03	5.57	3.86
3.20	3	0.03	5.57	3.82
3.30	4	0.03	7.43	5.05
3.40	3	0.03	5.57	3.75
3.50	5	0.02	9.29	6.19
3.60	4	0.03	7.43	4.91
3.70	3	0.03	5.57	3.65
3.80	5	0.02	9.29	6.03
3.90	5	0.02	9.29	5.97
4.00	5	0.02	9.29	5.92
4.10	10	0.01	18.58	11.74
4.20	8	0.01	14.86	9.31
4.30	6	0.02	11.15	6.92
4.40	8	0.01	14.86	9.15
4.50	5	0.02	9.29	5.67
4.60	5	0.02	9.29	5.62
4.70	4	0.03	7.43	4.46
4.80	5	0.02	9.29	5.53
4.90	5	0.02	9.29	5.49
5.00				



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.7457
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

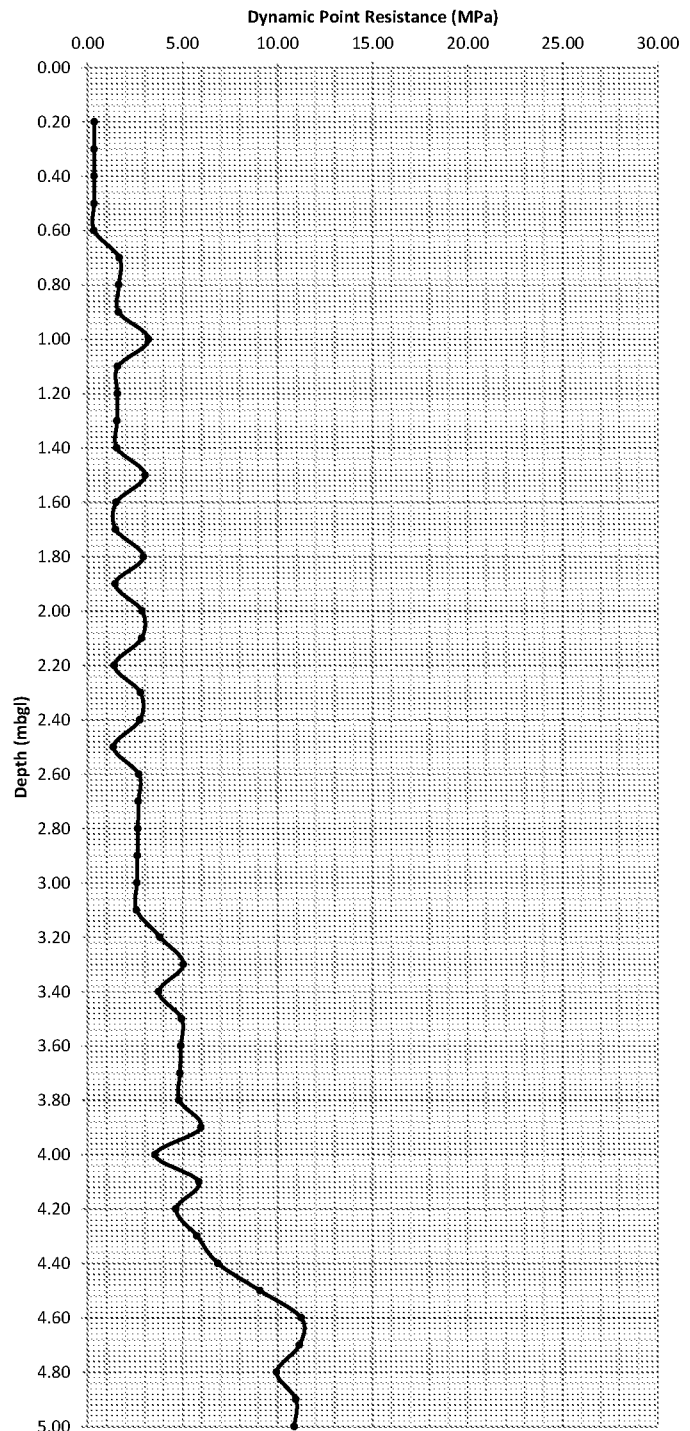
Dynamic Probe Record

SITE Hascombe, Tamarisk Way, East Preston, West Sussex

Report Ref.

LW26047

Test Location Reference			WS4	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	0.2	0.50	0.37	0.36
0.30	0.2	0.50	0.37	0.35
0.40	0.2	0.50	0.37	0.35
0.50	0.2	0.50	0.37	0.34
0.60	0.2	0.50	0.37	0.34
0.70	1	0.10	1.86	1.67
0.80	1	0.10	1.86	1.65
0.90	1	0.10	1.86	1.63
1.00	2	0.05	3.72	3.22
1.10	1	0.10	1.86	1.59
1.20	1	0.10	1.86	1.57
1.30	1	0.10	1.86	1.55
1.40	1	0.10	1.86	1.54
1.50	2	0.05	3.72	3.04
1.60	1	0.10	1.86	1.50
1.70	1	0.10	1.86	1.49
1.80	2	0.05	3.72	2.94
1.90	1	0.10	1.86	1.45
2.00	2	0.05	3.72	2.88
2.10	2	0.05	3.72	2.84
2.20	1	0.10	1.86	1.41
2.30	2	0.05	3.72	2.79
2.40	2	0.05	3.72	2.76
2.50	1	0.10	1.86	1.36
2.60	2	0.05	3.72	2.70
2.70	2	0.05	3.72	2.67
2.80	2	0.05	3.72	2.65
2.90	2	0.05	3.72	2.62
3.00	2	0.05	3.72	2.60
3.10	2	0.05	3.72	2.57
3.20	3	0.03	5.57	3.82
3.30	4	0.03	7.43	5.05
3.40	3	0.03	5.57	3.75
3.50	4	0.03	7.43	4.96
3.60	4	0.03	7.43	4.91
3.70	4	0.03	7.43	4.87
3.80	4	0.03	7.43	4.82
3.90	5	0.02	9.29	5.97
4.00	3	0.03	5.57	3.55
4.10	5	0.02	9.29	5.87
4.20	4	0.03	7.43	4.65
4.30	5	0.02	9.29	5.77
4.40	6	0.02	11.15	6.86
4.50	8	0.01	14.86	9.07
4.60	10	0.01	18.58	11.25
4.70	10	0.01	18.58	11.15
4.80	9	0.01	16.72	9.96
4.90	10	0.01	18.58	10.97
5.00	10	0.01	18.58	10.88



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.7457
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LIMITED

Site: Hascombe, Tamarisk Way, East Preston, West Sussex	Report No.: LW26047 Sheet No.: 1 of 1
--	--

SUMMARY OF STANDING WATER DEPTHS

WS3			
Date and Time	Standpipe Depth (m bgl)	Standing Water Depth (m bgl)	High Tide Time (Littlehampton Entrance)
23/05/2015 13:15	5.00	1.95	11:21
11/03/15 16:00	5.00	2.20	14:13

GEOTECHNICAL LABORATORY TESTING NOTES

1 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) and Part 2 Principles of classification (BS EN 14688-2:2004) as well as the BS5930:1990 + A2:2010 code of Practice for Site Investigations.

2 Index Tests

Index (Atterberg Limit) tests are undertaken on samples of fine grained soils provide the primary information for the classification of fine grained soils.

Fine grained soil is tested to determine its liquid and plastic limits, which are moisture contents that define boundaries between material consistency states. These tests are used to evaluate indices used for soil identification and to help determine the shrinkage and swelling characteristics of the soil under conditions of changing moisture content. The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

The consistency index is derived from the Index Tests and is summarized in the following table. These divisions may be approximate, particularly for low plasticity soils. The consistency recorded on the soil classification summary is derived from the consistency index.

Consistency	Consistency Index
Very Soft	<0.25
Soft	0.25 to 0.50
Firm	0.50 to 0.75
Stiff	0.75 to 1.00
Very Stiff	>1.00

Based on BN EN ISO 14688-2:2004

3 Particle Size Distribution Tests

Sieve analyses are carried out soil samples to establish their particle size distribution that can assist in the assessment of the permeability and classification of granular soils.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

4 Natural Moisture/ Saturated Moisture Content Determination of Chalk

The results of natural moisture or saturated moisture content tests of disturbed samples of chalk are used to assist in the classification of the chalk to determine key geotechnical parameters of strength, density and crushing properties.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

5 Soil Suction Testing

Soil suction tests are undertaken for the determination of the state of desiccation in clay soils.

The testing is carried out in accordance with the Building Research Establishment Information Paper IP4/93, dated February 1993.

6 Triaxial Compression Tests

Undrained triaxial compression tests are carried out on undisturbed samples of cohesive soil in order to assist in the determination of the undrained shear strength of the soil. The results of moisture content and density determinations are also included.

The tests are carried out in accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

7 Shear Vane and Hand Penetrometer Testing

Undisturbed samples are tested in the laboratory using a Geonor Hand Shear Vane for the determination of their undrained shear strength.

The vane tests are carried out in general accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

8 One Dimensional Consolidation Tests

One-dimensional consolidation tests are performed on undisturbed soil samples to ascertain their settlement characteristics.

The tests are carried out in accordance with BS1377: Part 5: 1990 + A1:1994 Compressibility, Permeability and Durability tests.

9 Dry Density / Moisture Content Relationship (Compaction) Testing

Compaction testing for the determination of the dry density / moisture content relationship is carried out on using either a 2.5kg, 4.5kg hammer or a vibrating hammer.

The tests are carried out in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction-related tests.

10 California Bearing Ratio

The soil is usually compacted at the as dug "natural" moisture content and often at moisture contents around the natural moisture content.

The California bearing ratio is determined in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction related tests.

11 Chemical Testing

Soil samples are tested for their concentration of water soluble sulphate and pH for use in concrete mix design.

Water samples are tested for total sulphate concentration and pH value.

Where a water soluble sulphate content in soils or a total sulphate content in groundwater exceeds 3000mg/l SO₄ the magnesium sulphate content of the samples is required to be determined (BRE Special Digest 1:2005).

Swanborough Farm
Swanborough
Lewes, East Sussex
BN73PF

ASHDOWN SITE INVESTIGATION LTD
Geotechnical and Geoenvironmental Engineers

**ASHDOWN SITE
INVESTIGATION**
L I M I T E D

Site:	Tamarisk Way, East Preston.	Job No:	LW26047
		Sheet No:	1

SOIL CLASSIFICATION SUMMARY

BH/TP No.	Depth (m)	Nat. Moist. Cont. (w %)	Equiv. Moist. Cont. (w _a %)	Atterberg Limits			Class'n	Cons. Index (I _c)	% passing 425 µm sieve	Visual Description of Sample
				W _l %	W _p %	I _p %				
WS1	1.80	21		33	20	13	CL	0.92*	98	Stiff brown and grey mottled slightly gravelly CLAY with orange iron staining. Gravel is fine to coarse calcareous sandstone.
WS2	0.50	26		48	21	27	CI	0.81*	100	Stiff brown slightly sandy CLAY with occasional iron staining.
WS3	1.50	18		31	18	13	CL	1.00*	95	Very stiff brown mottled grey slightly gravelly slightly sandy CLAY. Gravel is fine to medium flint.
WS4	2.20	24		42	20	22	CI	0.82*	99	Stiff brown mottled grey slightly gravelly slightly sandy CLAY with occasional iron staining. Gravel is fine to medium flint.

Test Method: Classification Tests BS1377: Part 2: 1990: Method 4.4, 5.3 and 5.4

* Consistency index based on natural moisture content and not the equivalent moisture content.



2683



Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 15-00762

Issue: 1

Date of Issue: 05/03/2015

Contact: David Harris

Customer Details: Ashdown Site Investigation Limited
The Old Dairy
Swanborough Farm
Lewes
East Sussex

Quotation No: Q14-00001

Order No: 150144

Customer Reference: LW26047

Date Received: 26/02/2015

Date Approved: 05/03/2015

Details: Tamarisk Way, East Preston

Approved by:

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 15-00762

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
17905	WS1 0.40	20/02/2015	27/02/2015	Silty clayey loam	
17906	WS3 1.50	20/02/2015	27/02/2015	Sandy loam	
17907	WS4 0.40	20/02/2015	27/02/2015	Silty clayey loam	
17908	WS2 2.50	20/02/2015	27/02/2015	Loamy sand	



Results Summary

Report No.: 15-00762

2683

ELAB Reference				17905	17906	17907	17908
Customer Reference							
Sample ID							
Sample Type				SOIL	SOIL	SOIL	SOIL
Sample Location				WS1	WS3	WS4	WS2
Sample Depth (m)				0.40	1.50	0.40	2.50
Sampling Date				20/02/2015	20/02/2015	20/02/2015	20/02/2015
Determinand	Codes	Units	LOD				
Anions							
Water Soluble Sulphate	M	g/l	0.02	0.04	< 0.02	< 0.02	< 0.02
Miscellaneous							
pH	M	units	0.1	9.5	8.3	6.7	8.2



Method Summary

Report No.: 15-00762

Parameter	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil				
pH	Air dried sample	04/03/2015	113	Electromeric
Water soluble anions	Air dried sample	04/03/2015	172	Ion Chromatography



Report Information

Report No.: 15-00762

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage