

**Sunny Corner
Copse Lane
Walberton
Arundel
West Sussex**

Geotechnical Assessment Report

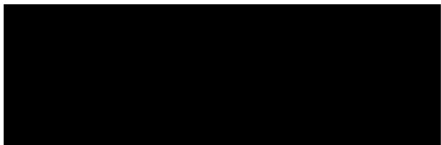
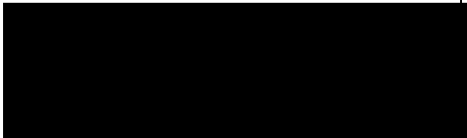
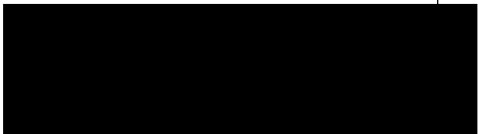


Report No. R17-12043

April 2017

Report prepared for the benefit of:

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EXECUTIVE SUMMARY

The following presents a summary of the main findings of the ground investigation. It is emphasised that no reliance should be placed on any individual point until the whole of the report has been read as other sections of the report may put into context the information contained herein.

At the time of writing the development plans had yet to be finalised and the site comprised an open field.

Reference to geological datasets indicates that the site is expected to be underlain by Raised Beach Deposits overlying Lambeth Group soils over the north western part of the site and the London Clay Formation in the south eastern part of the site. The ground investigation confirmed the underlying soils to comprise a variable thickness of what is judged to be River Terrace Deposits, overlying London Clay Formation in the eastern part of the site and the Lambeth Group deposits in the western part of the site.

The Raised Beach Deposits and the River Terrace Deposits are both classed as Secondary A Aquifers. The London Clay Formation and the Lambeth Group are classed as an unproductive stratum and a Secondary A Aquifer, respectively. The site does not lie within an Environment Agency Source Protection Zone with regard to the protection of the quality of groundwater that is abstracted for potable supply. Groundwater was recorded to lie at depths of between 0.45m and 0.90mbgl during the single monitoring visit undertaken subsequent to the site works having been completed.

It is recommended that the design of precautions against shrinkage and heave for any new foundation system should assume a high volume change potential for the fine grained soils encountered at this site

Net allowable bearing capacities of 100kN/m² and 150kN/m² may be assumed for pad or strip foundations up to 1m in breadth that are constructed directly onto the natural soils of at least firm and stiff consistency, respectively.

A high groundwater table prevails at the site which may present difficulty for the effective construction of spread foundations. It is recommended that trial pumping from proposed formation depths across the site should be undertaken in advance of detailed design to fully establish requirements for groundwater control at this site.

Further investigation in the form of deep boreholes (between 12m and 15m depth) would be required to provide soil parameters for the design of piled foundations.

A DS-1 Design Sulfate Class and an AC-1 ACEC classification should be assumed for the design of concrete in contact with the River Terrace Deposits and Lambeth Group deposits located on the western side of the site. A DS-2 design sulphate class and an AC-2 ACEC is recommended for concrete in contact with the London Clay Formation soils.

It is recommended that ground floors should be suspended, though ground bearing floors may be adopted where the criteria set out within this report are met.

A design equilibrium CBR value of no greater than 2% should be assumed for the design of pavement bearing on the River Terrace Deposits. The subgrade is not likely to be susceptible to frost heave.

The results from the infiltration tests indicate that the River Terrace Deposits are unlikely to be suitable for discharging water to the ground via infiltration systems. Consideration could however be given to the use of peak flow storage tanks connected via attenuated drainage pipes to mains surface water drainage or open water courses, if available. It is emphasised that the design of any drainage system proposed for the site should consider the implications of the prevailing high groundwater table.

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1. INTRODUCTION

A new residential development is intended to be developed at the site of Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex. At the time of writing the development plans had yet to be finalised.

Ashdown Site Investigation Limited was requested to provide an estimate for carrying out a ground investigation and geotechnical assessment of the site by Mr and Mrs Holden of Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex BN18 0QH. 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 Q17-5692, dated 21st February 2017. The instruction to proceed was received from the client, in an email dated 10th March 2017.

The objectives of the works were to:

- a) Establish the expected geology and hydrogeology at the site;
- b) Investigate the shallow ground and groundwater conditions prevailing at the site; and
- c) Provide preliminary advice to assist others in undertaking design of foundations, ground floors, road pavement and soakaways.

2. SITE CONTEXT

2.1 Site Description

The site comprises an irregular shaped plot of land located at Copse Lane, Walberton, Arundel, West Sussex, and is centred on the approximate Ordnance Survey national grid reference SU 9642 0647. A site location plan and exploratory hole location plan are presented as Figure 1 and Figure 2, respectively.

At the time of the intrusive works the site comprised an open field. The boundaries were marked by mature trees, bushes and metal fencing.

The site sloped slightly down to the south west, and a stream ran along the western boundary, originating from ponds located north of the site area.

2.2 Geology and Hydrogeology

The stratigraphic succession that may be expected to underlie the site is presented in the following table.

Table 1. Expected Strata, Aquifer Designation and Description

Type	Stratum	Stratum Description	Aquifer Designation
Superficial	Raised Beach Deposits	The Raised Beach Deposits consist of marine sand, silt, and pebbly sand, with sandy gravel and 'clean' flint shingle. For the most part the deposit is thinly bedded, calcareous, silty, fine to medium grained sand containing a few flint or chalk pebbles. The thickness of the deposit is highly variable and can differ a great deal over relatively small distances.	Secondary A Aquifer
Superficial	River Terrace Deposits (in the vicinity)	The River Terrace Deposits generally comprise well graded sandy fine to coarse gravel. Locally sand or gravel strata may predominate. Lenses of clay, silt and localised peat may be present. Gravels normally include a high proportion of subangular flint.	Secondary A Aquifer
Bedrock	London Clay Formation	The London Clay Formation comprises a blue grey silty clay, which tends to weather to brown near to the upper surface. With depth, the clay becomes very stiff/hard, is frequently fissured and can contain some inclusions and beds of weak mudstone and siltstone. In this area, the basal London Clay may be expected to be locally sandy.	Unproductive Stratum
Bedrock	Lambeth Group	The Lambeth Group (formerly named the Woolwich and Reading Beds) comprises a complex and laterally variable sequence of sedimentary deposits including clay, silt, sand and gravel. Inter-laminated clay and sand deposits are common in the lower part of the succession. The component formations are the Upnor Formation, Reading Formation and Woolwich Formation.	Secondary A Aquifer

2.2.1 *Groundwater Source Protection Zones*

The site does not lie within an Environment Agency Source Protection Zone with regard to the protection of the quality of groundwater that is abstracted for potable supply.

3. GROUND INVESTIGATION

3.1 Introduction

The ground investigation comprised the excavation of two hand dug trial pits together with a series of dynamic sampler boreholes with accompanying in situ geotechnical testing. Groundwater monitoring standpipes were installed in three boreholes and monitored on the second day of site works and on a single subsequent site monitoring visit. The fieldwork was carried out on 27th and 28th March 2017. The exploratory hole locations are shown on Figure 2.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole records given in Appendix A, together with notes to assist in their interpretation.

3.2 Exploratory Holes

3.2.1 Dynamic Sampler Boreholes

Eight boreholes (designated WS01 to WS07 and WS109) were each drilled to a depth of 3.00m below ground level. A ninth borehole (WS108) was drilled to a depth of 4.00m below ground level.

The boreholes were formed by a series of 1.0m long, open ended, hollow steel tubes of up to 100mm diameter, each containing a removable plastic liner. The tubes, progressively reducing in diameter, were driven into the ground by means of a track-mounted drop weight. Each tube was extracted from the ground using a hydraulically operated jack and the enclosed sample was recovered in its plastic liner.

The system enables sub-samples to be taken for detailed examination and laboratory testing.

3.2.2 Trial Pits

Two trial pits, designated TP02 and TP09, were dug using hand tools to respective depths of 0.70m and 0.90m below ground level to enable in situ testing to be carried out.

3.3 Sampling

Disturbed samples of soil were taken at the depths shown in the exploratory hole records and were collected in plastic bags.

3.4 In Situ Testing

The depths of in situ testing, together with the test results, are either given on the exploratory hole records or are summarised separately in Appendix A. Notes providing additional information on the tests performed are included in the appendix.

3.4.1 *DPSH Dynamic Probe (Super Heavy) Testing*

Continuous dynamic probe tests were undertaken adjacent to each dynamic sampler borehole to depths of 5.00m below ground level. Probing was undertaken in accordance with BS EN ISO 22476-2:2005 using a super heavy DPSH-B probing geometry.

The DPSH-B configuration is similar to that of the standard penetration test (SPT); the main differences being that the tip comprises a 90° cone, the driving rods are lighter than those used for SPT testing and the blow counts are recorded over 100mm increments rather than 300mm, as is the case for the SPT.

The blow counts recorded and the calculated dynamic point resistances, which account for inertia of the anvil and driving rods, are presented on the borehole records and separately in Appendix A.

3.4.2 *Undrained Shear Strength*

Undrained shear strength determinations were made in situ within the fine grained soils using a Geonor hand shear vane.

Additionally undrained shear strength determinations were made within samples of the fine grained soils held in the dynamic sampler liners using a hand penetrometer.

3.4.3 *Soakage Testing*

Falling head soakage tests were undertaken in two of the boreholes (WS02 and WS09) and within each trial pit, with the boreholes at depths of 3.00m and the trial pits at shallow depths of 0.70m and 0.90m below ground level. The soakage tests were undertaken within the River Terrace Deposits and/or London Clay Formation deposits. The tests undertaken in the boreholes were carried out in general accordance with The Soakaway Design Guide published by Kent County Council (2000), and those within the trial pits in general accordance with the Building Research Establishment (BRE) Digest 365 (1991), other than the pits were filled only once rather than the three times suggested by the digest.

3.5 *Installations*

Groundwater monitoring standpipes were installed to depths of either 3.00m or 4.00m in boreholes WS01, WS04 and WS08. Descriptions of the installations are shown on the exploratory hole records in Appendix A.

The depths to groundwater were recorded within the standpipes on the second day of site works and during a single return monitoring visit on the 20th April 2017. The readings are presented in Appendix A.

3.6 *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

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accordance with BRE SD1 was undertaken by an external UKAS accredited laboratory. The results of the tests, together with notes to assist with their interpretation, are contained within Appendix B.

4. GROUND CONDITIONS

4.1 Stratigraphy

4.1.1 *Surface Covering*

Each of the exploratory holes was excavated through a surface cover of topsoil with underlying subsoil, totalling some 300mm to 400mm in thickness.

4.1.2 *River Terrace Deposits*

Underlying the surfacing, the investigation progressed into undisturbed firm to stiff gravelly clay deposits locally interbedded with loose to medium dense sand and gravel deposits, judged to be representative of River Terrace Deposits, shown to be present in the vicinity of the site on the published geology map.

These soils were encountered to proven depths of between 0.90m and 2.80m below ground level. They were also encountered to the full depth of borehole WS02 at 3.00m below ground level.

Attention should be made to the soft soils recorded in borehole WS09 at depths of between 1.40m and 2.40m below ground level. These soils were also recorded to contain wood fragments.

4.1.3 *London Clay Formation*

Beneath the River Terrace Deposits in the eastern half of the site, the investigation progressed into firm to stiff clays considered to be representative of the London Clay Formation soils indicated on the published geology map. These deposits were recorded to contain iron pyrites and selenite crystals that are typically present within these soils.

4.1.4 *Lambeth Group*

Beneath the River Terrace Deposits in the western half of the site, the investigation progressed into generally stiff to very stiff clays, judged to be representative of the Lambeth Group deposits indicated on the published geology map.

4.2 Stability

Instability was recorded locally within the exploratory holes.

4.3 Groundwater Conditions

Groundwater was recorded to lie at depths of between 0.45m and 0.90m during monitoring of the borehole installations.

5. GEOTECHNICAL ASSESSMENT

At the time of preparation of this report a specific development proposal for the site had yet to be finalised. As such the geotechnical assessment is generic and may need to be supplemented by further ground investigation works, dependant on the development proposal selected to be progressed as well as any planning authority or warrantor requirements that may be imposed.

5.1.1 Foundations

5.1.2 Soil Shrinkage/Heave Potential

The fine grained soils of the River Terrace Deposits have been classified as clays of intermediate plasticity and with modified plasticity indices of up to 26%, the soils may be expected to exhibit up to a medium volume change potential.

The fine grained soils of the London Clay Formation and Lambeth Group have been classified as clays of intermediate to very high plasticity and with plasticity indices in the range of 28% to 48% these soils may be expected to exhibit a medium to high volume change potential.

It is recommended that the design of precautions against shrinkage and heave for any new foundation system (spread footings and ground beams etc.) should assume a high volume change potential for the fine grained soils encountered at this site and take into account current guidance such as that given by the Building Research Establishment (BRE) or the National House Builders Council (NHBC).

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. It is recommended that an arboricultural survey of the site should be conducted to establish the species and maturity of the existing trees in the areas of the proposed new buildings. The survey should be extended to include a review of historical photographs and detailed site plans (if available) to establish the species and 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 detailed design of foundation systems, including assessment of minimum founding depths for spread foundations, and requirements for placement of void formers et cetera.

5.1.3 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. In general a minimum depth to formation of 1.00m should be adopted, although foundations should be deepened where there is a requirement to do so to comply with NHBC / BRE guidance to protect foundations against seasonal soil volume changes induced by trees. Attention is drawn to the presence of soft soils with wood fragments encountered within borehole WS09 between depths of 1.40m and 2.40m depth; spread foundations, if adopted, should bear below these soft soils, where encountered.

For preliminary design purposes, a net allowable bearing capacity of 100kN/m^2 may be assumed for spread (pad or strip) foundations up to 1m across bearing within natural soils of at least firm consistency. An increased bearing capacity of 150kN/m^2 may be adopted when stiff or better soils are present at formation level. The quoted bearing capacity is expected to limit settlement to less than 25mm.

Given that the River Terrace Deposit soils encountered at the site are both laterally and vertically highly variable in composition and strength, designers should consider the need for foundations constructed within these soils to be reinforced due to the potential for differential cracking to develop as a result of these soils settling at different rates under loading.

5.1.4 Piled Foundations

It is noted that a relatively high groundwater table was recorded at the site (see Section 5.2) and stable excavations required to construct spread foundations may be locally difficult to achieve. Once development proposals are known, and a preliminary assessment made of the depths of spread foundations that would be required, consideration may need to be given to supporting proposed structures on piled foundations.

Further investigation in the form of deep boreholes extending to at least 5m below expected piling depths would be required to provide soil parameters for the design of piled foundations.

5.2 Groundwater

Standing water was recorded to lie between depths of 0.45m and 0.90m during the monitoring period. Where excavations are proposed to extend below the groundwater, particularly within coarse grained soils, groundwater control will be required to maintain adequately dry working conditions and excavation stability. In such circumstances it is recommended that trial pumping from proposed formation depths should be undertaken in advance of detailed design to fully establish requirements for groundwater control at this site.

It is also possible that heavy precipitation during construction could lead to the ingress of perched groundwater or surface water run-off into excavations made above the groundwater table. In such circumstances it would be expected that water entering into excavations may be adequately managed by pumping from sumps.

5.3 Stability of Excavations

All coarse grained natural soils exposed in excavations should be assumed to be unstable, even in the short term. Whilst fine grained natural soils may remain stable for a short period of time if not subjected to surcharge loads (such as may be imposed by existing foundations, traffic or storage of materials), the stability of these deposits if left unsupported should be assumed to have the potential to deteriorate. Where stable excavations are required, excavations should either be suitably supported or side slopes should be battered back to a safe angle of repose.

All excavations requiring human entry must be shored or battered as necessary to conform to current best practice, as accepted by the Health and Safety Executive (HSE); relevant guidance is given on the HSE website (www.hse.gov.uk). Current legislation requires that where personnel access is required into any excavation a competent person must inspect

excavation supports or battering of slopes at the start of the working shift and at other specified times. No work should take place until the excavation is safe. Excavations should also be inspected after any event that may have affected their stability, such as a significant weather event, changes in surcharge loadings imposed by temporary storage of materials or changes in site traffic plans or alteration of support systems. Inspections should be formally recorded and any faults that are found should be corrected immediately.

5.4 Aggressivity to Concrete

In consideration of the soils encountered beneath the site it is considered that 'natural ground conditions' may be assumed for the purpose of assessing the aggressivity of the chemical environment for concrete classification (ACEC class). Given the noted groundwater levels, 'mobile groundwater' conditions should be assumed.

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 alkaline.

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

However given that iron pyrites and selenite crystals have been noted within the London Clay Formation soils encountered, it would be prudent to adopt a higher DS classification, such as DS-2 for concrete exposed to the London Clay Formation soils and an AC-2 classification is recommended for these soils.

5.5 Ground Floors

In view of the presence of soils of high volume change potential underlying the site, it is recommended that ground floors 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.

5.6 Pavement Design

Equilibrium CBR values (with reference to Transport Research Laboratory (TRL) Report LR1132 'Structural design of Bituminous Roads') are derived from knowledge of soil classification data (plasticity index for soils exhibiting cohesion (clay type) and particle size distribution for granular soils), the location of the water table, pavement thickness, and weather conditions at the time of construction. This guidance document suggests a design equilibrium CBR value of 1.5% to 2.5% would be applicable to the natural soils for the construction of thin (300mm) pavement under poor to average construction conditions and assuming a high (shallower than 1m below formation level) groundwater table.

It is recommended that, for the River Terrace Deposits, a CBR value of no greater than 2% should be adopted for preliminary pavement design.

All formations should be proof rolled and any excessively large, soft, degradable or otherwise unsuitable materials thus identified should be removed and be replaced with well compacted coarse grained fill. Prepared subgrades should be protected from severe adverse weather by ensuring they are graded to falls to prevent ponding, and they should be reasonably protected from trafficking during construction.

The subgrade may be assumed not to be susceptible to frost heave.

If new roads are to be adopted the local highway authority should be consulted with reference to the acceptability of the proposed CBR figures prior to designs being finalised and construction undertaken.

5.7 Stormwater Infiltration Systems

In situ infiltration testing was carried out in the shallow trial pits in general accordance with the requirements of BRE 365 'Soakaway Design'.

During the test performed within the trial pit TP02, the water level did not fall below 25% of the initial test depth and calculation of the soil infiltration rate in accordance with the BRE digest was not possible. For this test, the soil infiltration rate has therefore been calculated by dividing the volume of water lost during the test by the product of the average surface area of the trial pit in contact with water during the test period and the test duration in seconds. During the test performed within trial pit TP09, the water level within the pit was recorded to rise very slightly over the monitoring period. The infiltration at this position is considered to be negligible.

In situ infiltration testing was undertaken in the boreholes in accordance with 'The Soakaway Design Guide' published by Kent County Council (July 2000). From the test results, calculations were made to estimate the infiltration rate that could be expected for soakaways constructed to discharge into the underlying soils within the test zone.

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

Table 2. Calculated Infiltration Rates

Exploratory Hole	Test Response Zone Depth (m)		Stratum	Infiltration Rate (f) (m/sec)	Driving Head of Water (m)
	Top	Bottom			
TP02 – Trial Pit	0.42	0.70	River Terrace Deposits	1.3×10^{-6}	-
TP09 – Trial Pit	0.58	0.90	River Terrace Deposits	Negligible	-
WS02 - Borehole	2.00	3.00	River Terrace Deposits	Negligible	2.0
WS09- Borehole	2.00	3.00	River Terrace Deposits	8.9×10^{-7}	2.0

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 River Terrace Deposits are unlikely to be suitable for discharging water to the ground via infiltration systems. Consideration could however be given to the use of peak flow storage tanks connected via attenuated drainage pipes to mains surface water drainage or open water courses, if available.

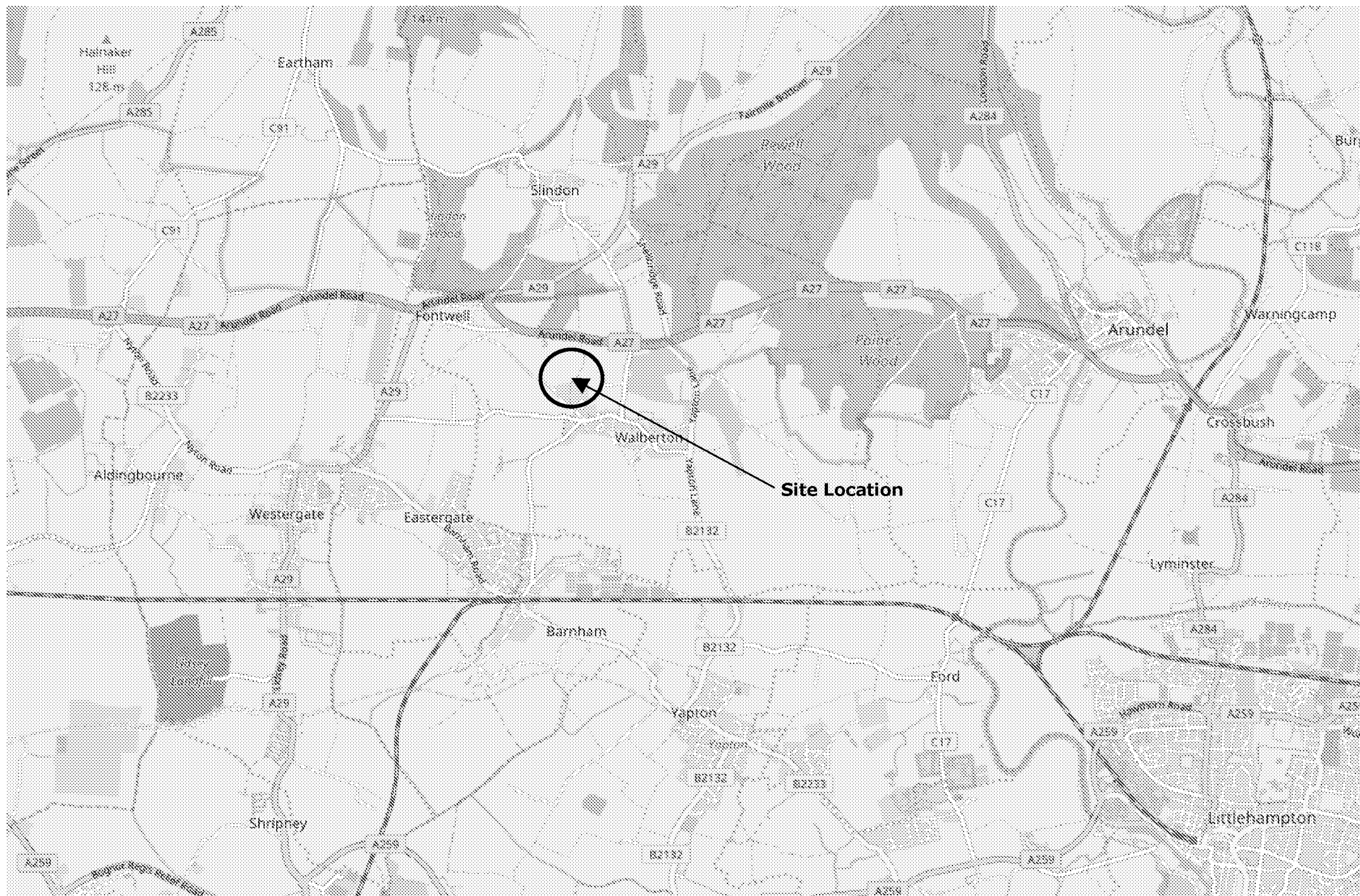
It is emphasised that the design of any drainage system proposed for the site should consider the implications of the prevailing high groundwater table.

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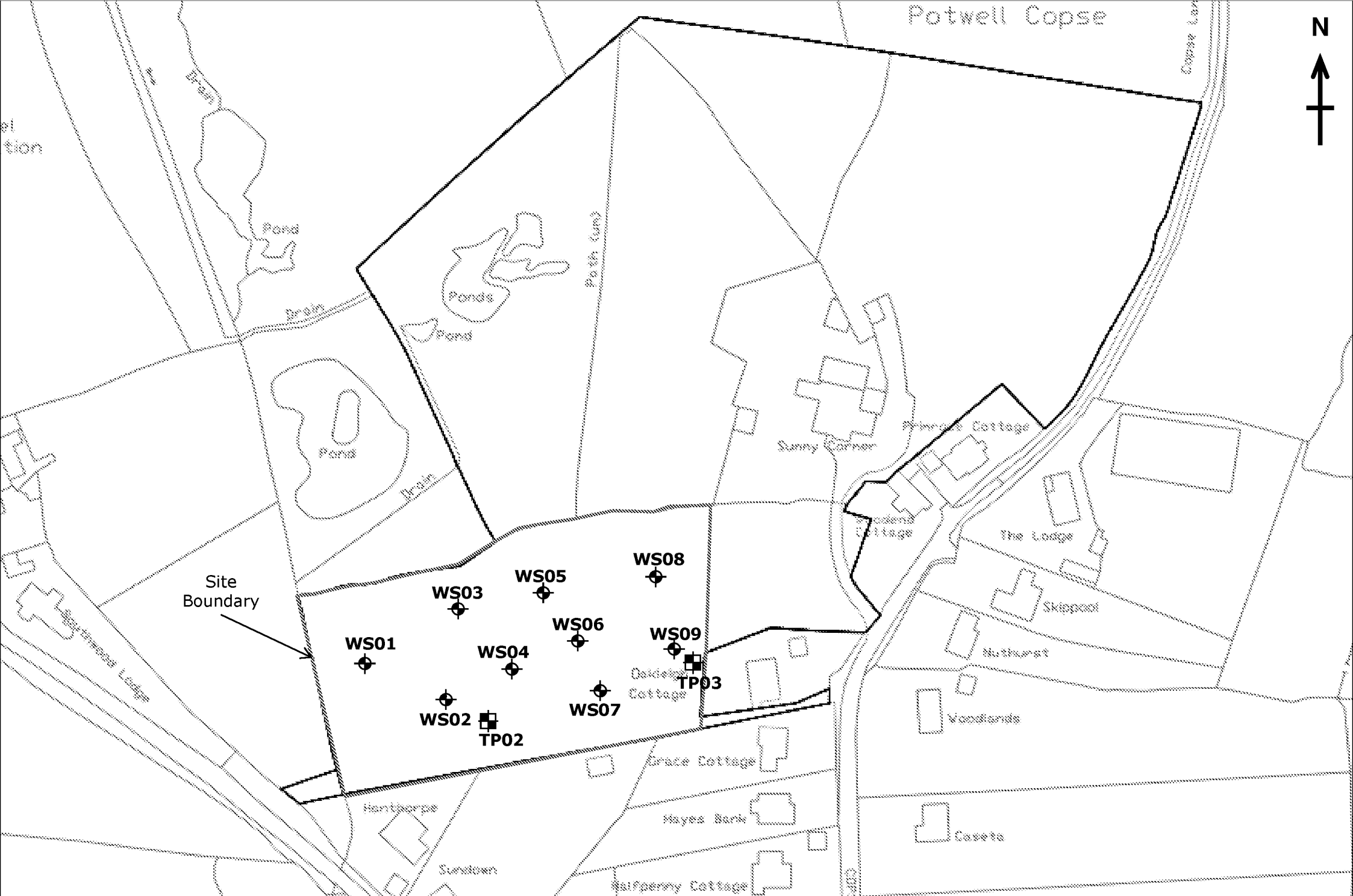
FIGURES

Figure 1 Site Location Plan

Figure 2 Exploratory Hole Location Plan



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APPENDIX A

Exploratory Hole Notes

In Situ Testing Notes

Exploratory Hole Records

DPSH-B Dynamic Probe Records

Summary of Borehole Falling Head Soakage Test Results

Summary of Trial Pit Falling Head Soakage Test Results

Groundwater Monitoring Results

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, 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.

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 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.

IN SITU TESTING NOTES

1 Standard Penetration Testing

Standard penetration testing (SPT) is carried out within a cased cable percussion borehole. The test is performed using either a split spoon (barrel) sampler in finer grained deposits, or, in coarser grained soils or weak rocks, using a 50mm diameter, 60° apex solid cone fitted in place of the sampler.

The sampler is driven into the deposits at the base of the borehole by means of a 63.5kg hammer falling freely through 760mm.

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.

(BS EN ISO 22476-3:2005+A1:2011, Geotechnical investigation and testing – Field Testing, Part 3 and BS5930:2015 code of practice of for ground investigations)

2 Dynamic Probe Testing

The DPH (heavy) dynamic probing rig drives a 32mm diameter rod with a 15cm² area, 90° end cone into the ground by means of a 50kg hammer which falls freely through a distance of 0.5m. The number of blows per 100mm penetration (N_{100}) is recorded.

The DPSH (super heavy) dynamic probing rig drives a 35mm diameter rod with a 20cm² area, 90° end cone into the ground by means of a 63.5kg hammer that falls freely through a distance of 0.75m. The number of blows per 100mm penetration (N_{100}) is recorded. The results can provide a useful indication of the relative strength of the material. The dynamic probing is carried out in accordance with BS EN ISO 22476-2:2005+A1:2011 and BS5930.

3 Perth Penetrometer Test

In this test a hardened stainless steel rod is driven into the deposit by a 9.5kg sliding hammer falling freely through 600mm. After an initial penetration of 150mm the number of blows required to drive the rod a further 300mm is recorded. In sand the Perth blow count gives a close correlation to the "N-value" that could be expected from a standard penetration test (SPT) made in similar materials. The results are less reliable in coarser grained materials but can give an indication of their engineering properties. The perth penetrometer test is carried out in accordance with the Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes, there is no European equivalent code.

4 Undrained Shear Strength

Undrained shear strength determinations are made in situ within the fine grained soils using a Geonor hand shear vane or (usually in the case of window sampler boreholes) a hand penetrometer. The test records the undrained shear strength (cohesion) in kN/m². The shear vane records a maximum shear strength of 130kN/m² and the hand penetrometer records a maximum shear strength of 250kN/m².

3 California Bearing Ratio Test

In this test a hand held Farnell cone penetrometer apparatus is pushed into the deposits for the estimation of the California bearing ratio of the subgrade (for use in pavement design). The test equipment is design for the estimation of the bearing ratio of fine grained soils (clay and silt) only and is unsuitable for use in coarse grained soils and rock.

End Date: 28/03/2017

Sheet 1 of 1

Remarks Groundwater: Trial pit dry on completion. Stability: Trial pit stable on completion. Notes: n/a	Excavation Method: HDP
	Pit Length: 0.30m
	Pit Width: 0.30m
	Made By: EM

Site Name: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

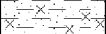
Job Number: R17-12043

Start Date: 28/03/2017

End Date: 28/03/2017

Trial Pit Number: **TP09**

Sheet 1 of 1

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
V	0.50	50			0.00	Topsoil.
					0.10	Subsoil: Grey with orange veins slightly sandy slightly gravelly silty clay. Sand is fine. Gravel is subangular to subrounded fine to coarse flint.
					0.30	Firm grey and orange brown mottled sandy silty CLAY. Sand is fine to medium. (River Terrace Deposits)
					0.60	Grey and orange mottled very clayey silty fine SAND with pockets of clay. (River Terrace Deposits)
					0.90	End of trial pit at 0.90m

Remarks
Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: n/a

Excavation Method: HDP

Pit Length: 0.40m

Pit Width: 0.30m

Made By: EM

Site Name: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

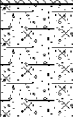
Job Number: R17-12043

Start Date: 27/03/2017

End Date: 27/03/2017

Borehole Number: **WS01**

Sheet 1 of 1

Samples and In Situ Testing				Dynamic Probe		Stratum Description		
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Blows/100mm	Legend	Depth	
							0.00	Topsoil.
	D	0.50					0.30	Loose to medium dense light grey clayey silty sandy subangular to fine to coarse GRAVEL of flint and chalk. Sand is fine to medium. (River Terrace Deposits)
	D	0.80					0.70	Firm to stiff light grey mottled orange gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint and chalk. (River Terrace Deposits).
	H	1.20		115			1.10	Stiff red, grey and yellow mottled CLAY (Lambeth Group).
	D	1.50						
	H	1.50		115				
	H	1.80		140				
	V	2.00		>130				
	H	2.20		155				becoming very stiff below 2.20m depth.
	D	2.50		170				
H	2.50		195					
H	2.80							
V	3.00		>130				3.00	End of borehole at 3.00m

Remarks

Groundwater: Groundwater encountered at 1.10m depth. Standing water at 2.20m depth on completion of borehole.

Stability: Borehole unstable in coarse grained soils.

Notes: Standpipe installed to 3.00m depth; 3.00m 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 ground surface.

Excavation Method: WLS

Borehole Diameter: Various

Made By: EM

End Date: 28/03/2017

WS02

Sheet 1 of 1

Remarks Groundwater: Borehole dry on completion. Stability: Borehole collapsed to 2.80m depth on completion. Notes: n/a	Excavation Method: WLS
	Borehole Diameter: Various
	Made By: EM

Site Name: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Job Number: R17-12043

Start Date: 27/03/2017

End Date: 27/03/2017

Borehole Number: **WS03**

Sheet 1 of 1

Standpipe		Samples and In Situ Testing				Dynamic Probe				Legend		Depth	Stratum Description	
	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Blows/100mm									
					0	5	10	15	20	25	30			
												0.00	Topsoil.	
												0.10	Subsoil: Grey with orange veins slightly sandy slightly gravelly silty clay. Sand is fine. Gravel is subangular to subrounded fine to coarse flint.	
												0.30	Soft firm grey and orange brown mottled sandy silty CLAY. Sand is fine to medium. (River Terrace Deposits)	
	D	0.50												
	H	0.50		<25								0.60	Very stiff grey and orange brown slightly sandy gravelly silty CLAY. Sand is fine. Gravel is subangular to subrounded fine to coarse flint and ironstone. (River Terrace Deposits)	
	D	0.80												
	D	1.50												
	H	1.90		115								1.90	Firm orange brown mottled grey slightly sandy slightly gravelly silty CLAY. Sand is fine. Gravel is subangular to subrounded fine to coarse flint and ironstone. (River Terrace Deposits)	
	H	2.20		75										
	D	2.50												
	H	2.50		90										
												2.80	becoming very gravelly at base.	
	D	2.90												
	H	2.90		225										
												3.00	End of borehole at 3.00m	
		</												

Remarks

Groundwater: Standing water at 2.85m depth on completion.

Stability: Borehole stable on completion.

Notes: n/a

Excavation Method: WLS

Borehole Diameter: Various

Made By: EM

Site Name: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Job Number: R17-12043

Start Date: 27/03/2017

End Date: 27/03/2017

Borehole Number: **WS04**

Sheet 1 of 1

Standpipe		Samples and In Situ Testing		Dynamic Probe		Legend		Depth		Stratum Description	
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Blows/100mm							
				0	5	10	15	20	25	30	
											0.00
											0.30
H	0.40		100								
D	0.50										
											0.60
D	0.80										
D	1.20		90								
H	1.20										
H	1.70		115								
D	1.80										
H	1.90		140								
V	2.00		130								
											2.00
H	2.20		170								
D	2.50		140								
H	2.50										
H	2.80		155								
											3.00

Remarks
Groundwater: Borehole dry on completion.

Stability: Borehole stable on completion.

Notes: Standpipe installed to 3.00m depth; 3.00m 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 the ground surface.

Excavation Method: WLS

Borehole Diameter: Various

Made By: EM

Site Name: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Job Number: R17-12043

Start Date: 27/03/2017

End Date: 27/03/2017

Borehole Number: **WS05**

Sheet 1 of 1

Samples and In Situ Testing						Dynamic Probe			
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result		Blows/100mm	Legend	Depth	Stratum Description
								0.00	Topsoil.
								0.10	Subsoil: Grey with orange veins slightly sandy slightly gravelly silty clay. Sand is fine. Gravel is subangular to subrounded fine to coarse flint.
	H	0.50		60				0.40	Firm grey and orange brown slightly gravelly sandy silty CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	D	0.70							
	H	0.70		75					
	V	1.00		110				0.90	Stiff orange and grey mottled silty CLAY. (London Clay Formation)
	H	1.20		90					
	D	1.50							
	H	1.50		115					
	H	1.80		140					
	V	2.00		>130					
	H	2.20		225					
	D	2.50							
	H	2.50		170					
	H	2.80		140					
	V	3.00		>130				3.00	End of borehole at 3.00m

Remarks	
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Groundwater: Borehole dry on completion.

Stability: Borehole stable on completion.

Notes: n/a

Excavation Method: WLS

Borehole Diameter: Various

Made By: EM

Site Name: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Job Number: R17-12043

Start Date: 28/03/2017

End Date: 28/03/2017

Borehole Number:

WS06

Sheet 1 of 1

Samples and In Situ Testing						Dynamic Probe			
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result		Blows/100mm	Legend	Depth	Stratum Description
	H	0.50		40				0.00	Topsoil.
	H	0.70		45				0.20	Subsoil: Grey with orange veins slightly sandy slightly gravelly silty clay. Sand is fine. Gravel is subangular to subrounded fine to coarse flint. Firm grey and orange brown mottled sandy silty CLAY. Sand is fine to medium. (River Terrace Deposits)
	D	0.80						0.40	
	H	0.90		50					
	H	1.30		60				1.20	Firm orange brown mottled grey sandy silty CLAY. Sand is fine. (River Terrace Deposits)
	D	1.50							Stiff orange brown mottled grey CLAY. (London Clay Formation)
	H	1.50		75					
	H	1.70		90					
	H	1.90		100				1.80	
	V	2.00		130					becoming dark grey below 2.70m depth.
	D	2.20							
	H	2.20		90					
	H	2.50		100					
	D	2.80							End of borehole at 3.00m
	H	2.80		100					
	V	3.00		130				3.00	

Remarks	
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Groundwater: Groundwater encountered at 1.70m depth. Standing water at 1.20m depth on completion.

Stability: Borehole collapsed to 2.30m depth on completion.

Notes: n/a

Excavation Method: WLS

Borehole Diameter: Various

Made By: EM

Site Name: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Job Number: R17-12043

Start Date: 27/03/2017

End Date: 27/03/2017

Borehole Number: **WS07**

Sheet 1 of 1

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Remarks	
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Groundwater: Groundwater encountered at 1.20m depth. Standing water at 1.00m depth on completion.

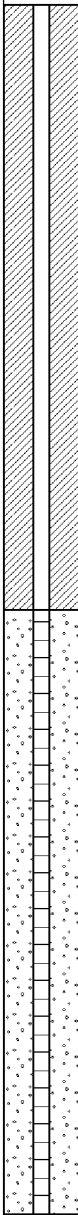
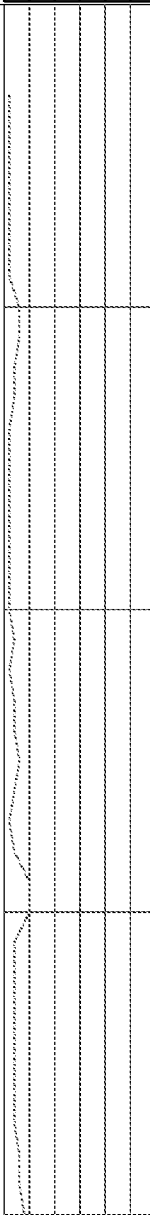
Stability: Borehole stable on completion.

Notes: n/a

Excavation Method: WLS

Borehole Diameter: Various

Made By: EM

Samples and In Situ Testing					Dynamic Probe									
Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Blows/100mm							Legend	Depth	Stratum Description
					0	5	10	15	20	25	30			
														

Remarks	
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Groundwater: Groundwater encountered between 3.00m and 4.00m depth.
Standing water at 3.50m depth on completion.

Stability: Borehole squeezing in on completion.

Notes: Standpipe installed to 4.00m depth; 4.00m to 2.00m slotted pipe with gravel surround; 2.00m to ground level plain pipe with bentonite seal; completed with end cap and security cover concreted flush with the ground surface.

Excavation Method: WLS

Borehole Diameter: Various

Made By: EM

Site Name: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Job Number: R17-12043

Start Date: 28/03/2017

End Date: 28/03/2017

Borehole Number: **WS09**

Sheet 1 of 1

Standpipe		Samples and In Situ Testing			Dynamic Probe					Depth	Stratum Description																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Blows/100mm						Legend																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

Remarks	
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Groundwater: Groundwater seepages at 1.50m and 2.20m depth.

Stability: Borehole cased to 2.00m depth.
Borehole collapsed to 2.10m depth on removal of casing

Notes: n/a

Excavation Method: WLS

Borehole Diameter: Various

Made By: EM

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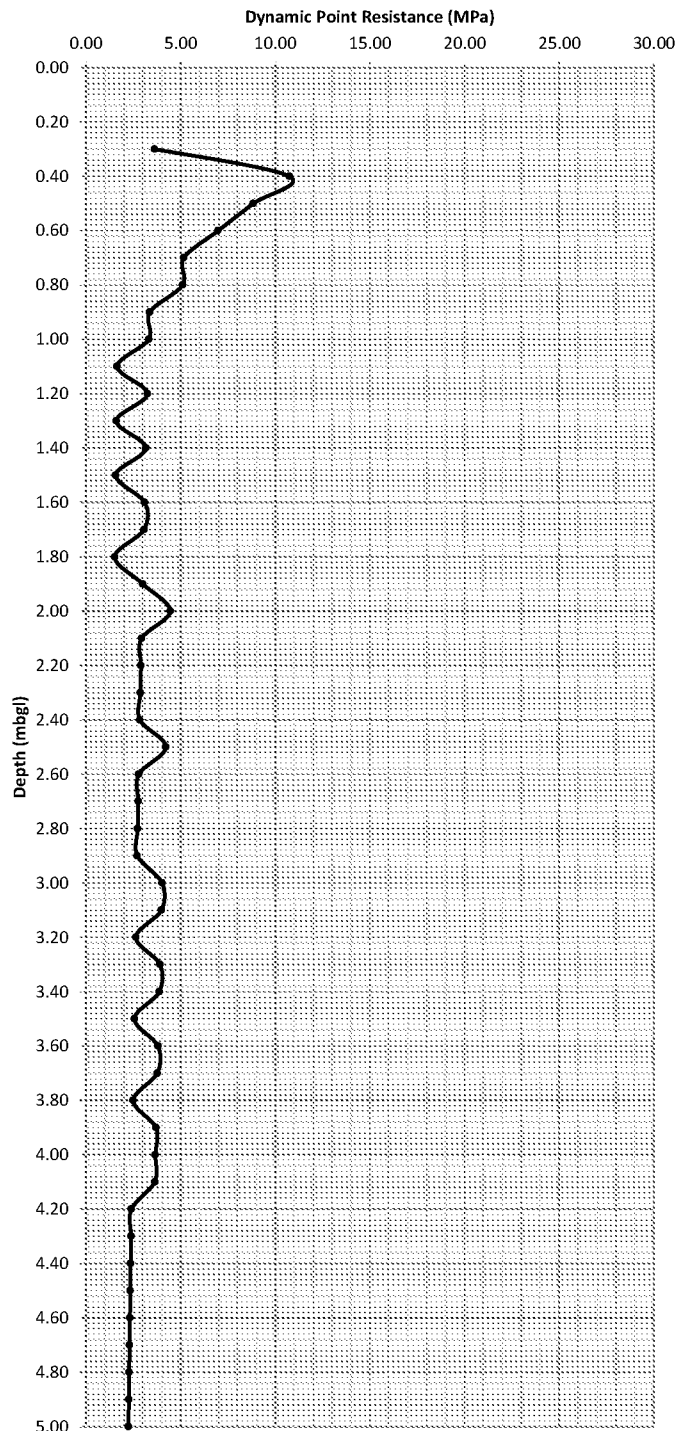
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference			WS01	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	2	0.05	3.84	3.63
0.40	6	0.02	11.51	10.75
0.50	5	0.02	9.59	8.84
0.60	4	0.03	7.67	6.98
0.70	3	0.03	5.76	5.17
0.80	3	0.03	5.76	5.11
0.90	2	0.05	3.84	3.37
1.00	2	0.05	3.84	3.32
1.10	1	0.10	1.92	1.64
1.20	2	0.05	3.84	3.25
1.30	1	0.10	1.92	1.60
1.40	2	0.05	3.84	3.17
1.50	1	0.10	1.92	1.57
1.60	2	0.05	3.84	3.10
1.70	2	0.05	3.84	3.07
1.80	1	0.10	1.92	1.52
1.90	2	0.05	3.84	3.00
2.00	3	0.03	5.76	4.45
2.10	2	0.05	3.84	2.94
2.20	2	0.05	3.84	2.91
2.30	2	0.05	3.84	2.88
2.40	2	0.05	3.84	2.85
2.50	3	0.03	5.76	4.23
2.60	2	0.05	3.84	2.79
2.70	2	0.05	3.84	2.76
2.80	2	0.05	3.84	2.73
2.90	2	0.05	3.84	2.71
3.00	3	0.03	5.76	4.02
3.10	3	0.03	5.76	3.98
3.20	2	0.05	3.84	2.63
3.30	3	0.03	5.76	3.91
3.40	3	0.03	5.76	3.87
3.50	2	0.05	3.84	2.56
3.60	3	0.03	5.76	3.80
3.70	3	0.03	5.76	3.77
3.80	2	0.05	3.84	2.49
3.90	3	0.03	5.76	3.70
4.00	3	0.03	5.76	3.67
4.10	3	0.03	5.76	3.64
4.20	2	0.05	3.84	2.40
4.30	2	0.05	3.84	2.38
4.40	2	0.05	3.84	2.36
4.50	2	0.05	3.84	2.34
4.60	2	0.05	3.84	2.32
4.70	2	0.05	3.84	2.30
4.80	2	0.05	3.84	2.28
4.90	2	0.05	3.84	2.27
5.00	2	0.05	3.84	2.25



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

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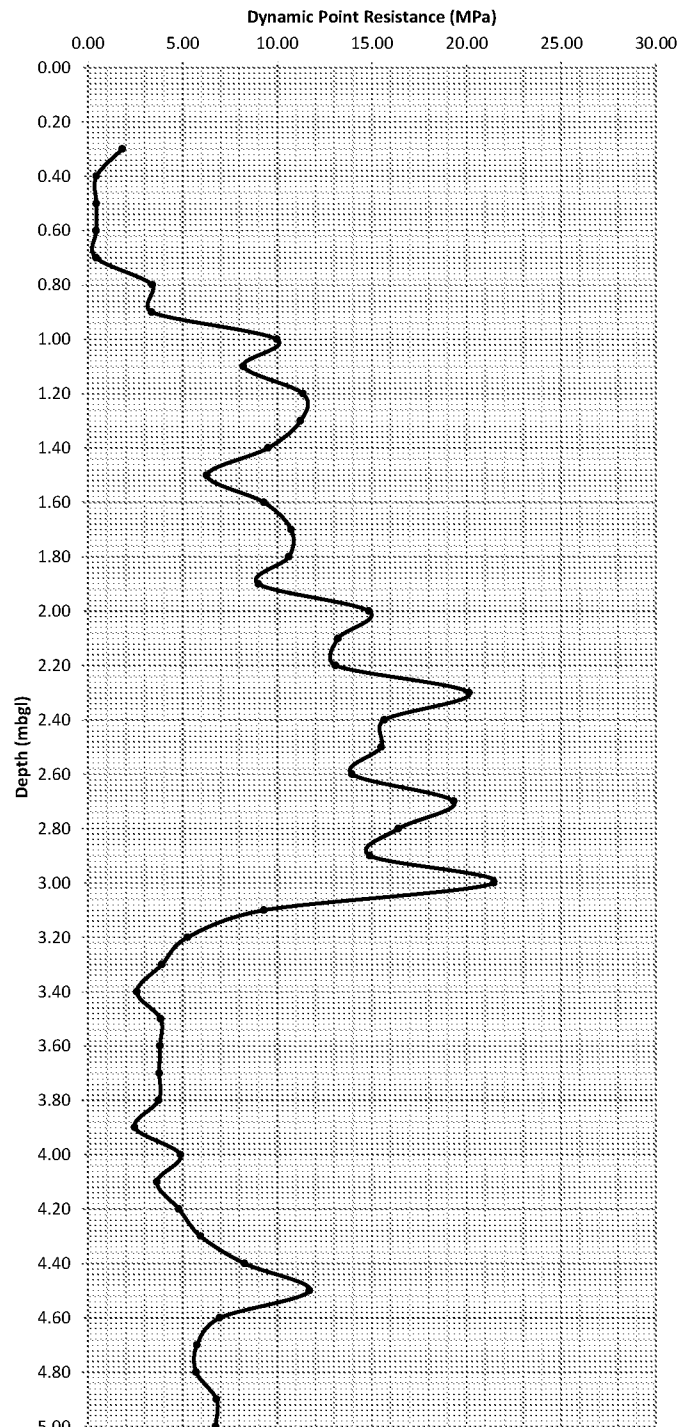
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference		WS02		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	1	0.10	1.92	1.81
0.40	0.25	0.40	0.48	0.45
0.50	0.25	0.40	0.48	0.44
0.60	0.25	0.40	0.48	0.44
0.70	0.25	0.40	0.48	0.43
0.80	2	0.05	3.84	3.41
0.90	2	0.05	3.84	3.37
1.00	6	0.02	11.51	9.97
1.10	5	0.02	9.59	8.21
1.20	7	0.01	13.43	11.36
1.30	7	0.01	13.43	11.23
1.40	6	0.02	11.51	9.52
1.50	4	0.03	7.67	6.27
1.60	6	0.02	11.51	9.31
1.70	7	0.01	13.43	10.74
1.80	7	0.01	13.43	10.62
1.90	6	0.02	11.51	9.00
2.00	10	0.01	19.19	14.85
2.10	9	0.01	17.27	13.22
2.20	9	0.01	17.27	13.08
2.30	14	0.01	26.86	20.14
2.40	11	0.01	21.11	15.66
2.50	11	0.01	21.11	15.50
2.60	10	0.01	19.19	13.95
2.70	14	0.01	26.86	19.33
2.80	12	0.01	23.02	16.41
2.90	11	0.01	21.11	14.89
3.00	16	0.01	30.70	21.46
3.10	7	0.01	13.43	9.30
3.20	4	0.03	7.67	5.26
3.30	3	0.03	5.76	3.91
3.40	2	0.05	3.84	2.58
3.50	3	0.03	5.76	3.84
3.60	3	0.03	5.76	3.80
3.70	3	0.03	5.76	3.77
3.80	3	0.03	5.76	3.73
3.90	2	0.05	3.84	2.47
4.00	4	0.03	7.67	4.89
4.10	3	0.03	5.76	3.64
4.20	4	0.03	7.67	4.81
4.30	5	0.02	9.59	5.96
4.40	7	0.01	13.43	8.27
4.50	10	0.01	19.19	11.71
4.60	6	0.02	11.51	6.97
4.70	5	0.02	9.59	5.76
4.80	5	0.02	9.59	5.71
4.90	6	0.02	11.51	6.80
5.00	6	0.02	11.51	6.74



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

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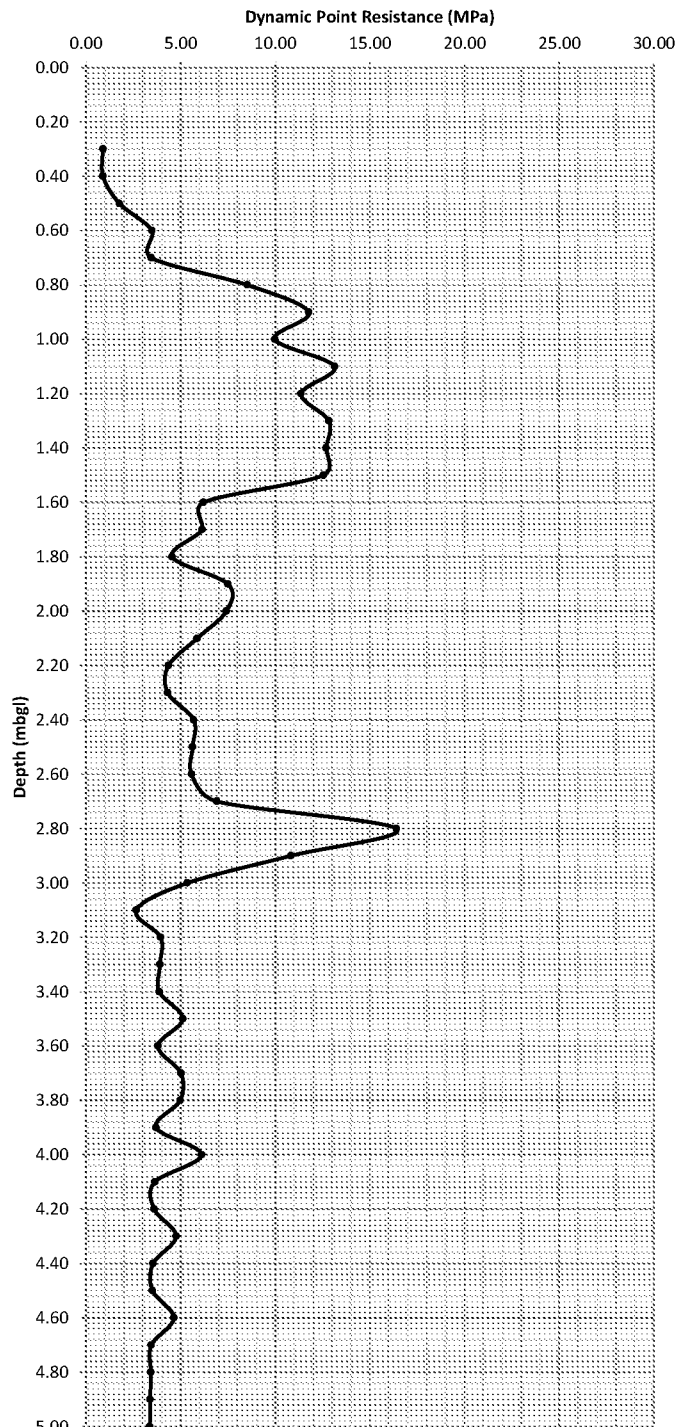
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference		WS03		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	0.5	0.20	0.96	0.91
0.40	0.5	0.20	0.96	0.90
0.50	1	0.10	1.92	1.77
0.60	2	0.05	3.84	3.49
0.70	2	0.05	3.84	3.45
0.80	5	0.02	9.59	8.52
0.90	7	0.01	13.43	11.78
1.00	6	0.02	11.51	9.97
1.10	8	0.01	15.35	13.14
1.20	7	0.01	13.43	11.36
1.30	8	0.01	15.35	12.84
1.40	8	0.01	15.35	12.69
1.50	8	0.01	15.35	12.55
1.60	4	0.03	7.67	6.20
1.70	4	0.03	7.67	6.14
1.80	3	0.03	5.76	4.55
1.90	5	0.02	9.59	7.50
2.00	5	0.02	9.59	7.42
2.10	4	0.03	7.67	5.88
2.20	3	0.03	5.76	4.36
2.30	3	0.03	5.76	4.31
2.40	4	0.03	7.67	5.69
2.50	4	0.03	7.67	5.64
2.60	4	0.03	7.67	5.58
2.70	5	0.02	9.59	6.91
2.80	12	0.01	23.02	16.41
2.90	8	0.01	15.35	10.83
3.00	4	0.03	7.67	5.36
3.10	2	0.05	3.84	2.66
3.20	3	0.03	5.76	3.95
3.30	3	0.03	5.76	3.91
3.40	3	0.03	5.76	3.87
3.50	4	0.03	7.67	5.12
3.60	3	0.03	5.76	3.80
3.70	4	0.03	7.67	5.02
3.80	4	0.03	7.67	4.98
3.90	3	0.03	5.76	3.70
4.00	5	0.02	9.59	6.11
4.10	3	0.03	5.76	3.64
4.20	3	0.03	5.76	3.60
4.30	4	0.03	7.67	4.76
4.40	3	0.03	5.76	3.54
4.50	3	0.03	5.76	3.51
4.60	4	0.03	7.67	4.65
4.70	3	0.03	5.76	3.45
4.80	3	0.03	5.76	3.43
4.90	3	0.03	5.76	3.40
5.00	3	0.03	5.76	3.37



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

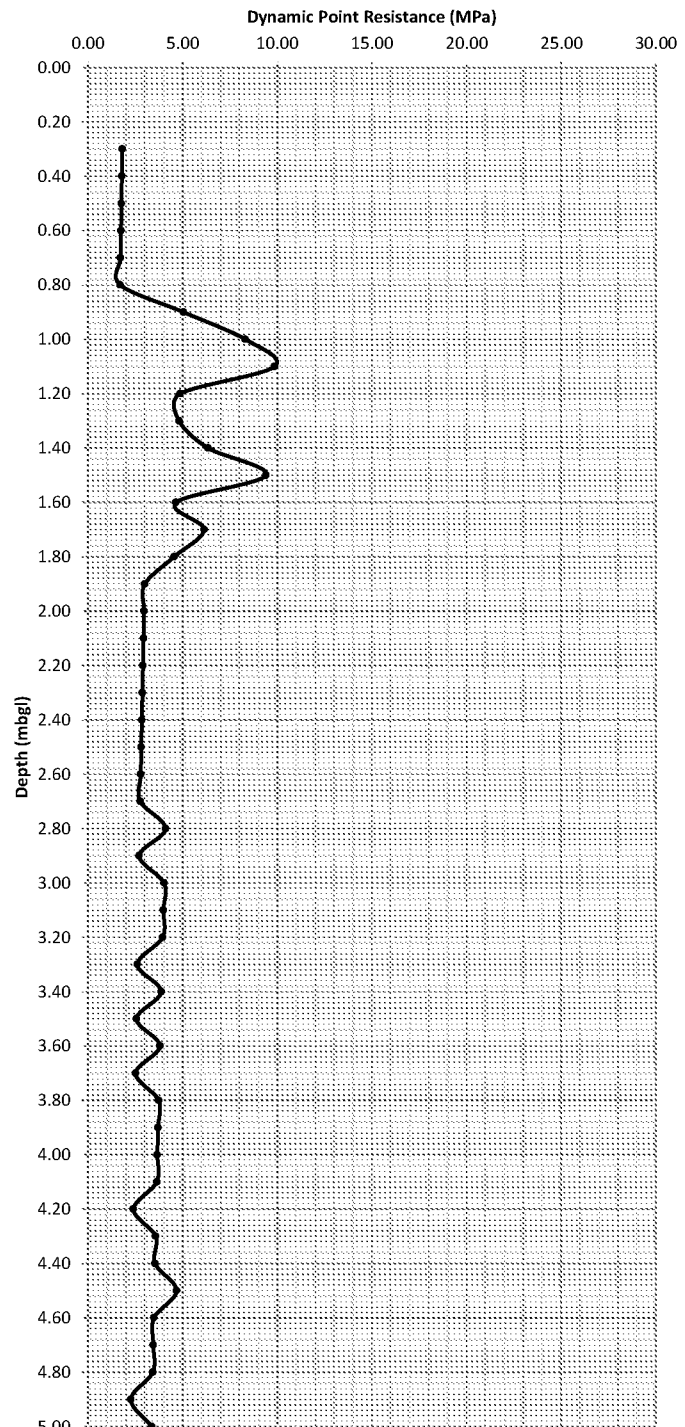
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference			WS04	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	1	0.10	1.92	1.81
0.40	1	0.10	1.92	1.79
0.50	1	0.10	1.92	1.77
0.60	1	0.10	1.92	1.75
0.70	1	0.10	1.92	1.72
0.80	1	0.10	1.92	1.70
0.90	3	0.03	5.76	5.05
1.00	5	0.02	9.59	8.31
1.10	6	0.02	11.51	9.86
1.20	3	0.03	5.76	4.87
1.30	3	0.03	5.76	4.81
1.40	4	0.03	7.67	6.35
1.50	6	0.02	11.51	9.41
1.60	3	0.03	5.76	4.65
1.70	4	0.03	7.67	6.14
1.80	3	0.03	5.76	4.55
1.90	2	0.05	3.84	3.00
2.00	2	0.05	3.84	2.97
2.10	2	0.05	3.84	2.94
2.20	2	0.05	3.84	2.91
2.30	2	0.05	3.84	2.88
2.40	2	0.05	3.84	2.85
2.50	2	0.05	3.84	2.82
2.60	2	0.05	3.84	2.79
2.70	2	0.05	3.84	2.76
2.80	3	0.03	5.76	4.10
2.90	2	0.05	3.84	2.71
3.00	3	0.03	5.76	4.02
3.10	3	0.03	5.76	3.98
3.20	3	0.03	5.76	3.95
3.30	2	0.05	3.84	2.61
3.40	3	0.03	5.76	3.87
3.50	2	0.05	3.84	2.56
3.60	3	0.03	5.76	3.80
3.70	2	0.05	3.84	2.51
3.80	3	0.03	5.76	3.73
3.90	3	0.03	5.76	3.70
4.00	3	0.03	5.76	3.67
4.10	3	0.03	5.76	3.64
4.20	2	0.05	3.84	2.40
4.30	3	0.03	5.76	3.57
4.40	3	0.03	5.76	3.54
4.50	4	0.03	7.67	4.68
4.60	3	0.03	5.76	3.48
4.70	3	0.03	5.76	3.45
4.80	3	0.03	5.76	3.43
4.90	2	0.05	3.84	2.27
5.00	3	0.03	5.76	3.37



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

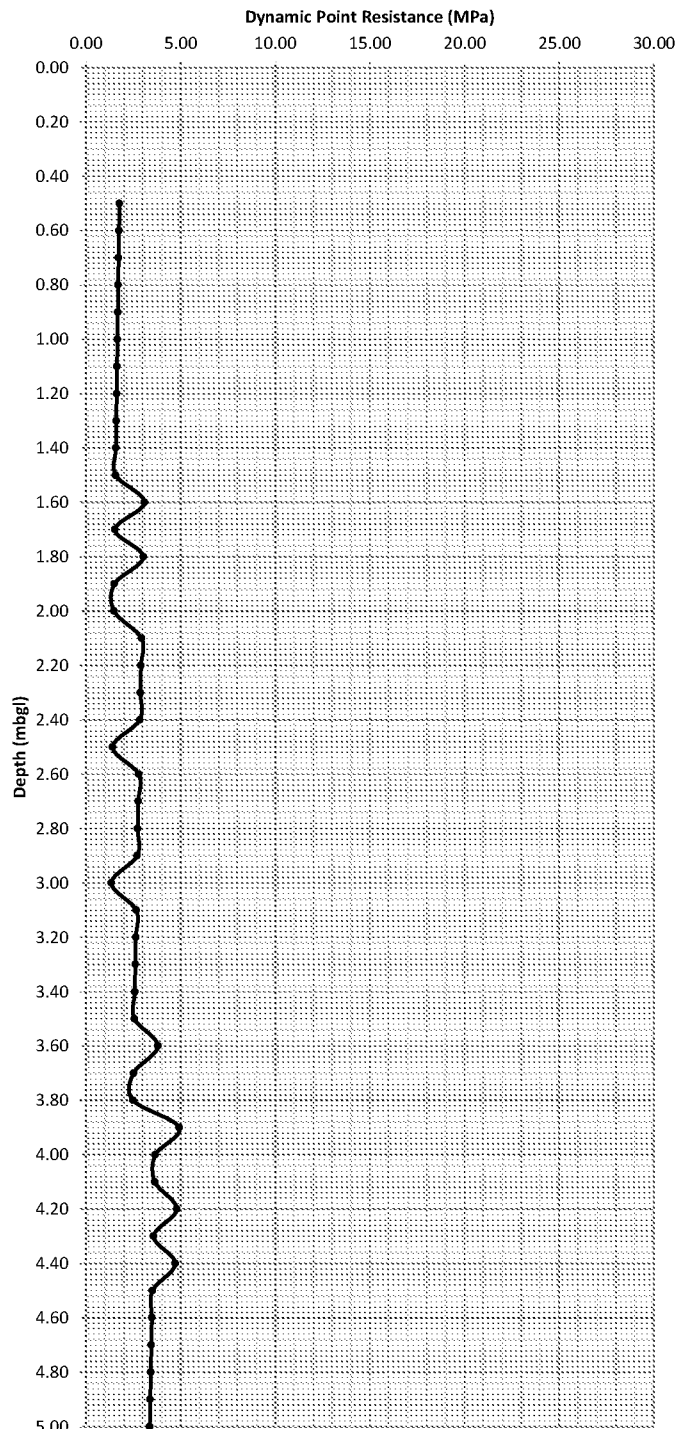
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference		WS05		
Depth (mbl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30				
0.40				
0.50	1	0.10	1.92	1.77
0.60	1	0.10	1.92	1.75
0.70	1	0.10	1.92	1.72
0.80	1	0.10	1.92	1.70
0.90	1	0.10	1.92	1.68
1.00	1	0.10	1.92	1.66
1.10	1	0.10	1.92	1.64
1.20	1	0.10	1.92	1.62
1.30	1	0.10	1.92	1.60
1.40	1	0.10	1.92	1.59
1.50	1	0.10	1.92	1.57
1.60	2	0.05	3.84	3.10
1.70	1	0.10	1.92	1.53
1.80	2	0.05	3.84	3.03
1.90	1	0.10	1.92	1.50
2.00	1	0.10	1.92	1.48
2.10	2	0.05	3.84	2.94
2.20	2	0.05	3.84	2.91
2.30	2	0.05	3.84	2.88
2.40	2	0.05	3.84	2.85
2.50	1	0.10	1.92	1.41
2.60	2	0.05	3.84	2.79
2.70	2	0.05	3.84	2.76
2.80	2	0.05	3.84	2.73
2.90	2	0.05	3.84	2.71
3.00	1	0.10	1.92	1.34
3.10	2	0.05	3.84	2.66
3.20	2	0.05	3.84	2.63
3.30	2	0.05	3.84	2.61
3.40	2	0.05	3.84	2.58
3.50	2	0.05	3.84	2.56
3.60	3	0.03	5.76	3.80
3.70	2	0.05	3.84	2.51
3.80	2	0.05	3.84	2.49
3.90	4	0.03	7.67	4.93
4.00	3	0.03	5.76	3.67
4.10	3	0.03	5.76	3.64
4.20	4	0.03	7.67	4.81
4.30	3	0.03	5.76	3.57
4.40	4	0.03	7.67	4.72
4.50	3	0.03	5.76	3.51
4.60	3	0.03	5.76	3.48
4.70	3	0.03	5.76	3.45
4.80	3	0.03	5.76	3.43
4.90	3	0.03	5.76	3.40
5.00	3	0.03	5.76	3.37



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

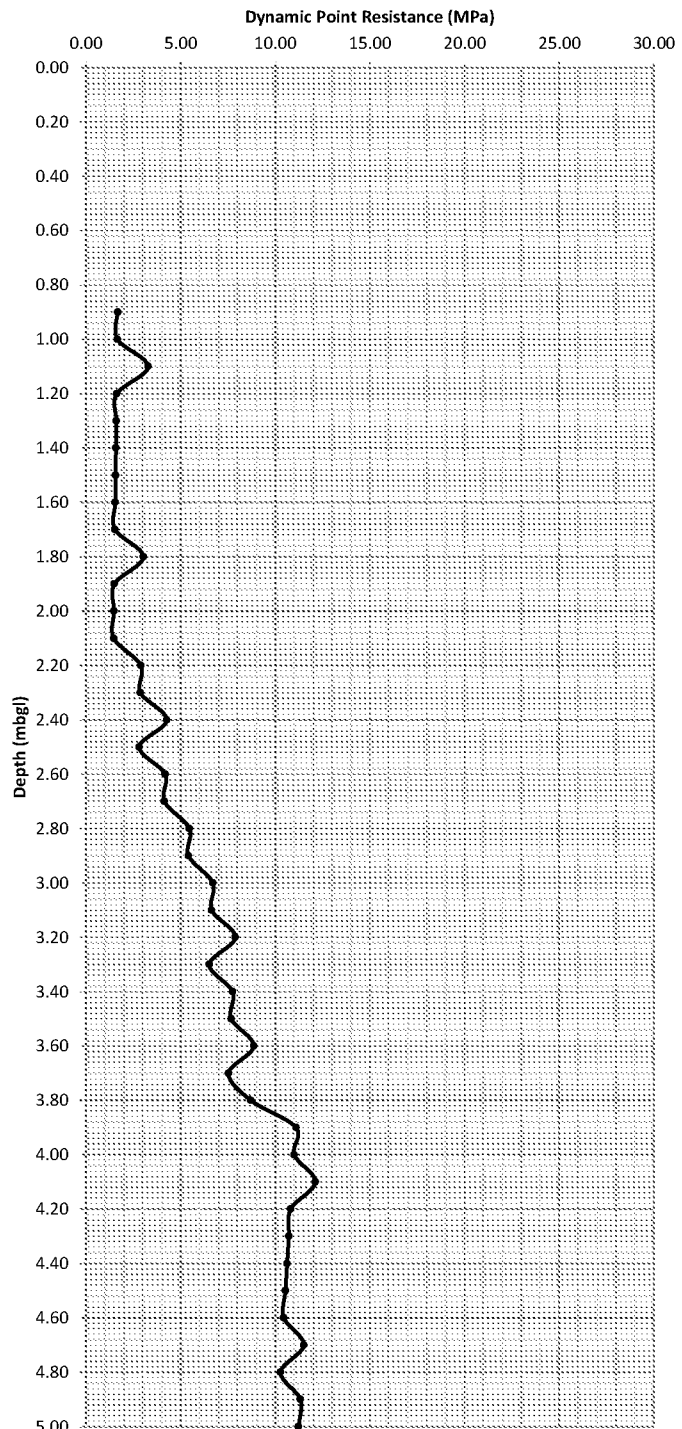
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference		WS06		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30				
0.40				
0.50				
0.60				
0.70				
0.80				
0.90	1	0.10	1.92	1.68
1.00	1	0.10	1.92	1.66
1.10	2	0.05	3.84	3.29
1.20	1	0.10	1.92	1.62
1.30	1	0.10	1.92	1.60
1.40	1	0.10	1.92	1.59
1.50	1	0.10	1.92	1.57
1.60	1	0.10	1.92	1.55
1.70	1	0.10	1.92	1.53
1.80	2	0.05	3.84	3.03
1.90	1	0.10	1.92	1.50
2.00	1	0.10	1.92	1.48
2.10	1	0.10	1.92	1.47
2.20	2	0.05	3.84	2.91
2.30	2	0.05	3.84	2.88
2.40	3	0.03	5.76	4.27
2.50	2	0.05	3.84	2.82
2.60	3	0.03	5.76	4.18
2.70	3	0.03	5.76	4.14
2.80	4	0.03	7.67	5.47
2.90	4	0.03	7.67	5.42
3.00	5	0.02	9.59	6.70
3.10	5	0.02	9.59	6.64
3.20	6	0.02	11.51	7.89
3.30	5	0.02	9.59	6.52
3.40	6	0.02	11.51	7.75
3.50	6	0.02	11.51	7.67
3.60	7	0.01	13.43	8.87
3.70	6	0.02	11.51	7.54
3.80	7	0.01	13.43	8.71
3.90	9	0.01	17.27	11.10
4.00	9	0.01	17.27	11.00
4.10	10	0.01	19.19	12.12
4.20	9	0.01	17.27	10.81
4.30	9	0.01	17.27	10.72
4.40	9	0.01	17.27	10.63
4.50	9	0.01	17.27	10.54
4.60	9	0.01	17.27	10.45
4.70	10	0.01	19.19	11.52
4.80	9	0.01	17.27	10.28
4.90	10	0.01	19.19	11.33
5.00	10	0.01	19.19	11.24



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

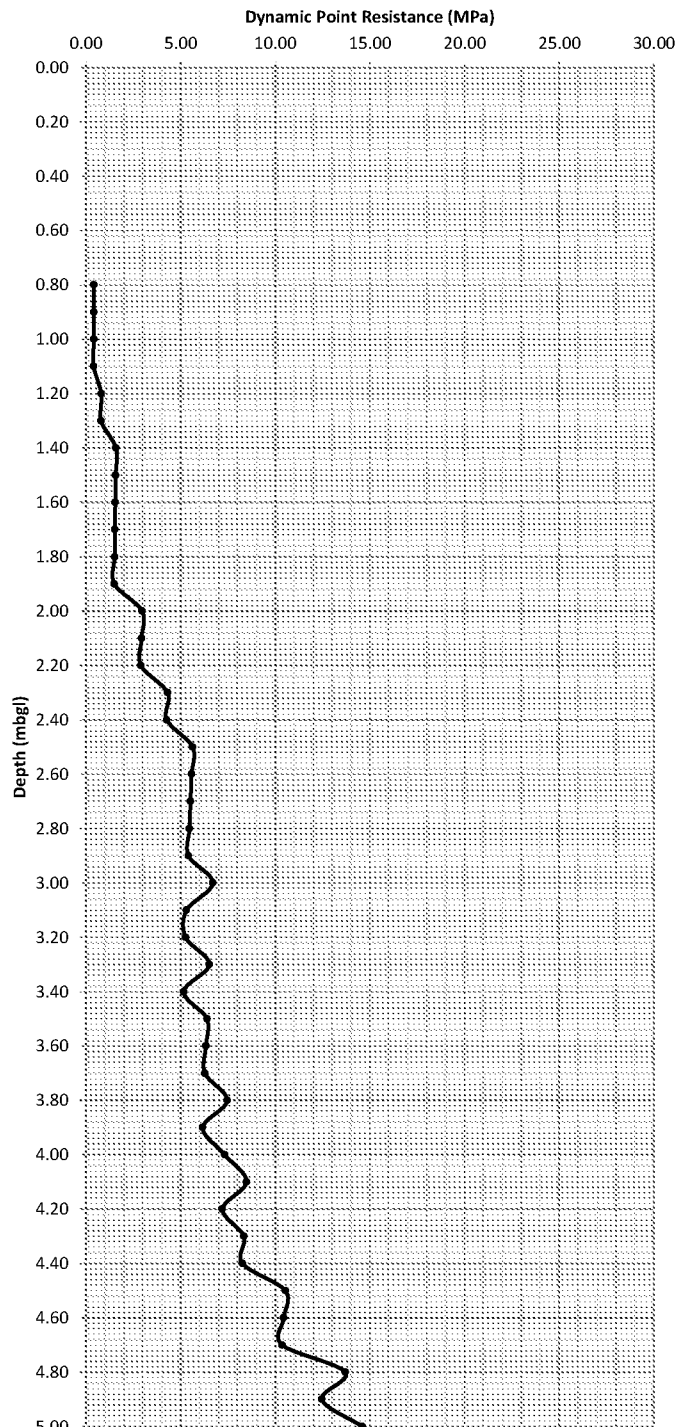
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference		WS07		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30				
0.40				
0.50				
0.60				
0.70				
0.80	0.25	0.40	0.48	0.43
0.90	0.25	0.40	0.48	0.42
1.00	0.25	0.40	0.48	0.42
1.10	0.25	0.40	0.48	0.41
1.20	0.5	0.20	0.96	0.81
1.30	0.5	0.20	0.96	0.80
1.40	1	0.10	1.92	1.59
1.50	1	0.10	1.92	1.57
1.60	1	0.10	1.92	1.55
1.70	1	0.10	1.92	1.53
1.80	1	0.10	1.92	1.52
1.90	1	0.10	1.92	1.50
2.00	2	0.05	3.84	2.97
2.10	2	0.05	3.84	2.94
2.20	2	0.05	3.84	2.91
2.30	3	0.03	5.76	4.31
2.40	3	0.03	5.76	4.27
2.50	4	0.03	7.67	5.64
2.60	4	0.03	7.67	5.58
2.70	4	0.03	7.67	5.52
2.80	4	0.03	7.67	5.47
2.90	4	0.03	7.67	5.42
3.00	5	0.02	9.59	6.70
3.10	4	0.03	7.67	5.31
3.20	4	0.03	7.67	5.26
3.30	5	0.02	9.59	6.52
3.40	4	0.03	7.67	5.16
3.50	5	0.02	9.59	6.40
3.60	5	0.02	9.59	6.34
3.70	5	0.02	9.59	6.28
3.80	6	0.02	11.51	7.47
3.90	5	0.02	9.59	6.17
4.00	6	0.02	11.51	7.34
4.10	7	0.01	13.43	8.48
4.20	6	0.02	11.51	7.21
4.30	7	0.01	13.43	8.34
4.40	7	0.01	13.43	8.27
4.50	9	0.01	17.27	10.54
4.60	9	0.01	17.27	10.45
4.70	9	0.01	17.27	10.36
4.80	12	0.01	23.02	13.71
4.90	11	0.01	21.11	12.46
5.00	13	0.01	24.94	14.61



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

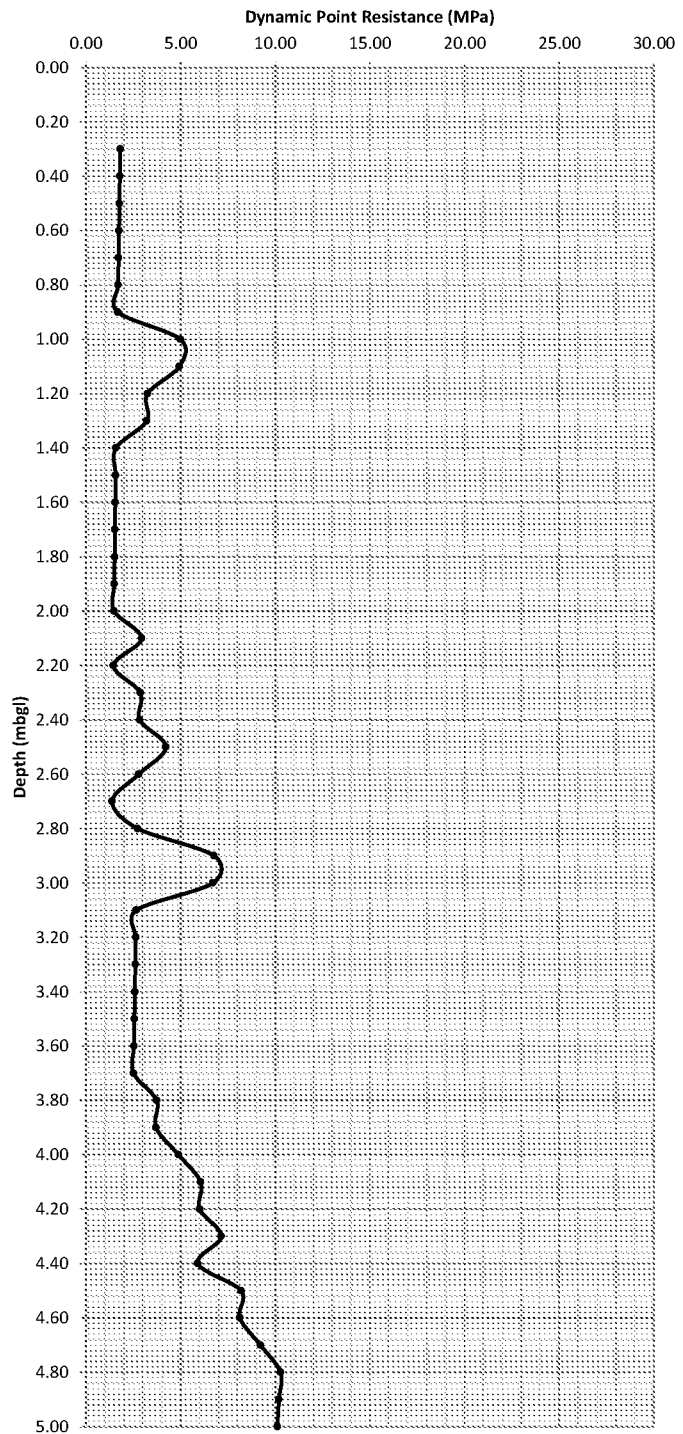
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference			WS08	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	1	0.10	1.92	1.81
0.40	1	0.10	1.92	1.79
0.50	1	0.10	1.92	1.77
0.60	1	0.10	1.92	1.75
0.70	1	0.10	1.92	1.72
0.80	1	0.10	1.92	1.70
0.90	1	0.10	1.92	1.68
1.00	3	0.03	5.76	4.99
1.10	3	0.03	5.76	4.93
1.20	2	0.05	3.84	3.25
1.30	2	0.05	3.84	3.21
1.40	1	0.10	1.92	1.59
1.50	1	0.10	1.92	1.57
1.60	1	0.10	1.92	1.55
1.70	1	0.10	1.92	1.53
1.80	1	0.10	1.92	1.52
1.90	1	0.10	1.92	1.50
2.00	1	0.10	1.92	1.48
2.10	2	0.05	3.84	2.94
2.20	1	0.10	1.92	1.45
2.30	2	0.05	3.84	2.88
2.40	2	0.05	3.84	2.85
2.50	3	0.03	5.76	4.23
2.60	2	0.05	3.84	2.79
2.70	1	0.10	1.92	1.38
2.80	2	0.05	3.84	2.73
2.90	5	0.02	9.59	6.77
3.00	5	0.02	9.59	6.70
3.10	2	0.05	3.84	2.66
3.20	2	0.05	3.84	2.63
3.30	2	0.05	3.84	2.61
3.40	2	0.05	3.84	2.58
3.50	2	0.05	3.84	2.56
3.60	2	0.05	3.84	2.53
3.70	2	0.05	3.84	2.51
3.80	3	0.03	5.76	3.73
3.90	3	0.03	5.76	3.70
4.00	4	0.03	7.67	4.89
4.10	5	0.02	9.59	6.06
4.20	5	0.02	9.59	6.01
4.30	6	0.02	11.51	7.15
4.40	5	0.02	9.59	5.91
4.50	7	0.01	13.43	8.20
4.60	7	0.01	13.43	8.13
4.70	8	0.01	15.35	9.21
4.80	9	0.01	17.27	10.28
4.90	9	0.01	17.27	10.20
5.00	9	0.01	17.27	10.11



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

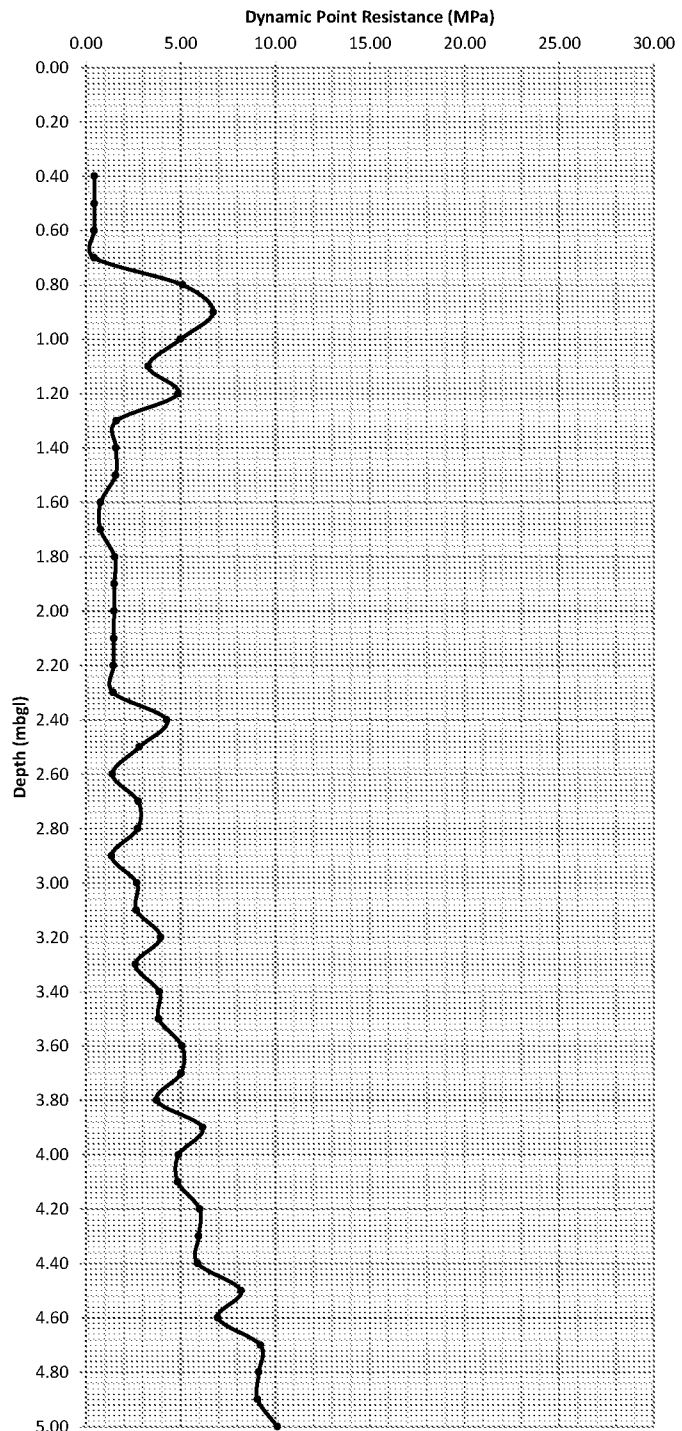
Dynamic Probe Record

SITE Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

Report Ref.

R17-12043

Test Location Reference		WS09		
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30				
0.40	0.25	0.40	0.48	0.45
0.50	0.25	0.40	0.48	0.44
0.60	0.25	0.40	0.48	0.44
0.70	0.25	0.40	0.48	0.43
0.80	3	0.03	5.76	5.11
0.90	4	0.03	7.67	6.73
1.00	3	0.03	5.76	4.99
1.10	2	0.05	3.84	3.29
1.20	3	0.03	5.76	4.87
1.30	1	0.10	1.92	1.60
1.40	1	0.10	1.92	1.59
1.50	1	0.10	1.92	1.57
1.60	0.5	0.20	0.96	0.78
1.70	0.5	0.20	0.96	0.77
1.80	1	0.10	1.92	1.52
1.90	1	0.10	1.92	1.50
2.00	1	0.10	1.92	1.48
2.10	1	0.10	1.92	1.47
2.20	1	0.10	1.92	1.45
2.30	1	0.10	1.92	1.44
2.40	3	0.03	5.76	4.27
2.50	2	0.05	3.84	2.82
2.60	1	0.10	1.92	1.39
2.70	2	0.05	3.84	2.76
2.80	2	0.05	3.84	2.73
2.90	1	0.10	1.92	1.35
3.00	2	0.05	3.84	2.68
3.10	2	0.05	3.84	2.66
3.20	3	0.03	5.76	3.95
3.30	2	0.05	3.84	2.61
3.40	3	0.03	5.76	3.87
3.50	3	0.03	5.76	3.84
3.60	4	0.03	7.67	5.07
3.70	4	0.03	7.67	5.02
3.80	3	0.03	5.76	3.73
3.90	5	0.02	9.59	6.17
4.00	4	0.03	7.67	4.89
4.10	4	0.03	7.67	4.85
4.20	5	0.02	9.59	6.01
4.30	5	0.02	9.59	5.96
4.40	5	0.02	9.59	5.91
4.50	7	0.01	13.43	8.20
4.60	6	0.02	11.51	6.97
4.70	8	0.01	15.35	9.21
4.80	8	0.01	15.35	9.14
4.90	8	0.01	15.35	9.06
5.00	9	0.01	17.27	10.11



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.77
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LIMITED

Site: Sunny Corner, Copse Lane, Walberton, Arundel,
West Sussex

Report No.: R17-12043
Sheet No.: 1 of 1

SUMMARY OF TRIAL PIT FALLING HEAD SOAKAGE TEST RESULTS

TP02	
Time (mins)	Depth to water (m bgl)
0	0.42
1	0.42
2	0.42
7	0.43
11	0.43
24	0.44
34	0.44
79	0.45
119	0.46
149	0.47
Pit Length - 0.30m Pit Width - 0.30m Pit Depth - 0.70m bgl	

TP09	
Time (mins)	Depth to water (m bgl)
0	0.58
1	0.58
2	0.58
10	0.58
25	0.58
34	0.57
67	0.56
137	0.55
167	0.54
Pit Length - 0.30m Pit Width - 0.30m Pit Depth - 0.90m bgl	

Notes: bgl – below ground level.

ASHDOWN SITE INVESTIGATION LIMITED

Site: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex	Report No.: R17-12043 Sheet No.: 1 of 1
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SUMMARY OF BOREHOLE FALLING HEAD SOAKAGE TEST RESULTS

WS02		WS09	
Time (mins)	Depth to water (m bgl)	Time (mins)	Depth to water (m bgl)
0	0.00	0	0.00
1	0.00	1	0.10
2	0.01	2	0.10
9	0.03	14	0.12
24	0.04	28	0.15
64	0.04	49	0.20
104	0.04	129	0.27
134	0.04	159	0.28
Borehole Depth (m bgl)	3.00	Borehole Depth (m bgl)	3.00
Casing Depth (m bgl)	2.00	Casing Depth (m bgl)	2.00
Borehole Diameter (mm)	92.00	Borehole Diameter (mm)	92.00
Casing Diameter (mm)	105.00	Casing Diameter (mm)	105.00

Notes: bgl – below ground level.

ASHDOWN SITE INVESTIGATION LIMITED

Site: Sunny Corner, Copse Lane, Walberton, Arundel,
West Sussex

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SUMMARY OF STANDING WATER DEPTHS

WS01

Date	Standpipe Depth (m bgl)	Standing Water Depth (m bgl)
28/03/2017	3.00	0.60
20/04/2017	3.00	0.60

WS04

Date	Standpipe Depth (m bgl)	Standing Water Depth (m bgl)
28/03/2017	3.00	Dry
20/04/2017	3.00	0.90

WS08

Date	Standpipe Depth (m bgl)	Standing Water Depth (m bgl)
28/03/2017	4.00	0.45
20/04/2017	4.00	0.80

APPENDIX B

Geotechnical Laboratory Testing Notes
Geotechnical Test Results

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+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.

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

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).

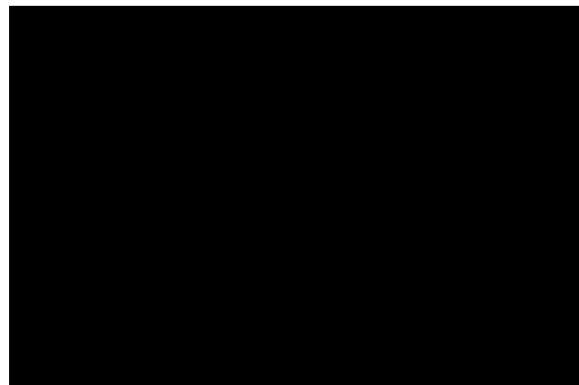
ASHDOWN SITE INVESTIGATION LIMITED

Soil Classification Summary

Site Name:	Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex	Job No:	R17-12043
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BH/TP No.	Depth (m)	Nat. Moist. Cont. (w %)	Equiv. Moist. Cont. (wa %)	Atterberg Limits			Class'n	Cons. Index (Ic)	% passing 425 µm sieve	Visual Description of Sample
				WI %	Wp %	Ip %				
WS01	1.50	16		43	14	29	CI	0.93*	98	Stiff grey mottled red brown silty CLAY with pockets of red siltstone.
WS02	0.80	23		45	18	27	CI	0.81*	97	Stiff grey slightly gravelly silty CLAY. Gravel is fine to medium flint.
WS04	2.50	20		57	18	39	CH	0.95*	100	Stiff grey mottled red silty CLAY.
WS05	1.50	22		72	23	49	CV	1.02*	98	Very stiff brown slightly gravelly CLAY. Gravel is fine to medium selenite crystals.
WS06	2.20	26		64	23	41	CH	0.93*	100	Stiff brown occasionally mottled grey CLAY.
WS07	2.80	28		64	23	41	CH	0.88*	98	Stiff dark grey CLAY with rare iron pyrites nodules.
WS08	0.80	25		37	23	14	CI	0.86*	100	Stiff light grey and orange brown mottled sandy CLAY.

Test Method: Classification Tests BS1377: Part 2: 1990: Method 4.4, 5.3 and 5.4	Sheet No. 1
* Consistency index based on natural moisture content and not the equivalent moisture content.	



THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 17-11460

Issue: 1

Date of Issue: 07/04/2017

Contact: David Harris

Customer Details: Ashdown Site Investigation Ltd
The Old Dairy
Swanborough Farm
Lewes
East Sussex BN7 3PF

Quotation No: Q15-00267

Order No: P17-4697

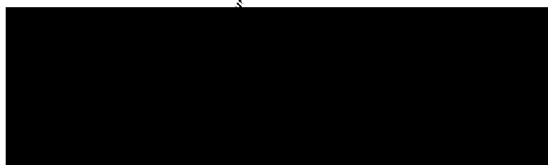
Customer Reference: R17-12043

Date Received: 31/03/2017

Date Approved: 06/04/2017

Details: Sunny Corner, Copse Lane, Walberton, Arundel, West Sussex

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.: 17-11460

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
95077	WS01 2.50	27/03/2017	31/03/2017	Silty clayey loam	
95078	WS02 0.80	28/03/2017	31/03/2017	Silty clayey loam	
95079	WS03 2.90	27/03/2017	31/03/2017	Silty clayey loam	
95080	WS04 1.20	27/03/2017	31/03/2017	Silty clayey loam	
95081	WS06 2.20	28/03/2017	31/03/2017	Clayey loam	
95082	WS08 3.90	27/03/2017	31/03/2017	Clayey loam	
95083	WS09 1.80	28/03/2017	31/03/2017	Clayey loam	



Results Summary

Report No.: 17-11460

2683

ELAB Reference	95077	95078	95079	95080	95081	95082
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS01	WS02	WS03	WS04	WS06	WS08
Sample Depth (m)	2.50	0.80	2.90	1.20	2.20	3.90
Sampling Date	27/03/2017	28/03/2017	27/03/2017	27/03/2017	28/03/2017	27/03/2017
Determinand	Codes	Units	LOD			
Anions						
Water Soluble Sulphate	M	g/l	0.02	0.04	0.03	0.03
Miscellaneous						
pH	M	pH units	0.1	8.1	7.1	7.6
				7.5	7.7	8.0



2683



Results Summary

Report No.: 17-11460

ELAB Reference	95083
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	WS09
Sample Depth (m)	1.80
Sampling Date	28/03/2017

Determinand	Codes	Units	LOD	
Anions				
Water Soluble Sulphate	M	g/l	0.02	0.03
Miscellaneous				
pH	M	pH units	0.1	8.3



Method Summary

Report No.: 17-11460

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	05/04/2017	113	Electromeric
Water soluble anions	M	Air dried sample	05/04/2017	172	Ion Chromatography



Report Information

Report No.: 17-11460

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 (dried at < 30°C)

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