

Agricultural Land Classification Report

Inglewood, Paignton, Devon



WB03590/R3

Deeley Freed Estates Limited

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Inglewood, Paignton, Devon

Client Name

Deeley Freed Estates Limited

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1 Introduction

1.1 Instruction and Brief

Clarkebond (UK) Limited was commissioned by Deeley Freed Estates Limited to undertake an Agricultural Land Classification (ALC) on the site known as Inglewood, Paignton, Devon.

1.2 Site Location and Description

The site is located within 3.3km of the centre of the town of Paignton at approximate National Grid Reference E288116, N57666. A site location plan is presented as Figure 2.1.

The site comprises 6no. large pastoral and arable fields separated by hedges. The fields have been labelled A to F as shown in Figure 3.1. The topography is gently undulating, with high points at the furthest north, furthest south and centre east of the site. The northern most field (field A) has been densely planted with mixed sapling trees and most field boundaries are raised 'Devon' type hedgerows which are to form a screen between this site and the adjacent development. Some hedgerows contain mature trees. A small pond is present in the centre-far east of the site (field D) and at the time of visiting this was almost dry.

At the time of the original assessment fields C and D were used for grazing while fields E and F were planted with kale. Fields A and B were not assessed in the original assessment, although field B was assessed in the 2019 investigation.

1.3 Geology

The northern end of the site (fields A to D) is directly underlain by the Saltern Cove Formation (Mudstone and Limestone) of Devonian age. The southern half of the site is underlain by the Brixham Limestone Formation (Limestone) also of Devonian age (field E and F). The maps show superficial Head deposits in the far southwest corner of field E.

The geological maps sheets show the area to be heavily faulted. Two east-west trending thrust faults are shown between the Brixham Limestone and Saltern Cove Formation in the centre of the site. The Saltern Cove Formation is also faulted, with two north-south trending faults shown beneath the western and eastern edges of the site.

1.4 Site Investigation

An initial site investigation using trial pits was carried out on the 20th April 2017. An additional investigation using hand dug pits was carried out on 2nd October 2019. The holes from both investigations are summarised below:

Table 1.1 Exploratory Holes

Exploratory Hole ID	Technique	Hole Depth (mBGL)	Comments & Reasons for Holes
TP105 & TP106	Machine Dug Trial Pit	1.1 - 1.2	To aid in Agricultural Land Classification of field F.
TP107 & TP108	Machine Dug Trial Pit	1.1 - 1.2	To aid in Agricultural Land Classification of field D.
TP109 & TP110	Machine Dug Trial Pit	1.0	To aid in Agricultural Land Classification of field C.
TP111 & TP112	Machine Dug Trial Pit	1.1 - 1.2	To aid in Agricultural Land Classification of field E.
HP1 & HP2	Hand Dug Trial Pits	0.6	To aid in Agricultural Land Classification of field B.

In the first phase of investigation in 2016 8nr trial pits in total, designated TP105 to TP112 inclusive, were excavated using a JCB-3CX type excavator. The trial pits were logged by an onsite engineer. On completion the pits were backfilled with excavated soil and compacted. During the second phase of investigation in 2019 hand dug inspection pits were used to avoid excessive rutting and damage to the field under investigation. 2no. hand pits, designated HP1 and HP2 were excavated. Exploratory hole location plan and trial pit records are attached.

1.5 Ground Conditions

The following table provides a summary of the strata encountered and the depth to the base of each stratum in metres encountered in the exploratory holes:

Table 1.2 Ground Conditions Fields E & F (TP105, TP106, TP111 & TP112)

Strata	Depth Encountered (mBGL)		Typical Thickness (m)	Description and Comments
	Top	Bottom		
Topsoil	0.0	0.3-0.4	0.35	Dark brown gravelly sandy SILT with gravel comprising of fine to coarse limestone. Cobbles of limestone observed within TP105 and pockets of clay within TP106.
Brixham Limestone Formation	0.3-0.4	0.7-1.1	0.5	Dark brown sandy very gravelly SILT with frequent cobbles and rare boulders of limestone. Gravel comprises of fine to coarse limestone. Becoming GRAVEL and COBBLES within TP105.
Brixham Limestone Formation (TP106 & TP112)	0.7-1.1	>1.2	Unknown	Light grey brown silty gravelly SAND with occasional cobble of limestone. Gravel of fine to coarse limestone.

Table 1.3 Ground Conditions Fields B, C & D (TP107 to TP110, HP1 and HP2)

Strata	Depth Encountered (mBGL)		Typical Thickness (m)	Description and Comments
	Top	Bottom		
Topsoil	0.0	0.3-0.4	0.35	Dark brown gravelly sandy SILT with gravel comprising of fine to coarse limestone and mudstone.
Saltern Cove Formation	0.3-0.4	>1.2	Unknown	Brown gravelly sandy SILT/CLAY. Gravel of fine to coarse mudstone.
Saltern Cove Formation (TP108)	0.35	>1.0	Unknown	Purple grey slatey extremely weak MUDSTONE recovered as tabular slatey gravel.

The ground conditions appear as per the published geology.

Groundwater was encountered within TP112 at 1.0mBGL within the Brixham Limestone Formation. All other pits (being 1-1.2m depth) were dry during excavation.

At the time of investigation, field B appeared to have been recently ploughed in preparation for planting.

2 Agricultural Land Classification

2.1 General

The Agricultural Land Classification provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long term limitations on agricultural use. The process for classifying agricultural land is described in the following report:

- *Agricultural Land Classification of England and Wales* by Ministry of Agriculture, Fisheries and Food. Dated October 1988.

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typically cropping range and the expected level of yield.

- **Grade 1 – excellent quality agricultural land**
Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.
- **Grade 2 – very good quality agricultural land**
Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.
- **Grade 3 - good to moderate quality agricultural land**
Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown, yields are generally lower or more variable than on land in Grades 1 and 2.
 - **Subgrade 3a - good quality agricultural land**
Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.
 - **Subgrade 3b - moderate quality agricultural land**
Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.
- **Grade 4 - poor quality agricultural land**
Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.
- **Grade 5 - very poor quality agricultural land**
Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

The following sections provide an assessment of the Classification Characteristics in relation to the current site.

2.2 Climatic Limitations

Climate has a major, and in places overriding, influence on land quality by affecting both the range of potential agricultural uses and the cost and level of production. Its most fundamental influence is on the potential for plant growth by determining the energy available for photosynthesis and water supply to plant roots.

The main parameters used in assessment of the climatic limitations are average annual rainfall (AAR), as a measure of overall wetness; and accumulated temperature, as a measure of the relative warmth of locality. For the climatic assessment, accumulated temperature is calculated, using an established algorithm (Meteorological Office, 1969), for the period January to June (AT0); this being the growth period for most crops

The data used for ALC is taken from the following report:

- *Climatological Data for Agricultural Land Classification*, by the Met Office. January 1989.

Table 2.1 Climatic Limitations

Field	AAR (mm)	AT0 (Day °C)	ALC Grade
A	950	1603	1
B	950	1603	1
C	1024	1531	1
D	950	1603	1
E	1024	1531	1
F	1024	1531	1

Given the location of the site within the south of England where the temperature is warmer and there is less rainfall than other parts England, the 6 fields can be given an ALC Grade of 1.

2.3 Gradient

Gradient has a significant effect on mechanised farm operations since most conventional agricultural machinery performs best on level ground. The table below shows the ALC Grades of the six fields based on the gradient.

Table 2.2 Field Gradients

Field	Minimum Gradient (°)	Maximum Gradient (°)	ALC Grade
A	1.6	3.9	1
B	2.0	4.2	1
C	1.4	2.3	1
D	0.1	2.5	1
E	2.4	4.7	1
F	0.8	5.6	1

All 6 fields have been given an ALC Grade of 1.

The micro-relief can severely limit the use of agricultural machinery and can affect the final ALC Grade. However, the four observed fields appeared to be of generally consistent slopes and showed no complex changes of slope angle and direction over short distances, or the presence of boulders or rock outcrops. Therefore, micro-relief does not affect the above final ALC Grade.

2.4 Flood Risk

The occurrence of flooding is strongly influenced by topography but the extent, duration, frequency and timing can be difficult to establish precisely. The risk of flooding may be significant in affecting the choice of crops to be grown, because at certain times of the year it can have a detrimental effect on yield and may give rise to soil management problems.

Information on flooding at a local scale is often fragmentary and the assessment may have to be based on local knowledge, together with any information or advice which can be obtained from Water Authorities. Most weight should be given to the predicted long-term risk, or the return periods used in the design of flood protection schemes, rather than to the average incidence of flooding in recent years, which may have been influenced by atypical climatic conditions.

The already completed Flood Risk Assessment for the site shows that it is located within a Flood Zone 1; the area of lowest flood risk with less than a 1 in 1000 (0.1%) chance of flooding from main rivers and the sea annually.

The Flood Risk Assessment report also indicates that **groundwater flooding** is not a major problem within Torbay and would only pose a risk in low-lying coastal areas. OS mapping indicates that the site is at a relatively high elevation in relation to surrounding areas and so the risk of groundwater flooding is low.

The risk of **surface water flooding** is generally considered low but will be influenced by the different permeability characteristics of the underlying limestone as opposed to less permeable mudstone.

Field C also suggests that surface water flooding can occur where the hedgerows restrict surface water flow. Field C is certainly more waterlogged on the western side in comparison to other fields'

boundaries, which comprise of stone and which will be more permeable and allow surface water to flow through.

Therefore, based on the above, the fields can be given an ALC Grade of 1, due to the rarity and short duration of any potential flood events, apart from field C which grade 2/3 based on observed surface water.

2.5 Soil depth

Soil depth is an important factor in determining the available water capacity of a soil. Shallowness affects cropping in other ways, notably by influencing the range and type of cultivations which can be carried out, but also by restricting nutrient uptake and root growth. Therefore, it is necessary to specify minimum soil depth requirements for the grades and subgrades. The table below shows the ALC Grades for each field based on soil depth.

Table 2.3 Minimum Soil Depths

Field	Minimum Soil Depth (m)	ALC Grade
B	0.60	1
C	0.35	3a
D	0.30	3a
E	0.40	3a
F	0.70	1

No trial pitting was undertaken in field A and so no grade could be determined from soil depth. As shown in the table field F had a minimum soil depth of 0.7m and field B 0.6m and these classify as ALC Grade 1. The other three fields classify as ALC Grade 3a.

2.6 Stoniness

The amount of stones has an effect on cultivation, harvesting and crop growth and to cause a reduction in the available water capacity of a soil.

A high stone content can increase production costs by causing extra wear and tear to implements and tyres. Crop quality may also be reduced in stony soil.

The degree of limitation imposed by stones depends on their quantity, size, shape and hardness. The grade on stone content is based upon the percentage of stones that will not pass through sieves with 2cm or 6cm square mesh and are expressed in terms of the percentage of total volume for the top 25cm of the soil.

Table 2.4 Stoniness

Field	Limiting percentages (volume) of hard stones in the top 25cm of soil		ALC Grade
	Stone larger than 2cm	Stones larger than 6cm	
B	0%	0%	1
C	6%	7%	2
D	0%	0%	1
E	27%	0%	3b
F	20%	7%	3b

Based upon the stone content within the top 25cm of topsoil (see results in Appendix B), the two fields located on top of the Brixham Limestone Formation have been given an ALC grade of 3b due to the high percentage of stones. The north and west fields underlain by the Saltern Cove Formation contain less stones over 2cm and classify as given ALC grades of 1 (fields B & D) and 2 (field C).

2.7 Soil wetness

A soil wetness limitation exists where the soil water regime adversely affects plant growth or imposes restriction on cultivations or grazing by livestock. Excessive soil wetness adversely affects seed germination and survival, partly by a reduction in soil temperature and partly because of anaerobism. It also inhibits the development of a good root system and can, in extreme cases, lead to plant death. Soil wetness also influences the sensitivity of the soil to structural damage and is therefore a major factor in determining the number of days when the soil is in a suitable condition for cultivation, trafficking by machinery or grazing by livestock.

For ALC purposes, the soil wetness assessment takes account of:

- The climatic regime
- The soil water regime
- The texture of the top 25cm of soil

The influence of climate on soil wetness is assessed by reference to median field capacity days (FCD). FCD ranges are specified within which similar soils are expected to have similar degrees of wetness limitation.

Soil wetness regime is defined in terms of the average duration of waterlogging at specified depths in the soil profile.

Lastly soil texture classes are divided into four groups according to ease of cultivation and susceptibility to damage by grazing animals.

Table 2.5 Soil Wetness

Field	Wetness Class	Texture of the top 25cm	Field Capacity Days	ALC Grade
B	3	SZL	197	3a
C	4	SZL/ZCL	209	3b
D	3	CL	197	3a
E	3	SZL	209	3a
F	3	ZCL	209	3a

The assigned 'Soil Wetness Class' for each field has been based upon interpretation of the logged soils (Appendix A) and the flow chart within Figure 6 in the Agricultural Land Classification, 1988.

2.8 Droughtiness

To achieve full yield potential, a crop requires an adequate supply of soil moisture throughout the growing season. Droughtiness is a significant limitation to crop growth in areas with relatively low rainfall or high evapotranspiration, or where the soil holds only small reserves of moisture available to plant roots.

Soil droughtiness requires the calculation of the 'crop-adjusted available water capacity' (AP) for both wheat and potatoes, as these crops are widely grown and, in terms of their susceptibility to drought are representative of a broad range of crops. AP is based upon the 'Total Available Water' and 'Easily Available Water' of the different topsoil and subsoil levels. The Moisture deficit (MD) is also needed, which is part of the 1989 Met Office data set. The AP and MD can be used to calculate the Moisture Balance (MB) which is used to define the ALC Grade.

Table 2.6 Droughtiness

Field	Trial Pit	Wheat			Potatoes			ALC Grade
		AP (mm)	MD (mm)	MB (mm)	AP (mm)	MD (mm)	MB (mm)	
B	HP1	153	100	53	159	92	67	1
	HP2	153	100	53	159	92	67	1
C	TP109	103.46	90	13.46	72.16	79	-6.84	2
	TP110	126.8	90	36.8	98.8	79	19.8	1
D	TP107	117.9	100	17.9	94.7	92	2.7	2
	TP108	126.7	100	26.7	97.7	92	5.7	2
E	TP111	92.6	90	2.6	70.6	79	8.4	3a
	TP112	112.4	90	22.4	89.8	79	10.8	2
F	TP105	126.1	90	36.1	103.6	79	24.6	1
	TP106	124.6	90	34.6	103.6	79	24.6	1

At the time of investigation, field B appeared to have been recently ploughed, resulting in a disturbed upper horizon. The results in Table 2.6 are therefore not thought to be entirely accurate.

2.9 Classification and Discussion

Table 2.7 below details the final land classification based upon the preceding analysis. The land assessment has followed guidance provided in the 1988 MAFF publication “Agricultural Land Classification of England and Wales”, detailed in Section 1. This document is not however prescriptive on the method for combining the component factors into an overall classification. The previous assessment undertaken in 2017 adopted a judgemental approach, weighting the contributing factors to form an average classification.

This initial classification has been revised in the light of guidance issued by DEFRA relating to climate change impacts (SP1104 “Impact of climate change on the capability of soils for agriculture as defined by the Agricultural Land Classification”, 2015). The DEFRA guidance states that the ALC classification given to a location is the lowest grade from any of the 10 criteria (i.e. the most limiting factor). Accordingly, the final ALC classifications have been revised and are summarised in the table below.

Table 2.7 Classification Summary

Field	ALC Grade According to:							Final ALC Grade
	Climate	Gradient	Flood Risk	Soil Depth	Stoniness	Soil Wetness	Soil Droughtiness	
A	1	1	1	-	-	-	-	-
B	1	1	1	1	1	3a	1	3a
C	1	1	2/3	3a	2	3b	1/2	3b
D	1	1	1	3a	1	3a	2	3a
E	1	1	1	3a	3b	3a	2/3a	3b
F	1	1	1	1	3b	3a	1	3b

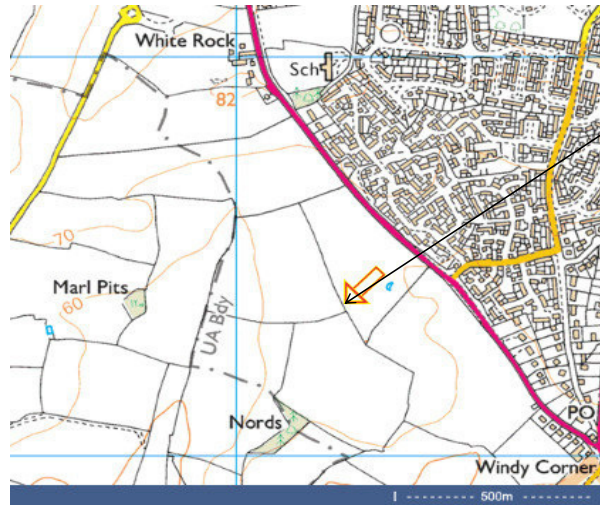
Based upon all the available calculated grades, all fields have been classed as Grade 3 and are therefore considered good (3a) to moderate (3b) quality agricultural land.

Investigation in field A has not been completed. Classification of field A is not appropriate as it has been replanted with shrubs and trees.

Figures

2.1 Site Location Plan

3.1 Exploratory Hole Location Plan



Site Centre (approximate):
 OS X (Eastings) 288116
 OS Y (Northings) 57666

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 Inglewood, Paignton
 Preliminary Geoenvironmental Investigation

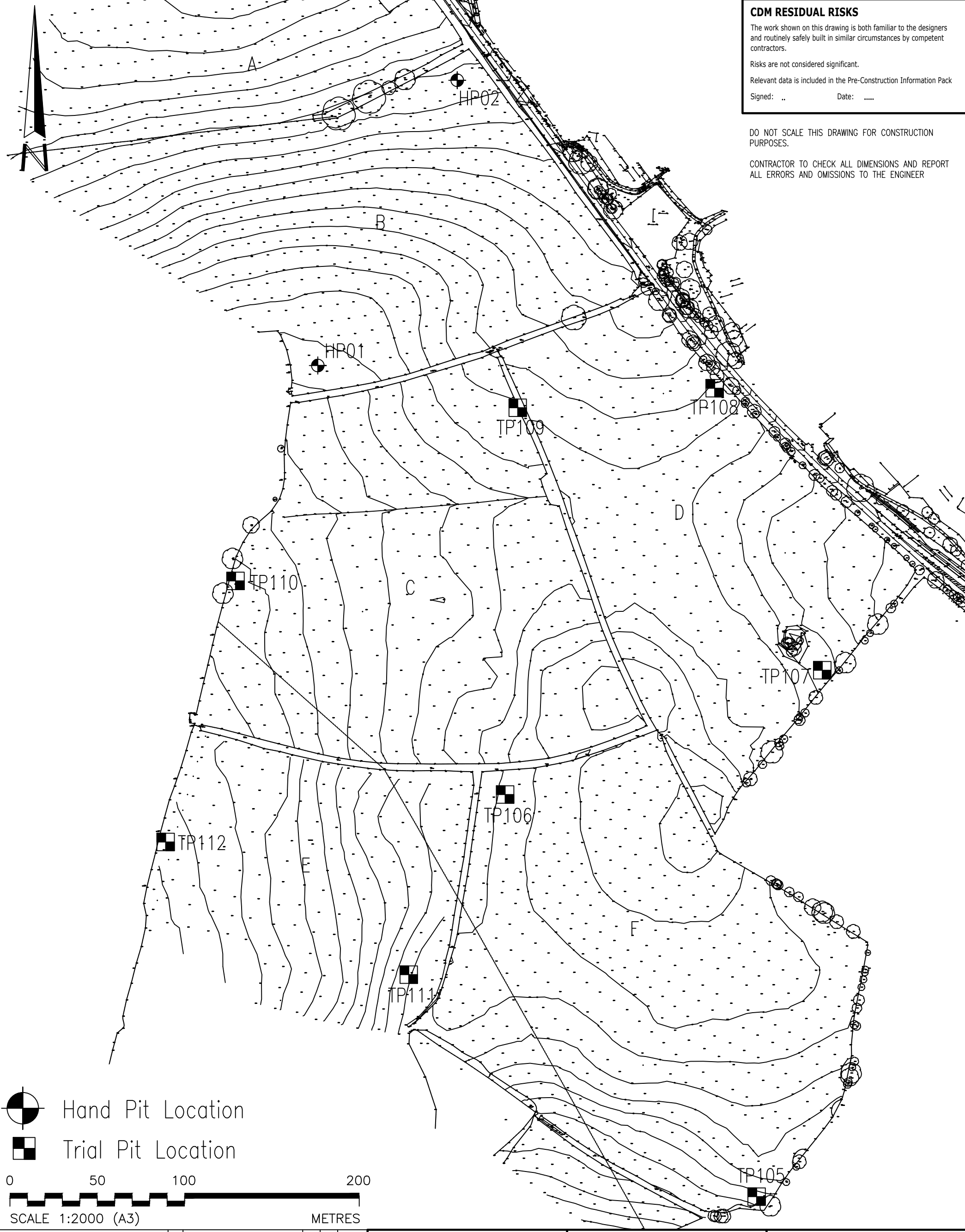
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Status Final Issue	

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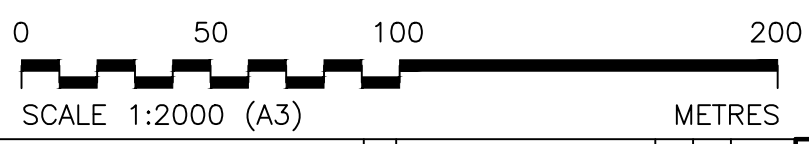
Figure No. WB03590/R2 Figure 2.1	Rev. 0
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CDM RESIDUAL RISKS
 The work shown on this drawing is both familiar to the designers and routinely safely built in similar circumstances by competent contractors.
 Risks are not considered significant.
 Relevant data is included in the Pre-Construction Information Pack
 Signed: .. Date:

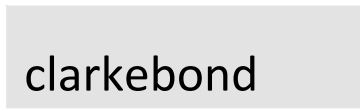
DO NOT SCALE THIS DRAWING FOR CONSTRUCTION PURPOSES.
 CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ENGINEER



 Hand Pit Location
 Trial Pit Location



DWG INFO: M:\CLARKEBOND UK LIMITED\BRISTOL PROJECTS\WB03590 - WHITE ROCK 2 URBAN EXTENSION\DRAWINGS\CURRENT\WB03590-3.1-EHLP LAND CLASSIFICATION - REV2

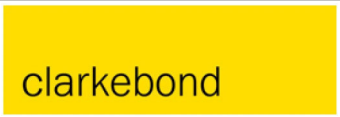
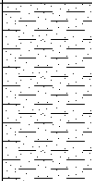

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		Project Inglewood, Paignton				Project No. WB0590	Discipline G
* PRELIMINARY FIRST ISSUE.		Scale 1:2500	Date Nov 19	Revision
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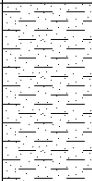

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Appendices




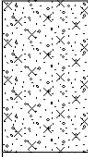
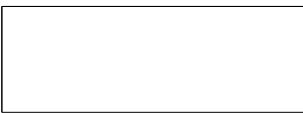
- A Trial Pit Exploratory Hole Logs**
- B Geotechnical Laboratory Results**

Appendix A – Trial Pit Exploratory Hole Logs



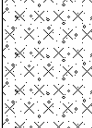

		<h1>Trial Pit Log</h1>					Trial Pit No.: <h2 style="text-align: center;">HP1</h2>		
		Project Name: Inglewood, Paignton			Co-Ordinates: 288022 E 57627 N		Start: 02/10/2019		
Project Number: WB03590			Ground Level (m OD):		End: 02/10/2019				
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well	
Depth (m)	Type	Results							
			0.60			Red brown gravelly sandy CLAY. Gravel of fine to coarse mudstone. SALTERN COVE FORMATION	0.5		
						End of Pit at 0.60m		1.0	
							1.5		
							2.0		
							2.5		
							3.0		
							3.5		
							4.0		
							4.5		
							5.0		
<div style="border: 1px solid black; width: 150px; height: 40px; margin: 0 auto;"></div>					General Remarks:			Logged By: NE	
								Approved By: MB	
Stability: Stable						Scale: 1:25			
Shoring: None			Method/Plant Used: Hand Dug Pit			Sheet 1 of 1			

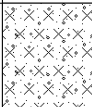

clarkebond		<h1>Trial Pit Log</h1>					Trial Pit No.: HP2	
Project Name: Inglewood, Paignton				Co-Ordinates: 288127 E 57834 N		Start: 02/10/2019		
Project Number: WB03590				Ground Level (m OD):		End: 02/10/2019		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
			0.60			Red brown gravelly sandy CLAY. Gravel of fine to coarse mudstone. SALTERN COVE FORMATION	0.5	
						End of Pit at 0.60m		
<div style="border: 1px solid black; width: 100px; height: 40px; margin-bottom: 5px;"></div>						General Remarks:		Logged By: NE
								Approved By: MB
Stability: Stable						Scale: 1:25		
Shoring: None						Method/Plant Used: Hand Dug Pit		
						Sheet 1 of 1		



clarkebond		Trial Pit Log					Trial Pit No.: TP105	
Project Name: Inglewood, Paignton			Co-Ordinates: 288335 E 57027 N			Start: 20/04/2017		
Project Number: WB03590			Ground Level (m OD):			End: 20/04/2017		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.30	B, D		0.30		Dark brown gravelly sandy SILT with occasional cobbles of limestone. Gravel of fine to coarse limestone. TOPSOIL			
0.60	D				Dark brown to brown sandy very gravelly SILT with frequent cobbles and rare boulders of limestone. BRIXHAM LIMESTONE FORMATION	0.5		
1.00	D		0.80 1.00		brown sandy silty GRAVEL and COBBLE of grey sugary limestone. Occasional boulders of limestone. BRIXHAM LIMESTONE FORMATION End of Pit at 1.00m	1.0		
						1.5		
						2.0		
						2.5		
						3.0		
						3.5		
						4.0		
						4.5		
						5.0		
1.60			General Remarks: No groundwater was encountered.			Logged By: HG		
0.70						Approved By: CW		
						Scale: 1:25		
Stability: Stable						Sheet 1 of 1		
Shoring: N/A			Method/Plant Used: Volvo BL71					

clarkebond		Trial Pit Log					Trial Pit No.: TP106	
Project Name: Inglewood, Paignton			Co-Ordinates: 288155 E 57315 N			Start: 20/04/2017		
Project Number: WB03590			Ground Level (m OD):			End: 20/04/2017		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.30	B, D		0.40			Dark brown gravelly sandy SILT with occasional clay pockets. Gravel of fine to coarse limestone. TOPSOIL		
0.60	D		0.70			Dark brown gravelly sandy SILT with occasional clay pockets and frequent cobbles of limestone. Gravel of fine to coarse limestone. BRIXHAM LIMESTONE FORMATION	0.5	
1.00	D		1.20			Light grey brwon silty gravelly SAND with occasional cobbles of limestone. Gravel of fine to coarse limestone. BRIXHAM LIMESTONE FORMATION	1.0	
						End of Pit at 1.20m		
							1.5	
							2.0	
							2.5	
							3.0	
							3.5	
							4.0	
							4.5	
							5.0	
1.50  0.50						General Remarks: No groundwater was encountered.		Logged By: HG
Stability: Stable								Approved By: CW
Shoring: N/A						Method/Plant Used: Volvo BL71		Scale: 1:25
								Sheet 1 of 1







clarkebond		Trial Pit Log					Trial Pit No.: TP107	
Project Name: Inglewood, Paignton			Co-Ordinates: 288382 E 57404 N			Start: 20/04/2017		
Project Number: WB03590			Ground Level (m OD):			End: 20/04/2017		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.30	B, D		0.30		XXXXXX XXXXXX XXXXXX	Dark brown gravelly sandy SILT. Gravel of fine to coarse limestone and mudstone. TOPSOIL		
0.60	D				XXXXXX XXXXXX XXXXXX	Brown gravelly sandy SILT/CLAY. Gravel of fine to coarse mudstone. SALTERN COVE FORMATION	0.5	
1.00	D		1.10		XXXXXX XXXXXX XXXXXX	<u>Increased gravel content at 0.9mbgl.</u> End of Pit at 1.10m	1.0	
							1.5	
							2.0	
							2.5	
							3.0	
							3.5	
							4.0	
							4.5	
							5.0	
1.80						General Remarks: No groundwater was encountered.		Logged By: HG
0.50								Approved By: CW
Stability: Stable								Scale: 1:25
Shoring: N/A						Method/Plant Used: Volvo BL71		Sheet 1 of 1

clarkebond		Trial Pit Log					Trial Pit No.: TP108	
Project Name: Inglewood, Paignton			Co-Ordinates: 288305 E 57606 N			Start: 20/04/2017		
Project Number: WB03590			Ground Level (m OD):			End: 20/04/2017		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.30	B, D		0.40		 Dark brown gravelly sandy SILT with occasional pockets of clay. Gravel of fine to coarse mudstone. TOPSOIL			
0.60	D							 Dark brown to red brown sandy very gravelly SILT with occasional pockets of clay. Gravel of fine to coarse mudstone. SALTERN COVE FORMATION
1.00	D							End of Pit at 1.20m
1.60 			General Remarks: No groundwater was encountered.				Logged By: HG	
Stability: Stable			Method/Plant Used: Volvo BL71				Approved By: CW	
Shoring: N/A							Scale: 1:25	
							Sheet 1 of 1	

clarkebond		Trial Pit Log					Trial Pit No.: TP109	
Project Name: Inglewood, Paignton			Co-Ordinates: 288164 E 57592 N			Start: 20/04/2017		
Project Number: WB03590			Ground Level (m OD):			End: 20/04/2017		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.30	B, D		0.35		 Dark brown to brown gravelly sandy SILT. Gravel of fine to coarse mudstone. TOPSOIL			
0.60	D							
1.00	D		1.00		End of Pit at 1.00m			
1.30 			General Remarks: No groundwater was encountered.				Logged By: HG	
Stability: Stable							Approved By: CW	
Shoring: N/A			Method/Plant Used: Volvo BL71				Scale: 1:25	
							Sheet 1 of 1	

clarkebond		Trial Pit Log					Trial Pit No.: TP110	
Project Name: Inglewood, Paignton			Co-Ordinates: 287962 E 57468 N			Start: 20/04/2017		
Project Number: WB03590			Ground Level (m OD):			End: 20/04/2017		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.30	B, D		0.40		 Dark brown to brown gravelly sandy SILT. Gravel of fine to coarse mudstone. TOPSOIL			
0.60	D							
1.00	D		1.00		End of Pit at 1.00m			
1.50 			General Remarks: No groundwater was encountered.			Logged By: HG Approved By: CW Scale: 1:25		
Stability: Stable			Method/Plant Used: Volvo BL71			Sheet 1 of 1		
Shoring: N/A								

clarkebond		Trial Pit Log					Trial Pit No.: TP111	
Project Name: Inglewood, Paignton			Co-Ordinates: 288086 E 57186 N			Start: 20/04/2017		
Project Number: WB03590			Ground Level (m OD):			End: 20/04/2017		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.30	B, D		0.30		XXXXXX XXXXXX XXXXXX	Dark brown to brown gravelly sandy SILT. Gravel of fine to coarse limestone. TOPSOIL		
0.60	D				XXXXXX XXXXXX XXXXXX	Brown very sandy very gravelly SILT with frequent cobbles of limestone. Gravel of fine to coarse limestone. BRIXHAM LIMESTONE FORMATION	0.5	
1.00	D		1.10			End of Pit at 1.10m	1.0	
							1.5	
							2.0	
							2.5	
							3.0	
							3.5	
							4.0	
							4.5	
							5.0	
1.50			General Remarks: No groundwater was encountered.			Logged By: HG		
<div style="border: 1px solid black; width: 100%; height: 100%;"></div>						Approved By: CW		
Stability: Stable						Scale: 1:25		
Shoring: N/A						Method/Plant Used: Volvo BL71		
						Sheet 1 of 1		

clarkebond		Trial Pit Log					Trial Pit No.: TP112	
Project Name: Inglewood, Paignton			Co-Ordinates: 287912 E 57281 N			Start: 20/04/2017		
Project Number: WB03590			Ground Level (m OD):			End: 20/04/2017		
Samples and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results						
0.30	B, D		0.40			Dark brown gravelly sandy SILT. Gravel of fine to coarse limestone. TOPSOIL	0.5	
0.60	D							
1.00	D		1.00			Grey to brown grey very gravelly SAND. Gravel of fine to coarse limestone.	1.0	
			1.20			BRIXHAM LIMESTONE FORMATION End of Pit at 1.20m	1.5	
							2.0	
							2.5	
							3.0	
							3.5	
							4.0	
							4.5	
							5.0	
1.80  0.60						General Remarks: Groundwater encountered at 1.0mbgl.		Logged By: HG
Stability: Stable								Approved By: CW
Shoring: N/A						Method/Plant Used: Volvo BL71		Scale: 1:25
								Sheet 1 of 1

Appendix B – Geotechnical Laboratory Results



STRUCTURAL SOILS LTD
TEST REPORT



Report No. 747334R.02(00)

1774

Date 14-June-2017 Contract Whiterock Urban Extensions

Client Clarkebond (UK) Limited
Address 129 Cumberland Road
Bristol
BS1 6UY

For the Attention of Hal Godwin

Samples submitted by client	25-March-2017	Client Reference	WB03590
Testing Started	26-May-2017	Client Order No.	PO 6839
Testing Completed	14-June-2017	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

1.10 Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of .
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd 1a Princess Street Bedminster Bristol BS3 4AG Tel.0117 9471000. e-mail dimitris.xirouchakis@soils.co.uk

TESTING VERIFICATION CERTIFICATE



1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **14/06/2017 08:28:50**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
Alan Frost (Deputy Laboratory Manager)

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Hemel Laboratory
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU



**STRUCTURAL
SOILS LTD**

Contract:

Whiterock Urban Extension

Job No:

747334

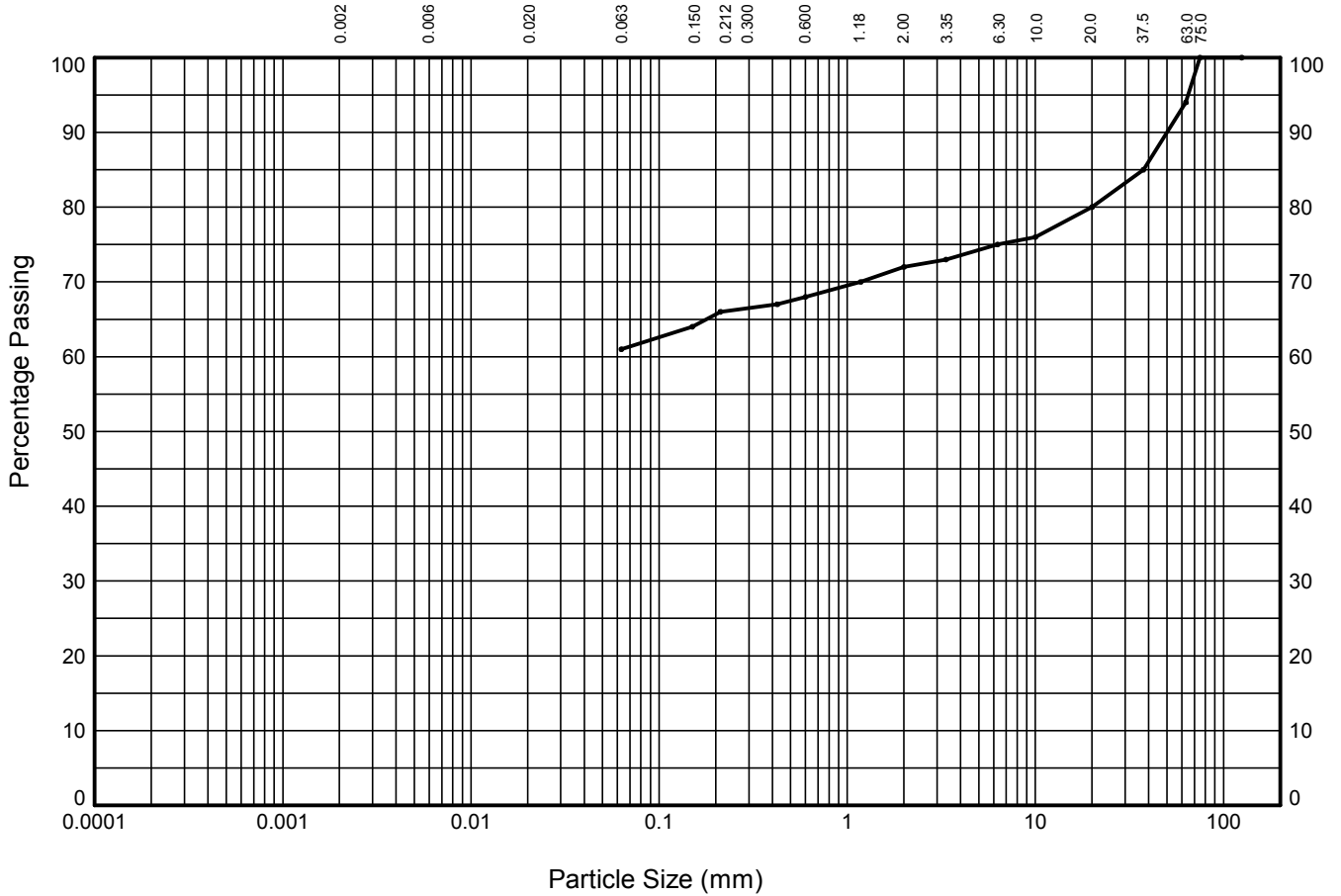


PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

NON-STANDARD TEST

Trial Pit: **TP105** Sample Ref: - Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	94
37.5	85
20.0	80
10.0	76
6.30	75
3.35	73
2.00	72
1.18	70
0.600	68
0.425	67
0.212	66
0.150	64
0.063	61

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
COBBLES	6
GRAVEL	22
SAND	11
SILT/CLAY	61

Soil Description:
Reddish brown slightly sandy slightly gravelly CLAY with low cobble content

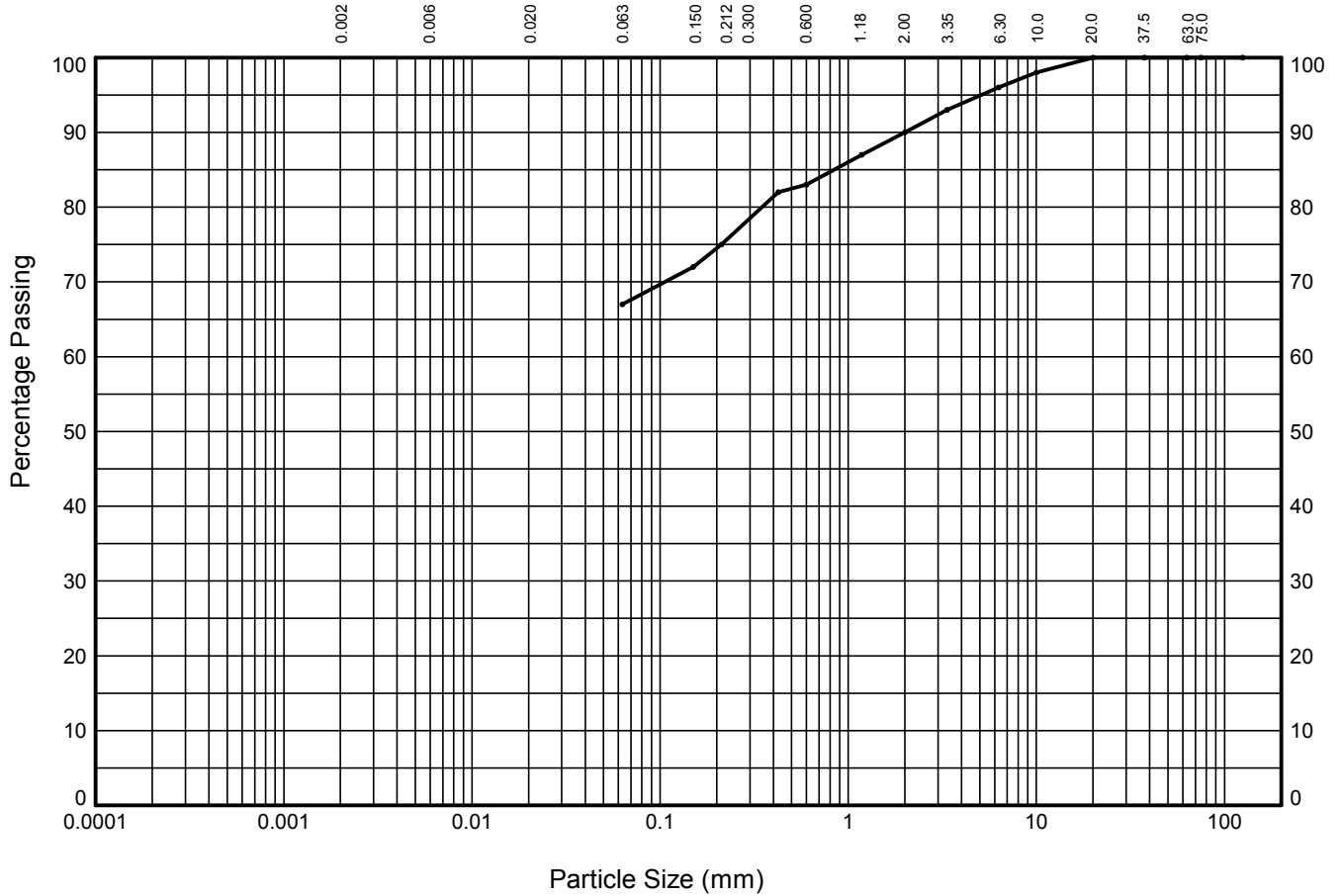
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	STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG	Compiled By MICHAEL STROWGER	Date 14/06/17	
	Contract Whiterock Urban Extension		Contract Ref: 747334	

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP106** Sample Ref: - Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	98
6.30	96
3.35	93
2.00	90
1.18	87
0.600	83
0.425	82
0.212	75
0.150	72
0.063	67

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	10
SAND	23
SILT/CLAY	67

Soil Description:
Brown slightly sandy slightly gravelly CLAY

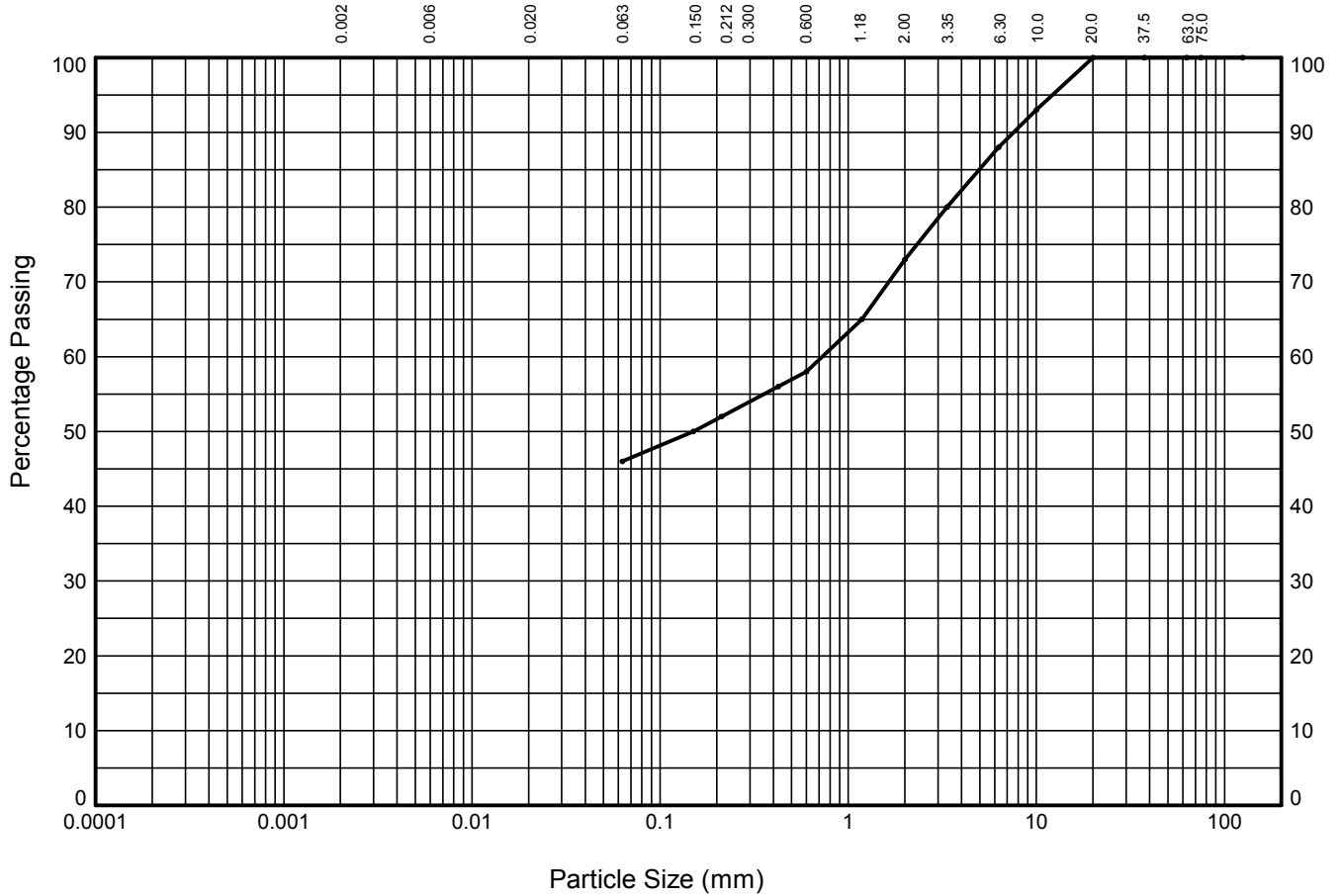
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	STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG	Compiled By EMY HOWARD	Date 14/06/17	
	Contract Whiterock Urban Extension		Contract Ref: 747334	

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP107** Sample Ref: - Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	93
6.30	88
3.35	80
2.00	73
1.18	65
0.600	58
0.425	56
0.212	52
0.150	50
0.063	46

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	27
SAND	27
SILT/CLAY	46

Soil Description:
Brown slightly sandy slightly gravelly CLAY

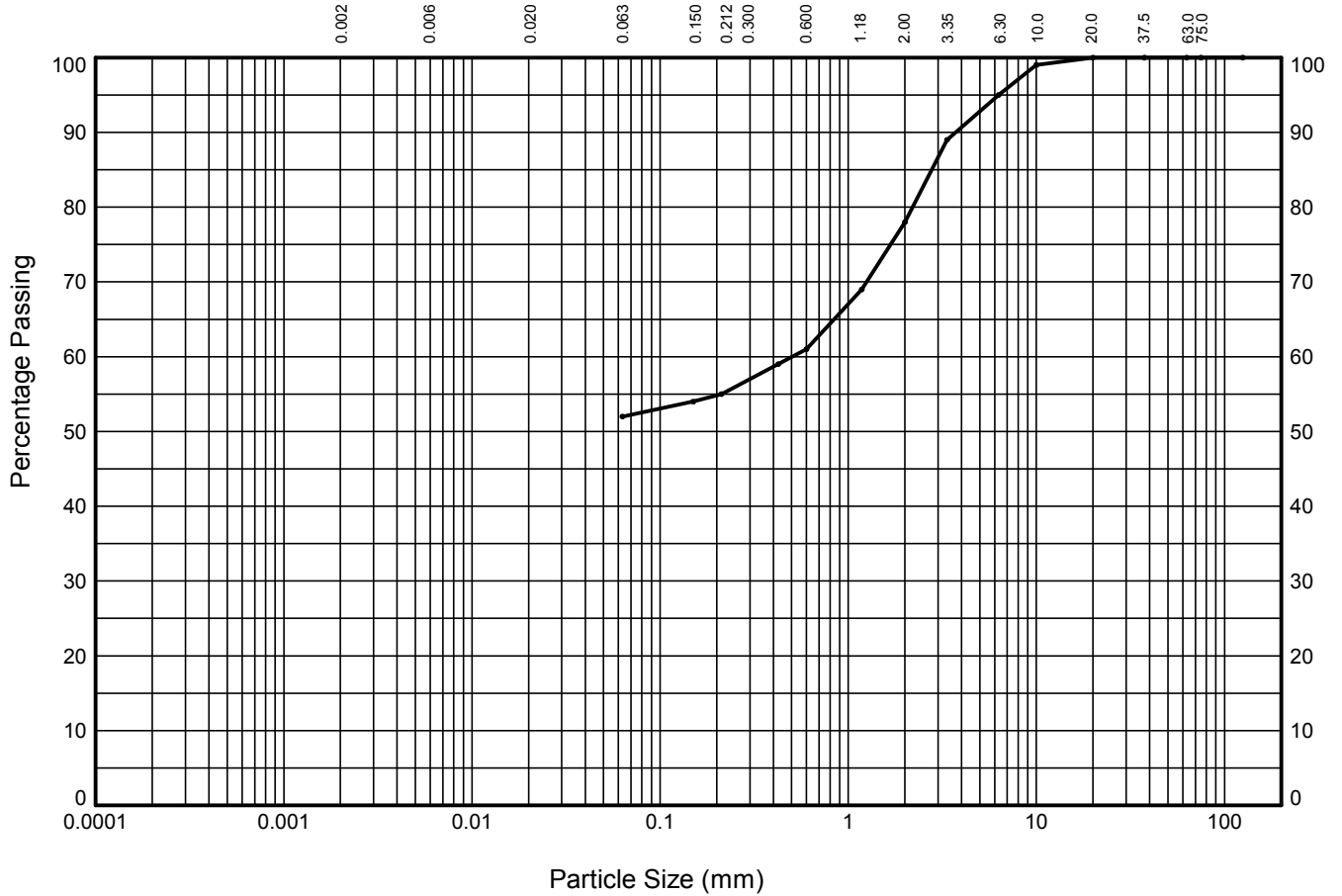
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<p>STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG</p>	Compiled By		Date
			EMY HOWARD 14/06/17
	Contract		Contract Ref:
Whiterock Urban Extension		747334	

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP108** Sample Ref: - Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	99
6.30	95
3.35	89
2.00	78
1.18	69
0.600	61
0.425	59
0.212	55
0.150	54
0.063	52

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	22
SAND	26
SILT/CLAY	52

Soil Description:
Brown slightly sandy slightly gravelly CLAY

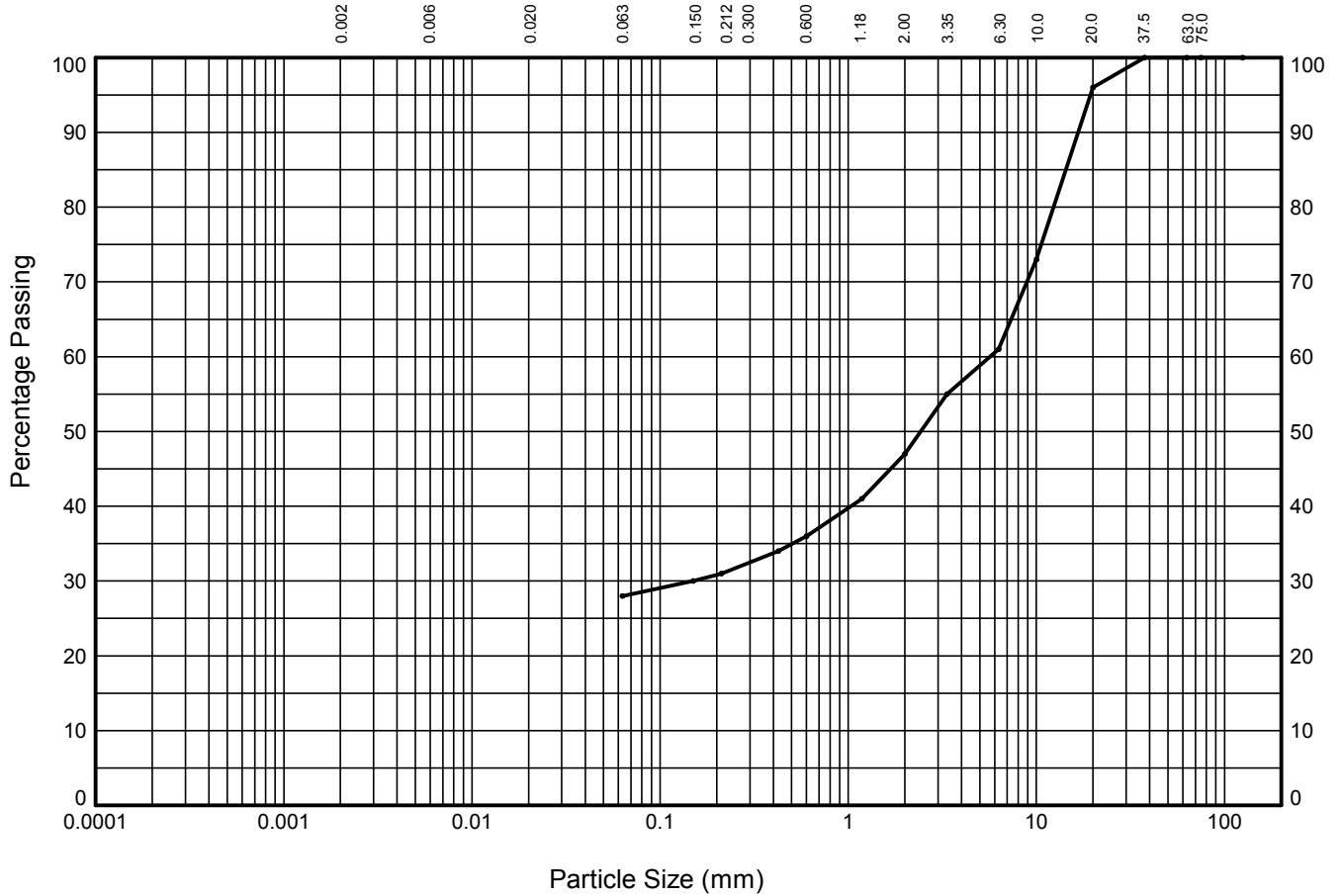
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	STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG	Compiled By EMY HOWARD	Date 14/06/17	
	Contract Whiterock Urban Extension		Contract Ref: 747334	

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP109** Sample Ref: - Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	96
10.0	73
6.30	61
3.35	55
2.00	47
1.18	41
0.600	36
0.425	34
0.212	31
0.150	30
0.063	28

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	53
SAND	19
SILT/CLAY	28

Soil Description:
Brown very clayey sandy GRAVEL

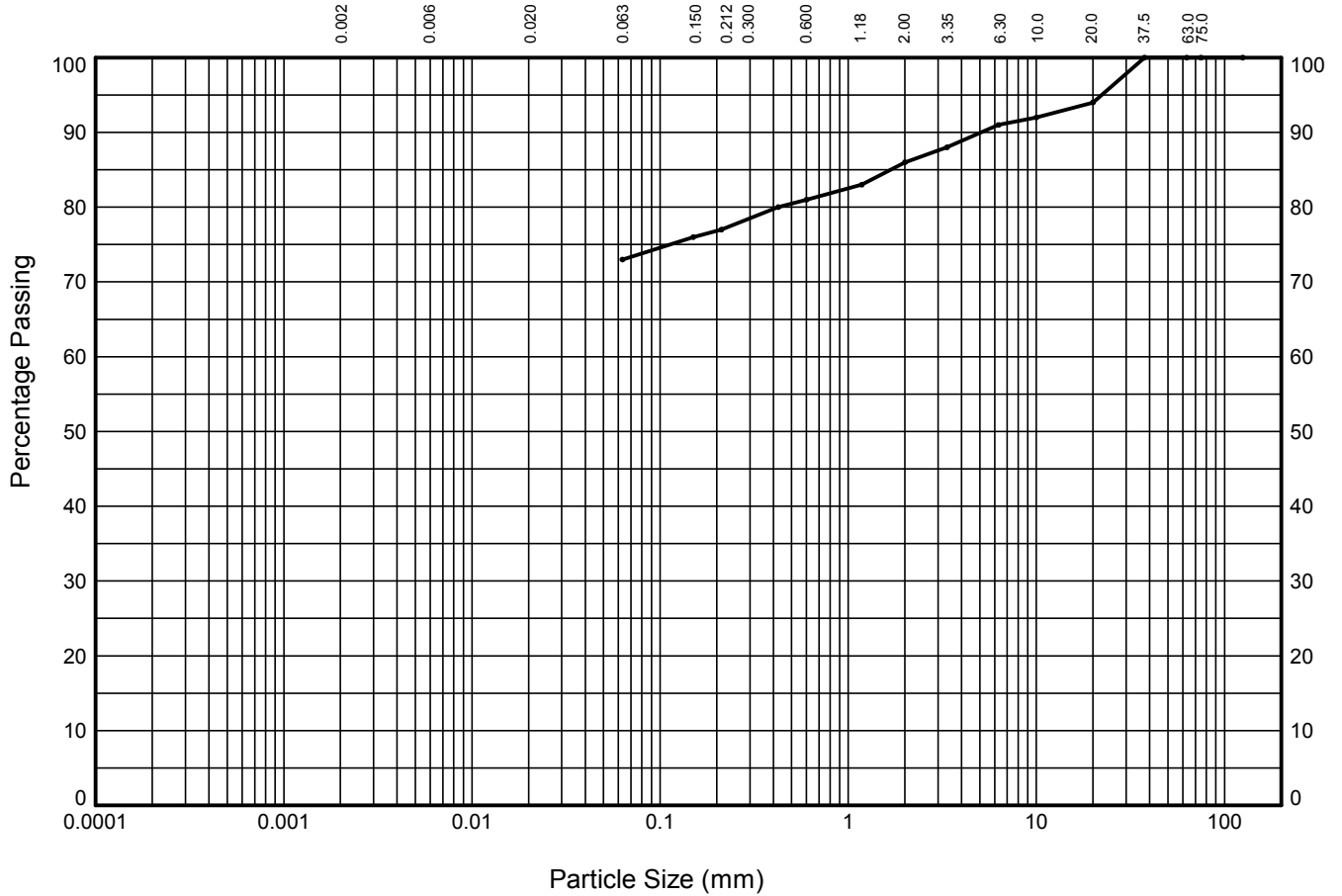
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	STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG	Compiled By EMY HOWARD	Date 14/06/17	
	Contract Whiterock Urban Extension		Contract Ref: 747334	

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP110** Sample Ref: - Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	94
10.0	92
6.30	91
3.35	88
2.00	86
1.18	83
0.600	81
0.425	80
0.212	77
0.150	76
0.063	73

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	14
SAND	13
SILT/CLAY	73

Soil Description:
Reddish brown slightly sandy slightly gravelly CLAY

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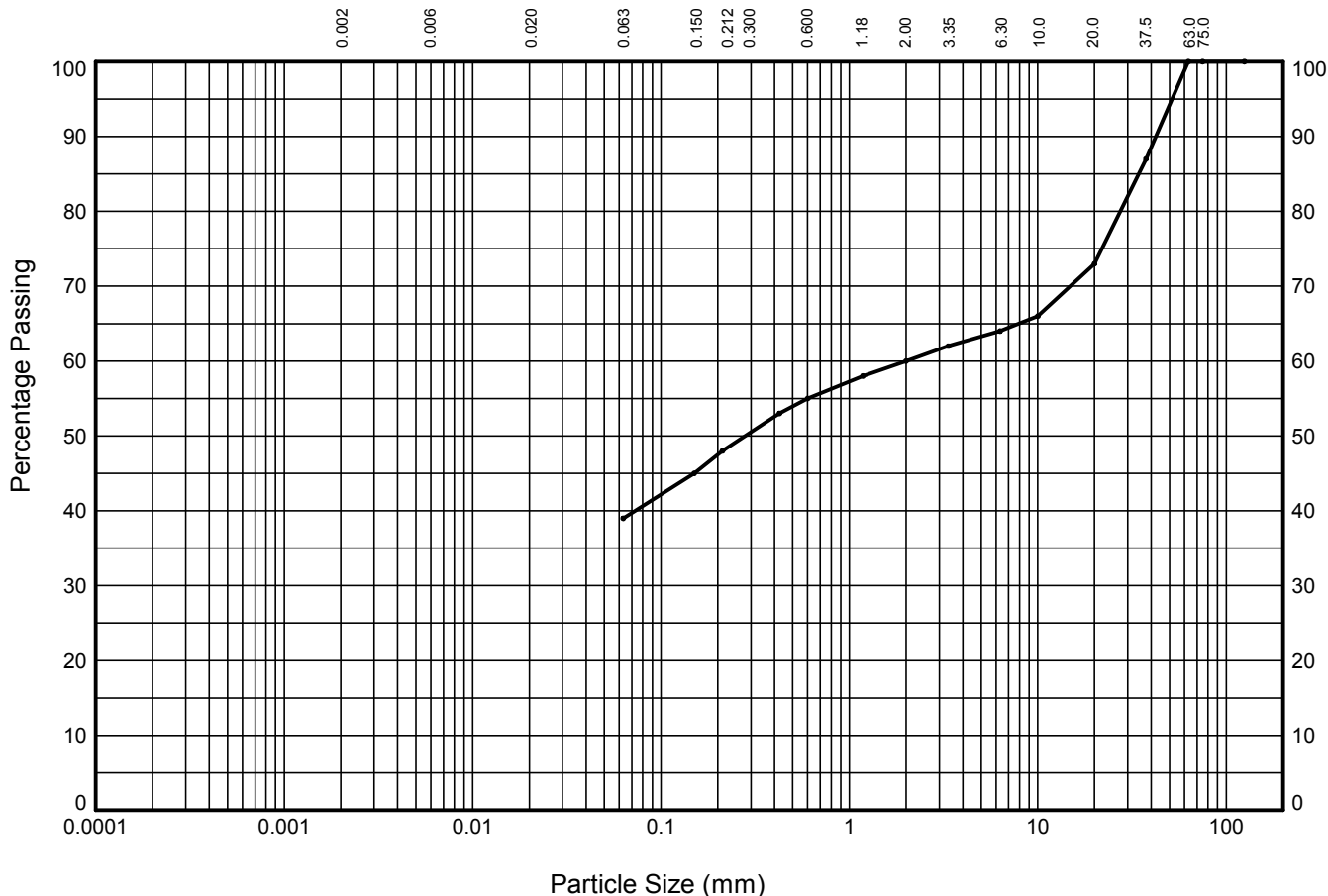
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	Contract Whiterock Urban Extension		Contract Ref: 747334	

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

NON-STANDARD TEST

Trial Pit: **TP111** Sample Ref: - Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	87
20.0	73
10.0	66
6.30	64
3.35	62
2.00	60
1.18	58
0.600	55
0.425	53
0.212	48
0.150	45
0.063	39

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	40
SAND	21
SILT/CLAY	39

Soil Description:
Brown slightly sandy gravelly CLAY

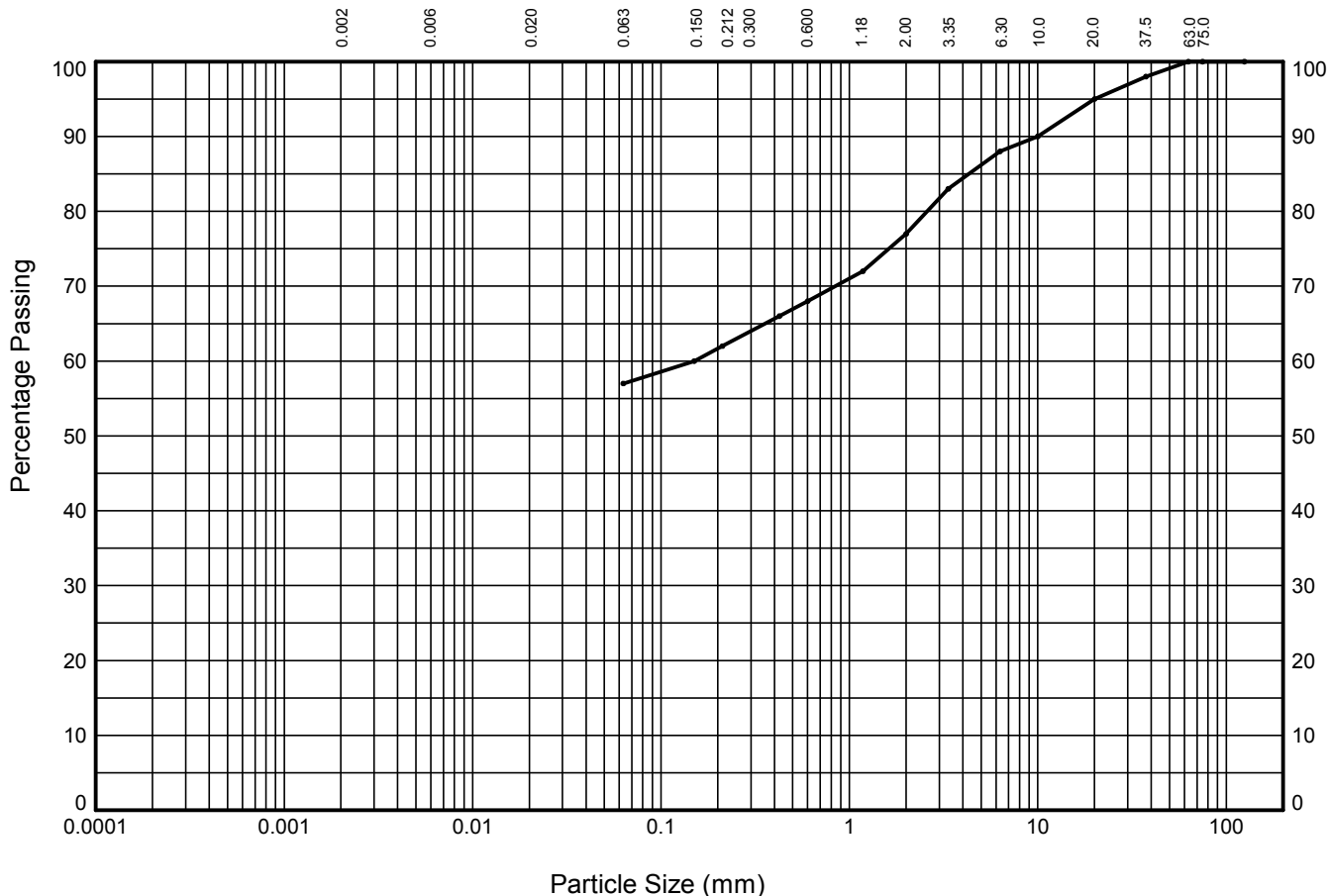
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	STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG	Compiled By EMY HOWARD	Date 14/06/17	
	Contract Whiterock Urban Extension		Contract Ref: 747334	

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP112** Sample Ref: - Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

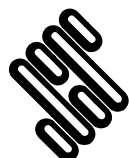
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	98
20.0	95
10.0	90
6.30	88
3.35	83
2.00	77
1.18	72
0.600	68
0.425	66
0.212	62
0.150	60
0.063	57

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	23
SAND	20
SILT/CLAY	57

Soil Description:
Reddish brown slightly sandy slightly gravelly CLAY

GINT_LIBRARY_V8_06.GLB LibVersion: v8_06_017 PjVersion: v8_06 - Core+Logs+Geotech Lab-Bristol - 009 | Graph L - PSD - A4P | 747334.GPJ - v8_06
 Structural Soils Ltd, Branch Office - Bristol Lab: 1a Princess Street, Bedminster, Bristol, BS3 4AG, Tel: 0117-947-1000, Fax: 0117-947-1004, Web: www.soils.co.uk, Email: ask@soils.co.uk | 14/06/17 - 08:23 | AF3 |



STRUCTURAL SOILS
 1a Princess Street
 Bedminster
 Bristol
 BS3 4AG

Compiled By		Date
<i>MStrowger</i>		14/06/17
Contract		Contract Ref:
Whiterock Urban Extension		747334



STRUCTURAL SOILS LTD
TEST REPORT



Report No. 747334R.01(00)

1774

Date 22-May-2017 Contract Whiterock Urban Extensions

Client Clarkebond (UK) Limited
Address 129 Cumberland Road
Bristol
BS1 6UY

For the Attention of Hal Godwin

Samples submitted by client	02-May-2017	Client Reference	WB03590
Testing Started	04-May-2017	Client Order No.	PO 6839
Testing Completed	20-May-2017	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

1.06 Particle Density gas jar method BS1377:Part 2:1990,clause 8.2

Testing carried out by an external laboratory - G.S.T.L

1.01 Moisture Content (oven drying method) BS1377:Part 2:1990:clause 3.2 (superseded)*

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of .
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd 1a Princess Street Bedminster Bristol BS3 4AG Tel.0117 9471000. e-mail dimitris.xirouchakis@soils.co.uk

TESTING VERIFICATION CERTIFICATE



1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **20/05/2017 06:49:37**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
Alan Frost (Deputy Laboratory Manager)

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Hemel Laboratory
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU



**STRUCTURAL
SOILS LTD**

Contract:





Whiterock Urban Extension

Job No:



747334



LABORATORY REPORT FOR INDEX PROPERTY AND CHEMICAL TESTING

Contract: Whiterock Urban Extension.				Customer: Structural Soils Ltd, The Old School, Stillhouse Ln, Bristol, BS3 4EB				 GIP Ltd Ground Investigation & Piling Limited Devonshire House, Ettingshall Road, Wolverhampton. WV2 2JT Phone 01902 459558, Fax 01902 459085, Email lab@gipuk.com								
Job No:- L/9064		Page No:- 1 of 3		Date Received:- 10.05.17		Date Issued:- 17.05.17										
SAMPLE DETAILS			TEST DATE	CLASSIFICATION				CHEMICAL				% PASSING BS SIEVE SIZE		SAMPLE DESCRIPTION	COMMENTS	
TP No.	DEPTH m	SAMPLE TYPE	W %	Index Properties				*Total SO ₄ %	Soluble SO ₄ g/L	pH Value	*L.O.I. %	*ORG %	2.00 mm			0.425 mm
				WL %	WP %	IP %	PD (Gas Jar) Mg/m ³									
105	0.30	D	10.05.17	22											Red brown clayey sandy GRAVEL.	#
105	0.60	D	10.05.17	15											Red brown clayey sandy GRAVEL.	#
105	1.00	D	10.05.17	12											Red brown clayey sandy GRAVEL.	#
106	0.30	D	10.05.17	24											Firm friable brown CLAY.	
106	0.60	D	10.05.17	26											Firm friable brown CLAY.	
106	1.00	D	10.05.17	12											Light brown silty slightly gravelly SAND.	
107	0.30	D	10.05.17	22											Firm friable red brown gravelly CLAY.	
107	0.60	D	10.05.17	17											Firm friable red brown CLAY.	
107	1.00	D	10.05.17	13											Red brown clayey sandy GRAVEL.	#
Sample type			Test abbreviations				Test methods - Unless otherwise stated.						  1897			
D	Disturbed	W	Moisture Content	W%	BS1377:Part 2:1990:3.2 (Withdrawn)											
B	Bulk disturbed	WL	Liquid limit	WL	BS1377:Part 2:1990:4.3				Sol SO ₄	BS1377:Part 3:1990:5.5						
U	Undisturbed	WP	Plastic limit	WP	BS1377:Part 2:1990:5.3				pH Value	BS1377:Part 3:1990:9						
S	SPT split spoon	IP	Index property	IP	BS1377:Part 2:1990:5.4				Approved signatory:-							
W	Ground water	PD	Particle Density	PD	BS1377:Part 3:1990:8.2				 Paul Smart, Laboratory Manager.....							
T	Tube	L.O.I	Loss on ignition	L.O.I	BS1377:Part 3:1990:4											
		ORG	Organic content	ORG	BS1377:Part 3:1990:3											
Opinions and interpretations are outside the scope of UKAS accreditation																
This test report shall not be reproduced except in full without written approval by the laboratory.																
Tests marked * are not UKAS accredited. The reported results relate only to samples received. # = Sample mass smaller than BS1377 requirements.																

LABORATORY REPORT FOR INDEX PROPERTY AND CHEMICAL TESTING

Contract: Whiterock Urban Extension.				Customer: Structural Soils Ltd, The Old School, Stillhouse Ln, Bristol, BS3 4EB				 Ground Investigation & Piling Limited Devonshire House, Ettingshall Road, Wolverhampton. WV2 2JT Phone 01902 459558, Fax 01902 459085, Email lab@gipuk.com								
Job No:- L/9064		Page No:- 2 of 3		Date Received:- 10.05.17		Date Issued:- 17.05.17										
SAMPLE DETAILS			TEST DATE	CLASSIFICATION				CHEMICAL				% PASSING BS SIEVE SIZE		SAMPLE DESCRIPTION	COMMENTS	
TP No.	DEPTH m	SAMPLE TYPE	W %	Index Properties				*Total SO ₄ %	Soluble SO ₄ g/L	pH Value	*L.O.I. %	*ORG %	2.00 mm			0.425 mm
				WL %	WP %	IP %	PD (Gas Jar) Mg/m ³									
108	0.30	D	10.05.17	16											Firm very friable red brown slightly gravelly CLAY.	
108	0.60	D	10.05.17	17											Firm friable red brown gravelly CLAY.	
108	1.00	D	10.05.17	17											Firm friable red brown gravelly CLAY.	
109	0.30	D	10.05.17	10											Purplish red slightly silty GRAVEL.	#
109	0.60	D	10.05.17	8.1											Purplish red slightly silty GRAVEL.	#
109	1.00	D	10.05.17	16											Firm friable red brown slightly gravelly CLAY.	#
110	0.30	D	10.05.17	26											Firm friable red brown CLAY.	
110	0.60	D	10.05.17	19											Firm friable red brown CLAY.	
110	1.00	D	10.05.17	13											Red brown clayey sandy GRAVEL.	
Sample type			Test abbreviations				Test methods - Unless otherwise stated.									
D	Disturbed	W	Moisture Content	W%	BS1377:Part 2:1990:3.2 (Withdrawn)											
B	Bulk disturbed	WL	Liquid limit	WL	BS1377:Part 2:1990:4.4				Sol SO ₄	BS1377:Part 3:1990:5.5						
U	Undisturbed	WP	Plastic limit	WP	BS1377:Part 2:1990:5.3				pH Value	BS1377:Part 3:1990:9						
S	SPT split spoon	IP	Index property	IP	BS1377:Part 2:1990:5.4				Approved signatory:-							
W	Ground water	PD	Particle Density	PD	BS1377:Part 3:1990:8.2				 Paul Smart, Laboratory Manager.....							
T	Tube	L.O.I	Loss on ignition	L.O.I	BS1377:Part 3:1990:4											
		ORG	Organic content	ORG	BS1377:Part 3:1990:3											
Opinions and interpretations are outside the scope of UKAS accreditation																
This test report shall not be reproduced except in full without written approval by the laboratory.																




1897

Tests marked * are not UKAS accredited.




The reported results relate only to samples received.

= Sample mass smaller than BS1377 requirements.

LABORATORY REPORT FOR INDEX PROPERTY AND CHEMICAL TESTING

Contract: Whiterock Urban Extension.	Customer: Structural Soils Ltd, The Old School, Stillhouse Ln, Bristol, BS3 4EB	 GIP <small>Ground Investigation & Piling Limited</small> Devonshire House, Ettingshall Road, Wolverhampton. WV2 2JT Phone 01902 459558, Fax 01902 459085, Email lab@gipuk.com
Job No:- L/9064	Page No:- 3 of 3	
Date Received:- 10.05.17	Date Issued:- 17.05.17	

SAMPLE DETAILS			TEST DATE	CLASSIFICATION					CHEMICAL					% PASSING BS SIEVE SIZE		SAMPLE DESCRIPTION	COMMENTS
TP No.	DEPTH m	SAMPLE TYPE	W %	Index Properties				*Total SO ₄ %	Soluble SO ₄ g/L	pH Value	*L.O.I. %	*ORG %	2.00 mm	0.425 mm			
				WL %	WP %	IP %	PD (Gas Jar) Mg/m ³										
111	0.30	D	10.05.17	22											Firm friable brown slightly gravelly CLAY.		
111	0.60	D	10.05.17	11											Brown slightly silty SAND and GRAVEL.	#	
111	1.00	D	10.05.17	6.9											Brown slightly silty sandy GRAVEL.	#	
112	0.30	D	10.05.17	19											Firm very friable red brown slightly gravelly CLAY.	#	
112	0.60	D	10.05.17	18											Firm very friable red brown slightly gravelly CLAY.		
112	1.00	D	10.05.17	21											Soft brown CLAY.		

Sample type	Test abbreviations	Test methods - Unless otherwise stated.										  1897	
D Disturbed	W Moisture Content	W% BS1377:Part 2:1990:3.2 (Withdrawn)											
B Bulk disturbed	WL Liquid limit	WL BS1377:Part 2:1990:4.4	Sol SO ₄ BS1377:Part 3:1990:5.5										
U Undisturbed	WP Plastic limit	WP BS1377:Part 2:1990:5.3	pH Value BS1377:Part 3:1990:9										
S SPT split spoon	IP Index property	IP BS1377:Part 2:1990:5.4	Approved signatory:-										
W Ground water	PD Particle Density	PD BS1377:Part 3:1990:8.2	 Paul Smart, Laboratory Manager.....										
T Tub	L.O.I Loss on ignition	L.O.I BS1377:Part 3:1990:4											
	ORG Organic content	ORG BS1377:Part 3:1990:3											
Opinions and interpretations are outside the scope of UKAS accreditation												Tests marked * are not UKAS accredited.	
This test report shall not be reproduced except in full without written approval by the laboratory.												The reported results relate only to samples received.	
												# = Sample mass smaller than BS1377 requirements.	

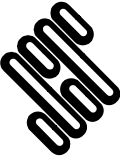
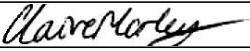
SUMMARY OF PARTICLE DENSITY TESTS

In accordance with clause 8.2 & 8.3 of BS1377:Part 2

Exploratory Position ID	Sample Ref	Depth (m)	Sample Type	Particle Density (Mg/m ³)	Test Type	Measured Water Density (Mg/m ³)	Lab
TP105		0.30	B	2.57	GAS JAR	1	B
TP106		0.30	B	2.69	GAS JAR	1	B
TP107		0.30	B	2.71	GAS JAR	1	B
TP108		0.30	B	2.69	GAS JAR	1	B
TP109		0.30	B	2.75	GAS JAR	1	B
TP110		0.30	B	2.61	GAS JAR	1	B
TP111		0.30	B	2.65	GAS JAR	1	B
TP112		0.30	B	2.66	GAS JAR	1	B

GINT LIBRARY: V8_06.GLB LibVersion: v8_06_017 ProjVersion: v8_06 - Core+Logs+Geotech Lab-Bristol - 009 | GrfcTbL - SUMMARY OF PARTICLE DENSITY - A4P | 747334.GPJ - v8_06
Structural Soils Ltd, Branch Office - Bristol Lab: 1a Princess Street, Bedminster, Bristol, BS3 4AG. Tel: 0117-947-1000, Fax: 0117-947-1004, Web: www.soils.co.uk, Email: asi@soils.co.uk | 19/05/17 - 14:37 | AF3 |

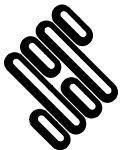
Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

 <p>STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG</p>	Compiled By		Date
	 CLAIRE MORLEY		19/05/17
	Contract: Whiterock Urban Extension		Contract Ref: 747334

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:199

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Particle Density Mg/m ³	Description of Sample
TP105		B	0.30	2.57	Reddish brown slightly sandy slightly gravelly CLAY
TP106		B	0.30	2.69	Brown slightly sandy slightly gravelly CLAY
TP107		B	0.30	2.71	Reddish brown slightly sandy slightly gravelly CLAY
TP108		B	0.30	2.69	Reddish brown slightly sandy slightly gravelly CLAY
TP109		B	0.30	2.75	Reddish brown slightly sandy slightly gravelly CLAY
TP110		B	0.30	2.61	Reddish brown slightly sandy slightly gravelly CLAY
TP111		B	0.30	2.65	Brown slightly sandy slightly gravelly CLAY
TP112		B	0.30	2.66	Reddish brown slightly sandy slightly gravelly CLAY



**STRUCTURAL
SOILS LTD**

Contract:

Whiterock Urban Extension



4041

Client: Clarkebond
 Client Address: 129 Cumberland Road, Bristol,
 BS1 6UY
 Contact: Mark Briggs
 Site Name: Inglewood, Paignton
 Site Address: Not Given

SUMMARY REPORT

Summary of Moisture Content Test Results

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
 7 Woodshots Meadow
 Croxley Green Business Park
 Watford Herts WD18 8YS



Environmental Science

Client Reference: WB03590
 Job Number: 19-64237
 Date Sampled: 02/10/2019
 Date Received: 03/10/2019
 Date Tested: 09/10/2019
 Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	MC														
		Reference	Depth Top m	Depth Base m	Type																	
1322348	HP1	Not Given	0.00	0.30	B	Orangish brown gravelly very sandy CLAY		22														
1322349	HP1	Not Given	0.30	0.60	B	Orangish brown gravelly very sandy CLAY		21														
1322350	HP2	Not Given	0.00	0.30	B	Orangish brown gravelly very sandy CLAY		26														
1322351	HP2	Not Given	0.30	0.60	B	Orangish brown gravelly very sandy CLAY		23														

Comments:

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
Piotrowski
Date Reported: 17/10/2019

Signed: Darren Berrill
 Geotechnical General Manager
D. Berrill
for and on behalf of i2 Analytical Ltd GF 099.11

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 The results included within the report are representative of the samples submitted for analysis.
 The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.*

"Any assessment of compliance with specifications based the analytical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request."



4041

Client: Clarkebond
 Client Address: 129 Cumberland Road, Bristol,
 BS1 6UY
 Contact: Mark Briggs
 Site Name: Inglewood, Paignton
 Site Address: Not Given

SUMMARY REPORT

Summary of Particle Density by Gas Jar Test Results

Tested in Accordance with: BS 1377-2: 1990: Clause 8.2

i2 Analytical Ltd
 7 Woodshots Meadow
 Croxley Green Business Park
 Watford Herts WD18 8YS



Environmental Science

Client Reference: WB03590
 Job Number: 19-64237
 Date Sampled: 02/10/2019
 Date Received: 03/10/2019
 Date Tested: 09/10/2019
 Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	PD														
		Reference	Depth Top m	Depth Base m	Type																	
1322348	HP1	Not Given	0.00	0.30	B	Orangish brown gravelly very sandy CLAY		2.73														
1322349	HP1	Not Given	0.30	0.60	B	Orangish brown gravelly very sandy CLAY		2.75														
1322350	HP2	Not Given	0.00	0.30	B	Orangish brown gravelly very sandy CLAY		2.70														
1322351	HP2	Not Given	0.30	0.60	B	Orangish brown gravelly very sandy CLAY		2.76														

Note: PD - Particle Density

Comments:

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
Piotrowski
Date Reported: 17/10/2019

Signed: Darren Berrill
 Geotechnical General Manager
D. Berrill
for and on behalf of i2 Analytical Ltd GF 104.10

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 The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.*

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with: BS 1377-2: 1990

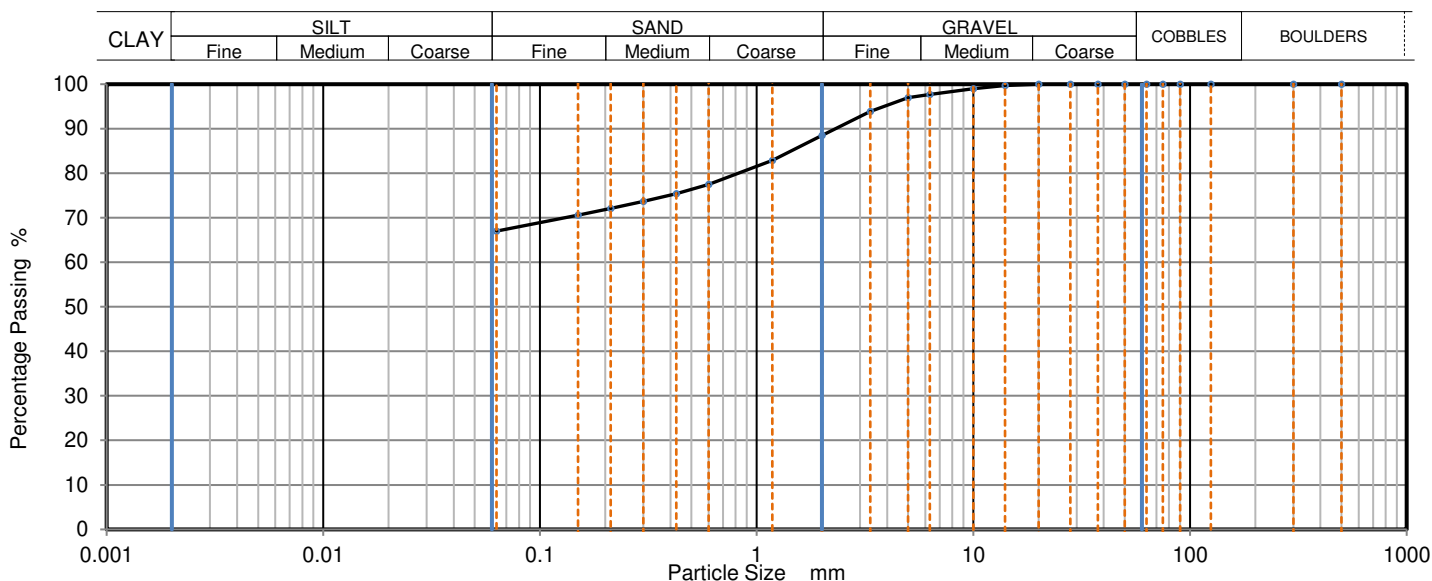
Client: Clarkebond
Client Address: 129 Cumberland Road, Bristol,
BS1 6UY
Contact: Mark Briggs
Site Name: Inglewood, Paignton
Site Address: Not Given

Client Reference: WB03590
Job Number: 19-64237
Date Sampled: 02/10/2019
Date Received: 03/10/2019
Date Tested: 09/10/2019
Sampled By: Not Given

Test Results:

Laboratory Reference: 1322348
Hole No.: HP1
Sample Reference: Not Given
Sample Description: Orangish brown gravelly very sandy CLAY

Depth Top [m]: 0.00
Depth Base [m]: 0.30
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	97		
3.35	94		
2	89		
1.18	83		
0.6	78		
0.425	75		
0.3	74		
0.212	72		
0.15	71		
0.063	68		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	11.50
Sand	20.60
Fines <0.063mm	67.90

Grading Analysis		
D100	mm	20
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 17/10/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 100.13

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Any assessment of compliance with specifications based the analytical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Environmental Science

Tested in Accordance with: BS 1377-2: 1990

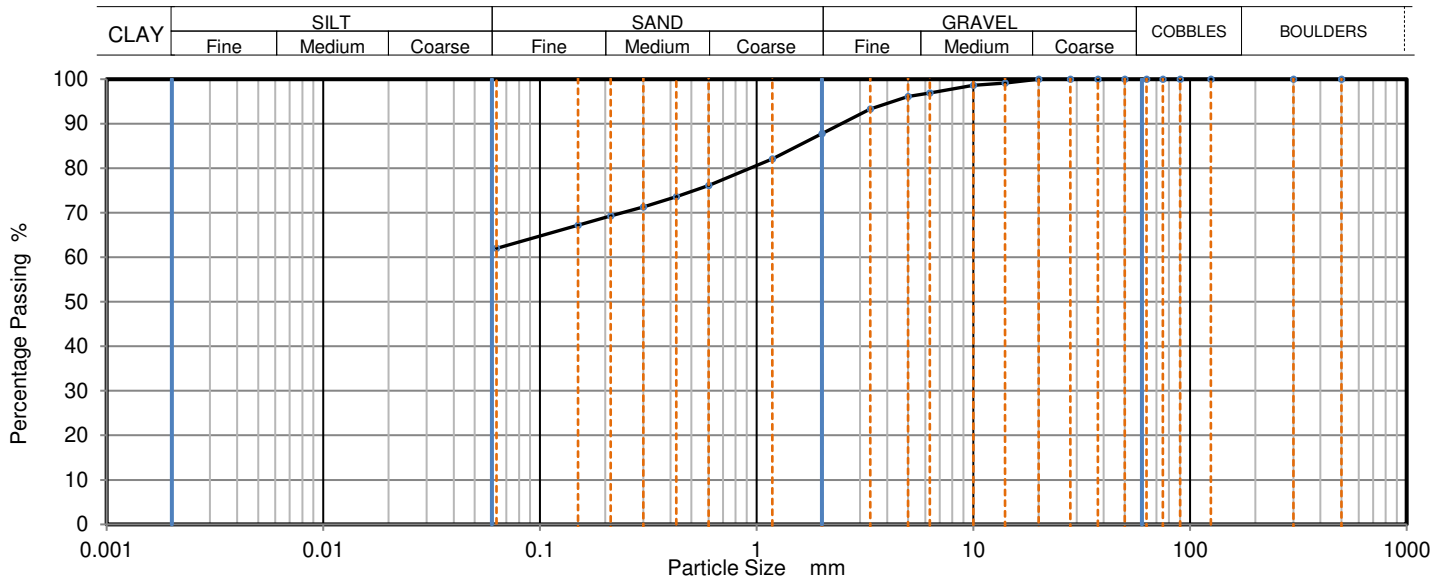
Client: Clarkebond
Client Address: 129 Cumberland Road, Bristol,
BS1 6UY
Contact: Mark Briggs
Site Name: Inglewood, Paignton
Site Address: Not Given

Client Reference: WB03590
Job Number: 19-64237
Date Sampled: 02/10/2019
Date Received: 03/10/2019
Date Tested: 09/10/2019
Sampled By: Not Given

Test Results:

Laboratory Reference: 1322349
Hole No.: HP1
Sample Reference: Not Given
Sample Description: Orangish brown gravelly very sandy CLAY

Depth Top [m]: 0.30
Depth Base [m]: 0.60
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	97		
5	96		
3.35	93		
2	88		
1.18	82		
0.6	76		
0.425	74		
0.3	71		
0.212	69		
0.15	67		
0.063	63		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	12.20
Sand	25.10
Fines <0.063mm	62.70

Grading Analysis		
D100	mm	20
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 17/10/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 100.13

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Any assessment of compliance with specifications based the analytical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with: BS 1377-2: 1990

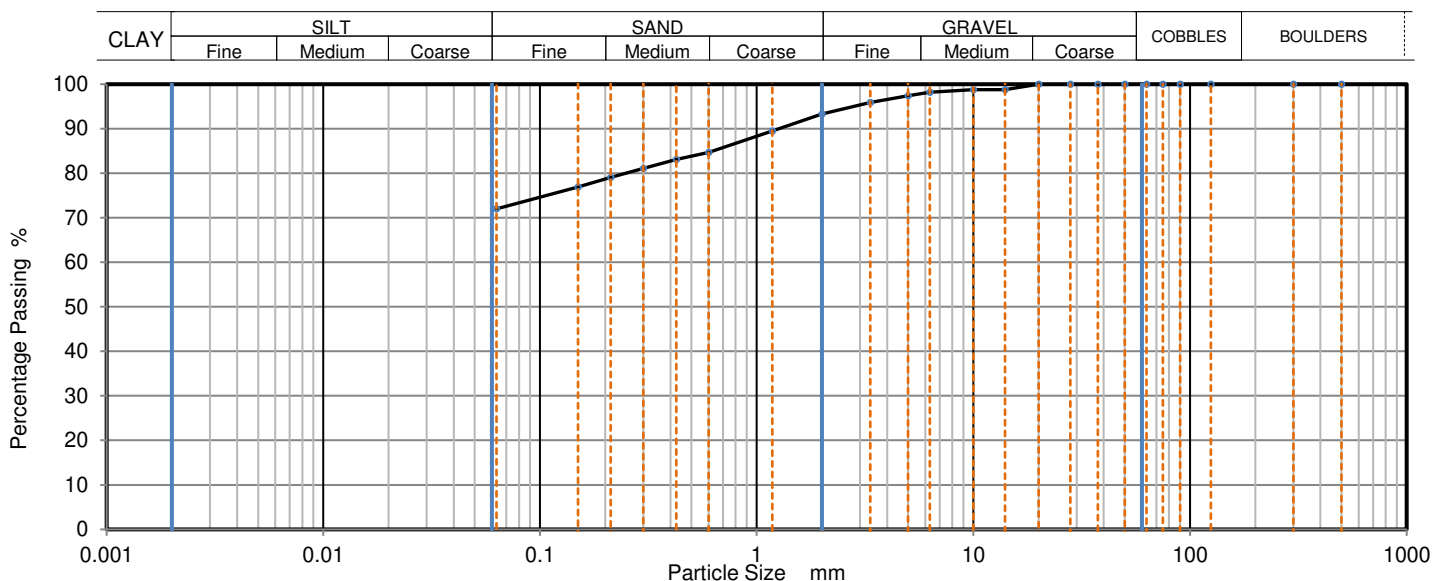
Client: Clarkebond
Client Address: 129 Cumberland Road, Bristol,
BS1 6UY
Contact: Mark Briggs
Site Name: Inglewood, Paignton
Site Address: Not Given

Client Reference: WB03590
Job Number: 19-64237
Date Sampled: 02/10/2019
Date Received: 03/10/2019
Date Tested: 09/10/2019
Sampled By: Not Given

Test Results:

Laboratory Reference: 1322350
Hole No.: HP2
Sample Reference: Not Given
Sample Description: Orangish brown gravelly very sandy CLAY

Depth Top [m]: 0.00
Depth Base [m]: 0.30
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	98		
5	97		
3.35	96		
2	93		
1.18	90		
0.6	85		
0.425	83		
0.3	81		
0.212	79		
0.15	77		
0.063	72		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	6.70
Sand	21.10
Fines <0.063mm	72.20

Grading Analysis		
D100	mm	20
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 17/10/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 100.13

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis. The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.

Any assessment of compliance with specifications based the analytical results in a report take in to account no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



Tested in Accordance with: BS 1377-2: 1990

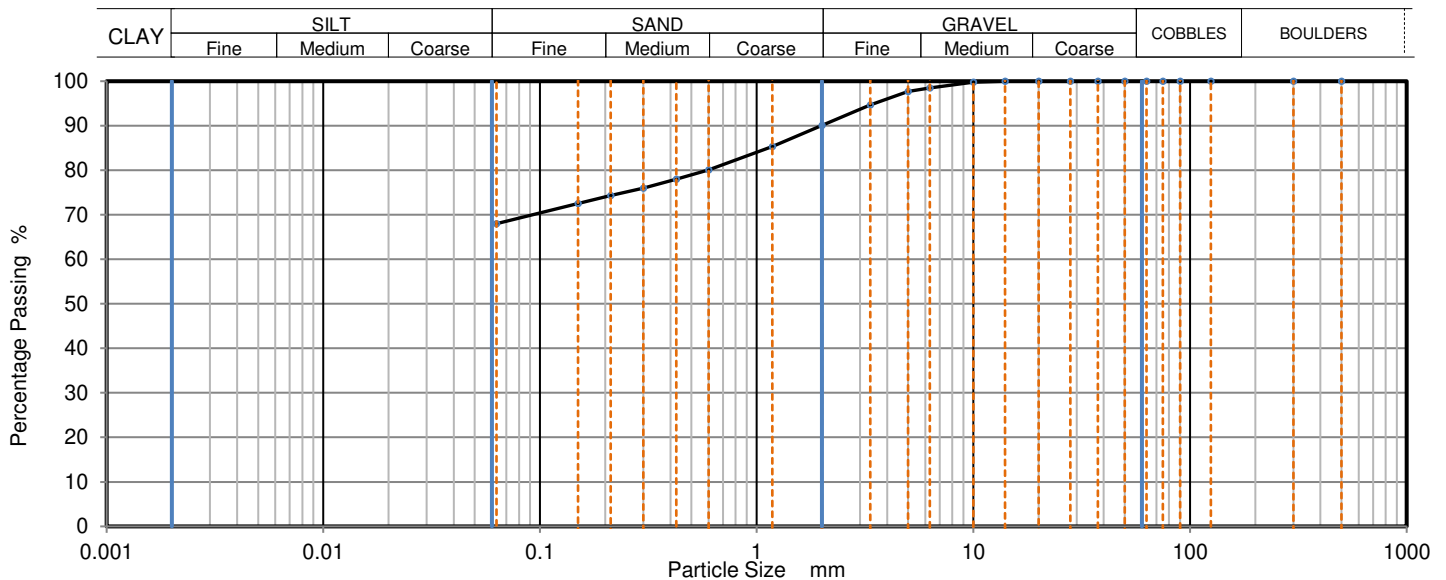
Client: Clarkebond
Client Address: 129 Cumberland Road, Bristol, BS1 6UY
Contact: Mark Briggs
Site Name: Inglewood, Paignton
Site Address: Not Given

Client Reference: WB03590
Job Number: 19-64237
Date Sampled: 02/10/2019
Date Received: 03/10/2019
Date Tested: 09/10/2019
Sampled By: Not Given

Test Results:

Laboratory Reference: 1322351
Hole No.: HP2
Sample Reference: Not Given
Sample Description: Orangish brown gravelly very sandy CLAY

Depth Top [m]: 0.30
Depth Base [m]: 0.60
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	98		
3.35	95		
2	90		
1.18	85		
0.6	80		
0.425	78		
0.3	76		
0.212	74		
0.15	73		
0.063	68		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	9.90
Sand	21.70
Fines <0.063mm	68.40

Grading Analysis		
D100	mm	14
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 17/10/2019

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