

Preliminary Factual & Interpretive Geotechnical Site Investigation Report

At:

Armoury Drive,
Gravesend,
Kent,
DA12 1CT

For:

The Longley Group

Private and Confidential

Ref: 4551 22 04 05 Rpt 07 Rev B EH CW

Sevenoaks Environmental Consultancy Ltd,
145a Hastings Road, Pembury, Kent, TN2 4JU
Tel: 01892 822999 Fax: 01892 822992

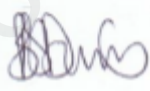


Association of Geotechnical &
Geoenvironmental Specialists



Sevenoaks
Environmental
Consultancy Ltd

Quality Assurance Control Sheet

This report was produced in accordance with the Sevenoaks Environmental Consultancy Ltd Quality Assurance System			
Report Ref:	4551 22 04 05 Rpt 07 Rev A EH CW		
	Consultants Name	Consultants Signature	Date
Report Written by:	Edward Hopkins (Graduate Geo-Environmental Consultant)		05/04/2022
Report Reviewed by:	Brendan Davis (Technical Director)		05/04/2022

Contents

Quality Assurance Control Sheet	1
Contents	2
1.0 Introduction	3
2.0 Site Location and Description	4
3.0 Geology	5
4.0 Scope of Works	6
5.0 Fieldwork and Ground Conditions	7
6.0 Laboratory Test Results	8
7.0 Geotechnical Interpretation	9
8.0 General Limitations and Exceptions	12

Appendices

Appendix A	Figures
Appendix B	Site Photos
Appendix C	Preliminary UXO Risk Assessment
Appendix D	Exploratory Hole Records
Appendix E	Monitoring Data
Appendix F	In-situ Test Results – SPT Results and Calibration Certificate
Appendix G	Geotechnical Laboratory Data

Figures

Figure 1	Site Location Plan
Figure 2	Existing Site Layout Plan
Figure 3	Proposed Site Plan
Figure 4	Exploratory Hole Location Plan
Figure 5	SPT N_{60} vs Depth

1.0 Introduction

- 1.1 The work covered by this report has been undertaken by Sevenoaks Environmental Consultancy Limited (SEC).
- 1.2 The Client for this project was The Longley Group.
- 1.3 The site under consideration is known as Armoury Drive, Gravesend, DA12 1CT (See Appendix A Figure 1 - Site Location Plan).
- 1.4 The site currently comprises an approximately 'L' shaped plot previously occupied by a former St Johns Ambulance garage and a disused Water Tower structures which were located within the western extent of the site (See Appendix A Figure 2 – Existing Site Layout Plan).
- 1.5 SEC would note that at the time of the site investigation, the former St Johns Ambulance garage had been partially demolished by the client with the concrete base broken through.
- 1.6 SEC have been provided with a Phase 1 Geo-Environmental Desk Study Report which was conducted by others (Ref: 17753/PIR_R26). It is noted that the historical maps indicated that the site was undeveloped between 1866 to 1874 after which time it became developed with the construction of the water tower and garage between 1874 to 1951.
- 1.7 We understand that this Preliminary Factual & Interpretive Geotechnical Report is required to help provide information on the ground conditions underlying the site in order to inform foundation design for the proposed construction of 1No. 2-storey block of flats and 2No. 1-storey accessible living bungalows (See Appendix A Figure 3 Proposed Site Plan).
- 1.8 Sevenoaks Environmental Consultancy have also produced a Preliminary Geo-Environmental Site Investigation Report (Ref: 4551 22 04 05 Rpt 06 Rev A EH CW), Archaeological watching brief on Site Investigation Report (Ref: 4551 22 03 08 Rpt 02 REV A EH CW), CCTV Survey (Ref: 4551 22 03 21 Rpt CCTV Survey) and Service Detection Survey (Ref: 4551 22 03 21 Rpt Service Detection Survey) which should be read in conjunction with this report.

2.0 Site Location and Description

- 2.1 The site was accessed via Armoury Drive, Gravesend, DA12 1NB and was located at Ordnance Survey (os) national grid reference of 565119, 173559
- 2.2 The site covers an area of ~0.114 Ha with boundaries forming an approximately 'L' shaped plot (see Appendix A Figure 2 – Existing Site Layout Plan). The site was predominantly covered in soft landscaping which had recently been cleared of vegetation with a bituminous surfaced access road which was orientated east to west across the site. A single-storey brick garage was identified along the southern boundary to the west with the Former Milton Barracks water tower identified in the northwest corner.
- 2.3 The site formed part of the Former Milton Barracks and the surrounding area was generally of a residential nature with a school located to the north. The ground level on site generally sloped gently to the east (see Appendix B Site Photos).
- 2.4 At the time of the Site Investigation, partial demolition of the former St Johns Ambulance garage building had commenced. The extent of the demolition included the breaking of the concrete base, with the northern most wall being completely removed. The western and eastern walls have been removed to half height with the southern wall demolished to three quarter height.

3.0 Geology

- 3.1 Geological records for the site were obtained from the Geological Survey of Great Britain (England and Wales) Sheet 271 Solid and Drift Edition (1:50,000), British Geological Survey (BGS) website and the local BGS Geological Memoir.
- 3.2 The geological records for the site indicates that the site is underlain by Thanet Sand which overlies the Lewes Nodular Chalk with no overlying superficial deposits.
- 3.3 From a brief review of British Geological Survey borehole records, borehole data (Ref. TQ67SE10) from ~50m east of the site recorded Made Ground to 0.50m below ground level (bgl) over firm brown silty sandy Clay up to 1.60m bgl over stiff light grey silty sandy Clay up to 5.60m bgl. Due to the regional dip of the Thanet Sand Formation approximately towards the northwest, the thickness thins locally with the borehole identifying underlying white Chalk with occasional flints proven up to 10.00m bgl. The depth of any groundwater was not recorded on the log.

4.0 Scope of Works

- 4.1 Fieldwork was conducted in general accordance with the British Standard 5930:2015, "Code of Practice for Ground Investigations" and Eurocode 7, BSEN ISO 1:2002 and 2:2004.
- 4.2 The scope of work for the site investigation conducted generally included the following:
- Production of RAMS prior to fieldwork including a Preliminary UXO Risk Assessment (see Appendix C);
 - Conduct of a Service Detection Survey to clear exploratory hole locations prior to Site Investigation date;
 - Full time site supervision by a suitably qualified and experienced SEC Engineer to record ground conditions to BS5930 / Eurocode 7 and CIRIA 574, collect samples and document the investigation;
 - Full time site attendance by a UXO Engineer;
 - Conduct of 5No. mini boreholes (WS01-WS05) up to 4.00m bgl using a Continuous Dynamic Sampler (CDS) drill rig with in-situ SPTs/CPTs at 1m intervals;
 - Conduct of 3No. hand dug trial pits up to 1.20m bgl or refusal using hand digging tools;
 - Conduct of 2No. groundwater monitoring visits following the fieldwork;
 - Geotechnical analysis of recovered soil samples for a range of parameters including Sieve Analysis, 4-point Atterberg Testing, 2:1 Sulphate Soluble + pH.
 - Production of a Preliminary Factual and Interpretive Geotechnical Site Investigation Report to provide comment on foundation design;
- 4.3 Exploratory hole locations were positioned by SEC to provide good general coverage across the site and to help inform foundation design. Exploratory hole locations are shown on the Exploratory Hole Location Plan (see Appendix A Figure 4 Exploratory Hole Location Plan).

5.0 Fieldwork and Ground Conditions

- 5.1 SEC attended the site on the 25th February 2022 to conduct the site investigation fieldwork.
- 5.2 Approximate exploratory hole locations are shown on the Exploratory Hole Location Plan (see Appendix A Figure 4)
- 5.3 All of the mini boreholes were completed to depths of 4.45m bgl (WS01 – WS05) with trial pits TP01 and TP02 achieving depths of up to 1.20m bgl, TP03 met refusal at 0.90m bgl on concrete cobbles.
- 5.4 Full details of the ground conditions encountered are presented within the Exploratory Hole Records appended to this report (see Appendix D – Exploratory Hole Records). However, the strata encountered have been summarised below;
- 5.5 **Made Ground:**
- 5.6 All exploratory hole locations were positioned within soft landscaping with the exception of WS01 which was laid to bituminous surfacing. Made Ground was encountered in all exploratory holes, ranging in depths up to between 0.25m bgl (WS04) and 1.35m bgl (WS05). Generally, the Made Ground was observed to have comprised dark brown slightly sandy gravelly Clay with flint, brick, concrete and tile.
- 5.7 **Natural Strata:**
- 5.8 Underlying the Made Ground, natural deposits were encountered which generally comprised a grey mottled orange slightly silty Sand with rare medium gravels of flint in all boreholes up to 4.45m bgl.
- 5.9 In-Situ standard penetration tests were undertaken within the CDS mini boreholes during drilling (see Appendix E for In-situ Testing Results – SPT Results and calibration certificates).
- 5.10 **Monitoring Results:**
- 5.11 At the time of drilling all exploratory holes were dry up to the 4.45m bgl with no groundwater identified during the 2No. rounds of groundwater monitoring (see Appendix E for groundwater monitoring data).

6.0 Laboratory Test Results

Geotechnical Testing

6.1 The following geotechnical laboratory analysis was conducted at an independent (UKAS accredited) geotechnical laboratory in accordance with British Standards Methods of Test for Soils for Civil Engineering Purposes, BS 1377 (1990) to determine engineering parameters (see Appendix F for Laboratory Data):

- 1 No. soil sample was analysed for Atterberg Limit (4 Point);
- 9 No. soil samples were analysed for Particle Size Distribution Analysis;
- 5 No. soil samples were analysed for 2:1 Sulphate Soluble and pH

Atterberg Limits

6.2 Moisture Content results were recorded at 11% (WS01 at 1.00m bgl).

6.3 Plasticity Index (PI) results were recorded at 6% (WS01 at 1.00m bgl).

Particle Size Distribution

6.4 Sieve Analysis results were recorded as followed;

Borehole	Depth	Fines (Silt + Clay) (%)	Sand (%)	Gravel (%)
WS01	2.5	25.4	72.6	2.1
	4.0	41.1	57.2	1.7
WS02	1.0	26.6	72.4	1.1
	3.0	28.3	71.7	0
WS03	2.0	28.5	71.3	0.1
WS04	1.2	22.0	63.2	14.7
	3.0	29.0	70.3	0.7
WS05	1.0	20.2	54.3	25.5
	4.0	44.6	39.1	16.3

Concrete Aggressive Chemicals Tests and pH

6.5 Concentrations of 2:1 Water Soluble Sulphate as SO_4 were recorded to range between <10mg/l (WS01 at 1.00m bgl and WS03 at 2.00m bgl) and 548mg/l (WS03 at 0.05m bgl).

6.6 The pH in soils was found between 7.7 (TP02 at 0.30m bgl) and 8.2 (WS03 at 0.50m bgl).

7.0 Geotechnical Interpretation

7.1 Introduction

The following section presents interpretation of the data obtained from the preliminary ground investigation recently carried out by SEC at the site in relation to the proposed development. Figure 3 shows the proposed site layout. It is noted that foundation loadings were not available at the time of writing.

7.2 Ground conditions

Five boreholes were drilled, all to depths of 4.45m. Made Ground was present to depths of 0.25m to 1.35m, though its base was not found in TP03 which was terminated on cobble-sized concrete fragments at 0.9m. The Made Ground was underlain by soils described mainly as silty sand, which is typical of the Thanet Formation. These soils extended to the base of all the boreholes.

7.3 No groundwater was seen in the boreholes during drilling. Standpipes were installed in all the boreholes. In two monitoring visits after the fieldwork was completed, the standpipes were monitored and found to be dry. This is consistent with the geology and the topography of the area around the site. However, it must be noted that groundwater levels vary with time, due to seasonal and other effects and there is a possibility that water may at some times be perched within the Thanet Formation.

7.4 Standard Penetration Tests (SPTs) were carried out in the boreholes. The results (N values) have been corrected to the standard 60% energy efficiency (N_{60}) based on the current calibration certificate of the equipment. The results are plotted in Figure 5.

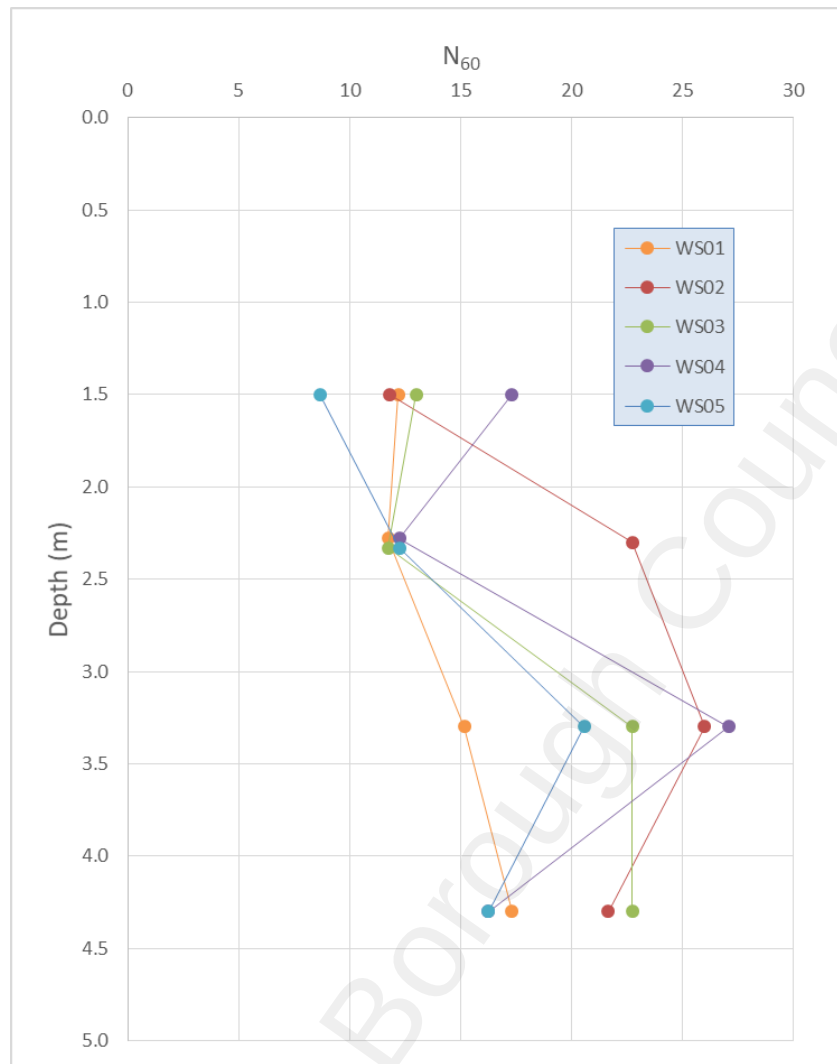


Figure 5: SPT N₆₀ vs Depth

- 7.6 Plasticity tests were carried out on one sample, from WS01 from 1.0m to 1.45m depth. The Liquid Limit was 24% and the Plasticity Index was 6%, classifying the sample as clay or silt of low plasticity. The volume change potential (NHBC¹) may be taken as negligible.

Nine samples were tested to determine their particle size distributions. The results are summarised in the table, below.

Borehole	Depth	Fines (Silt + Clay) (%)	Sand (%)	Gravel (%)
WS01	2.5	25.4	72.6	2.1
	4.0	41.1	57.2	1.7
WS02	1.0	26.6	72.4	1.1
	3.0	28.3	71.7	0
WS03	2.0	28.5	71.3	0.1
WS04	1.2	22.0	63.2	14.7
	3.0	29.0	70.3	0.7
WS05	1.0	20.2	54.3	25.5
	4.0	44.6	39.1	16.3

- 7.7 The results show a strong trend for the percentage of fine particles to increase with depth. Given the accompanying increase in penetration resistance with depth, the permeability would be expected to decrease with depth.

7.8 Foundations

Shallow spread foundations will be suitable for the proposed buildings at depths below any Made Ground and at least 0.6m below finished ground level. A net bearing pressure of 100kPa may be used in foundation design.

- 7.9 The base of foundation excavations should be inspected by a competent person. If any particularly soft or loose zones are found, they should be removed and replaced with well-compacted granular fill or lean mix concrete.

7.10 Pavements

Based on the plasticity data and the site conditions, a subgrade CBR value of 2% may be used. The exposed subgrade should be protected from free water as the soil would be susceptible to rapid softening.

7.11 Buried concrete

Six samples of soil from depths between 0.05m and 2.0m were tested for the concentration of water-soluble sulphate. Five of the samples had sulphate concentrations between <10mg/l and 43mg/l, with pH values ranging from 7.7 to 8.1. These results classify the soils within BRE Special Digest 1² Design Sulphate Class DS-1 and the Aggressive Chemical Environment for Concrete (ACEC) Class is AC-1. For this classification, no special concrete mix is needed to protect against sulphate attack.

- 7.12 The sixth sample (from 0.05m in WS03) had a water-soluble sulphate concentration of 548mg/l and a pH value of 8.2. This lies within Class DS-2 and ACEC Class AC-2. Table D1 of the Digest gives a Design Chemical Class of DC-2. Table D2 of the Digest gives alternative concrete mixes for buried concrete. If the material represented by this sample will be removed during site preparation, this test result could be ignored.

7.13 References

1. National House Building Council (NHBC) Standards, Chapter 4.2 Building near trees. Available online from <https://www.nhbc.co.uk/builders/products-and-services/techzone/nhbc-standards>
2. BRE Special Digest 1 (2005) Concrete in aggressive ground. Building Research Establishment, Watford. ISBN 1 86081 754 8

8.0 General Limitations and Exceptions

1. The advice given in this report with respect to contaminated land/pollution is based on the guidelines available at the time of writing.
2. This report does not include for an assessment of above-ground structures on site for the presence of potential asbestos containing materials.
3. The Client is advised that the conditions observed on site by SEC at the time of the investigation or assessment are subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance or investigation and they may subsequently have become observable.
4. Comments made relating to land gas or groundwater conditions are based on observations made at the time of an investigation unless otherwise stated. However, land gas or groundwater conditions may vary as a result of seasonal or other effects. It would be prudent to conduct groundwater monitoring.
5. This assessment may be subject to amendment in light of additional information becoming available.
6. The findings and opinions conveyed in this report are based on information obtained from a variety of sources, including that from chemical testing laboratories, and which SEC has assumed are correct. Nevertheless, SEC cannot and does not guarantee the authenticity or reliability of the information it has relied upon. SEC can accept no responsibility for inaccuracies within the data supplied by other parties.
7. This report is written in the context of an agreed scope of work between SEC and the Client and should not be used in a different context. In light of additional information becoming available, improved practices and changes in legislation, amendment or re-interpretation of the assessment or report in whole or part may be necessary after its original submission.
8. This report is provided for sole use by the Client and is confidential to them. No responsibility whatsoever for the contents of the report will be accepted to anyone other than the Client.
9. SEC believes that providing information about limitations is essential to help the Client identify and thereby manage risks.
10. The copyright of written materials supplied shall remain the property of SEC but with a royalty free perpetual licence, granted to the Client on payment in full of any outstanding monies.
11. SEC does not provide legal advice and the advice of the Client's legal advisors may also be required.

12. No allowance has been made in this report for testing which may be required for waste categorisation prior to the removal of any material from site for disposal.
13. The report is issued on the condition that SEC will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the boreholes or trial pits which have not been shown by the borehole, trial pits or other tests carried out during the investigation.
14. In addition, SEC will not be liable for any loss whatsoever arising directly or indirectly from any opinion given on the possible configuration of strata both between the borehole and/or trial pit positions and/or below the maximum depth of the investigation. Such opinions, where given, are for guidance only.
15. No person other than the client to whom this report is addressed, shall rely on it in any respect and no duty of care shall be owed to any such third party.
16. Copyright of this Report remains with SEC and in addition we will not accept any responsibility for the report and recommendations given until our invoice is settled in full.
17. It should be noted that the Made Ground depth recorded above is that encountered within the trial pits and exploratory holes undertaken during the phase of work to which this report pertains. Owing to the variable nature and unknown deposition criteria of Made Ground it is possible that deeper or more extensive areas of Made Ground may exist at this site which has not been revealed by the current work.
18. The above should take into account any LPA requirements with respect to the sites archaeological sensitivity (e.g. Watching Brief on Excavation works)

Gravesend Borough Council

Appendix A

Figures

Gravesham Borough Council



Crown Copyright. Licence Number 100040584. All rights reserved.
This map is not to be relied upon for accuracy and is for identification purposes only

SITE: Armoury Drive, Gravesend

SCALE: NTS

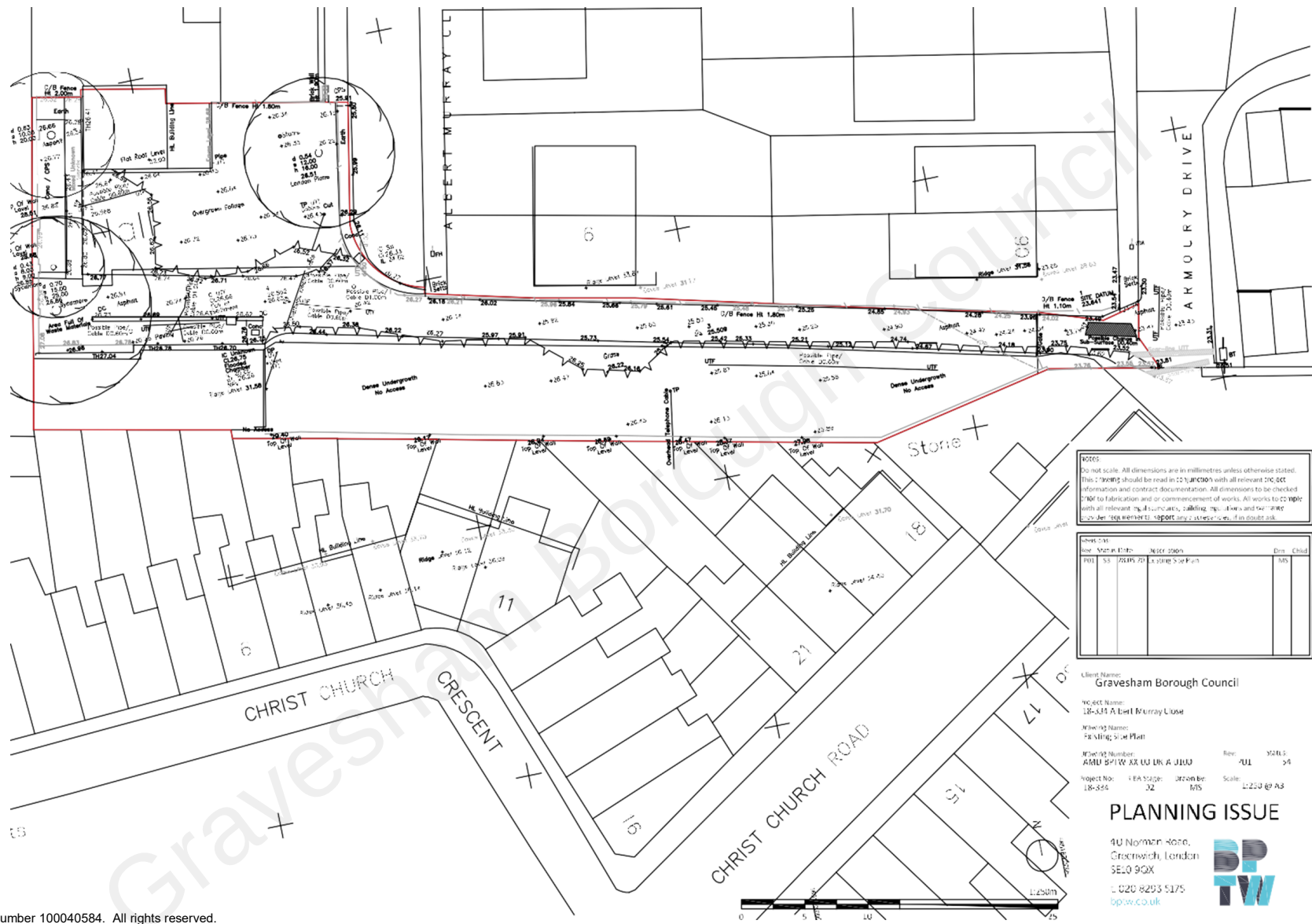
JOB NO: 4551

FIGURE TITLE: Site Location Plan

REV: 01

FIGURE NO: 01

 SEVENOAKS
ENVIRONMENTAL
CONSULTANCY



Crown Copyright. Licence Number 100040584. All rights reserved.
 This map is not to be relied upon for accuracy and is for identification purposes only

SITE: Armoury Drive, Gravesend	SCALE: NTS	JOB NO: 4551	
FIGURE TITLE: Existing Layout Plan	REV: 01	FIGURE NO: 02	



Crown Copyright.
Licence Number 100040584. All rights reserved.
This map is not to be relied upon for accuracy and is for identification purposes only

SITE: Armory Drive, Gravesend

SCALE: NTS

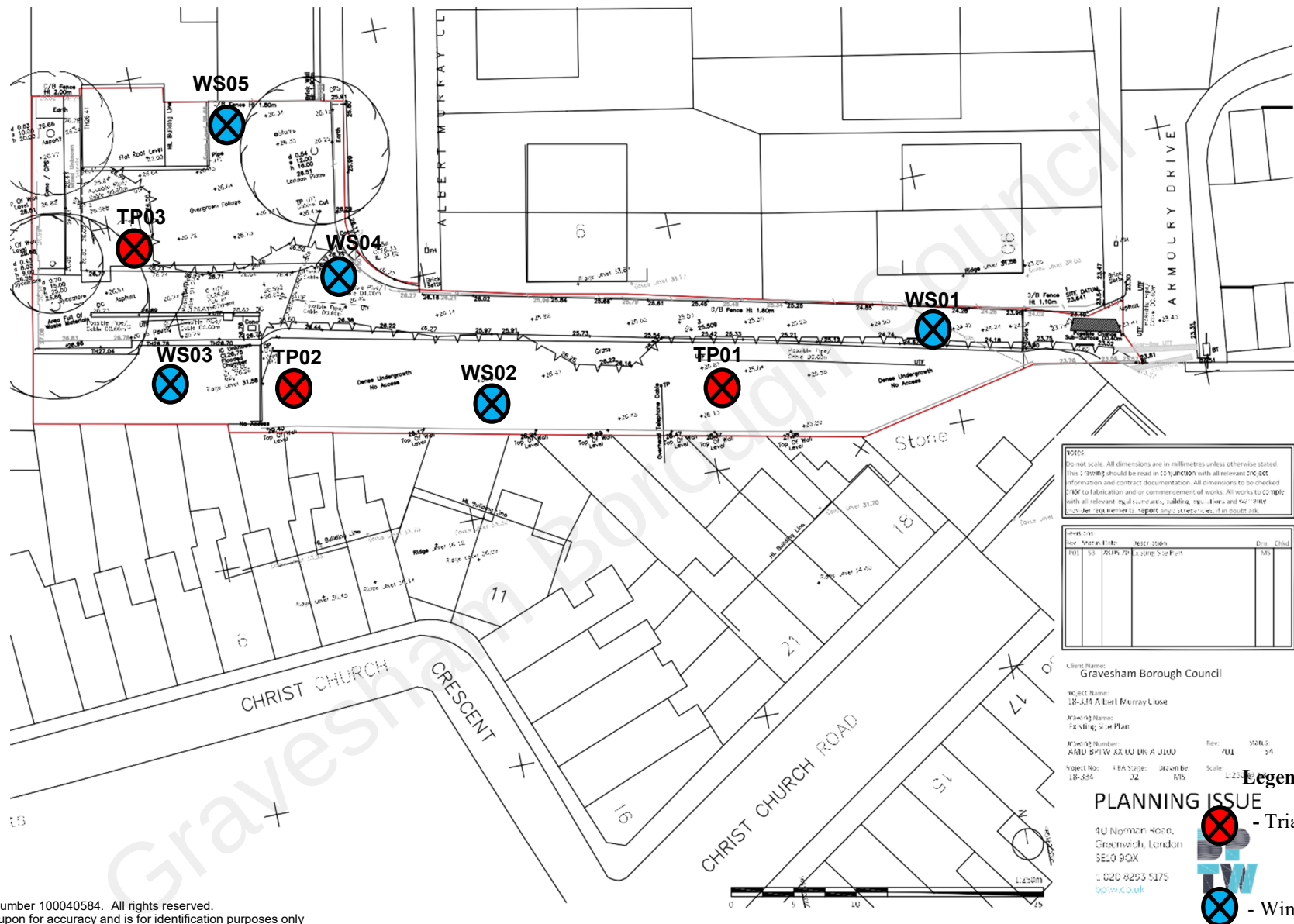
JOB NO: 4551

FIGURE TITLE: Site Location Plan

REV: 01

FIGURE NO: 03

SEVENOAKS
ENVIRONMENTAL
CONSULTANCY



Crown Copyright. Licence Number 100040584. All rights reserved.
 This map is not to be relied upon for accuracy and is for identification purposes only

SITE: Armoury Drive, Gravesend	SCALE: NTS	JOB NO: 4551	 SEVENOAKS ENVIRONMENTAL CONSULTANCY
FIGURE TITLE: Exploratory Hole Location Plan	REV: 01	FIGURE NO: 04	

Appendix B

Site Photos

Gravesham Borough Council



Photo 1: Easterly view down site



Photo 2: Showing breaking out WS01 position



Photo 3: Showing down hole of WS01



Photo 4: showing WS02 with UXO engineer



Photo 5: showing hand digging of WS05



Photo 6: showing WS03 being cleared



Photo 7: showing WS01 samples taken



Photo 6: showing TP03 once dug



Photo 9: showing PACM from TP03



Photo 10: showing WS01 once installed



Photo 11: showing WS02 once installed



Photo 12: showing WS03 once installed



Photo 13: showing WS05 once installed



Photo 14: showing WS04 once installed

Appendix C

Preliminary UXO Risk Assessment

Gravesham Borough Council



SEVENOAKS ENVIRONMENTAL CONSULTANCY

Pre-Desk Study Assessment

Site:	Armoury Drive, Gravesend, Kent
Client:	Sevenoaks Environmental Consultancy
Contact:	Edward Hopkins
Date:	3 rd February 2022
Pre-WWI Military Activity on or Affecting the Site	By 1862 Milton Barracks had been established on the Site. It was initially a temporary camp for troops training at Milton Rifle Range, approximately 2.3km northeast of the Site. It later became a permanent garrison and infantry depot, accommodating units including the 1st Battalion Somerset & Cornwall Light Infantry Regiment.
WWI Military Activity on or Affecting the Site	During WWI Milton Barracks continued to accommodate troops. In 1917 it became an Auxiliary Military Hospital Unit.
WWI Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: • Military barracks and training areas. • Docks, wharves, and warehouses along the River Thames. • Transport infrastructure and public utilities. • Industries important to the war effort, including chemical and metal works. • Anti-Aircraft (AA) guns.
WWI Bombing	None identified on the Site.
Interwar Military Activity on or Affecting the Site	Post-WWII Milton Barracks remained operational.
WWII Military Activity on or Affecting the Site	From 1939 Milton Barracks became a Training and Holding Depot. In 1940 the Barracks was expanded, with additional Nissen Huts established to the east of the existing buildings.
WWII Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: • Military barracks, camps, and training areas. • Docks, wharves, and warehouses along the River Thames. • Transport infrastructure and public utilities. • Industries important to the war effort, including chemical and metal works. • Royal Air Force (RAF) Gravesend. • AA and anti-invasion defences.
WWII Bombing Decoys (within 5km of Site)	1No. located approximately 3.5km northeast of the Site.
WWII Bombing	During WWII the Site was located in the Municipal Borough (MB) of Gravesend, which officially recorded 286No. High Explosive (HE) bombs with a bombing density of 71.3 bombs per 405 hectares (ha). Readily available records have been found to indicate that several HE bombs fell in close proximity to the Site.

Post-WWII Military Activity on or Affecting the Site	Between 1945 and 1957 Milton Barracks was handed to the 30th Reinforcement Holding Unit. In the latter half of the 20th century the Barracks was closed and the majority of the former buildings redeveloped.
Recommendation	It is recommended that a detailed desk study is commissioned to assess, and potentially zone, the Unexploded Ordnance (UXO) hazard level on the Site.
Further information	For information about Zetica's detailed UXO desk studies and other UXO services, please visit our website: www.zeticauxo.com. Details and downloadable resources covering the most common sources of UXO hazard affecting sites in the UK can be found here. If you have any further queries, please don't hesitate to get in contact with us at uxo@zetica.com or 01993 886 682.
This summary is based on a cursory review of readily available records. Caution is advised if you plan to action work based on this summary. It should be noted that where a potentially significant source of UXO hazard has been identified on the Site, the requirement for a detailed desk study and risk assessment has been confirmed and no further research will be undertaken at this stage. It is possible that further in-depth research as part of a detailed UXO desk study and risk assessment may identify other potential sources of UXO hazard on the Site.	

Appendix D

Exploratory Hole Records

Gravesham Borough Council

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS01
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

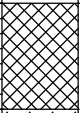
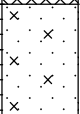
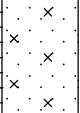
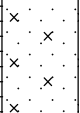
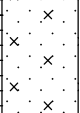
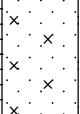
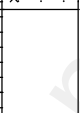
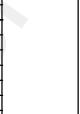
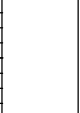
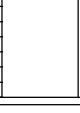
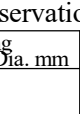
SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 0.0ppm				0.15	MADE GROUND: Bituminous surfacing with hydrocarbon smell noted throughout.		
0.50	D	PID: 0.4ppm				(0.50) 0.65	MADE GROUND: Soft dark orange mottled black slightly sandy Clay with rare gravels. Gravels are fine to medium sub-rounded to sub-angular bituminous surfacing and tile fragments.		
1.00	D	PID: 0.4ppm					Medium dense orange mottled yellow slightly clayey Sand. Sand is fine.		
1.00-1.45	SPTN	= 11 blows				(1.45)			
1.50	D	PID: 4.1ppm							
2.00	D	PID: 4.1ppm				2.10			
2.00-2.45	SPTN	= 10 blows					Loose to medium dense grey mottled orange slightly gravelly slightly silty fine SAND. Gravel is fine subrounded flint fragments.		
2.50	D	PID: 18.1ppm				(1.35)			
3.00	D	PID: 18.9ppm				3.45			
3.00-3.45	SPTN	= 14 blows					Medium dense grey mottled orange slightly clayey SAND, with rare medium sub-rounded flint gravel.		
3.50	D	PID: 5.9ppm				(1.00)			
4.00	D	PID: 11.5ppm				4.45			
4.00-4.45	SPTN	= 16 blows							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client The Longley Group			Method/ Plant Used CDS Rig			Logged By EH		

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE GPJ AGS3 ALL GDT 5/4/22

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS02
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 4.6ppm				(0.70)	MADE GROUND: Loose to medium dense dark brown very clayey gravelly Sand with rootlets. Gravels are fine to medium sub-angular to sub-rounded flint glass and tile fragments.		
0.50	D	PID: 7.5ppm				0.70	Medium dense grey mottled orange slightly silty fine SAND.		
1.00	D	PID: 5.1ppm							
1.00-1.45	SPTN	= 12 blows							
1.50	D	PID: 6.6ppm							
2.00	D	PID: 0.6ppm							
2.00-2.45	SPTN	= 21 blows							
2.50	D	PID: 5.7ppm				(3.75)			
3.00	D	PID: 9.5ppm							
3.00-3.45	SPTN	= 24 blows							
3.50	D	PID: 40.8ppm							
4.00	D	PID: 5.3ppm							
4.00-4.45	SPTN	= 20 blows				4.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.

All dimensions in metres
Scale 1:50

Client **The Longley Group**

Method/
Plant Used

CDS Rig

Logged By
EH

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS03
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 0.5ppm				0.30	MADE GROUND: Soft to firm dark brown mottled white slightly sandy very gravelly Clay with cobbles. Sand is fine. Gravel is fine to coarse angular to subrounded flint, brick, concrete and tile fragments. Cobbles are up to 10cm in diameter.		
0.50	D	PID: 0.4ppm				(0.80)	MADE GROUND: Soft to firm dark brown slightly sandy gravelly Clay. Sand is fine. Gravels are fine to coarse rounded to sub-angular flint, cement and brick fragments.		
1.00	D	PID: 0.7ppm				1.10			
1.00-1.45	SPTN	= 12 blows				1.25	MADE GROUND: Loose to medium dense brown mottled orange slightly clayey gravelly Sand, with rare rootlets. Sand is fine. Gravels are fine to coarse rounded to sub-angular flint, concrete and brick fragments.		
2.00	D	PID: 11.4ppm					Medium dense grey mottled orange slightly silty fine Sand.		
2.00-2.45	SPTN	= 16 blows							
3.00	D	PID: 24.6ppm				(3.20)			
3.00-3.45	SPTN	= 21 blows							
4.00	D	PID: 1.1ppm				4.45			
4.00-4.45	SPTN	= 21 blows							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client The Longley Group			Method/ Plant Used CDS Rig			Logged By EH		

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE GPJ AGS3 ALL GDT 5/4/22

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS04
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 0.0ppm				0.25	MADE GROUND: Soft dark brown slightly sandy gravelly Clay. Sand is fine. Gravels are fine to medium sub-angular to rounded flint, brick and concrete fragments.		
0.50	D	PID: 0.0ppm				(0.90)	Medium dense grey mottled orange slightly silty gravelly SAND. Sand fine to medium. Gravels are fine to medium sub-angular to rounded flint fragments.		
1.00	D	PID: 0.3ppm				1.15			
1.00-1.45	SPT	16 blows					Medium dense grey mottled orange slightly silty fine SAND.		
1.50	D	PID: 0.3ppm							
2.00	D	PID: 0.9ppm							
2.00-2.45	SPT	11 blows							
2.50	D	PID: 1.5ppm							
3.00	D	PID: 1.3ppm							
3.00-3.45	SPT	25 blows							
3.50	D	PID: 0.2ppm							
4.00	D	PID: 0.9ppm							
4.00-4.45	SPT	15 blows				4.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client The Longley Group			Method/ Plant Used CDS Rig			Logged By EH		

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE GPJ AGS3 ALL GDT 5/4/22

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No WS05
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.05	D	PID: 0.0ppm					MADE GROUND: Soft to firm dark brown mottled yellow slightly sandy gravelly Clay, with occasional rootlets to 0.15m bgl. Sand is fine. Gravels are fine to coarse sub-angular to sub-rounded brick, flint and tile fragments.		
0.50	D	PID: 0.0ppm				(1.35)			
1.00	D	PID: 0.1ppm				1.35			
1.00-1.45	SPT N = 8 blows						Loose to medium dense grey mottled orange slightly silty slightly gravelly SAND. Sand is fine to medium. Gravel is fine to medium rounded flints. ...@between 3.20m and 3.30m bgl gravelly lense noted. Gravel is coarse, subrounded of flint.		
1.20	D	PID: 3.3ppm							
1.50	D	PID: 25.7ppm							
2.00	D	PID: 11.9ppm							
2.00-2.45	SPT N = 8 blows								
2.50	D	PID: 8.8ppm				(3.10)			
3.00	D	PID: 2.1ppm							
3.00-3.45	SPT N = 19 blows								
3.50	D	PID: 4.7ppm							
4.00	D	PID: 1.3ppm							
4.00-4.45	SPT N = 15 blows					4.45			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client The Longley Group			Method/ Plant Used CDS Rig			Logged By EH		

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE GPJ AGS3 ALL GDT 5/4/22

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No TP01
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION		
0.20	D	PAC			(0.45)	MADE GROUND: Loose to medium dark brown very clayey gravelly Sand, with abundant rootlets and small roots (<0.5cm ion diameter). Sand is fine to medium. Gravels are abundant fine to medium sub-angular to sub-rounded flint, glass and rare wood fragements. ...@0.20m bgl potential cement bonded asbestos sheeting fragment noted. MADE GROUND: Dark brown very gravelly slightly clayey Sand. Sand is medium. Gravels are fine to medium sub-rounded to rounded flints and decaying wood fragments. ...@1.10m bgl rare fine sub-angular tile fragments noted. Orange very clayey slightly gravelly SAND. Sand is fine to medium. Gravels are fine sub-rounded flint fragments.			
0.25	D						0.45		
0.50	D						(0.70)		
					1.15				
1.20	D				1.20				

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.

All dimensions in metres Scale 1:50	Client Longely Group	Method/ Plant Used Hand Pitting Tools.	Logged By AS
--	----------------------	---	-----------------

WINDOW SAMPLE LOG 4551 ARMOURY DRIVE TP GPU AGS3 ALL GDT 5/4/22

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No TP02
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION		
0.30	D					(0.55) 0.55	MADE GROUND: Loose to medium blackish grey very sandy Gravel. Sand is medium to coarse. Gravels are fine to coarse sub-angular brick, slate, concrete and flint fragments.		
0.75	D					(0.45) 1.00	MADE GROUND: Loose to medium orange brown very sandy Gravel. Sand is medium. Gravels are medium to coarse sub-rounded to rounded flint fragments.		
1.20	D					1.25	Loose to medium orange brown very gravelly SAND. Sand is medium. Gravels are medium to coarse sub-rounded to rounded flint fragments.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:50			Client Longely Group			Method/ Plant Used Hand Pitting Tools.			Logged By AS		

WINDOW SAMPLE LOG

Project Combined Site Investigation - Former St Johns Ambulance HQ, Armoury Drive, DA12 1NB				Window Sample No TP03
Job No 4551	Date 25-02-22	Ground Level (m)	Co-Ordinates ()	
Contractor Sevenoaks Environmental Consultancy Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)		
0.05	D	PAC			0.10	MADE GROUND: Loose to medium dark brown gravelly slightly clayey Sand. Sand is medium. Gravels are medium sub-roiunded flint and brick fragments.		
0.50	D				(0.80)	MADE GROUND: Loose to medium dark brownish grey gravelly cobbly Sand. Sand is medium to coarse. Gravels are fine to cobble sized angular concrete, flint and brick fragments, including whole bricks. Cobbles are up to 0.25m in diameter.		
0.80	D				0.90	...@0.50m bgl potential cement bonded sheeting fragment noted. Refused upon concrete cobbles @ 0.90m bgl.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.

Appendix E

Monitoring Data

Gravesham Borough Council



Date: 18/03/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 1

Borehole Ref:	Dip [m]	Plumb [m]	Comments
WS01	Dry	4.02	
WS02	Dry	3.85	
WS03	Dry	3.98	
WS04	Dry	4.06	
WS05	Dry	3.98	

Atmospheric pressure start:	1030mb
Atmospheric pressure finish:	1030mb
Weather:	Sunny



Date: 31/03/2022
Site: Armoury Drive
Job Ref: 4551
Monitoring Round: 2

Borehole Ref:	Dip [m]	Plumb [m]	Comments
WS01	Dry	3.93	
WS02	Dry	3.75	
WS03	Dry	3.90	
WS04	Dry	3.97	
WS05	Dry	3.87	

Atmospheric pressure start:	987mb
Atmospheric pressure finish:	985mb
Weather:	Snowing

Appendix F

In-situ Test Results – SPT Result and Calibration Certification

Gravesham Borough Council

Results	Window Sample SPT/CPT Calibration:	Energy Ratio E/r (%)
4551		
Site: Armoury Drive, Gravesend DA12 1CT		

Location: WS01		No. of blows									
Depth (m bgl)	Test	Seating		Test Drive				Penetration	Total blows (N value)	Extrapolated (N value)	
1.2	SPT	1	2	2	3	3	3	-	11	-	
2	SPT	1	2	2	2	3	3	-	11	-	
3	SPT	2	2	2	4	4	4	-	14	-	
4	SPT	2	4	3	4	4	5	-	16	-	

Location: WS02		No. of blows						Penetration	Total blows (N value)	Extrapolated (N value)
Depth (m bgl)	Test	Seating		Test Drive						
1.2	SPT	1	1	2	3	3	3	-	11	-
2	SPT	3	3	4	5	6	6	-	21	-
3	SPT	3	4	5	6	6	7	-	24	-
4	SPT	3	4	4	5	5	6	-	20	-

Location: WS03		No. of blows						Penetration	Total blows (N value)	Extrapolated (N value)
Depth (m bgl)	Test	Seating		Test Drive						
1.2	SPT	2	2	3	3	3	3	-	12	-
2	SPT	2	2	4	4	4	4	-	11	-
3	SPT	2	2	5	5	5	6	-	21	-
4	SPT	3	3	5	5	5	6	-	21	-

Location: WS04		No. of blows						Penetration	Total blows (N value)	Extrapolated (N value)
Depth (m bgl)	Test	Seating		Test Drive						
1.2	SPT	2	3	4	4	4	4	-	16	-
2	SPT	2	3	4	4	4	4	-	11	-
3	SPT	4	5	5	7	6	7	-	25	-
4	SPT	2	2	3	4	4	4	-	15	-

Location: WS05		No. of blows						Penetration	Total blows (N value)	Extrapolated (N value)
Depth (m bgl)	Test	Seating		Test Drive						
1.2	SPT	1	1	2	2	2	2	-	8	-
2	SPT	1	1	1	2	2	3	-	11	-
3	SPT	2	3	4	5	5	5	-	19	-
4	SPT	2	2	3	4	4	4	-	15	-

Southern Testing
Unit 11
Charlwood Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref: CK WS02
Test Date: 10/01/2022
Report Date: 10/01/2022
File Name: CK WS02.spt
Test Operator: NPB

Instrumented Rod Data

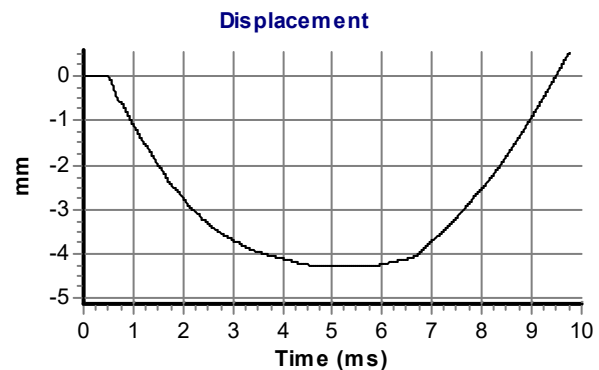
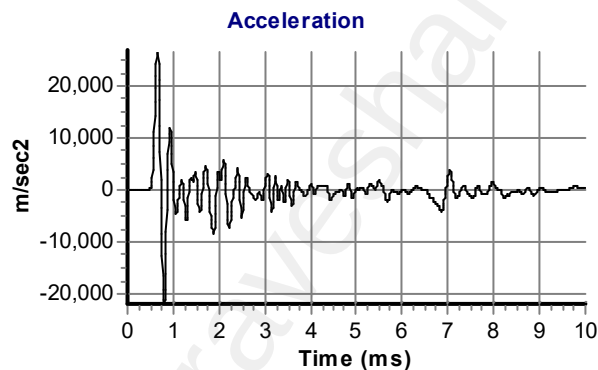
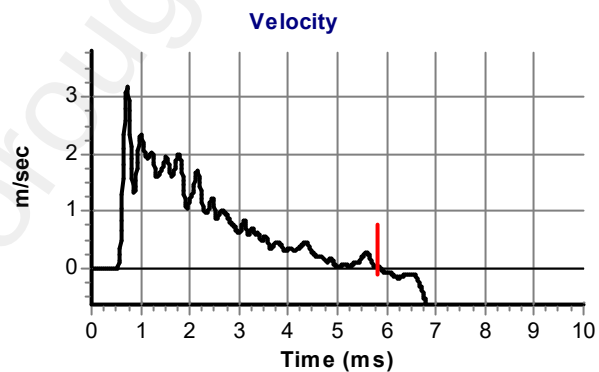
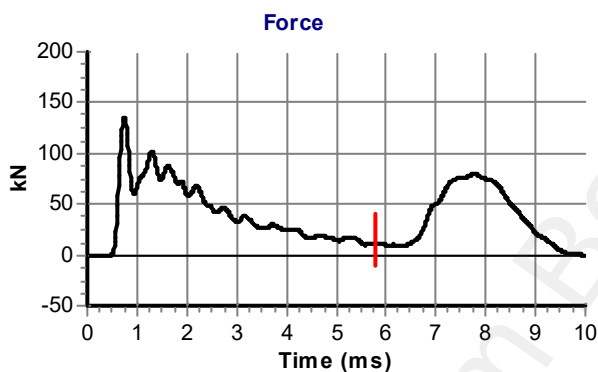
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.6
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 64786
Accelerometer No.2: 64789

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.5

Comments / Location

CHARLWOODS



Calculations

Area of Rod A (mm²): 983
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 306

Energy Ratio E_r (%): **65**

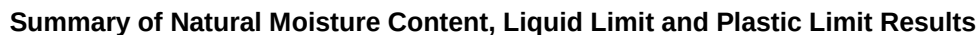
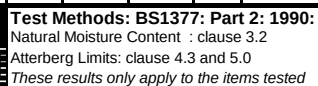
Signed: N Burrows
Title: FOC Manager

The recommended calibration interval is 12 months

Appendix G

Geotechnical Laboratory Data

Gravesham Borough Council

[illegible]

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Checked and
Approved

Initials J.P

Date: 24/03/2022

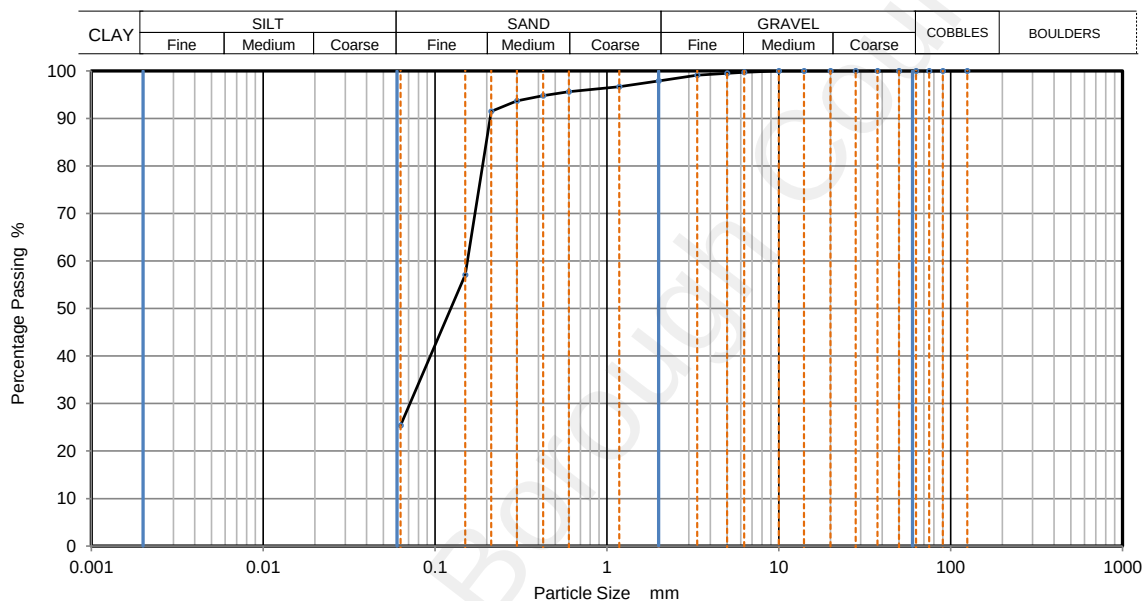
2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R1(b)

	PARTICLE SIZE DISTRIBUTION			Job Ref	31496
				Borehole/Pit No.	WS01
Site Name	4551			Sample No.	-
Project No.	4551	Client	Sevenoaks	Depth Top	2.50 m
Soil Description	Greyish brown silty clayey SAND with rare fine angular gravel			Depth Base	- m
				Sample Type	D
				Samples received	28/02/2022
				Schedules received	02/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/03/2022
				Date tested	18/03/2022

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	98		
1.18	97		
0.6	96		
0.425	95		
0.3	94		
0.212	92		
0.15	57		
0.063	25		

Sample Proportions		% dry mass
Very coarse		0.0
Gravel		2.1
Sand		72.6
Fines <0.063mm		25.4

Grading Analysis		
D100	mm	
D60	mm	0.154
D30	mm	0.0715
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with BS1377 unless noted below

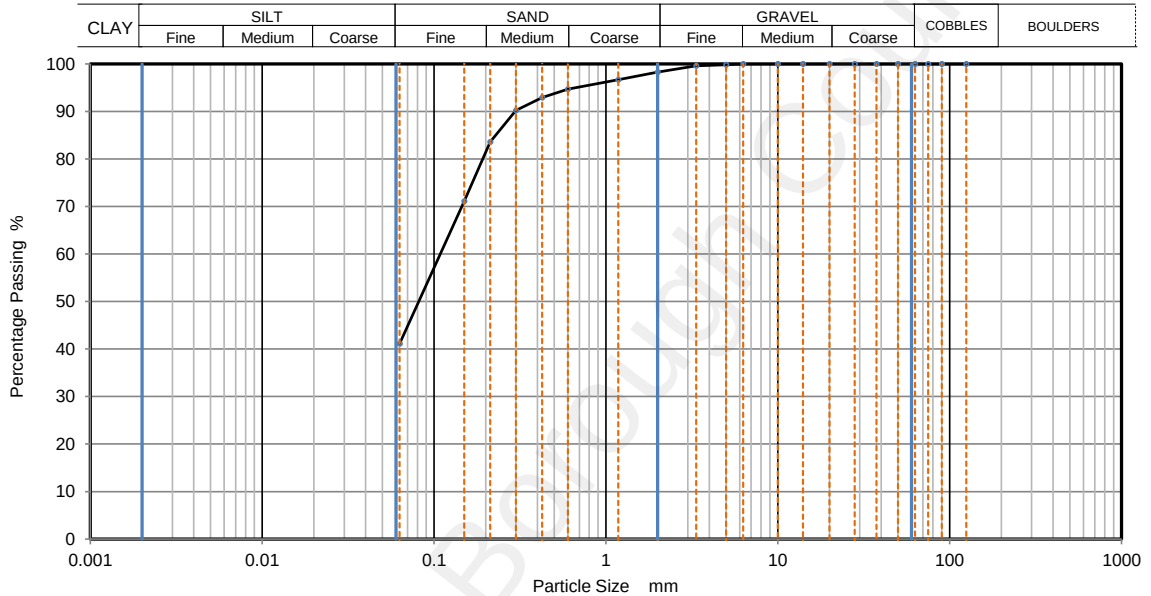
NOTE: The report shall not be reproduced except in full without approval of the laboratory

	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 24/03/2022
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3
	2519		



PARTICLE SIZE DISTRIBUTION

	PARTICLE SIZE DISTRIBUTION			Job Ref	31496
				Borehole/Pit No.	WS01
Site Name	4551			Sample No.	-
Project No.	4551	Client	Sevenoaks	Depth Top	4.00 m
Soil Description	Greyish brown sandy silty CLAY with rare fine gravel			Depth Base	- m
				Sample Type	SPT
				Samples received	28/02/2022
				Schedules received	02/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/03/2022
These results only apply to the items tested				Date tested	18/03/2022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	98		
1.18	97		
0.6	95		
0.425	93		
0.3	90		
0.212	84		
0.15	71		
0.063	41		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	1.7
Sand	57.2
Fines <0.063mm	41.1

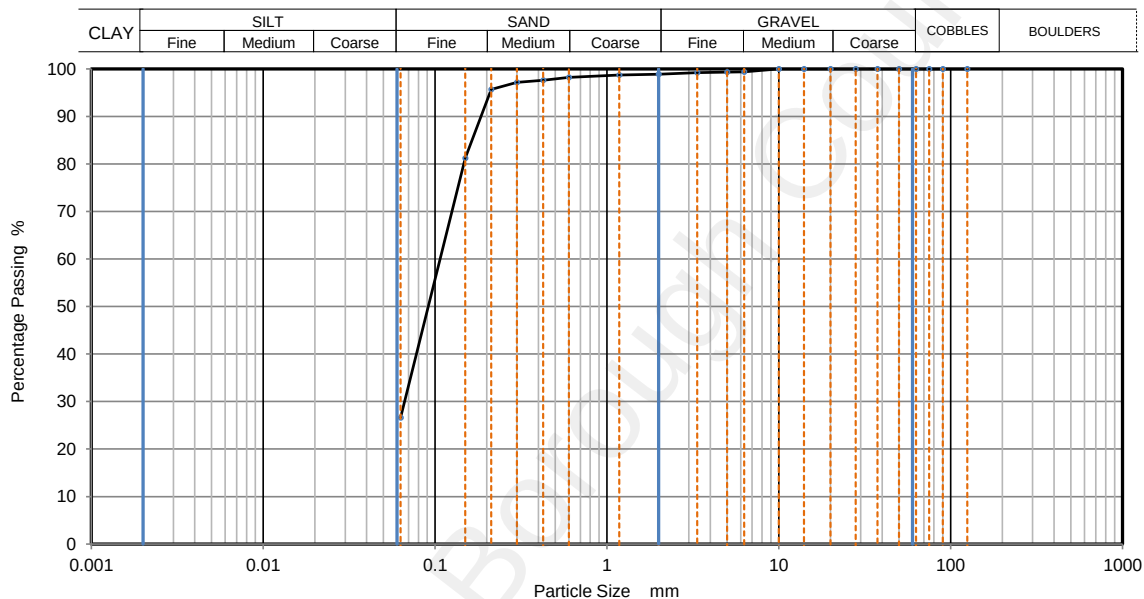
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
 Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

 2519	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 24/03/2022
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3

	PARTICLE SIZE DISTRIBUTION			Job Ref	31496
				Borehole/Pit No.	WS02
Site Name	4551			Sample No.	-
Project No.	4551	Client	Sevenoaks	Depth Top	1.00 m
Soil Description	Greyish brown silty clayey SAND with rare fm rounded gravel			Depth Base	- m
				Sample Type	SPT
				Samples received	28/02/2022
				Schedules received	02/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/03/2022
These results only apply to the items tested				Date tested	18/03/2022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
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	99		
3.35	99		
2	99		
1.18	99		
0.6	98		
0.425	98		
0.3	97		
0.212	96		
0.15	81		
0.063	27		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	1.1
Sand	72.4
Fines <0.063mm	26.6

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

Remarks
Preparation and testing in accordance with BS1377 unless noted below

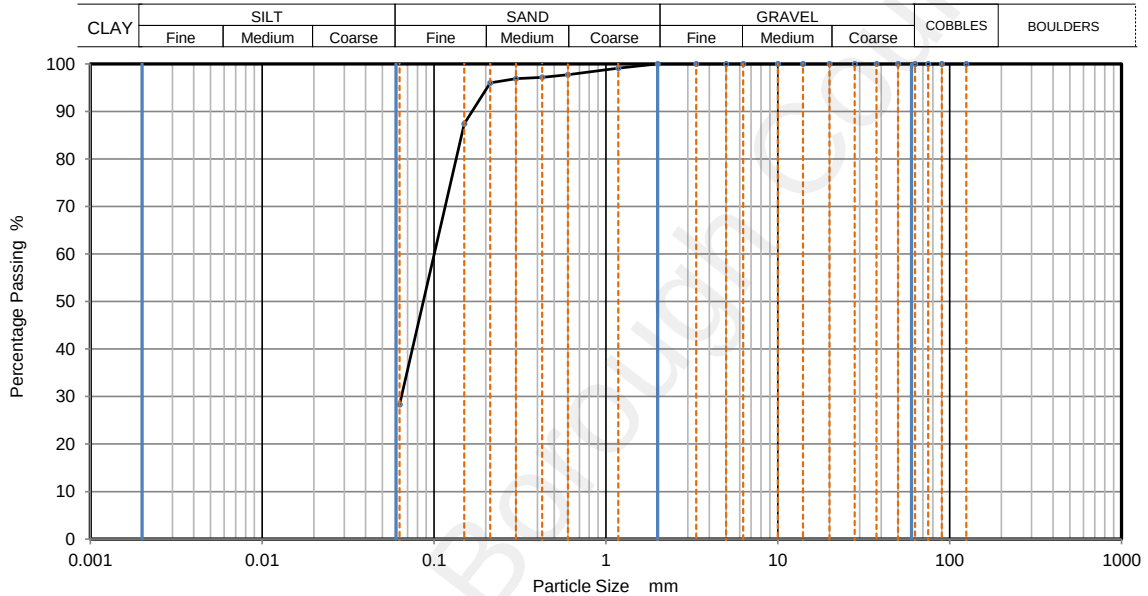
NOTE: The report shall not be reproduced except in full without approval of the laboratory

	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288	Checked and Approved Initials: J.P Date: 24/03/2022
	2519	MSF-5-R3
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	



PARTICLE SIZE DISTRIBUTION

Job Ref	31496		
	Borehole/Pit No.		
Site Name	4551		
Project No.	4551	Client	Sevenoaks
Soil Description	Greyish brown silty clayey SAND		
Test Method	BS1377:Part 2: 1990, clause 9.0		
These results only apply to the items tested			
Date tested			18/03/2022
Project started			03/03/2022
Schedules received			02/03/2022
Samples received			28/02/2022
Sample Type			SPT
Depth Base			- m
Depth Top			3.00 m
Sample No.			-
Borehole/Pit No.			WS02
Job Ref			31496



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	98		
0.425	97		
0.3	97		
0.212	96		
0.15	87		
0.063	28		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.0
Sand	71.7
Fines <0.063mm	28.3

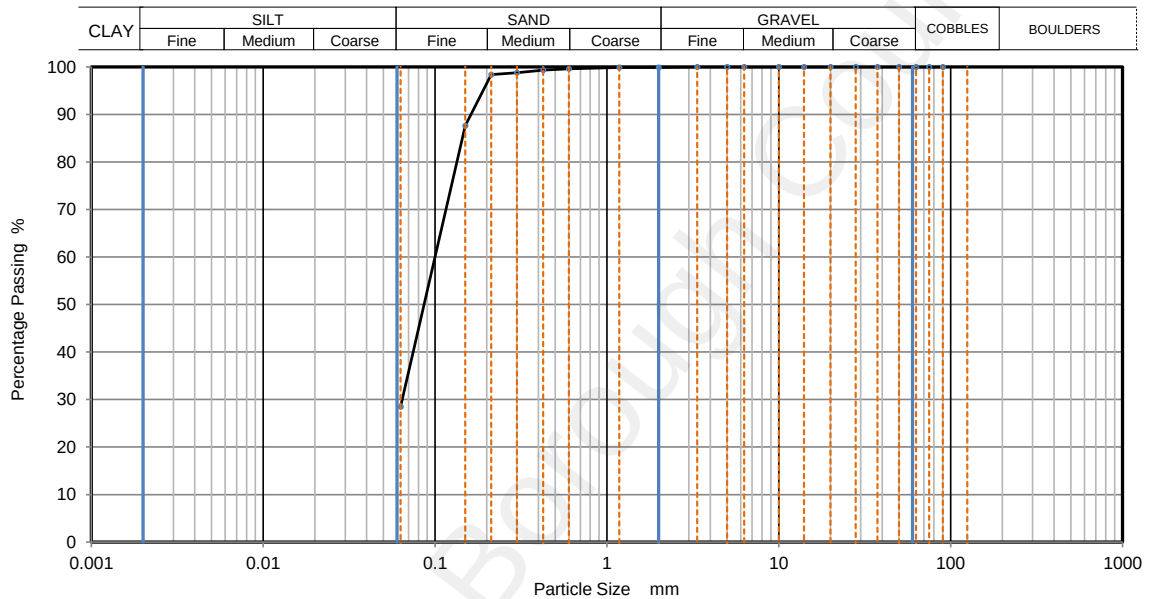
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

 2519	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 24/03/2022
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3

	PARTICLE SIZE DISTRIBUTION			Job Ref	31496
				Borehole/Pit No.	WS03
Site Name	4551			Sample No.	-
Project No.	4551	Client	Sevenoaks	Depth Top	2.00 m
Soil Description	Greyish brown silty clayey SAND			Depth Base	- m
				Sample Type	SPT
				Samples received	28/02/2022
				Schedules received	02/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/03/2022
These results only apply to the items tested				Date tested	18/03/2022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	99		
0.3	99		
0.212	98		
0.15	88		
0.063	29		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.1
Sand	71.3
Fines <0.063mm	28.5

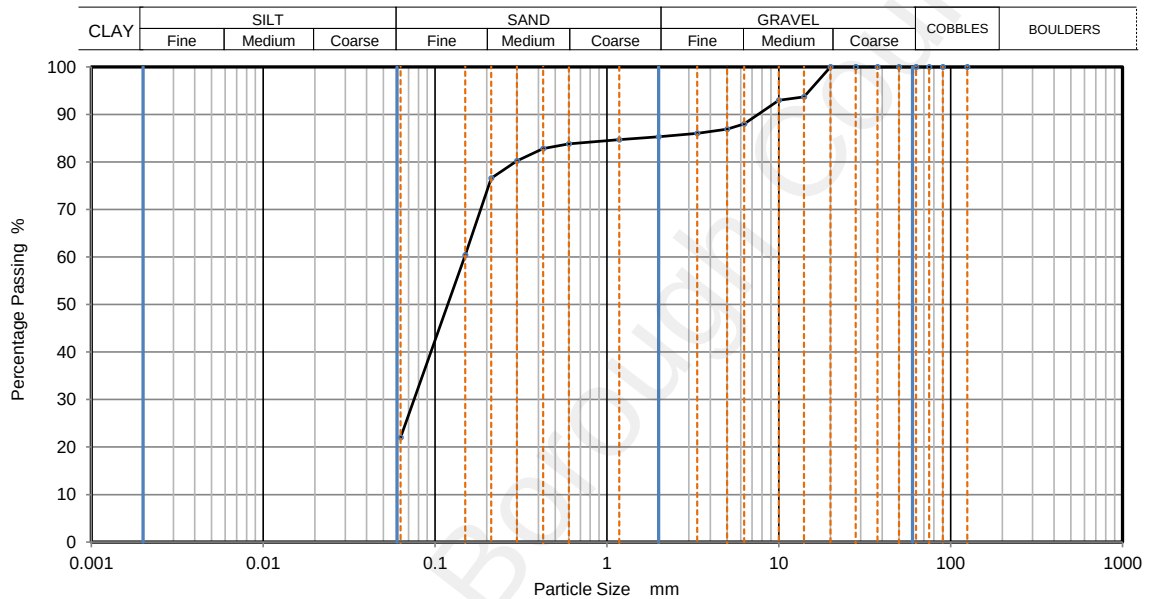
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288	Checked and Approved Initials: J.P Date: 24/03/2022	
	2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-5-R3

	PARTICLE SIZE DISTRIBUTION			Job Ref	31496
				Borehole/Pit No.	WS04
Site Name	4551			Sample No.	-
Project No.	4551	Client	Sevenoaks	Depth Top	1.20 m
Soil Description	Greyish brown gravelly silty clayey SAND (gravel is fm and sub-rounded)			Depth Base	- m
				Sample Type	SPT
				Samples received	28/02/2022
				Schedules received	02/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/03/2022
These results only apply to the items tested				Date tested	18/03/2022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	94		
10	93		
6.3	88		
5	87		
3.35	86		
2	85		
1.18	85		
0.6	84		
0.425	83		
0.3	80		
0.212	77		
0.15	60		
0.063	22		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	14.7
Sand	63.2
Fines <0.063mm	22.0

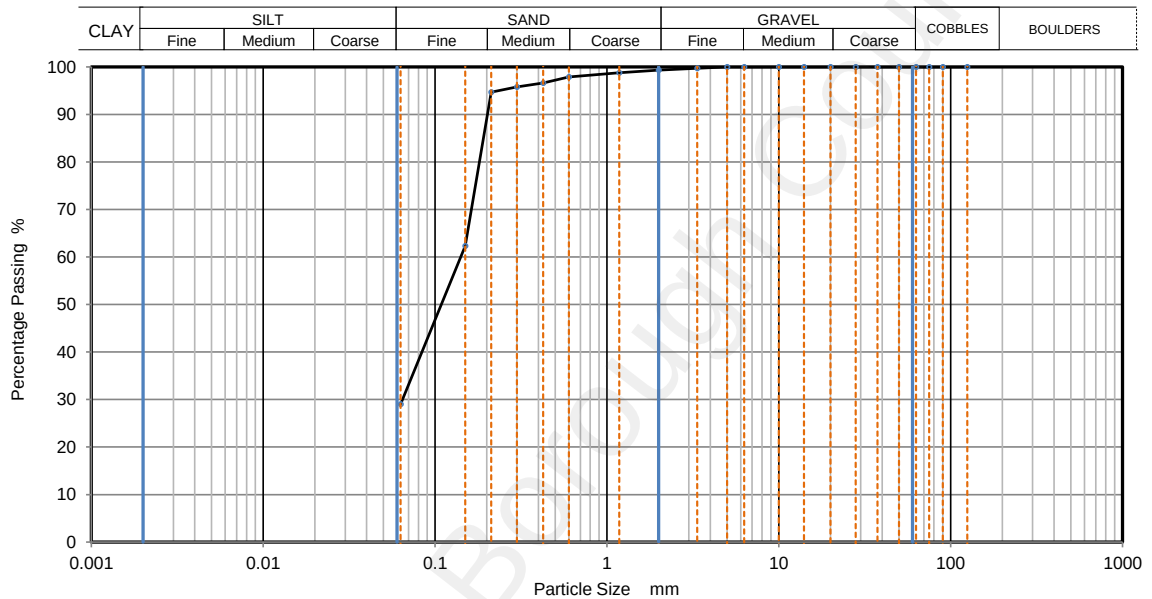
Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 24/03/2022	
	2519		MSF-5-R3	
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)			

	PARTICLE SIZE DISTRIBUTION			Job Ref	31496
				Borehole/Pit No.	WS04
Site Name	4551			Sample No.	-
Project No.	4551	Client	Sevenoaks	Depth Top	3.00 m
Soil Description	Greyish brown silty clayey SAND with rare fine gravel			Depth Base	- m
				Sample Type	SPT
				Samples received	28/02/2022
				Schedules received	02/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/03/2022
These results only apply to the items tested				Date tested	18/03/2022



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	98		
0.425	97		
0.3	96		
0.212	95		
0.15	62		
0.063	29		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.7
Sand	70.3
Fines <0.063mm	29.0

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

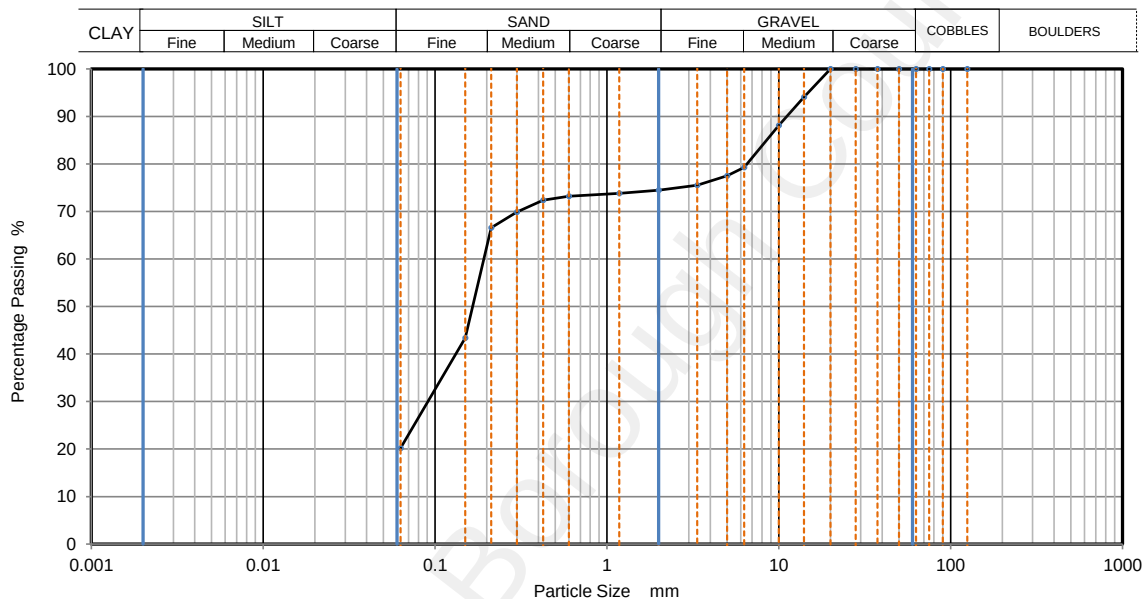
Remarks
Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288	Checked and Approved Initials: J.P Date: 24/03/2022	
	2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-5-R3

	PARTICLE SIZE DISTRIBUTION			Job Ref	31496
				Borehole/Pit No.	WS05
Site Name	4551			Sample No.	-
Project No.	4551	Client	Sevenoaks	Depth Top	1.00 m
Soil Description	Greyish brown silty clayey very gravelly SAND (gravel is fm and sub-angular to sub-rounded)			Depth Base	- m
				Sample Type	SPT
				Samples received	28/02/2022
				Schedules received	02/03/2022
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	03/03/2022
				Date tested	18/03/2022

These results only apply to the items tested



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	94		
10	88		
6.3	79		
5	78		
3.35	76		
2	75		
1.18	74		
0.6	73		
0.425	72		
0.3	70		
0.212	67		
0.15	43		
0.063	20		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	25.5
Sand	54.3
Fines <0.063mm	20.2

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

Remarks
Preparation and testing in accordance with BS1377 unless noted below

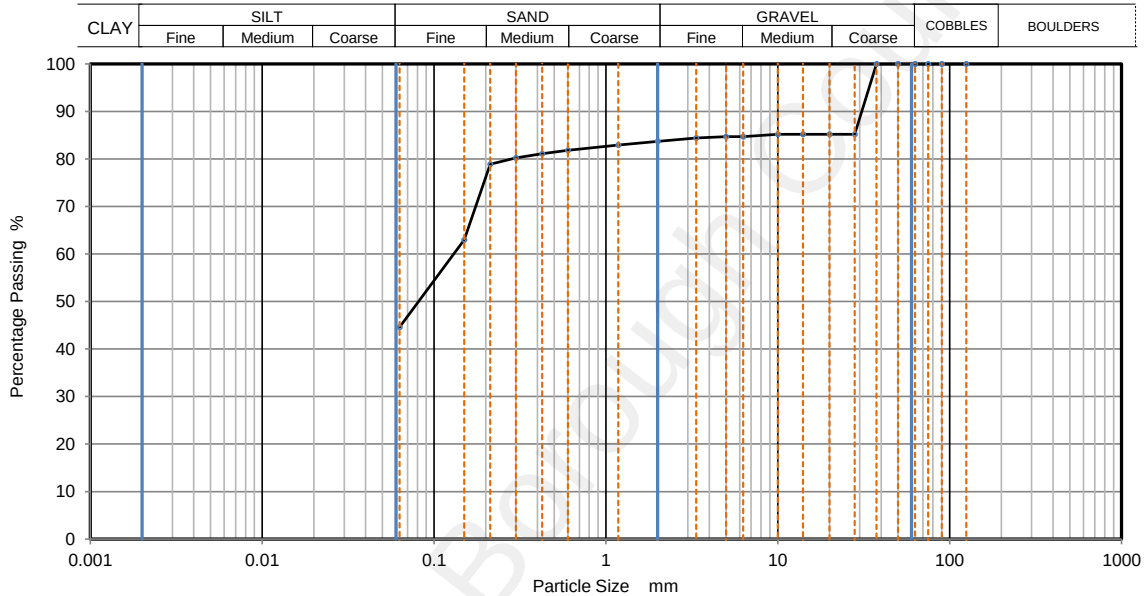
NOTE: The report shall not be reproduced except in full without approval of the laboratory

	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288	Checked and Approved Initials: J.P Date: 24/03/2022	
	2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-5-R3



PARTICLE SIZE DISTRIBUTION

Job Ref	31496		
	Borehole/Pit No.		
Site Name	4551		
Project No.	4551	Client	Sevenoaks
Soil Description	Greyish brown slightly gravelly sandy silty CLAY gravel is fmc and sub angular)		
Test Method		BS1377:Part 2: 1990, clause 9.0	
These results only apply to the items tested		Date tested	
Job Ref		31496	
Borehole/Pit No.		WS05	
Sample No.		-	
Depth Top		4.00 m	
Depth Base		- m	
Sample Type		SPT	
Samples received		28/02/2022	
Schedules received		02/03/2022	
Project started		03/03/2022	
Date tested		18/03/2022	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	85		
20	85		
14	85		
10	85		
6.3	85		
5	85		
3.35	84		
2	84		
1.18	83		
0.6	82		
0.425	81		
0.3	80		
0.212	79		
0.15	63		
0.063	45		

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	16.3
Sand	39.1
Fines <0.063mm	44.6

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

Remarks
Preparation and testing in accordance with BS1377 unless noted below

NOTE: The report shall not be reproduced except in full without approval of the laboratory

 2519	K4 Soils Laboratory Unit 8, Olds Close, Watford, Herts, WD18 9RU Email: james@k4soils.com Tel: 01923 711288		Checked and Approved Initials: J.P Date: 24/03/2022
	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)		MSF-5-R3