



**GEOENVIRONMENTAL SITE INVESTIGATION
REPORT
PHASE II SITE INVESTIGATION
OF LAND AT
LOWERCROFT ROAD
BURY**

Prepared for: -

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1.0 INTRODUCTION

1.1 Instruction

- 1.1.1 GeoCon Site Investigations Ltd (GeoCon) have been commissioned by HJK Construction Ltd to undertake a Phase II Geoenvironmental Site Investigation on land at Lowercroft Road, Bury.
- 1.1.2 It is understood that this is required following the results of a Phase I Preliminary Risk Assessment carried out by Delta-Simons in June 2017 referenced Geo-environmental Report – (CAT 1 and PRA) which should be referred to in conjunction with this report.
- 1.1.3 This report is provided to establish the presence type and nature of any contamination at the site, and to identify the ground conditions and provide details of their engineering properties in order to facilitate foundation design for the proposed development.
- 1.1.4 GeoCon have not been commissioned to undertake a Phase I Preliminary Risk Assessment or Phase II Geoenvironmental Site Investigation and have not been provide with any third party reports at this stage.

1.2 Scope of Works

- 1.2.1 Prior to commencing the site works the proposed scope of investigation was as follows, however the proposed scope will be subject to change dependent upon site conditions, access, restrictions and obstructions. The actual works undertaken following the completion of the site works and any on site amendments are detailed in section 3.0.
 - Ten Dynamic sample boreholes to a nominal depth of up to 5.00mbgl or refusal.
 - Five dynamic probe follow-on holes to a nominal depth of up to 10.00mbgl or refusal
 - Insitu environmental and geotechnical sampling, and insitu geotechnical testing;
 - Full supervision of all works by engineering geologist including sampling and detailed geotechnical descriptions to BS5930, EN ISO 14688-1 EN ISO 14688-2 and EN ISO 14689 of all strata types encountered within the exploratory holes.
 - The installation of five gas and groundwater monitoring wells to a nominal depth of 5.00mbgl.
 - Subsequent gas and groundwater monitoring on six occasions over a three month period in accordance with CIRIA 665 commencing approximately one week after the completion of the ground investigation.
 - A suite of chemical laboratory analysis.
 - A suite of geotechnical laboratory analysis.
 - Production of an interpretative report.

1.3 Reliance and Limitations

- 1.3.1 This report has been prepared using published information and information provided by the Client and their professional advisers which has been made available to GeoCon at the time of writing only. GeoCon accepts no liability for any changes resulting from new information which has become available since this time.
- 1.3.2 This report is provided for the sole use of the client and their professional advisors and is confidential to them unless agreed otherwise in writing. This report may only be used and relied on once the work has been paid for in full.

- 1.3.3 GeoCon owes no duty of care and has no liability to any third party who is not authorised by GeoCon to use this report. Any unauthorised third parties using information contained in this report do so at their own risk.
- 1.3.4 This assessment has been carried out to determine the potential risks posed to future end users, along with other key receptors, resulting from potential contamination at the site, based on the proposed development. Should any revisions in the development proposals result in a change any assessment parameters detailed in this report, a re-assessment of the risk should be carried out.
- 1.3.5 Whilst this report may reference observations made regarding the presence of features/ issues such as invasive species, ACM, site drainage and evidence of structural abnormalities, this report does not constitute specialist surveys on these matters. Should further specialist surveys be carried out in this regard, the findings of these should be reported to GeoCon so that we may determine if this has any impact on the findings of this report.
- 1.3.6 The assessment and interpretation of the factual data obtained as part of this Ground Investigation has been undertaken in accordance with standard consulting practise and with current national and international guidance.
- 1.3.7 This report presents the observations made during the Ground Investigation and the factual data obtained. The conclusions and recommendations in this report are limited to those which can be made based on the findings of the survey and information provided by third parties. GeoCon assumes all third party data to be true and correct. No responsibility can be accepted by GeoCon for inaccuracies in the information provided by any other party.
- 1.3.8 This report is written in the context of an agreed scope of works and should not be used in a different context. Furthermore, new information, improved practises, and changes in legislation may require the reinterpretation of the report in whole or in part after its original issue. GeoCon reserve the right to alter their conclusions and recommendations in the light of further information that may become available. This report is provided for the sole use of the client and their professional advisers and is confidential to them unless agreed otherwise in writing.
- 1.3.9 Ground conditions can be variable and change rapidly, especially in areas of Made Ground, however it is assumed that the ground conditions encountered and observed are typical and representative of the site as a whole. Most specifically with regard to this limited investigation, the ground conditions have been determined from a limited number of exploratory holes formed across the site, therefore only a small percentage of the total area of the site has been investigated. Interpolation between exploratory holes has enabled a general picture of the subsurface conditions to be produced. Conclusions drawn from the ground investigation should be read in this context. GeoCon cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.
- 1.3.10 In addition, subsurface conditions including contaminant concentrations and groundwater levels may vary spatially with time. This factor should be given due consideration in the event that the information contained within this report is used after any significant period of time has elapsed.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

2.1.1 The site is located at land off Lowercroft Road, Bury, at approximate National Grid Reference NGR: 377576, 411107 (centre of the site).

2.1.2 A site location plan is presented as Drawing No. GSI 1923/01 in Appendix A.

2.2 Site Description

2.2.1 The site is a roughly rectangular shaped piece of land with an approximate area of 0.15Ha.

2.2.2 The topography of the site is generally flat and level, with a slight decline in the southwestern area. The surrounding area sloped generally to the south, consistent with the local topography. The site is lower than the surrounding ground level, with steep slopes raising to the west and north and dropping to the south and west.

2.2.3 The site is currently occupied by a vacant plot of land consisting of predominantly soft, made ground. Some domestic waste was seen across the site, and concrete slabs are located in the eastern area, assumed to be associated with the previous development. Small earth bunds were present along the eastern and southern edges of the site. Mature trees were noted along the northern and western boundaries of the site.

2.2.4 An approximate distribution of the surface covering is given below in Table 2.1: Site Surface Covering.

Table 2.1: Site Surface Covering

Type of Surface Cover	Distribution (%)
Soft Ground (grassed and landscaped areas)	90
Hardstanding	10
Roadways	0
Buildings	0
Water (ponds, streams)	0

2.2.5 The sites boundary is defined by Lowercroft Road to the east and steep slopes raising to the west and north and dropping to the south and west.

2.2.6 Access to the site is via Lowercroft Road from the east.

2.3 Surrounding Area

2.3.1 The surrounding area comprised residential properties to the west, north and east with industrial properties to the south and southeast.

2.3.2 The topography of the surrounding area is gently inclining to the northwest.

2.4 Future Site Usage

2.4.1 It is currently proposed to construct four residential properties at the site, with both private and communal garden spaces, new hardstanding driveway and a separated garage structure, as shown on the proposed development plan drawing (ref: Site Plan) and contained with Appendix A.

2.4.2 This assessment has been carried out with reference to this proposed development plan as provided by the client, any changes to the proposed development may result in this assessment requirement updating.

3.0 GROUND INVESTIGATION

3.1 General

- 3.1.1 The intrusive investigation was carried out between 20th and 21st July 2023.
- 3.1.2 The specification and scope of works for the ground investigation has been provided by the client.
- 3.1.3 The ground investigation has been carried out in accordance with BS5930 and the UK Specification for Ground Investigation Second Edition 2012.
- 3.1.4 All strata descriptions were undertaken in accordance with BS5930 Amendment 2; EN ISO 14688 -1; EN ISO 14688 -2; and EN ISO 14689.
- 3.1.5 The actual ground investigation comprised the formation of:
 - Ten Dynamic sample boreholes to a nominal depth of up to 5.00mbgl or refusal.
 - Five dynamic probe follow-on holes to a nominal depth of up to 10.00mbgl or refusal
 - Insitu environmental and geotechnical sampling, and insitu geotechnical testing;
 - Full supervision of all works by engineering geologist including sampling and detailed geotechnical descriptions to BS5930, EN ISO 14688-1 EN ISO 14688-2 and EN ISO 14689 of all strata types encountered within the exploratory holes.
 - The installation of four gas and groundwater monitoring wells to a nominal depth of 5.00mbgl.
 - Subsequent gas and groundwater monitoring on six occasions over a three month period in accordance with CIRIA 665 commencing approximately one week after the completion of the ground investigation.
 - A suite of chemical laboratory analysis.
 - A suite of geotechnical laboratory analysis.
 - Production of an interpretative report.
- 3.1.6 The ground investigation was carried out to determine the geotechnical and geoenvironmental properties of the soils and rock beneath the site for a proposed residential development at the site.
- 3.1.7 The locations of the exploratory holes were specified by GeoCon and were positioned to gain key information beneath the site in relation to the proposed development.
- 3.1.8 All locations were checked against buried service location plans and then scanned with a Cable Avoidance Tool (CAT) and Genny prior to excavation, and a permit to dig was then issued. Each location was then continued by hand down to a minimum of 1.20mbgl to clear any buried services or other subsurface obstructions. All locations were then checked again with a CAT at the base of the hand excavated inspection pit by GeoCon prior to commencement of drilling.
- 3.1.9 All access permissions were arranged by the client prior to the ground investigation commencing.
- 3.1.10 An exploratory hole location plan is presented in Appendix A as drawing number GSI 1923/02.

3.2 Dynamic Sample Boreholes

- 3.2.1 Ten dynamic sample boreholes were drilled at the site, referenced DS01 to DS10, to depths of between 3.70 and 5.00mbgl.
- 3.2.2 The dynamic sample boreholes were drilled using a tracked dynamic sample rig in order to facilitate geoenvironmental sampling and to gain an understanding of the environmental and geotechnical properties of the soils and rock beneath the site, and to facilitate the installation of groundwater monitoring standpipes.

- 3.2.3 The dynamic sample boreholes were drilled using 100mm diameter barrel reducing in size with depth, to achieve the target depths.
- 3.2.4 All dynamic sample borehole logs are presented in Appendix B.

3.3 Dynamic Probing

- 3.3.1 Five dynamic probe holes were formed through the base of their corresponding dynamic sample borehole to depths of between 4.10 and 7.00mbgl.
- 3.3.2 All dynamic probes were terminated on refusal.
- 3.3.3 Dynamic probing was carried out using a super heavy dynamic probe machine.
- 3.3.4 All dynamic probe holes were terminated at refusal which is defined as 50 or greater blows over the 100mm increment length.
- 3.3.5 Blow counts are recorded for every 100mm of advancement with the rods.
- 3.3.6 Details of the super heavy dynamic probe are given below in Table 3.1: Super Heavy Dynamic Probe Parameters.

Table 3.1: Super Heavy Dynamic Probe Parameters

Parameter	Detail
Hammer Weight (kg)	63.5
Weight Drop (mm)	750
Rod Width (mm)	22
Cone Width (mm)	33
Cone Angle (°)	90

- 3.3.7 The Dynamic Probe logs are presented in Appendix C.

3.4 Sampling and Insitu Testing

- 3.4.1 The environmental and geotechnical sampling regime and insitu testing regime included the following:
- Environmental samples for subsequent chemical analysis were taken from each strata type, with a minimum of three samples taken from the upper 1.00 m, then at 1.00 m intervals in made ground with a minimum of one sample from the natural strata.
 - Small disturbed samples taken from each strata type and then at 1.00 m intervals thereafter.
 - Insitu Standard Penetration Tests (SPTs) were carried out at 1.00 m intervals down to 5.00 mbgl to collate insitu strength information (relative density) for the soils beneath the site.
- 3.4.2 Soil samples were collected for environmental and geotechnical analysis by the engineering geologist on site based on physical and visual inspection in addition to standard sampling.
- 3.4.3 All samples were stored in pre-chilled cool-boxes prior to immediate dispatch to laboratory. Where there has been a delay in transporting the samples to the laboratory, samples have been kept in a cool dark storage unit inside cool boxes packed with ice, which is regularly replaced to maintain sample quality.
- 3.4.4 The environmental samples were subsequently transported to a chemical laboratory in plastic tubs, glass jars and soils vials. The geotechnical samples were subsequently transported to a geotechnical laboratory in prepared bulk bags and plastic tubs.

3.5 Installations and Backfill

- 3.5.1 Four of the dynamic sample were installed with combined gas and ground water monitoring standpipes. The details of the gas and ground water monitoring standpipes are summarised below in **Error! Reference source not found.** Table 3.2: Gas and Groundwater Monitoring Installations.

Table 3.2: Gas and Groundwater Monitoring Installations

BH ID	Installation Depth (mbgl)	Response Zone (mbgl)	Installation Date	Strata	Comments
DS06	5.00	1.00 – 5.00	21/07/23	Till	Cohesive Deposits
DS07	5.00	1.00 – 5.00	21/07/23	Till	Cohesive Deposits
DS08	5.00	1.00 – 5.00	21/07/23	Till	Cohesive Deposits
DS09	5.00	1.00 – 5.00	21/07/23	Till	Cohesive Deposits

- 3.5.2 Full details of the installations and backfill are presented on the relevant exploratory hole logs.
- 3.5.3 All monitoring standpipes are constructed using 50mm slotted pipe with a Geosock filter and gravel surround medium within the response zone, and 50mm plain pipe with a bentonite seal above the response zone (minimum 0.50m thick).
- 3.5.4 All remaining exploratory holes were backfilled with bentonite and made level at the surface to a similar condition as prior to the work.

3.6 Groundwater

- 3.6.1 Where groundwater was encountered a waiting period of 20 minutes was allowed to monitor any change (rise or fall) in the levels of each groundwater strike.

3.7 Groundwater Monitoring

- 3.7.1 Groundwater monitoring has been carried out across the site on six occasions in conjunction with the gas monitoring regime, to establish the standing water levels beneath the site, and facilitate groundwater sampling.

3.8 Laboratory Testing

- 3.8.1 Geotechnical laboratory testing was subsequently carried out on selected samples of soil. Further details of the geotechnical laboratory testing are given within Section 5.0 – Geotechnical Testing and Results.
- 3.8.2 All geotechnical laboratory testing was scheduled by GeoCon.
- 3.8.3 Chemical laboratory testing was subsequently carried out on selected samples of soil. Further details of the chemical laboratory testing are given within Section 7.0 – Chemical Testing and Results.
- 3.8.4 All chemical laboratory testing was scheduled by GeoCon.

3.9 Restrictions

- 3.9.1 No restrictions were encountered during this site investigation that would have prevented parts of the site being accessed and consequently resulting in any of the exploratory locations being abandoned.

4.0 GROUND CONDITIONS

4.1 Geology

- 4.1.1 The British Geological Survey shows the site to be underlain by the geological succession outlined below Table 4.1: Published Geology.

Table 4.1: Published Geology

Geology	Description /strata	BGS General Description
Artificial	None Recorded	N/A
Superficial	Alluvium	'...Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel...'
Superficial	Till	'...consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape...'
Bedrock	Pennine Lower Coal Measures Formation	'Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.'

4.2 General

- 4.2.1 A generalised summary of the ground conditions encountered, depths to base, and thickness recorded from the exploratory hole records is presented below in **Error! Reference source not found.**Table 4.2: Summary of Ground Conditions.

Table 4.2: Summary of Ground Conditions

Geology / Strata	Depth (mbgl)				Thickness (m)		Locations encountered
	Top		Base		Min	Max	
	Min	Max	Min	Max			
Made Ground	0.00	-	0.50	1.30	0.50	1.30	All Locations
Till (Cohesive)	0.50	3.40	2.90	5.00	0.30	4.50	All Locations
Till (Granular)	0.50	4.20	0.90	5.00	0.10	1.70	DS01, DS02, DS03, DS05, DS08 and DS10
Groundwater	Strike depth (mbgl)		Rest Level (mbgl)		Locations encountered		
	Min	Max	Min	Max			
Seepage	-	-	-	-	Not Encountered		
Strike	2.60	3.20	2.60	3.20	DS03 & DS04		
SWL only (no obvious strike)	-	-	-	-	Not Encountered		

- 4.2.2 The general ground conditions encountered have been summarised below.
- 4.2.3 Detailed strata descriptions are presented on the Dynamic sample borehole logs presented in Appendix B.

4.3 Made Ground

- 4.3.1 Made ground was encountered in all exploratory hole locations from ground level to depths of between, 0.50 and 1.30mbgl. Cohesive made ground materials were encountered in all locations from ground level to depths of between 0.50 and 1.30mbgl, and generally comprised sandy gravelly clay with fragments of brick, concrete and sandstone.

4.4 Superficial Deposits

- 4.4.1 Soils considered to represent till were encountered in all locations directly beneath the made ground to unproven depths beyond 5.45mbgl
- 4.4.2 Underlying the Made Ground, cohesive till deposits were encountered in all locations and generally described as very soft to hard reddish brown sandy gravelly Clay, with thin sand bands present.
- 4.4.3 In DS01, DS02, DS05, DS09 and DS10, at depths from 2.80 and 3.00m, granular deposits were encountered underlying the clay. The granular till deposits generally comprised medium dense to very dense clayey sandy gravel, interbedded with clay to unproven depths beyond 5.45mbgl.

4.5 Bedrock

- 4.5.1 Bedrock was not encountered during this ground investigation.

4.6 Groundwater

- 4.6.1 Groundwater was encountered in two of the ten exploratory holes formed across the site. Further details are as follows:
- DS03 – strike at 2.60mbgl remaining stable after 20 minutes.
 - DS03 – strike at 3.20mbgl remaining stable after 20 minutes.

4.7 Groundwater Monitoring

- 4.7.1 A groundwater monitoring regime was carried out at the site to establish the ground water levels beneath the site, which included monitoring on six occasions. Table 4.3: Groundwater Monitoring Results, below presents the details of the groundwater monitoring regime. All boreholes were purged and developed accordingly to prior to the groundwater monitoring.

Table 4.3: Groundwater Monitoring Results

Exploratory Hole ID	Base of Hole (mbgl)	Standing Water Level (SWL) (mbgl)					
		Date of Visit					
		04/08/23	18/08/23	08/09/23	15/09/23	TBC	TBC
DS06	4.82	1.03	1.00	1.00	0.96		
DS07	4.45	0.30	0.41	1.52	0.40		
DS08	4.86	1.50	1.68	1.20	1.74		
DS09	4.86	4.83	4.83	4.52	4.80		

N/R = Not recorded

4.8 Obstructions

- 4.8.1 No obstructions were encountered during this ground investigation.

4.9 Contamination

- 4.9.1 No visual or olfactory evidence of contamination was encountered or observed during this ground investigation, in particular no obvious visual or olfactory evidence of mobile contamination was observed during the ground investigation.

5.0 GEOTECHNICAL TESTING AND RESULTS

5.1 In-situ Testing

- 5.1.1 In-situ Standard Penetration Tests (SPTs) were undertaken in accordance with BS1377 (1990) within the window sample boreholes. A summary of the insitu testing is given below in Table 5.1: Insitu Geotechnical Testing.

Table 5.1: Insitu Geotechnical Testing

Strata	SPT N Value vs Depth Range	Locations Encountered
Till (Cohesive)	1.20: N = 4 – 28 2.00: N = 2 – 26 3.00: N = 11 – 23 4.00: N = 17 – 25 5.00: N = 20 – 50+	All Locations
Till (Granular)	3.00: N = 16 – 38 4.00: N = 50+ 5.00: N = 50+	DS02, DS05 & DS10

NR = Not Recorded In This Strata

5.2 Laboratory Testing

- 5.2.1 A programme of geotechnical laboratory testing was undertaken in accordance with BS1377 (1990) 'Methods of tests for soils for civil engineering purposes. The geotechnical testing regime has been summarised below in Table 5.2: Geotechnical Laboratory Analysis.

Table 5.2: Geotechnical Laboratory Analysis

BS 1377 Test Number	Test Description	Quantity Analysed
BS 1377 1990: Part 2. Clause 3.2	Moisture content	6
BS 1377 1990: Part 2. Clause 4.3, 5.3 & 5.4	Atterberg Limits	6
BS 1377 1990: Part 3. Clause 5.3 & BRE CP2/79	BRE SD 1 Suite	4

- 5.2.2 The results of the geotechnical testing are presented in Appendix D.

Plasticity Index

- 5.2.3 Atterberg limit testing was carried out on selected samples of cohesive soils taken from the site to establish the plasticity index of the clay beneath the site. The results of this testing is presented below in Table 5.3: Atterberg Limits Testing Results.

Table 5.3: Atterberg Limits Testing Results

Test	Range
Moisture Content (%)	13 – 24
Liquid Limit (%)	30 – 50
Plastic Limit (%)	15 – 24
Plasticity Index (%)	15 – 26
Modified plasticity index (%)	10 – 24

- 5.2.4 Based on these results the clay beneath the site can be classed as low to high plasticity.
- 5.2.5 Chapter 4.2 'Building near Trees' of the NHBC standards indicates that from the testing results, the modified plasticity index is between 10 and 24% and therefore, the clay beneath the site is of low to medium volume change potential.

BRE SD 1

- 5.2.6 Four soil samples were analysed for BRE SD 1 reduced suite to assess the risk to buried concrete at the site, which includes total sulphate, water soluble sulphate, pH and total sulphur. The results of the testing are summarised below in Table 5.4: Summary of BRE SD 1 Results.

Table 5.4: Summary of BRE SD 1 Results

Test	Soil Test - Results Range
Total sulphate (%)	<0.01 – 0.02
Water soluble sulphate (mg/l)	15 – 69
Total sulphur (%)	<0.01 – 0.02
pH	6.4 – 7.6
Total Potential Sulphate (%)	0.03 – 0.06
Potential amount of Oxidisable Sulphate Present (%)	0.02 – 0.04

- 5.2.7 Design/mix of buried concrete should be undertaken in accordance with the “Aggressive Chemical Environment for Concrete” (ACEC) classification, of BRE Special Digest 1:2005 (Concrete in Aggressive Ground).
- 5.2.8 The above results indicate that pyrite is unlikely to be present within the soils beneath the site.

6.0 GEOTECHNICAL ASSESSMENT

6.1 General

- 6.1.1 It is understood that the proposed development will comprise the construction of four residential properties with associated access driveways, gardens and garages.
- 6.1.2 At this stage GeoCon have not been provided with any loadings for the proposed development.
- 6.1.3 The recommendations given below assume that ground levels intended for the redevelopment will be similar to those existing at present. If ground levels are subject to significant change as part of the proposed development, then the recommendations in this report may require reinterpretation.

6.2 Geotechnical Model

- 6.2.1 Ten dynamic sample boreholes, four with dynamic probe follow-on, were advanced across the site on a basis of targeting proposed structures and as a general coverage assessment of the site as a whole.
- 6.2.2 The ground conditions encountered within the exploratory holes are summarised below in **Error! Reference source not found.**

Table 6.1: Summary of Ground Conditions

Stratum	Depth Range to Base of Stratum (mbgl) (Thickness Range)	Relative Density / Undrained Shear Strength	Notes
Made Ground and Topsoil			
Made Ground	0.50 to 1.30m (0.50 to 1.30m+)	Not recorded.	Made Ground was encountered in all locations comprising sandy gravelly clay with fragments of brick, concrete and sandstone.
Natural Strata			
Till (Cohesive)	2.90 to 5.00m+ (0.30 to 4.50m+)	<u>Strength from Field Description</u> Very Soft to Hard <u>Strength from In-situ Field Testing</u> SPT 'N' values recorded: 1.20: N = 4 – 28 2.00: N = 2 – 26 3.00: N = 11 – 23 4.00: N = 17 – 25 5.00: N = 20 – 50+	Till (cohesive) was encountered in all locations directly beneath the Made Ground and interbedded with the granular deposits of till. Cohesive deposits generally comprised sandy gravelly clay. Moisture Contents – 13 to 24% Plastic Limits – 15 to 24% Liquid Limits – 30 to 50% Plasticity Indices* - 15 to 26% The Atterberg Limit tests indicate that the clay is of low to high plasticity and of low to medium volume change potential. Low SPT values present in DS04 and DS08 are not representative of results of remaining eight boreholes, indicating an range between 13 and 25 elsewhere on site at depth of 2.00mbgl.
Till (Granular)	2.80 to 5.00m+ (1.70m+)	<u>Strength from Field Description</u> Medium dense to very dense <u>Strength from In-situ Field Testing</u> SPT 'N' values recorded: 3.00: N = 16 – 38 4.00: N = 50+ 5.00: N = 50+	Till was encountered in DS01, DS02, DS03, DS05, DS08 and DS10 directly beneath the Made Ground and interbedded with the cohesive deposits of till. Granular deposits generally comprised medium dense to very dense clayey sandy gravel. Dynamic probing encountered refusals at depths ranging between 4.20mbgl (DS05) and between 6.00 and 7.00mbgl on the remaining four tests completed in DS01 – DS04.
* - Corrected for fines content in accordance with NHBC Chapter 4.2.			

- 6.2.3 The liquid and plastic limits of six samples within the clay deposits have been determined. The results of the testing yielded liquid limits of between 30 and 50% in association with plastic limits of between

15% and 24% thus, with respect to the recorded moisture content, a consistency index of between 0.9 and 1.1.

- 6.2.4 These results demonstrate that this cohesive soil may be generally classified as clay of low to high plasticity and on the basis of the consistency index has a stiff to very stiff consistency. In addition, the NHBC classification indicates that the clay revealed at this site possesses a low to medium volume change potential.
- 6.2.5 Super Heavy Dynamic Probing 'N' value refusals (i.e. $N > 50$) were obtained at the base of DS01 to DS05, 4.20mbgl (DS05) and between 6.00 and 7.00mbgl on the remaining four tests completed in DS01 – DS04.
- 6.2.6 Groundwater was not encountered within the exploratory holes advanced across the site.

6.3 Foundations

Shallow Foundations

- 6.3.1 The made ground in its current setting would not be suitable for the construction of shallow foundations due to the risk of unacceptable total and differential settlement occurring. These soils are present in a weak and variable condition such that excessive total and or differential settlement could occur under moderately light surface loading.
- 6.3.2 Where made ground is either not present or present only at shallow depths, it would be possible to adopt strip or spread foundations in the underlying till, which generally consists of sandy gravelly clay. It is considered that this material will provide a suitable bearing stratum, provided that the foundations are placed within a single soil type, and where cohesive generally described as being present in a firm (or higher) insitu condition. It is considered that strip or spread foundations constructed within this material at a minimum depth of say 2.00m could be designed assuming an allowable increase in load given below in **Error! Reference source not found..** However, in the area of DS04 and DS08 soft ground is present at 2.00m making shallow foundations in this area unsuitable and the below table does not include for these ground characteristics within these locations.

Table 6.2: Allowable increase in stress

Foundation Type	Strip Footings (m)			Spread Foundation (m)		
Foundation Width (m)	0.60	1.00	1.50	1.00	2.00	3.00
Foundation Depth (m)	2.00			2.00		
Allowable Increase in Stress (kN/m ²)	120	115	110	180	165	155

- 6.3.3 The allowable increase in stress given above assumes a factor of safety of 3 against general shear failure, with cohesion of 55kN/m² at the foundation depths. Settlements at the above loading intensities should remain within tolerable limits for the type of structure proposed provided that the underlying soils are carefully inspected immediately final trimming has taken place. Should any soft or weak material be encountered they should be locally removed and replaced with lean-mix concrete or compacted granular soil.
- 6.3.4 Once excavated, the formation may be subject to heave, which may result in settlement when the new foundation loads are applied. The designer should ensure that any settlement would remain within serviceable limits for the new and existing structures.
- 6.3.5 It is recommended that foundations are placed in one soil type to avoid any differential settlement. If this is not possible due to the varying depth of cohesive and granular soils, then foundations would need to be locally deepened and placed within the clays or suitably reinforced if spanning across soil types. Foundations would need to be designed by a suitably structural engineer.
- 6.3.6 Foundation depths may need to be increased where they are within influencing distance of trees. Heave precautions may also be required. Advice on these issues is given in NHBC Standards Chapter 4.2.

6.3.7 Where shallow foundations would not be suitable due to the soft cohesive Strata in DS04 and DS08, which is present in near to plot 1 in the south east part of the site, the following options would need to be considered:

- Piled Foundations;
- Raft Foundations;
- Ground Improvement;

6.3.8 Given the proposed structure and the low strength soils beneath the surface in the southeastern corner of the site, it is recommended that a piled foundation solution should be adopted for the construction of the new development at this corner of the site, to transfer the foundation loads through the low strength natural soils to more competent strata at depth. In order to formulate a suitable design, it is recommended that the advice of specialist piling contractors be sought. In addition, the pile design should include provision for negative skin friction within the made ground soils as these deposits may be subject to collapse compression if not treated.

6.3.9 In view of the relatively weak near surface soils, it will be necessary to construct a working platform for the piling rig and any other plant required during the works. Such a design should be undertaken in accordance with the procedures given in the BRE publication: Working platforms for tracked plant.

General Advice

6.3.10 All foundations should be designed by a suitably competent structural engineer in line with current guidance and good practise.

6.3.11 Interactions between new and existing foundations would need to be considered, as would the potential for differential settlement between new and existing structures. A construction joint should be incorporated at the interface between any new and existing structures. Particular care will be required to ensure that the new basement does not adversely impact the existing foundations.

6.4 Floor Slabs

6.4.1 It is recommended that suspended floor slabs are used at this site due to the presence and thickness of Made Ground immediately beneath the site.

6.5 Concrete

6.5.1 A review of the pH and sulphate concentrations indicates that all concrete used in the foundations at this site should be designed to “Design Sulphate Class” DS-1, and the “Aggressive Chemical Environment for Concrete” (ACEC) class AC-2z.

6.6 Groundwater and Excavations

6.6.1 Groundwater is unlikely to represent a particular problem to the construction of the proposed development at this site. However, it should be recognized that slight seepages and minor water entries may combine in any long trench excavations to create a significant volume of water which may cause local problems during the construction phase. Any minor groundwater seepages or significant standing water within excavations made upon this site may be removed by using a simple form of de-watering. Such a system could include the excavation of sumps from which the water could be pumped. Advice on Groundwater Control is given in CIRIA Report No 515 – Groundwater Control Design and Practice.

6.6.2 It is recommended that the borehole installation is grouted up during the construction works to prevent it from acting as a future conduit for potential artesian water.

6.6.3 Foundation excavations should be feasible using conventional plant.

6.6.4 The stability of the excavation faces cannot be guaranteed, thus temporary support to the excavation faces may become necessary. Alternatively, subject to space constraints, excavations could be battered back to a suitable angle of repose. However, if there is a requirement to protect nearby structures or

services, appropriate supports may still be required. Advice on excavation support is given in CIRIA Report No 97 – Trenching Practice.

6.7 Road Pavement

- 6.7.1 Any new pavements will require assessment of the existing sub grade in terms of its California Bearing Ratio (CBR) to facilitate the actual pavement design.
- 6.7.2 It is recommended that CBR testing is carried out at the site along any proposed access roads prior to construction to confirm the CBR design value.

6.8 Sustainable Drainage

- 6.8.1 In accordance with National Planning and Policy Framework (NPPF) the Planning Authority are likely to insist that surface water drainage from any new-build or redevelopment complies with current design practices for Sustainable Urban Drainage (SUD's) construction of separate drainage systems for foul and surface water. Surface water shall be required to be attenuated reducing the discharge of water from the site requiring treatment and disposal. A 20% reduction in surface water discharge rates off the site is to be expected – allowing for the 1 in 100 year storm event and allowing for climate change.
- 6.8.2 Based on the ground conditions encountered it is possible that sustainable drainage would be suitable at the site, however due to the thickness of made ground overlying the natural deposits, it may not be practical or feasible. If sustainable drainage is to be considered, it is recommended that soak-away testing is carried out in accordance with BRE 365 at the site to establish the sites suitability for sustainable drainage.

6.9 Existing structures

- 6.9.1 Any existing structures and foundations if found should be grubbed up and replaced with a suitable engineered granular backfill and should be compacted in layers.

6.10 Material Re-Use

- 6.10.1 Any site won soils / materials may be available for reuse across the site subject to the appropriate classification, analysis and engineered solution.
- 6.10.2 Any natural topsoil or Made Ground topsoil may be suitable for reuse across the site in any proposed landscaped areas subject to appropriate chemical testing.

7.0 CHEMICAL TESTING AND RESULTS

7.1 General

- 7.1.1 All samples were sent to a UKAS accredited chemical testing laboratory, and MCERTS were used where available. The analytical strategy focussed on a general suite of potential contaminants and the analytical suites are summarised in Table 7.1: Summary of Chemical Testing Suite.

Table 7.1: Summary of Chemical Testing Suite

Testing	Comment	No. analysed
General metals suite including: Arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, phenol, selenium, zinc, pH, and water soluble sulphate	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	8
Speciated PAH	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	8
TPH CWG	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	8
Asbestos Screen	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	8

- 7.1.2 All chemical testing results are presented in Appendix E.

7.2 Chemical Results

- 7.2.1 Only detectable concentrations of contaminants reported above the screening criteria are presented overleaf in **Error! Reference source not found..** All other samples recorded contaminant concentrations either below screening criteria or below laboratory detection limits. Where no screening criteria is available these results are discussed in section 8.2 and presented in **Error! Reference source not found..**
- 7.2.2 All chemical results have initially been compared against screening criteria for a residential end use with plant uptake.
- 7.2.3 Total Organic Carbon (TOC) was analysed in all three samples from the site. The results of the TOC recorded values between 0.36 and 2.45%. From this Soil Organic Matter (SOM) has been calculated at values of between 0.62 and 4.22. Therefore, a worst-case scenario of 1% SOM has been used where appropriate in the chemical assessment overleaf.
- 7.2.4 Eight samples were analysed for asbestos screen. No fibres were detected in any of the samples.

Table 7.2: Summary of Soil Chemical Testing Results

Determinand	No. Of samples analysed	Screening value (mg/kg) (where applicable)	Determinand concentration range (mg/kg)		No of Samples exceeding screening value
			Min	Max	
Arsenic	8	37	1.00	15.00	0
Cadmium	8	11	0.50	0.60	0
Copper	8	2400	10.00	29.00	0
Chromium	8	910	15.00	21.00	0
Hexvalent Chromium	8	6	BD	BD	0
Lead	8	210	8.00	63.00	0
Mercury	8	1.2	0.17	0.17	0
Nickel	8	180	11.00	23.00	0
Selenium	8	250	BD	BD	0
Zinc	8	3700	26.00	56.00	0
Acenaphthene	8	210	BD	0.03	0
Acenaphthylene	8	170	BD	0.05	0
Anthracene	8	2400	BD	0.13	0
Benzo(a)anthracene	8	7.2	0.04	0.28	0
Benzo(a)pyrene	8	2.2	0.04	0.24	0
Benzo(b)fluoranthene	8	2.6	0.05	0.25	0
Benzo(ghi)perylene	8	320	0.05	0.09	0
Benzo(k)fluoranthene	8	77	0.07	0.19	0
Chrysene	8	15	0.06	0.35	0
Dibenzo(ah)anthracene	8	0.24	0.04	0.04	0
Fluoranthene	8	280	0.08	0.82	0
Fluorene	8	170	BD	0.05	0
Indeno(123-cd)pyrene	8	27	BD	0.10	0
Naphthalene	8	2.3	BD	0.03	0
Phenanthrene	8	95	BD	0.75	0
Pyrene	8	620	0.07	0.63	0
Total TPH	8	1100	BD	8.00	0

BD = Below Detection

NGV = No Guideline Screening Value Available

8.0 GENERIC QUANTITATIVE RISK ASSESSMENT

8.1 Criteria for Interpretation

- 8.1.1 The regime for contaminated land was set out in Part IIA of the Environmental Protection Act (EPA) 1990, as inserted by S.57 of The Environment Act 1995 and came into effect in England on 1st April 2000 as The Contaminated Land (England) Regulations 2000 (SI 2000/227). These regulations were subsequently updated with the provision of The Contaminated Land (England) Regulations 2006 (SI 2006/1380), which consolidated the previous regulations and amendments and added in provisions regarding radioactive contaminated land. These regulations came into force on 4th August 2006. This modified the wording for “Contaminated Land” under Part IIA of the EPA. Section 78A (2) defines contaminated land as “land which appears to be in such a condition, by reason of substances in, on or under the land, that:

- significant harm is being caused, or there is a significant possibility of significant harm being caused (SPOSH).

8.2 Human Health Receptors

- 8.2.1 An initial Generic Quantitative Risk Assessment (GQRA) for human health has been undertaken by comparison of the soil analytical results with published guidance criteria. These can be classified as Generic Assessment Criteria (GAC) and are widely referred to by consultants, Regulatory Authorities and other professionals within the industry and include the following:

- Current published Soil Guideline Values (SGVs) published by the Environmental Agency (EA).
- Land Quality Management (LQM) have published a series of GACs via the CLEA v1.04 software which are applicable to the UK for common Determinands. The GAC’s can be applied to a wide range of land contamination problems, which can be used as initial screening criteria in order to assess potentially contaminated land.
- Contaminated Land: Applications in Real Environments (CL:aire) ‘The Soil Generic Assessment Criteria for Human Health Risk Assessment’ GAC’s via the CLEA v1.06 software (updated version of the v1.04 update after the release of LQM GAC’s).
- Defra C4SL’s: Development of Category 4 Screening Levels for assessment of land affected by contamination.

- 8.2.2 It should be noted that the above guidance criteria are generally restricted with depth i.e., the values quoted with reference to human health are generally only applicable in the top 1.00m of soil and do not (dependant on the conceptual site model and conditions identified on site) necessarily identify significant harm.

8.3 Risk to Human Health

- 8.3.1 All chemical determinands recorded levels below the relevant screening criteria (where available) for a residential end use.
- 8.3.2 Based on the above, contamination does not appear to be present beneath parts of the site within the made ground or shallow natural soils.
- 8.3.3 It is understood that the proposed development comprises the construction of four residential properties with associated access driveways, gardens and garages.
- 8.3.4 Therefore, a pollutant linkage is considered to be present in the garden areas, whilst the driveways, houses and garages will block the pollutant linkage. Therefore a **low** risk to human end users is considered to be present at this stage.
- 8.3.5 Risks to construction workers are considered to be **low**. All construction workers should wear appropriate Personal Protective Equipment (PPE) including latex gloves and dust masks. Provisions should be made for water on site to ‘damp down’ any dust in dry conditions.

- 8.3.6 Should any erroneous materials or previously unidentified contamination be encountered during construction then further sampling and analysis may be required.
- 8.3.7 The above recommendations should be agreed in principle with the LPA prior to development to avoid any delays or complications at a later stage.

8.4 Risk to Controlled Waters

- 8.4.1 The Environmental Agency aquifer classification scheme indicates that the superficial aquifer designation for the site is classed as Secondary Aquifer – A, and the bedrock aquifer designation for the site is classed as Secondary Aquifer – Undifferentiated.
- 8.4.2 There is one licenced groundwater abstraction points within 1000m of the site, which is located 180m to the south of the site for commercial usage.
- 8.4.3 There are no public drinking water abstractions within 1000m of the site.
- 8.4.4 The site is not located within a Source Protection Zones (SPZ).
- 8.4.5 Therefore, based on the above information, the results of the soil testing, the generally impermeable geology beneath the site, and considering that natural attenuation, dilution and dispersion will take place, the risks to groundwater and drinking waters are considered to be **very low** at this stage.

Surface Water

- 8.4.6 The nearest surface watercourse to the site is an unknown feature approximately 20m to the south, however this was not observed on the Delta-Simons walkover. The next nearest feature is a reservoir retained by a dam, 80m to the southwest.
- 8.4.7 Therefore, based on the above information, the results of the soil testing, the distance of the surface water receptor to the site, and considering that natural attenuation, dilution and dispersion will take place, the risks to surface waters are considered to be **very low** at this stage.

8.5 Ground Gas Risk Assessment

General

- 8.5.1 Gas monitoring has been carried out at the above site on six occasions over a three month period to assess the risks to the proposed commercial development from potential hazardous ground gasses.
- 8.5.2 Ground gas monitoring standpipes have been installed at a depth of 5.00mbgl with response zones placed within the made ground and natural deposits (where the made ground was less than 3.00m thick) beneath the site.
- 8.5.3 It is considered that hazardous ground gasses if present would migrate vertically upwards through the permeable sands beneath the site into the proposed development.

Results

- 8.5.4 The monitoring period has been carried between 4th August 2023 and 2nd October 2017.
- 8.5.5 The following ground gas risk assessment was carried out in accordance with CIRIA 665, CIRIA 149 and BS 8485.
- 8.5.6 The full results of the gas monitoring regime are presented Appendix F and are summarised below.
- 8.5.7 Where possible, monitoring has been carried out under a minimum of two occasions where low and falling atmospheric pressure were present together.

- 8.5.8 Methane concentrations were recorded at 0.0% v/v; Carbon dioxide concentrations ranged between 0.0 and 8.3% v/v; oxygen concentrations ranged between 5.3 and 20.7% v/v, and flows were recorded between 0 and 97l/hr during the monitoring period.
- 8.5.9 In the case of any negative flows, it should be assumed that any negative flows can become positive and therefore the any negative GSV's should be taken as positive.
- 8.5.10 Hydrogen sulphide concentrations were recorded at 0.0 ppm.
- 8.5.11 Carbon monoxide concentrations were recorded at 0.0 ppm.
- 8.5.12 Based on these recorded values a maximum Gas Screening Values (GSVs) for methane were calculated at 0.0000l/hr; and a maximum GSV for carbon dioxide were calculated at 0.9065l/hr.

Conclusions and Recommendations

- 8.5.13 Based on the above information to date and considering the elevated CO₂ and variable peak flows and steady flows, (>5.00% DS08, peak flow of 97lt/hr in DS06), this site has been categorised as falling under Characteristic Situation (CS) 3 – Moderate risk.
- 8.5.14 BS 8485 2015 recommends a point system for protection measures. The proposed development would class as building type A, and therefore this development would require a total of 4.5 points. BS 8485:2015 provides details of the different options that can be used in order to make up the required points which include a combination of a structural barrier, ventilation measures and gas resistant membrane.
- 8.5.15 Professional advice should be sought from a suitably qualified structural engineer as to the appropriateness of any gas protection scheme to the intended construction. All gas protection measures should be designed by a competent person and they should refer to BS 8485 and BRE 414.
- 8.5.16 The site would be classed as Amber 1 under the NHBC traffic light system which would mean that low level ground gas protection measures required, using a membrane and ventilated subfloor void that creates a permeability contrast to limit the ingress of gas into buildings. further gas monitoring and more detailed risk assessment is required, and possible remediation / removal of the gas source.
- 8.5.17 Following the installation of any gas resistant membranes the local authority may require verification to prove the membrane has been installed correctly.
- 8.5.18 With regards carbon monoxide: Information provided by the World Health Organisation (WHO) provides air quality guidelines for Europe 2000, which provides time weighted average exposures that have been determined in such a way that the carboxyhaemoglobin (COHb) level of 2.5% is not exceeded. These are as follows:
- 87ppm for 15 minutes
 - 52ppm for 30 minutes
 - 26ppm for one hour
 - 9ppm for eight hours
- 8.5.19 In addition, recommended WHO European guidelines for indoor air quality is as follow:
- 6ppm for twenty four hours so as not to exceed 2% COHb for chronic exposure.
- 8.5.20 Based on the above, the risks from carbon monoxide are considered to be **very low**.
- 8.5.21 Therefore, based on the above results, no protection is considered necessary against carbon monoxide.
- 8.5.22 With regards hydrogen sulphide: Information taken directly from the HSE (Health & Safety Executive) Online provides the following:

- 0.0047 ppm is the recognition threshold of human smell, the concentration at which 50% of humans can detect the characteristic odour of hydrogen sulphide.
- 10-20 ppm is the borderline concentration for eye irritation.
- 50-100 ppm leads to eye damage.
- At 150-250 ppm the olfactory nerve is paralyzed after a few inhalations, and the sense of smell disappears, often together with awareness of danger.
- 320-530 ppm leads to pulmonary edema with the possibility of death.
- 530-1000 ppm causes strong stimulation of the central nervous system and rapid breathing, leading to loss of breathing.
- Concentrations over 1000 ppm cause immediate collapse with loss of breathing, even after inhalation of a single breath.

8.5.23 Based on the above, the risks from hydrogen sulphide are considered to be **very low**.

8.5.24 Therefore, based on the above results, no protection is considered necessary against hydrogen sulphide.

8.5.25 It is recommended that the above conclusions should be agreed with the LPA to gain their approval prior to commencing with the construction of the new development.

8.6 Plants and Native Grasses

8.6.1 Any plants that may be grown at the site in areas of landscaping may potentially be at risk from phytotoxic elements in any artificial soils beneath the site. Guideline screening values are currently available for copper, nickel and zinc which are considered to be the most harmful to plant life.

8.6.2 All three chemical Determinands recorded levels below the relevant phytotoxic screening criteria. In addition, all plant growth appeared normal during the site walkover. Given the above and the generally low potential for contamination and the results of the wider soil analysis, the risks to plants and native grasses are considered to be very low.

8.7 Buried Services and Utilities

8.7.1 Any organic contamination present in the soils or groundwater beneath the site would pose a risk of premature failure to below ground services via chemical reaction. Based on the chemical analysis carried out during this ground investigation, the risks to buried services and pipelines are considered to be **low**.

8.7.2 It is the responsibility of the utility providers to confirm the risk status and determine what materials should be used in the provision of any newly proposed buried services and utilities based on the results of the chemical analysis with this report. A copy of this report should therefore be provided to the utility contractors.

8.7.3 It is recommended that prior to the placement of any newly proposed buried services, that adequate testing of the soils of which the pipes / cables will be laid in is carried out to determine the suitability of those soils for the utility provider's equipment.

8.8 Updated Conceptual Site Model

8.8.1 Following the results of the site investigation and above assessment, an updated CSM has been produced overleaf as Table 8.3: Updated Conceptual Site Model.

Table 8.1: Updated Conceptual Site Model

Potential Sources	Contaminants of Concern	Potential Pathway	Potential Receptor	Potential Pollutant Linkage	Probability	Consequence	Risk Classification	Action / Mitigation / Justification
Made Ground both on site and within influencing distance of the site Current and former land uses both on site and within influencing distance of the site	Heavy metals, sulphates and inorganics PAH's Asbestos	Ingestion Inhalation Dermal Contact	Human health Including current site users, future site users	Considered potentially active	Low Likelihood	Mild	Low	Results of the site investigation confirm that all determinands analysed recorded levels below the relevant screening criteria for a residential end use. No further action.
			Human health Construction workers	Considered potentially active	Low likelihood	Mild	Low	Construction personnel to adhere to standard PPE guidelines and hygienic site practices to control risk. Results of the site investigation confirm that all determinands analysed recorded levels below the relevant screening criteria for a residential end use. No further action.
			Human health Neighbouring residents	Considered potentially active	Unlikely	Minor	Very low	Results of the site investigation confirm that all determinands analysed recorded levels below the relevant screening criteria for a residential end use. No further action.
Made Ground on site Current and former land uses on site	Heavy metals, sulphates and inorganics Leachable contamination	Lateral and vertical migration and leaching of contaminants into local groundwater	Underlying Aquifer (Potable water)	Considered potentially active	Unlikely	Minor	Very low	Areas of the site will be completely covered by hardstanding which will reduce the volumes of rainwater percolating through the underlying soils and thus to a receptor, which will remove the receptor and thus break the 'pollutant linkage'. No further action required.

Potential Sources	Contaminants of Concern	Potential Pathway	Potential Receptor	Potential Pollutant Linkage	Probability	Consequence	Risk Classification	Action / Mitigation / Justification
Made Ground on site Current and former land uses on site	Heavy metals, sulphates and inorganics Leachable contamination	Lateral and vertical migration and leaching of contaminants into surface water bodies via permeable strata and features.	Local water courses and associated flora and fauna	Considered potentially active	Unlikely	Minor	Very low	Areas of the site will be completely covered by hardstanding which will reduce the volumes of rainwater percolating through the underlying soils and thus reaching a receptor, which will remove the receptor and thus break the 'pollutant linkage'. No further action required.
Landfill sites Potentially infilled Land (ponds, quarries, reservoirs etc) Made Ground Natural organic soils Coal mining Fuel Stations (on and off-site sources)	Hazardous ground gases including CO ₂ , CH ₄ , CO, H ₂ S Vapours	Inhalation Explosion	Human health Including current site users, future site users, neighbouring residents and constructions workers	Considered potentially active	Likely	Medium	Moderate	The results of the gas monitoring classify the site as CS-3, therefore special precaution measures are required in accordance with BS 8485. The results of the gas monitoring classify the site as CS-3, therefore special precaution measures are required in accordance with BS 8485.
		Explosion	Buildings	Considered potentially active	Likely	Medium	Moderate	
Made Ground beneath the site Current and former site uses	Phytotoxic elements	Plant uptake	Plants and vegetation	Considered inactive	Unlikely	Minor	Very low	Results of the site investigation confirm that all determinands analysed recorded levels below the relevant phytotoxic screening levels. No further action required.

9.0 OTHER POTENTIAL DEVELOPMENT CONSIDERATIONS

9.1 Waste Soils Characterisation

- 9.1.1 Any excavation works may potentially produce waste soils for which appropriate waste management will be required. Any soils requiring removal and disposal from site would require appropriate classification testing prior to disposal and the results would need to be confirmed with the landfill operator. Isolated hotspots if encountered may need to be taken off as Non-Hazardous or Hazardous waste. Any off-site disposal of soil requires careful management and due consideration of appropriate legislation, guidance and Duty of Care responsibilities.
- 9.1.2 A Hazardous Waste Assessment should be carried out on any materials requiring removal and disposal from site. Waste Acceptance Criteria (WAC) testing may also be required, and the results of the Hazardous Waste Assessment and WAC testing (if appropriate) should be presented to the landfill operator for their confirmation of waste category.

9.2 Imported Fill

- 9.2.1 Any imported fill will be subject to specific quality requirements, particularly in any proposed areas of landscaping. Allowance should be made for the testing of imported fill materials prior to emplacement to ensure suitability should the materials be delivered with no testing certification.

9.3 Construction Activities

- 9.3.1 Due consideration should be given to the suppression of noise, dust and vibration emissions from the site during construction.

9.4 Previously Unidentified Contamination

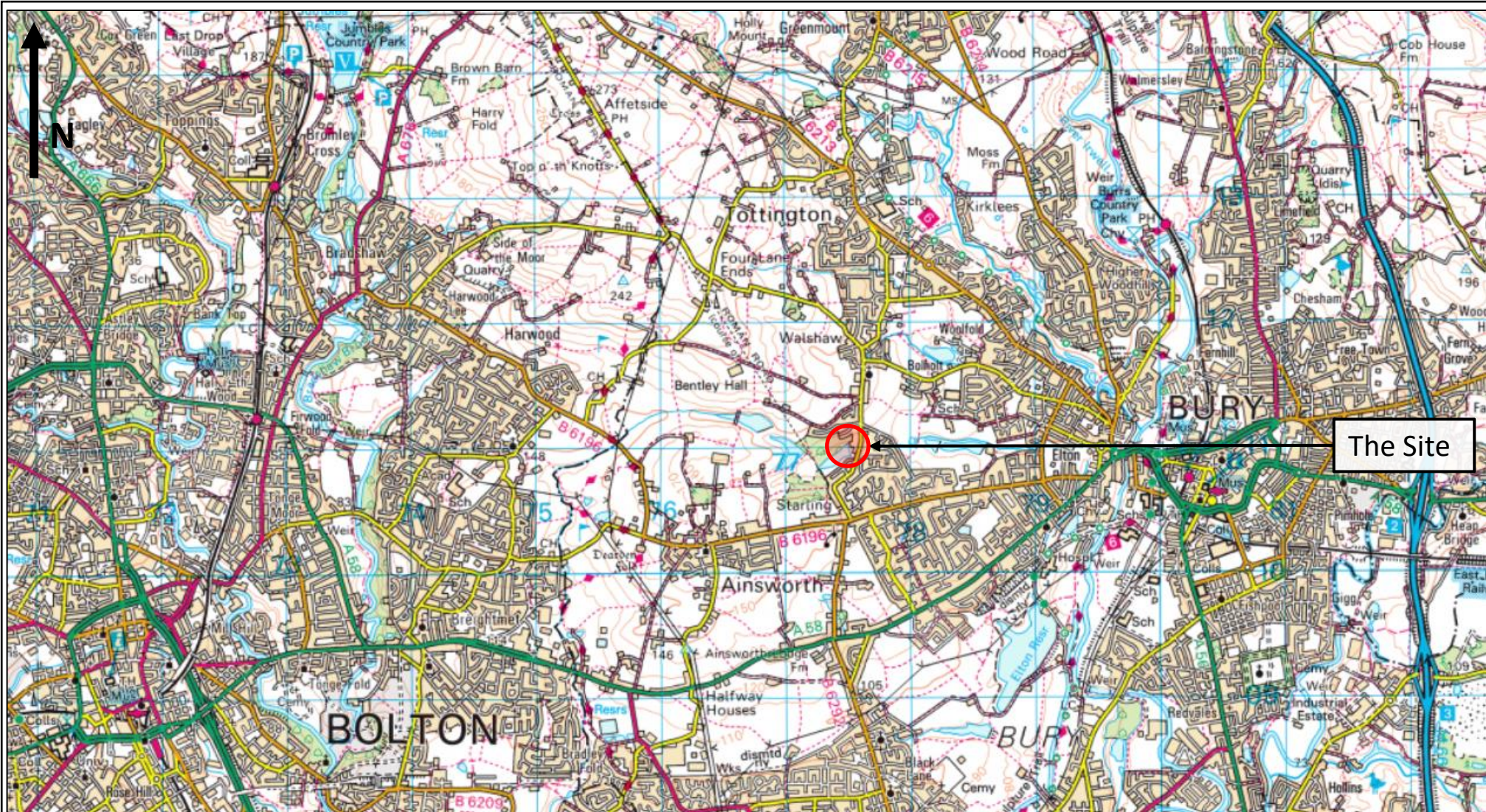
- 9.4.1 If, during the course of the groundworks phase of the construction, previously unidentified contamination is encountered or suspected to have been encountered, samples of the potentially contaminated material should be tested and if appropriate a Remediation Strategy provided to advise on how to remediate this material.
- 9.4.2 The LPA should be informed that potentially contaminated material has been encountered and should be kept informed at all times with respect to work relating to previously unidentified contamination.

10.0 REFERENCES

- AGS: *A clients guides and tool kit*
- British Geological Survey (BGS): *1:50'000 geological maps of the area*
- British Geological Survey (BGS): *Open geoscience online mapping tool*
- BS 5930: *code of Practise for Site Investigation Amendment 2*
- BS 10175: *Code of Practise for the Investigation of Potentially Contaminated Sites*
- BRE 211 Radon: *Guidance on protective measures for new buildings*
- CIRIA 552: *Contaminated Land Risk Assessment; A Guide to Good Practise 2001*
- CIRIA 665: *Assessing the Risks Posed by Hazardous Ground Gases for Buildings 2007*
- Coal Authority: *Coal authority mining report and Cheshire brine subsidence report*
- *Contaminated Land: Applications in Real Environments (CL:AIRE): 'The Soil Generic Assessment Criteria for Human Health Risk Assessment' GAC's.*
- David Norbury: *Soil and Rock Descriptions in Engineering Practise*
- Department of the Environment: *DOE industry profiles*
- EN ISO 14688-1: *Geotechnical investigation and testing -- Identification and classification of soil -- Part 1: Identification and description*
- EN ISO 14688-2: *Geotechnical investigation and testing -- Identification and classification of soil -- Part 2: Principles for a classification*
- EN ISO 14689: *Geotechnical investigation and testing -- Identification and classification of rock -- Part 1: Identification and description*
- Environment Agency (EA): *EA Online & What's in my back yard*
- Environment Agency (EA): *Soil Guideline Values (SGVs)*
- Land Quality Management (LQM): *Generic Screening Criteria (GACs)*
- Landmark: *Envirocheck report and Envirocheck analysis online historical mapping tool.*
- Ordnance survey: *OS Landranger map for the area; OS open data online mapping tool*
- Planning Policy 23: *Planning and Pollution Control, Office of The Deputy Prime Minister 2004*
- R&D Publication CLR 8: *Assessment of risks to human health from land contamination.*
- R&D Publication CLR 10: *The Contaminated Land Exposure Model (CLEA)*
- R&D Publication CLR 11: *Model Procedure for the Management of Contaminated Land DEFRA 2004*
- UK Specification for Ground Investigation Second Edition 2012

APPENDIX A

DRAWINGS



GeoCon Site Investigations Ltd
Suite 2 Marple House,
39 Stockport Road,
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SK6 6BD.
Tel: 0844 504 3901, Fax: 0844 504 3902,
Email: info@geoconsiteinvestigations.com
Web: www.geoconsiteinvestigations.com

PROJECT ID

GSI 1923 Land On Lowercroft, Bury

TITLE

Site Location Plan

DRAWING NUMBER

GSI 1923/01

DATE

October 2023

SCALE

N.T.S

DRAWN BY

LR



GeoCon Site Investigations Ltd
 Suite 2 Marple House,
 39 Stockport Road,
 Marple,
 Stockport,
 SK6 6BD.
 Tel: 0844 504 3901, Fax: 0844 504 3902,
 Email: info@geoconsiteinvestigations.com
 Web: www.geoconsiteinvestigations.com

PROJECT ID
 GSI 1923 Land Off Lowercroft Road, Bury

TITLE
 Exploratory Hole Location Plan

DRAWING NUMBER
 GSI 1923/02

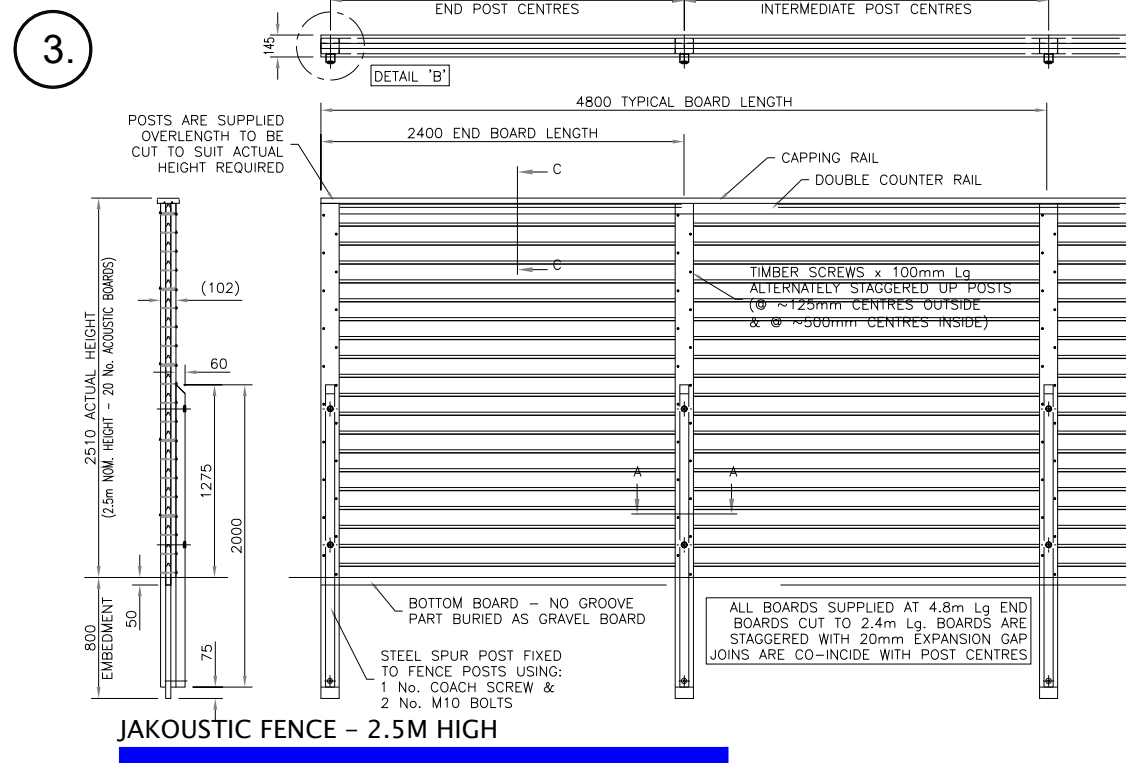
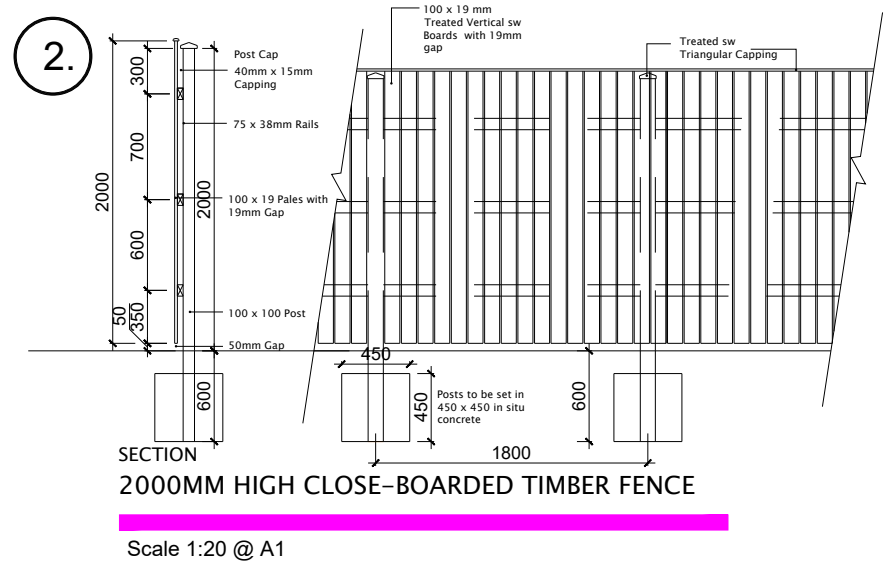
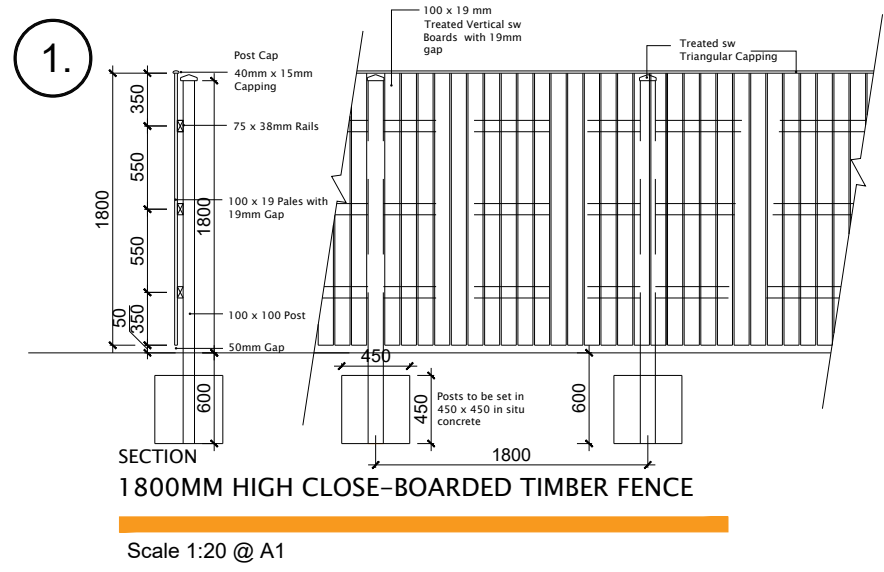
DATE
 October 2023

SCALE
 N.T.S

DRAWN BY
 LR



Boundary Treatments : Scale @1:50 A1



DO NOT SCALE
NO DIMENSIONS TO BE SCALED FROM THIS DRAWING.
ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF WORKS AND ANY DISCREPANCIES REPORTED TO THE ARCHITECT / ENGINEER / CONTRACTOR
ALL INFORMATION ON THIS DRAWING IS SUBJECT TO A FULL AND COMPREHENSIVE TOPOGRAPHICAL SURVEY AND CONFIRMATION OF RELEVANT TITLE.

ADDITIONAL NOTES
ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE BUILDING REGULATIONS AND THE REQUIREMENTS OF THE LOCAL AUTHORITY.

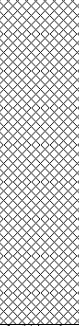
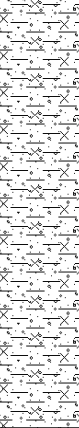
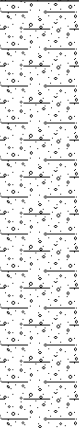
4	Added public sewer	A.H	H.K	06/07/23
3	amendments to site layout & landscaping	A.H	H.K	05/07/23
2	Further amendments to plot 1	A.H	H.K	03/07/23
1	Plot 1 size reduced, added boundary dims	A.H	H.K	26/06/23
REV	DESCRIPTION	DRWNCHKD	DATE	



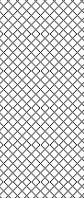
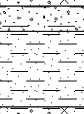
PROJECT	Land At Lowercroft
TITLE	Site Plan
SCALE	1:200 @ A1
DATE	26/06/23
DRAWING NO.	HJK-LC-SP
REVISION	4
DRAWN BY	CHECKED BY
PURPOSE OF ISSUE	☐ PLANNING ☐ BUILDING REGS ☐ TENDER ☐ APPROVAL ☐ COMMENT ☐ CONSTRUCTION
BELMONT HOUSE 2 DALTON COURT COMMERCIAL ROAD DARWIN BB3 0DG	

APPENDIX B

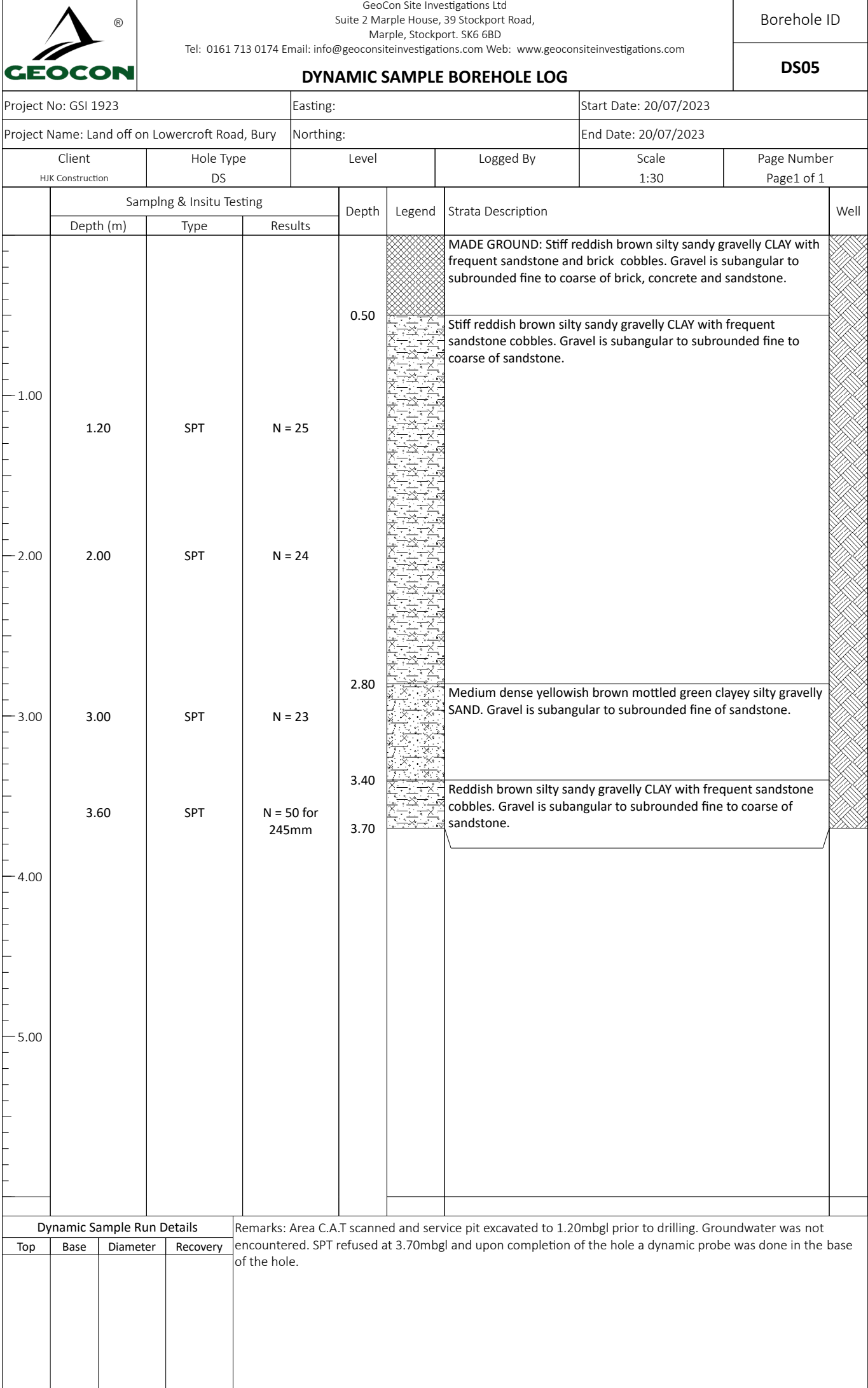
DYNAMIC SAMPLE BOREHOLE
LOGS

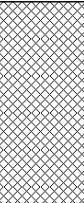
		GeoCon Site Investigations Ltd Suite 2 Marple House, 39 Stockport Road, Marple, Stockport. SK6 6BD Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com					Borehole ID	
		DYNAMIC SAMPLE BOREHOLE LOG					DS01	
Project No: GSI 1923			Easting:			Start Date: 20/07/2023		
Project Name: Land off on Lowercroft Road, Bury			Northing:			End Date: 20/07/2023		
Client HJK Construction		Hole Type DS		Level		Logged By		Scale 1:30
								Page Number Page1 of 1
	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well	
	Depth (m)	Type	Results					
1.00	1.20	SPT	N = 14	1.30		MADE GROUND: Firm reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.		
2.00	2.00	SPT	N = 13					Firm reddish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.
3.00	3.00	SPT	N = 34	3.00		Dense yellowish brown clayey very sandy subangular to subrounded fine to coarse GRAVEL of sandstone.		
4.00	4.00	SPT	N = 50 for 255mm	4.70				
5.00								
Dynamic Sample Run Details				Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was not encountered. SPT refused at 4.70mbgl and upon completion of the hole a dynamic probe was done to				
Top	Base	Diameter	Recovery					

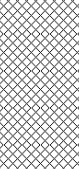
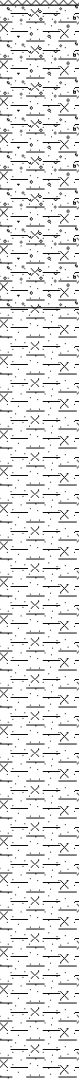
		GeoCon Site Investigations Ltd Suite 2 Marple House, 39 Stockport Road, Marple, Stockport. SK6 6BD Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com				Borehole ID	
		DYNAMIC SAMPLE BOREHOLE LOG				DS02	
Project No: GSI 1923			Easting:			Start Date: 20/07/2023	
Project Name: Land off on Lowercroft Road, Bury			Northing:			End Date: 20/07/2023	
Client HJK Construction		Hole Type DS		Level		Logged By Scale 1:30 Page Number Page 1 of 1	
	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well
	Depth (m)	Type	Results				
1.00 2.00 3.00 4.00 5.00	1.20	SPT	N = 23	0.90	MADE GROUND: Firm reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.		
					Stiff reddish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.		
	2.00	SPT	N = 14	2.90	Medium dense yellowish brown clayey very sandy subangular to subrounded fine to coarse GRAVEL of sandstone.		
	4.00	SPT	N = 13	3.80	Firm reddish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.		
				4.20	Yellowish brown clayey very sandy subangular to subrounded fine to coarse GRAVEL of sandstone.		
	5.00	SPT	N = 51 for 255mm	5.00			
Dynamic Sample Run Details				Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was not encountered. Hole terminated at target depth then a dynamic probe was done at the base of the hole.			
Top	Base	Diameter	Recovery				

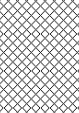
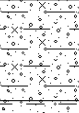
		GeoCon Site Investigations Ltd Suite 2 Marple House, 39 Stockport Road, Marple, Stockport. SK6 6BD Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com					Borehole ID	
		DYNAMIC SAMPLE BOREHOLE LOG					DS03	
Project No: GSI 1923			Easting:			Start Date: 20/07/2023		
Project Name: Land off on Lowercroft Road, Bury			Northing:			End Date: 20/07/2023		
Client HJK Construction		Hole Type DS		Level		Logged By		Scale 1:30
								Page Number Page1 of 1
	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well	
	Depth (m)	Type	Results					
1.00 2.00 3.00 4.00 5.00	1.20	SPT	N = 4	0.80		MADE GROUND: Firm Reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.		
	2.00	SPT	N = 22	2.60 2.70		Soft reddish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.		
	3.00	SPT	N = 17	3.00		Yellowish brown slightly clayey slightly gravelly SAND. Gravel is subangular to subrounded fine to coarse of sandstone. Very dense yellowish brown sandy CLAY.		
	4.00	SPT	N = 25			Stiff reddish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.		
	5.00	SPT	N = 21	5.00				
Dynamic Sample Run Details				Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was npt encountered . Hole terminated at target depth then a dynamic probe was done at the base of the hole.				
Top	Base	Diameter	Recovery					

		GeoCon Site Investigations Ltd Suite 2 Marple House, 39 Stockport Road, Marple, Stockport. SK6 6BD Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com					Borehole ID	
		DYNAMIC SAMPLE BOREHOLE LOG					DS04	
Project No: GSI 1923			Easting:			Start Date: 20/07/2023		
Project Name: Land off on Lowercroft Road, Bury			Northing:			End Date: 20/07/2023		
Client HJK Construction		Hole Type DS		Level		Logged By		Scale 1:30
								Page Number Page1 of 1
	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well	
	Depth (m)	Type	Results					
1.00 2.00 3.00 4.00 5.00	1.20	SPT	N = 8	0.80	MADE GROUND: Firm reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.			
					Soft reddish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.			
	2.00	SPT	N = 2	2.00	Very soft dark grey silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.			
				2.30	Very soft yellowish brown slightly silty sandy CLAY.			
	3.00	SPT	N = 19	2.90	Firm dark grey silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.			
					Firm yellowish brown slightly silty sandy CLAY.			
	4.00	SPT	N = 17					
	5.00	SPT	N = 20	5.00				
Dynamic Sample Run Details				Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was encountered at 3.20mbgl. Hole terminated at target depth then a dynamic probe was done at the base of the hole.				
Top	Base	Diameter	Recovery					



		GeoCon Site Investigations Ltd Suite 2 Marple House, 39 Stockport Road, Marple, Stockport. SK6 6BD Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com					Borehole ID	
		DYNAMIC SAMPLE BOREHOLE LOG					DS06	
Project No: GSI 1923			Easting:			Start Date: 21/07/2023		
Project Name: Land off on Lowercroft Road, Bury			Northing:			End Date: 21/07/2023		
Client HJK Construction		Hole Type DS		Level		Logged By		Scale 1:30
								Page Number Page1 of 1
	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well	
	Depth (m)	Type	Results					
1.00 2.00 3.00 4.00 5.00	1.20	SPT	N = 15	0.80		MADE GROUND: Firm reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.		
	2.00	SPT	N = 16					
	3.00	SPT	N = 20					
	4.00	SPT	N = 22					
	5.00	SPT	N = 27	5.00				
Dynamic Sample Run Details			Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was not encountered. Hole terminated at target depth and installed with gas and groundwater monitoring well.					
Top	Base	Diameter	Recovery					

		GeoCon Site Investigations Ltd Suite 2 Marple House, 39 Stockport Road, Marple, Stockport. SK6 6BD Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com					Borehole ID	
		DYNAMIC SAMPLE BOREHOLE LOG					DS07	
Project No: GSI 1923			Easting:			Start Date: 21/07/2023		
Project Name: Land off on Lowercroft Road, Bury			Northing:			End Date: 21/07/2023		
Client HJK Construction		Hole Type DS		Level		Logged By		Scale 1:30
								Page Number Page1 of 1
	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well	
	Depth (m)	Type	Results					
1.00	1.20	SPT	N = 23	0.70		MADE GROUND: Reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.		
						Orangish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.		
	2.00	SPT	N = 26	1.90		Reddish brown silty sandy CLAY		
	3.00	SPT	N = 11					
	4.00	SPT	N = 19					
5.00	SPT	N = 50 for 155mm	5.00					
Dynamic Sample Run Details				Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was not encountered. Hole terminated at target depth and installed with gas and groundwater monitoring well.				
Top	Base	Diameter	Recovery					

		GeoCon Site Investigations Ltd Suite 2 Marple House, 39 Stockport Road, Marple, Stockport. SK6 6BD Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com				Borehole ID		
		DYNAMIC SAMPLE BOREHOLE LOG				DS08		
Project No: GSI 1923			Easting:			Start Date: 21/07/2023		
Project Name: Land off on Lowercroft Road, Bury			Northing:			End Date: 21/07/2023		
Client HJK Construction		Hole Type DS		Level		Logged By Scale 1:30 Page Number Page1 of 1		
	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well	
	Depth (m)	Type	Results					
1.00	1.20	SPT	N = 6	0.50		MADE GROUND: Reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.		
						0.90		Grey mottled green sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone.
						1.50		Black mottled grey and green sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone.
						2.30		Reddish brown mottled grey and green silty sandy CLAY.
						3.70		Red mottled brown very sandy CLAY.
2.00	2.00	SPT	N = 8					
3.00	3.00	SPT	N = 23					
4.00	4.00	SPT	N = 17					
5.00	5.00	SPT	N = 20	5.00			?	
Dynamic Sample Run Details				Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was not encountered. Hole terminated at target depth and installed with gas and groundwater monitoring well.				
Top	Base	Diameter	Recovery					



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Borehole ID

DS09

DYNAMIC SAMPLE BOREHOLE LOG

Project No: GSI 1923

Easting:

Start Date: 21/07/2023

Project Name: Land off on Lowercroft Road, Bury

Northing:

End Date: 21/07/2023

Client
HJK Construction

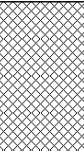
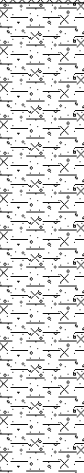
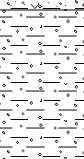
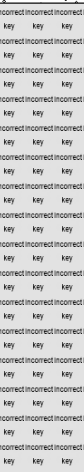
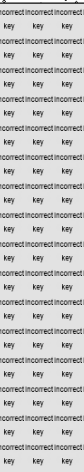
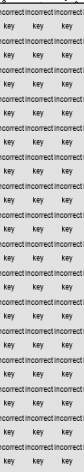
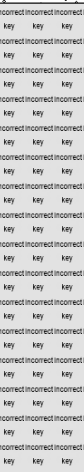
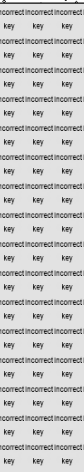
Hole Type
DS

Level

Logged By

Scale
1:30

Page Number
Page1 of 1

	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well
	Depth (m)	Type	Results				
1.00	1.20	SPT	N = 28	0.60		MADE GROUND: Reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.	
						Reddish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.	
2.00	2.00	SPT	N = 17	2.50		Reddish brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone.	
						No Recovery.	
4.00	4.00	SPT	N = 11	3.10		No Recovery.	
						No Recovery.	
5.00	5.00	SPT	N = 32	5.00		No Recovery.	
						No Recovery.	

Dynamic Sample Run Details

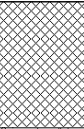
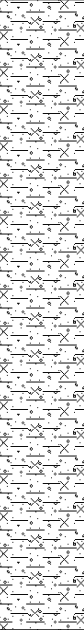
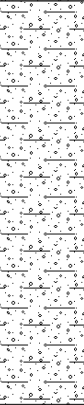
Top

Base

Diameter

Recovery

Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was not encountered. Hole terminated at target depth and installed with gas and groundwater monitoring well.

		GeoCon Site Investigations Ltd Suite 2 Marple House, 39 Stockport Road, Marple, Stockport. SK6 6BD Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com					Borehole ID	
		DYNAMIC SAMPLE BOREHOLE LOG					DS10	
Project No: GSI 1923			Easting:			Start Date: 21/07/2023		
Project Name: Land off on Lowercroft Road, Bury			Northing:			End Date: 21/07/2023		
Client HJK Construction		Hole Type DS		Level		Logged By		Scale 1:30
								Page Number Page1 of 1
	Sampling & Insitu Testing			Depth	Legend	Strata Description	Well	
	Depth (m)	Type	Results					
1.00 2.00 3.00 4.00 5.00	1.20	SPT	N = 22	0.50	 MADE GROUND: Reddish brown silty sandy gravelly CLAY with frequent sandstone and brick cobbles. Gravel is subangular to subrounded fine to coarse of brick, concrete and sandstone.	 Reddish brown silty sandy gravelly CLAY with frequent sandstone cobbles. Gravel is subangular to subrounded fine to coarse of sandstone.		
	2.00	SPT	N = 17					
	3.00	SPT	N = 38	3.00	 Yellowish brown clayey very sandy subangular to subrounded fine to coarse GRAVEL of sandstone.			
	4.00	SPT	N = 50 for 245mm	4.60				
Dynamic Sample Run Details				Remarks: Area C.A.T scanned and service pit excavated to 1.20mbgl prior to drilling. Groundwater was not encountered. Hole terminated at target depth.				
Top	Base	Diameter	Recovery					

APPENDIX C
DYNAMIC PROBE LOGS



DYNAMIC PROBE HOLE LOG

Project No: GSI 1923		Easting:		Start Date: 20/07/2023	
Project Name: Land off on Lowercroft Road, Bury		Northing:		End Date: 20/07/2023	
Client HJK Construction	Hole Type DP	Level	Logged By	Scale 1:50	Page Number Page 1 of 1

Depth	Strata Description	Reduced Level	0	10	20	30	40	50	60
1.00									
2.00									
3.00									
4.00									
5.00									
6.00									
7.00									
8.00									
9.00									

Dynamic Probe Details					
Probe Type	Hammer Mass	Standard Drop	Groundwater Level	Termination Reason	Remarks
DPSH-B	63.50	750			

Remarks: Carried out in the Base of DS01. Refused at 5.90mbgl.



GeoCon Site Investigations Ltd
Suite 2 Marple House, 39 Stockport Road,
Marple, Stockport. SK6 6BD
Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com

Borehole ID

DP02

DYNAMIC PROBE HOLE LOG

Project No: GSI 1923

Easting:

Start Date: 20/07/2023

Project Name: Land off on Lowercroft Road, Bury

Nothing:

End Date: 20/07/2023

Client
HJK Construction

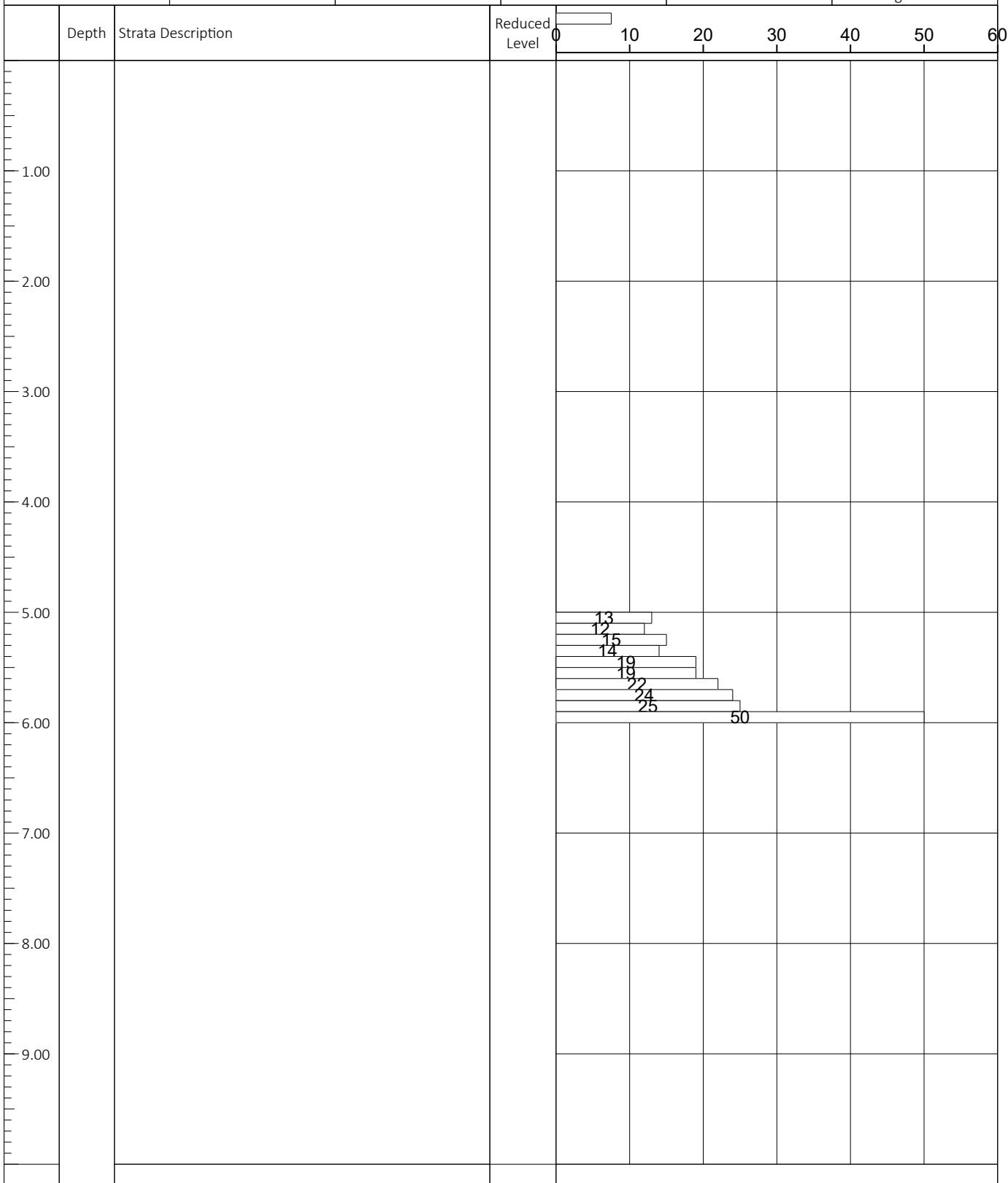
Hole Type
DP

Level

Logged By

Scale
1:50

Page 1 of 1



Dynamic Probe Details

Probe Type	Hammer Mass	Standard Drop	Groundwater Level	Termination Reason	Remarks
DPSH-B	63.50	750			

Remarks: Carried out in the Base of DS02. Refused at 5.90mbgl.



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Borehole ID

DP03

DYNAMIC PROBE HOLE LOG

Project No: GSI 1923

Easting:

Start Date: 20/07/2023

Project Name: Land off on Lowercroft Road, Bury

Nothing:

End Date: 20/07/2023

Client
HJK Construction

Hole Type
DP

Level

Logged By

Scale
1:50

Page 1 of 1

[illegible]

Dynamic Probe Details

Probe Type	Hammer Mass	Standard Drop	Groundwater Level	Termination Reason	Remarks
DPSH-B	63.50	750			

Remarks: Carried out in the Base of DS03. Refused at 7.00mbgl.



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Marple, Stockport. SK6 6BD
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Borehole ID

DP04

DYNAMIC PROBE HOLE LOG

Project No: GSI 1923

Easting:

Start Date: 20/07/2023

Project Name: Land off on Lowercroft Road, Bury

Nothing:

End Date: 20/07/2023

Client
HJK Construction

Hole Type
DP

Level

Logged By

Scale
1:50

Page Number
Page 1 of 1[illegible]

Dynamic Probe Details

Probe Type	Hammer Mass	Standard Drop	Groundwater Level	Termination Reason	Remarks
DPSH-B	63.50	750			

Remarks: Carried out in the Base of DS04. Refused at 6.20mbgl.



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Suite 2 Marple House, 39 Stockport Road,
Marple, Stockport. SK6 6BD
Tel: 0161 713 0174 Email: info@geoconsiteinvestigations.com Web: www.geoconsiteinvestigations.com

Borehole ID

DP05

DYNAMIC PROBE HOLE LOG

Project No: GSI 1923		Easting:		Start Date: 20/07/2023	
Project Name: Land off on Lowercroft Road, Bury		Northing:		End Date: 20/07/2023	
Client HJK Construction	Hole Type DP	Level	Logged By	Scale 1:50	Page Number Page 1 of 1

[illegible]

Dynamic Probe Details

Probe Type	Hammer Mass	Standard Drop	Groundwater Level	Termination Reason	Remarks
DPSH-B	63.50	750			

Remarks: Carried out in the Base of DS05. Refused at 4.10mbgl.

APPENDIX D

GEOTECHNICAL TESTING

RESULTS



LABORATORY REPORT



Contract Number: PSL23/6261

Report Date: 30 August 2023

Client's Reference: GSI 1923

Client Name: Geocon Site Investigations Ltd
Suite 2, Marple House
39 Stockport Road
Marple
Stockport
SK6 6BD

For the attention of: Graham Boulton

Project Name: Lowercroft Road, Bury

Date Received: 28/7/2023

Date Commenced: 28/7/2023

Date Completed: 30/08/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)


M Fennell
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

Lowercroft Road, Bury

Contract No:

PSL23/6261

Client Ref:

GSI 1923

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



Lowercroft Road, Bury

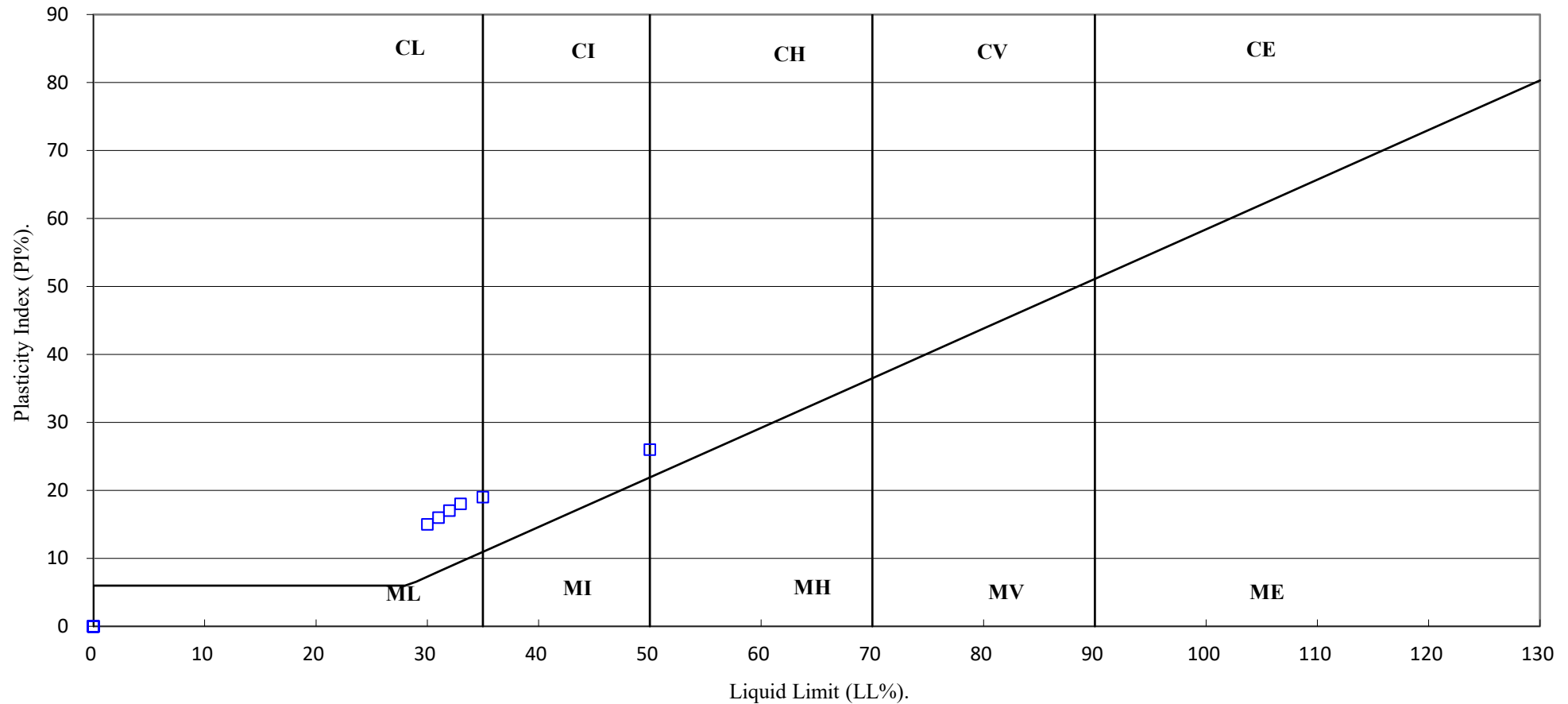
Contract No:

PSL23/6261

Client Ref:

GSI 1923

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Lowercroft Road, Bury

Contract No:

PSL23/6261

Client Ref:

GSI 1923

Professional Soils Laboratory

5/7 Hexthorpe Road
Hexthorpe
Doncaster
DN4 0AR

Analytical Test Report: L23/04423/PSL - 23-36426

Your Project Reference:	PSL23/6261 Lowercroft Road, Bury		
Your Order Number:	PSL	Samples Received / Instructed:	15/08/2023 / 15/08/2023
Report Issue Number:	1	Sample Tested:	15/08 to 22/08/2023
Samples Analysed:	4 soil samples	Report issued:	22/08/2023

Signed



James Gane
Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30°C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 26.07.23

Issued by: J. Gane

Issue No: 4

Rev No: 2



7 - 11 Harding Street
Leicester
LE1 4DH

L23/04423/PSL - 23-36426

Project Reference - PSL23/6261 Lowercroft Road, Bury

Analytical Test Results - Soil

Lab Reference			310080	310081	310082	310083
Client Sample ID			-	-	-	-
Client Sample Location			DS01	DS02	DS03	DS04
Client Sample Type			D	D	D	D
Client Sample Number			-	-	-	-
Depth - Top (m)			1.50	1.50	2.50	3.50
Depth - Bottom (m)			1.50	1.50	2.50	3.50
Date of Sampling			-	-	-	-
Time of Sampling			-	-	-	-
Sample Matrix			Clay	Clay	Clay	Clay
Determinant	Units	Accreditation				
Sulphate (Acid Soluble)	(%)	u	0.01	< 0.01	< 0.01	0.02
pH	pH Units	MCERTS	7.6	6.4	6.4	7.1
Sulphate (Water soluble as SO ₄)	(mg/l)	u	36	16	15	69
Sulphur (Total)	(%)	UKAS	0.01	< 0.01	< 0.01	0.02



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Leicester
LE1 4DH

L23/04423/PSL - 23-36426

Project Reference - PSL23/6261 Lowercroft Road, Bury

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
310080	-	DS01	D	-	Reddish dark brown slightly gravelly sandy clay with rare slag	-	-	50
310081	-	DS02	D	-	Mottled cream red gravelly sandy clay	-	-	48
310082	-	DS03	D	-	Reddish brown slightly gravelly sandy clay	-	-	39
310083	-	DS04	D	-	Reddish brown sandy clay with rare organic matter	-	-	48



L23/04423/PSL - 23-36426

Project Reference - PSL23/6261 Lowercroft Road, Bury

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
310080	-	DS01	D	-	
310081	-	DS02	D	-	
310082	-	DS03	D	-	
310083	-	DS04	D	-	



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Leicester
LE1 4DH

L23/04423/PSL - 23-36426

Project Reference - PSL23/6261 Lowercroft Road, Bury

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preparation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
ASSO4S	MS - CL - Acid Soluble Sulphate	Oven Dried	Passing 2mm test sieve	Determination of total sulphate in soils by acid extraction followed by ICP analysis
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis
1377TS-ELT	BS1377 Total Sulphur Content by HTC	Oven dried	BS1377 : Part 1 : 2016	Total Sulphur Content testing of Soil in accordance with BS 1377 : Part 3 : 2018 + A1 : 2021 Clause 7.10 (using Eltra CS-800 Analyser)



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Leicester
LE1 4DH

L23/04423/PSL - 23-36426

Project Reference - PSL23/6261 Lowercroft Road, Bury

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided

C - Received in inappropriate container

H - Contains headspace

T - Temperature on receipt exceeds storage temperature

R - Date of sampling to receipt insufficient to allow analysis to be completed without deviation, Please note this is only a deviation if 'X' is also recorded against the sample

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
310080	-	DS01	D	-		A
310081	-	DS02	D	-		A
310082	-	DS03	D	-		A
310083	-	DS04	D	-		A

APPENDIX E

CHEMICAL TESTING RESULTS

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 23/07421
Issue Number: 1

Date: 08 August, 2023

Client: Geocon Site Investigations Ltd
Suite 2 Marple House,
39 Stockport Road,
Marple
Stockport
UK
SK6 6BD

Project Manager: Henry Holden/Use - Mailing list/Use - Mailing list
Project Name: Land on Lowercroft Road, Bury
Project Ref: GSI 1923
Order No: PO 23/0364
Date Samples Received: 24/07/23
Date Instructions Received: 25/07/23
Date Analysis Completed: 08/08/23

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 23/07421

Client Project Name: Land on Lowercroft Road, Bury

Client Project Ref: GSI 1923

Lab Sample ID	23/07421/1	23/07421/5	23/07421/7	23/07421/9	23/07421/10	23/07421/11	23/07421/13	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	DS01	DS04	DS06	DS07	DS07	DS08	DS09			
Depth to Top	0.30	0.40	0.40	0.30	0.70	0.20	0.40			
Depth To Bottom										
Date Sampled	20-Jul-23	20-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	6A	5AE	5AE	5AE	5A	5A	6AE			
% Stones >10mm _A	13.9	3.7	11.7	<0.1	<0.1	6.2	5.8	% w/w	0.1	A-T-044
pH _D ^{M#}	5.65	5.76	6.58	6.64	6.20	5.04	5.99	pH	0.01	A-T-031s
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	0.2	A-T-050s
Total Organic Carbon _D ^{M#}	0.45	0.37	2.36	1.47	0.36	0.38	2.45	% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	2	<1	5	7	6	6	15	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	13	13	13	14	16	12	29	mg/kg	1	A-T-024s
Chromium _D ^{M#}	19	21	19	19	18	15	19	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead _D ^{M#}	8	8	23	22	22	22	63	mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	22	23	13	13	14	11	16	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc _D ^{M#}	37	37	37	32	31	28	56	mg/kg	5	A-T-024s

Envirolab Job Number: 23/07421

Client Project Name: Land on Lowercroft Road, Bury

Client Project Ref: GSI 1923

Lab Sample ID	23/07421/1	23/07421/5	23/07421/7	23/07421/9	23/07421/10	23/07421/11	23/07421/13	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	DS01	DS04	DS06	DS07	DS07	DS08	DS09			
Depth to Top	0.30	0.40	0.40	0.30	0.70	0.20	0.40			
Depth To Bottom										
Date Sampled	20-Jul-23	20-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	6A	5AE	5AE	5AE	5A	5A	6AE			
Asbestos in Soil (inc. matrix)										
Asbestos in soil _D [#]	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual) _D	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 23/07421

Client Project Name: Land on Lowercroft Road, Bury

Client Project Ref: GSI 1923

Lab Sample ID	23/07421/1	23/07421/5	23/07421/7	23/07421/9	23/07421/10	23/07421/11	23/07421/13	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	DS01	DS04	DS06	DS07	DS07	DS08	DS09			
Depth to Top	0.30	0.40	0.40	0.30	0.70	0.20	0.40			
Depth To Bottom										
Date Sampled	20-Jul-23	20-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	6A	5AE	5AE	5AE	5A	5A	6AE			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	<0.02	0.13	<0.02	<0.02	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	0.06	<0.04	0.28	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	0.07	<0.04	0.24	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	0.07	<0.05	0.25	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	0.19	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	0.09	<0.06	0.35	<0.06	<0.06	<0.06	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	0.12	<0.08	0.82	<0.08	<0.08	<0.08	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03	0.10	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	0.03	<0.03	0.75	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	0.12	<0.07	0.63	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Total PAH-16MS _A	<0.08	0.56	<0.08	3.96	<0.08	<0.08	<0.08	mg/kg	0.01	A-T-019s

Envirolab Job Number: 23/07421

Client Project Name: Land on Lowercroft Road, Bury

Client Project Ref: GSI 1923

Lab Sample ID	23/07421/1	23/07421/5	23/07421/7	23/07421/9	23/07421/10	23/07421/11	23/07421/13	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	DS01	DS04	DS06	DS07	DS07	DS08	DS09			
Depth to Top	0.30	0.40	0.40	0.30	0.70	0.20	0.40			
Depth To Bottom										
Date Sampled	20-Jul-23	20-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23	21-Jul-23			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	6A	5AE	5AE	5AE	5A	5A	6AE			
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	<1	<1	<1	3	<1	<1	4	mg/kg	1	A-T-055s
Total Aliphatics _A	<1	<1	<1	3	<1	<1	4	mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1	<1	<1	1	<1	<1	1	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1	<1	<1	4	<1	<1	1	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	<1	<1	<1	8	<1	<1	4	mg/kg	1	A-T-055s
Total Aromatics _A	<1	<1	<1	13	<1	<1	6	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	<1	<1	<1	15	<1	<1	10	mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 23/07421

Client Project Name: Land on Lowercroft Road, Bury

Client Project Ref: GSI 1923

Lab Sample ID	23/07421/15							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	DS10									
Depth to Top	0.30									
Depth To Bottom										
Date Sampled	21-Jul-23									
Sample Type	SOIL - ES									
Sample Matrix Code	5AE									
% Stones >10mm _A	10.7							% w/w	0.1	A-T-044
pH _D ^{M#}	5.98							pH	0.01	A-T-031s
Cyanide (total) _A ^{M#}	<1							mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2							mg/kg	0.2	A-T-050s
Total Organic Carbon _D ^{M#}	0.55							% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	<1							mg/kg	1	A-T-024s
Cadmium _D ^{M#}	<0.5							mg/kg	0.5	A-T-024s
Copper _D ^{M#}	10							mg/kg	1	A-T-024s
Chromium _D ^{M#}	16							mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1							mg/kg	1	A-T-040s
Lead _D ^{M#}	12							mg/kg	1	A-T-024s
Mercury _D	<0.17							mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	18							mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1							mg/kg	1	A-T-024s
Zinc _D ^{M#}	26							mg/kg	5	A-T-024s

Envirolab Job Number: 23/07421

Client Project Name: Land on Lowercroft Road, Bury

Client Project Ref: GSI 1923

Lab Sample ID	23/07421/15							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	DS10									
Depth to Top	0.30									
Depth To Bottom										
Date Sampled	21-Jul-23									
Sample Type	SOIL - ES									
Sample Matrix Code	5AE									
Asbestos in Soil (inc. matrix)										
Asbestos in soil _D [#]	NAD									A-T-045
Asbestos Matrix (visual) _D	-									A-T-045
Asbestos Matrix (microscope) _D	-									A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A									A-T-045

Envirolab Job Number: 23/07421

Client Project Name: Land on Lowercroft Road, Bury

Client Project Ref: GSI 1923

Lab Sample ID	23/07421/15							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	DS10									
Depth to Top	0.30									
Depth To Bottom										
Date Sampled	21-Jul-23									
Sample Type	SOIL - ES									
Sample Matrix Code	5AE									
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02							mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04							mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04							mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05							mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05							mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07							mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06							mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A	<0.04							mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08							mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07							mg/kg	0.07	A-T-019s
Total PAH-16MS _A	<0.08							mg/kg	0.01	A-T-019s

Envirolab Job Number: 23/07421

Client Project Name: Land on Lowercroft Road, Bury

Client Project Ref: GSI 1923

Lab Sample ID	23/07421/15									
Client Sample No										
Client Sample ID	DS10									
Depth to Top	0.30									
Depth To Bottom										
Date Sampled	21-Jul-23									
Sample Type	SOIL - ES									
Sample Matrix Code	5AE									
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01							mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01							mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1							mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	<1							mg/kg	1	A-T-055s
Total Aliphatics _A	<1							mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1							mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1							mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1							mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1							mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	<1							mg/kg	1	A-T-055s
Total Aromatics _A	<1							mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	<1							mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01							mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01							mg/kg	0.01	A-T-022s

Report Notes

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
 The results reported herein relate only to the material supplied to the laboratory.
 The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **six weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
 Analytical results reflect the quality of the sample at the time of analysis only.
 Opinions and Interpretations expressed are outside our scope of accreditation.
 The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
 A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Key

Superscript "#"	Accredited to ISO 17025
Superscript "M"	Accredited to MCertS
Superscript "U"	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript "A"	Analysis performed on as-received Sample
Subscript "D"	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript "A"	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
N/A	Not applicable

Asbestos

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
 Stones etc. are not removed from the sample prior to analysis
 Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing, and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs

Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.

Soil Chemical Analysis:

All results are reported as dry weight (<40°C).
 For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
 For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
 All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
 Results "with Clean up" indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:

EPH CWG results have humics mathematically subtracted through instrument calculation.
 Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the accreditation range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Geocon Site Investigations Ltd, Suite 2 Marple House, 39 Stockport Road,
Marple, Stockport, UK, SK6 6BD

Project: Land on Lowercroft Road, Bury

Clients Project No: GSI 1923

Project No: 23/07421

Date Received: 25/07/2023 (am)

Cool Box Temperatures (°C): 16.7, 17.0, 16.8

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	23/07421/1	23/07421/5	23/07421/7	23/07421/9	23/07421/10	23/07421/11	23/07421/13	23/07421/15
Client Sample No								
Client Sample ID/Depth	DS01 0.30m	DS04 0.40m	DS06 0.40m	DS07 0.30m	DS07 0.70m	DS08 0.20m	DS09 0.40m	DS10 0.30m
Date Sampled	20/07/23	20/07/23	21/07/23	21/07/23	21/07/23	21/07/23	21/07/23	21/07/23
A-T-019s	01/08/2023	01/08/2023	01/08/2023	01/08/2023	01/08/2023	01/08/2023	01/08/2023	01/08/2023
A-T-022s	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023
A-T-024s	03/08/2023	03/08/2023	03/08/2023	03/08/2023	03/08/2023	03/08/2023	03/08/2023	03/08/2023
A-T-031s	03/08/2023	03/08/2023	03/08/2023	03/08/2023	03/08/2023	03/08/2023	03/08/2023	03/08/2023
A-T-032s	04/08/2023	04/08/2023	04/08/2023	04/08/2023	04/08/2023	04/08/2023	04/08/2023	04/08/2023
A-T-040s	08/08/2023	08/08/2023	08/08/2023	08/08/2023	08/08/2023	08/08/2023	08/08/2023	08/08/2023
A-T-042sTCN	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023
A-T-044	01/08/2023	01/08/2023	01/08/2023	01/08/2023	01/08/2023	01/08/2023	01/08/2023	01/08/2023
A-T-045	27/07/2023	27/07/2023	27/07/2023	27/07/2023	27/07/2023	27/07/2023	27/07/2023	27/07/2023
A-T-050s	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023	28/07/2023
A-T-055s	31/07/2023	31/07/2023	31/07/2023	31/07/2023	31/07/2023	31/07/2023	31/07/2023	31/07/2023
Calc-As Recd	31/07/2023	31/07/2023	31/07/2023	31/07/2023	31/07/2023	31/07/2023	31/07/2023	31/07/2023

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

APPENDIX F

**GAS AND GROUNDWATER
MONITORING RESULTS**



Gas Monitoring Results Sheet

GeoCon Site Investigations Ltd

Suite 2 Marple House,
39 Stockport Road,
Marple,
Stockport.
SK6 6BD

Tel: 0161 713 0174

email: info@geoconsiteinvestigations.com

Online: www.geoconsiteinvestigations.com

Site: Bury
Project Number: GSI 1923
National Grid Reference: XXXX
Instrument: GFM 436 & Dip meter

Monitoring Point Reference	Date	Atmospheric pressure (mb)	Flow Range (l/hr)		Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Methane Gas Screening Value (GSV) (l/hr)	Carbon Dioxide Gas Screening Value (GSV) (l/hr)	Hydrogen Sulphide (ppm)	Carbon Monoxide (ppm)	Standing Water Level (mbgl)	Well Depth (mbgl)
			Peak	Steady	Peak	Steady	Peak	Steady	Low	Steady						
DS06	04 August 2023	1001	90	2.5	0.0	0.0	1.0	1.0	16.8	16.8	0.0000	0.0250	0.0	0.0	1.03	4.82
	18 August 2023	997	97	1.0	0.0	0.0	1.0	1.0	14.8	14.8	0.0000	0.9700	0.0	0.0	1.00	4.82
	08 September 2023	1001	1	1.0	0.0	0.0	0.8	0.8	16.8	16.8	0.0000	0.0080	0.0	0.0	1.00	4.82
	15 September 2023	996	72	0.2	0.0	0.0	0.9	0.9	16.7	16.7	0.0000	0.0018	0.0	0.0	0.96	4.82
	29 September 2023	1001	-17	0.0	-0.3	-0.3	1.6	1.6	16.9	16.9	0.0000	0.0000	0.0	0.0	0.70	4.82
DS07	04 August 2023	1001	-21	-6.0	0.0	0.0	0.7	0.7	17.4	17.4	0.0000	-0.0420	0.0	0.0	0.30	4.45
	18 August 2023	997	-19	-5.4	0.0	0.0	0.8	0.8	16.8	16.8	0.0000	-0.0432	0.0	0.0	0.41	4.45
	08 September 2023	1001	4	4.0	0.0	0.0	0.8	0.8	16.9	16.9	0.0000	0.0320	0.0	0.0	1.52	4.45
	15 September 2023	996	-16	-5.0	0.0	0.0	0.7	0.7	17.0	17.0	0.0000	-0.0350	0.0	0.0	0.40	4.45
	29 September 2023	1001	0	0.0	-0.3	-0.3	0.9	0.9	18.7	18.7	0.0000	0.0000	0.0	0.0	1.94	4.45
DS08	04 August 2023	1001	0	0.0	0.0	0.0	4.6	4.6	13.9	13.9	0.0000	0.0000	0.0	0.0	1.50	4.86
	18 August 2023	997	0	0.0	0.0	0.0	7.5	7.5	10.9	10.9	0.0000	0.0000	0.0	0.0	1.68	4.86
	08 September 2023	1001	0	0.0	0.0	0.0	5.4	5.4	12.3	12.3	0.0000	0.0000	0.0	0.0	1.20	4.86
	15 September 2023	996	0	0.0	0.0	0.0	8.3	8.3	5.3	5.3	0.0000	0.0000	0.0	0.0	1.74	4.86
	29 September 2023	1001	0	0.0	-0.4	-0.4	9.0	9.0	8.0	8.0	0.0000	0.0000	0.0	0.0	1.86	4.86
DS09	04 August 2023	1001	-58	-12.3	0.0	0.0	0.0	0.0	20.7	20.7	0.0000	0.0000	0.0	0.0	4.83	4.86
	18 August 2023	997	27	24.5	0.0	0.0	3.7	3.7	5.8	5.8	0.0000	0.9065	0.0	0.0	4.83	4.86
	08 September 2023	1001	10	10.0	0.0	0.0	3.3	3.3	16.0	16.0	0.0000	0.3300	0.0	0.0	4.52	4.86
	15 September 2023	996	25	15.5	0.0	0.0	3.2	3.2	6.0	6.0	0.0000	0.4960	0.0	0.0	4.80	4.86
	29 September 2023	1001	-57	-1.6	-0.2	-0.2	0.0	0.0	20.7	20.7	0.0032	0.0000	0.0	0.0	4.82	4.86
											0.0000	0.0000				
											0.0000	0.0000				
											0.0000	0.0000				
											0.0000	0.0000				
											0.0000	0.0000				
Maximum			97.0	24.5	0.0	0.0	9.0	9.0	5.3	5.3	0.0032	0.9700	0.0	0.0		

Additional Information:

Date	Engineer	Weather	Air Temperature (°C)	Ground Conditions	Pressure Trend	Comments
04/08/2023	AH	15	Overcast	Damp	Rising	N/A
18 August 2023	AH	19	Light Rain	Damp	Falling	N/A
15 September 2023	AH	19	Overcast	Damp	Falling	N/A
29 September 2023	MP	12	Overcast	Dry	Rising	N/A

- * All monitoring point locations are monitored for a minimum of 60 seconds, and both the peak reading and the steady / rest readings are recorded
- * BD = Below the detection limit of the gas analyser (0.1units)
- * NR = No reading taken
- * NA = Not Applicable