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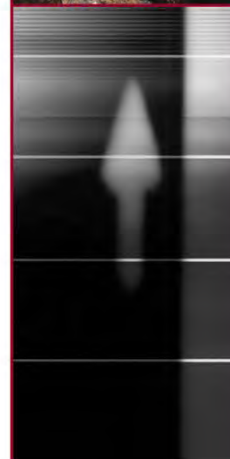
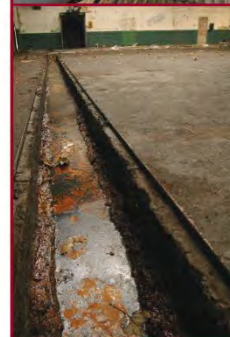
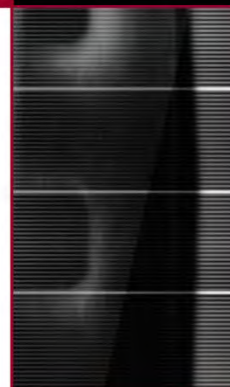
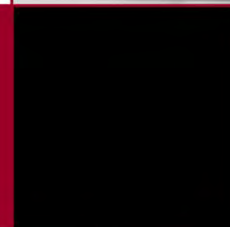
PHASE II GROUND INVESTIGATION

CHERRY ORCHARD FARM HIGHAM ON THE HILL

Report No: 23018/1
Date: April 2023

Prepared for

OWL HOMES LIMITED



Innovative Land Development Solutions

**PROJECT QUALITY ASSURANCE
INFORMATION SHEET**

**PHASE II
GROUND INVESTIGATION**

**CHERRY ORCHARD FARM
HIGHAM ON THE HILL**

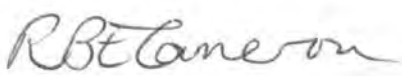
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EXECUTIVE SUMMARY

PHASE II GROUND INVESTIGATION

CHERRY ORCHARD FARM HIGHAM ON THE HILL

Georisk Management Limited has been instructed to carry out a Phase II Ground Investigation for the proposed development scheme at the above site.

Phase I	Comments
Phase I	Reference should be made to the Phase I Geo-environmental Desk Study prepared by Mewies Engineering Consultants Ltd (MEC), report reference 26277-04-DS-01 Rev B dated May 2021. This provides an Initial Conceptual Site Model and provides recommendations for a subsequent intrusive site investigation.
Phase II	Comments
Ground Conditions	Topsoil was encountered across the site to depths of between 0.2 and 0.5 m begl (and commonly around 0.3 m in thickness) and typically consisted of dark brown sandy locally gravelly clay or dark brown clayey sand with rootlets. Superficial Deposits were encountered beneath the topsoil and were proved to a maximum penetrated depth of 5.0 m begl. These deposits typically comprised firm, firm to stiff or stiff brown or reddish brown sandy to very sandy locally gravelly clay with rare bands of brown or reddish-brown sand. Beneath the clay, loose or medium dense brown or reddish brown locally clayey or silty sand was encountered in WS3, WS4, WS5, WS6, WS7, WS8, TP3 and TP6 and directly beneath the topsoil in TP4. Evidence of soft or loose material was encountered at the following locations: • WS1: soft to firm clay at 1.1 to 1.3 m begl; • WS2: soft to firm clay at 0.3 to 0.6 m begl; • WS3: loose sand at 0.9 to 2.0 m begl, very soft clay from 2.7 to at least 3.0 m begl; • WS4: soft to firm clay at 0.3 to 1.0 m begl, loose sand from 3.4 to at least 5.0 m begl; • WS5: soft to firm clay at 2.0 to 2.8 m begl, loose sand at 3.2 to 4.0 m begl; • WS8: very soft becoming soft to firm clay at 2.0 to 2.5 m begl, loose sand from 2.5 to at least 3.0 m begl.
Contamination	No visual/olfactory evidence of potential significant contamination was recorded during the fieldwork.
Groundwater	Groundwater was encountered across much of the site during the fieldwork at depths of between 1.5 and 3.8 m begl, with subsequent groundwater monitoring recording standing water levels, where present, between 1.8 and 2.8 m begl.
Soil-Gas	No methane has been recorded during the monitoring programme. Steady state carbon dioxide levels ranged from 0.8 to 3.5 % by volume (% v/v) and a maximum positive gas flow of 0.1 l/hr has been recorded. Ambient atmospheric pressures ranged from 982 to 1016 mb.
Environmental Assessment	Comments
Soil Contamination	All test results for the potential contaminants of concern are below the relevant assessment criteria (S4UL/C4SL/SSV). TPH screening tests were carried out on selected samples of near surface soil and no significant TPH concentrations were detected. Pesticide screening tests were carried out on two samples of topsoil and pesticide levels were below the detection limit of the laboratory testing equipment. Concentrations of phytotoxic metals are present at levels below those considered to present a risk to plant growth.
Risk Evaluation: Human Health	Based on the findings of the ground investigation and chemical test results, no remedial action in respect of risk to human health is considered necessary for the proposed development at the site.
Risk Evaluation: Soil-Gas	From the monitoring results for carbon dioxide, a maximum GSV of 0.002 l/hr has been calculated, which is below the 'Characteristic Situation 1' GSV of 0.07 l/hr. No methane has been recorded and therefore a GSV has not been calculated. The GSV calculated from the monitoring results are indicative of a CS1 classification and the soil-gas levels are below the respective 'Typical Maximum Concentrations'. The ground investigation did not identify any pond infill or Made Ground at the site with natural soil present beneath surface topsoil and no other potential significant sources of soil-gas have been identified. On this basis, a CS1 classification is considered appropriate for the site - gas protection measures are not required for a CS1 classification.

Statutory Consultation	If required to satisfy planning and/or land quality conditions, this report should be submitted to the Local Authority and/or warranty provider for approval before any construction work starts on site.
Geotechnical Assessment	Comments
Foundations	The proposed development is anticipated to comprise traditional low-rise housing. Across most of the site, following site preparatory works, it is considered that conventional strip/trench fill foundations extending into competent Superficial Deposits should be viable for much of the proposed development. <i>Majority of Site</i> Geotechnical testing of the near-surface soil indicates it should be classified as a shrinkable soil of medium volume change potential and; therefore, a minimum founding depth of 0.9 m bgl would need to be adopted in accordance with NHBC Standards ensuring at least 300 mm penetration into competent undisturbed strata is achieved. Foundations near any trees and/or hedgerows would need to be deepened and heave protection measures adopted in accordance with NHBC Standards Chapter 4.2 'Building Near Trees'. Where foundation depths exceed 2.5 m due to tree influence, the NHBC require a design by an Engineer to demonstrate that potential heave uplift forces can be resisted by the foundation and this usually entails the use of a piled foundation. Further ground investigation may be required for pile design purposes. Any proposed deepened foundation dig depths should also be reviewed against the ground investigation data and the potential for encountering loose sands at depth. An alternative foundation solution may be appropriate in this instance. For a strip/trench fill foundation bearing onto firm-stiff Superficial Deposits, an allowable bearing pressure of 100 kN/m² is considered appropriate for design purposes. Due to the variability of the Superficial Deposits (both laterally and with depth) it is recommended that mesh reinforcement is incorporated into all foundation construction to minimise the risk of unacceptable settlement. Total settlements would not be anticipated to exceed 25 mm. Care should be taken to limit the exposure of any excavation prepared to receive concrete, which may cause deterioration and a reduction in bearing capacity. Foundation excavations should be inspected by qualified personnel and if any soft/loose material is encountered at formation level, foundations would need to be deepened further into competent material and infilled with lean mix concrete. <i>Central-Western Area</i> Towards the central and western areas of the site, the Superficial Deposits are typically more variable with soft or loose material near surface that is susceptible to collapse of excavation sides; these locations are identified on Drawing No. 23018/1 included in Appendix A. In these locations the use of traditional spread foundations is not considered viable, and consideration will need to be given to an abnormal foundation solution. Shallow vibro treatment of near surface soft and loose superficial deposits, in conjunction with reinforced widened strip foundations could be considered as a potential foundation solution. However, reference should be made to specialist subcontractors for advice on the detailed design and application of their proprietary vibro treatment system in the prevailing ground conditions. To assess this further, they may wish to view the ground in trial pits which would be best undertaken once the housing layout has been finalised. Mini piling is another potential option; however, discussions would need to be held with specialist contractors to determine the most suitable pile design and the piling scheme. As the load bearing characteristics of piles are dependent upon the type of pile used, method of installation, construction and workmanship, it is recommended that detailed discussions are held with suitably experienced piling contractors prior to finalising design. In any event, positive assurances should be sought from the piling contractor in respect of performance and a representative number of piles should be subject to pile loading tests. Further ground investigation comprising deeper boreholes may be required for pile design purposes.
Floor Slabs	Given the presence of shrinkable soil beneath the site, it is recommended that a suspended floor slab design (cast in situ or 'beam and block' with underfloor void) is adopted for the proposed development.
Buried Concrete	For the near-surface Superficial Deposits, water soluble sulphate testing results (expressed as SO ₄ in a 2:1 water:soil extract) range from 0.0019 to 0.064 g/l with pH values of 7.2 to 8.1. Following the guidance given in the BRE Special Digest (2005) and assuming 'mobile' groundwater conditions for a 'natural ground' site, the Aggressive Chemical Environment (ACEC) classification has been determined. These indicate a Design Sulphate Class of DS-1 and an ACEC class of AC-1 apply at the site.

Pavement Design	Final road and pavement levels are not known at this stage, however, assuming a firm clay subgrade and based on the laboratory test results from the present investigation, an equilibrium CBR value of 3% should be assumed for preliminary design purposes. The proposed formation should be proof rolled and caution must be exercised to ensure that any soft/loose areas identified within the formation are excavated and filled with suitably compacted granular fill. The near-surface soils have the potential to be disturbed by weathering and site traffic. Suitable workings methods should therefore be employed to avoid this and therefore reduce the potential to create volumes of unsuitable fill material. Once road alignments and levels have been finalised, in situ CBR tests should be undertaken to allow detailed design of road formations to be made.
Dewatering	The findings of this investigation indicate that significant water ingress is unlikely to occur in shallow temporary excavations; however, any localised seepage should be controllable by sump pumping.
Excavations	Conventional mechanical excavation should be readily achievable through the near-surface soils to depths of at least 3.0 m begl. Trial pit instability was recorded in some locations where sand was encountered; however, shallow foundation excavations typically should not extend to this depth. Shallow excavations should remain stable in the short term; however, instability may occur in any deeper excavations or excavations left open for extended periods of time. Support should be provided in any excavations requiring man entry.
Soakaways	Infiltration testing has not been carried out as part of this investigation; however, due to the ground conditions encountered comprising predominantly clay with bands of sand with associated perched groundwater, it is considered that the use of soakaway drainage is not considered viable, and an alternative drainage solution will need to be adopted.
Additional Work	Comments
Various	If required to satisfy planning and/or land quality conditions, this report should be submitted to the Local Authority and/or warranty provider for approval before any construction work starts on site.

The above summary is intended for reference purposes only and specific details should be obtained by reading the entire report.

FOREWORD

This report has been prepared for the sole internal use and reliance of the Client(s) named on the Project Quality Assurance Information Sheet. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Georisk Management Ltd (Georisk). If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The report should be read in its entirety, including all associated drawings and appendices. Georisk cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context.

The findings and opinions conveyed in this report are based on information obtained from a variety of sources as detailed within this report and which Georisk believes is reliable. All reasonable care and skill has been applied in examining the information obtained, nevertheless, Georisk cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The report represents the findings and opinions of experienced geoenvironmental consultants. Georisk does not provide legal advice and the advice of lawyers may also be required.

Any recommendations made or opinions expressed in the Report are based on the exploratory hole records, an examination of samples and the results of the site and laboratory tests. No liability can be accepted for conditions not revealed by the exploratory holes particularly between positions. Whilst every effort is made to ensure accuracy of data supplied any opinion expressed as to the possible configuration of strata between or below investigation locations is for guidance only and no responsibility is accepted as to its accuracy.

Unless otherwise specifically stated, this report assumes that ground levels will not change significantly from those existing at present and that the proposed development will be of two to three storey construction. If this is not to be the case, some modifications to this report may be required.

The groundwater conditions entered on the borehole records and from any monitoring programme are those observed at the time of the investigation. Groundwater levels are susceptible to seasonal fluctuations and may be higher during wetter periods than those encountered during this investigation.

Where the report refers to the potential presence of invasive plant species, such as Japanese Knotweed, or the presence of possible asbestos containing materials, it should be noted that the observations are for information purposes only and should be verified by a suitably qualified expert.

Georisk reserves the right to amend the conclusions and recommendations made in this report in the light of any further or more detailed information that may become available.

**PHASE II
GROUND INVESTIGATION**

**CHERRY ORCHARD FARM
HIGHAM ON THE HILL**

1. INTRODUCTION

- 1.1 Georisk Management Limited (Georisk) has been instructed by Owl Homes Limited (Owl Homes) to carry out a Phase II Ground Investigation of a parcel of land at Cherry Orchard Farm in Higham on the Hill, near Nuneaton, Leicestershire. The work was carried out in accordance with Georisk's offer letter reference 23018/LO.001/AIB dated 11 January 2023.
- 1.2 A Phase I Geo-environmental Desk Study been prepared by Mewies Engineering Consultants Ltd (MEC), report reference 26277-04-DS-01 Rev B dated May 2021. This provides an Initial Conceptual Site Model and provides recommendations for a subsequent intrusive site investigation. This report should be referred to for background and supporting information; however, a brief summary of pertinent information is included in Section 5 of this report.
- 1.3 It is understood that the site is to be developed for housing and; therefore, the principal aims of this investigation are as follows:
- to determine the prevalent ground and groundwater conditions at the site;
 - to provide an assessment of the concentrations of a range of potential contaminants of concern within the near-surface soils, including Phase II evaluation of risk to human health and environmental receptors;
 - to identify any potential geoenvironmental constraints associated with the development of the site for the proposed end use;
 - to provide general geotechnical design recommendations for the proposed development scheme.
- 1.4 This report presents the factual data obtained from the programme of fieldwork, monitoring and laboratory testing implemented by Georisk, together with an assessment of the contamination status of the near-surface soils and general engineering considerations for the proposed development scheme.

2. INFORMATION SOURCES

- 2.1 The information sources used in the production of this report were as follows:
- background information contained within MEC report entitled '*Phase I Geo-environmental Desk Study*' reference 26227-04-DS-01 dated May 2021;
 - information gained with respect to the ground and groundwater conditions established in the programme of fieldwork and monitoring carried out by Georisk;
 - appraisal of laboratory data resulting from chemical and geotechnical testing scheduled by Georisk;
 - topographical survey of the site by Survey Solutions reference 47368CVLS-01 and 47368CVLS-02 dated January 2023;
 - Feasibility Layout provided by Owl Homes reference XXX-FL-001D dated December 2021.

3. REFERENCE SOURCES

3.1 This report has been prepared regarding the following sources of reference and guidance, supplemented with experience of similar sites:

- *Investigation of Potentially Contaminated Sites – Code of Practice. British Standards Institute BS10175 (2011+A2:2017);*
- *Code of Practice for Site Investigations. BS5930 (2015+A1:2020);*
- *Human health toxicological assessment of contaminants in soil. Science Report SC050021/SR2 EA (2009);*
- *The LQM/CIEH S4ULs for Human Health Risk Assessment. LQM 2015;*
- *Updated technical background to the CLEA Model. Science Report SC050021/SR3 EA (2009);*
- *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document. SP1010 DEFRA/CL:AIRE (2014);*
- *Land Contamination Risk Management. EA (2020);*
- *Guidance on Comparing Soil Contamination Data with a Critical Concentration. CIEH and CL:AIRE (2008);*
- *Abandoned Mine Workings Manual. CIRIA C758 (2019);*
- *Guidance for the Safe Development of Housing on Land Affected by Contamination. R & D Publication 66, NHBC, Environment Agency and CIEH (2008);*
- *Concrete in Aggressive Ground. BRE Special Digest 1: Part 1 Assessing the aggressive chemical environment. Building Research Establishment (2005);*
- *Radon: guidance on protective measures for new dwellings. BRE Report BR211 (2015);*
- *Code of practice for design of protective measures for methane and carbon dioxide ground gases for new buildings. BS8485 (2015+A1:2019);*
- *Guidance on Evaluation of Development Proposals on sites where Methane and Carbon Dioxide are Present. NHBC report Edition No. 4 (2007);*
- *Assessing Risks Posed by Hazardous Ground Gases to Buildings. CIRIA Report C665 (2006);*
- *Passive venting of soil gases beneath buildings. DETR/ARUP Environmental PIT Research Report (1997);*
- *Protective measures for housing on gas-contaminated land. BRE/EA Report BR414 (2001);*
- *Site preparation and resistance to moisture. The Building Regulations 2000 Approved Document C (2004 edition);*
- *Specification for Topsoil and Requirements for Use. BS3882 (2015);*
- *BRE 365 Soakaway Design (2016);*
- *NHBC Standards (2021).*

4. THE SITE

- 4.1 The site is situated to the south of Wood Lane in Higham on the Hill near Nuneaton, Leicestershire and can be located approximately by National Grid Reference 437774, 295276. The general site layout is shown on Drawing No. 23018/1, entitled 'Exploratory Hole Location Plan' included in Appendix A.
- 4.2 It comprises a portion of a large, grassed field with hedgerows bordering the site to the north, east and west. The field extends beyond the boundary to the south of the site.
- 4.3 Topography is relatively level across the majority of the site at approximately 111.4 to 113.2 m OD, with gradual undulations; however, the site slopes more steeply down to a level of approximately 107.5 m OD in the north-west corner.
- 4.4 No evidence of any potential significant contamination was identified during the site walkover.

- 4.5 The site is situated in an area of mixed agricultural and residential land use. Beyond the hedgerows, Wood Lane borders the site to the north with housing beyond to the north and to the east. The field extends to the south, with further farmland to the west.

5. SUMMARY OF PHASE I DESK STUDY

- 5.1 A brief summary of the pertinent information contained within the Phase I Geo-environmental Desk Study by MEC is provided below:

- historical maps show the site has remained open agricultural land since at least the 1880s;
- surrounding land use has remained primarily agricultural, with Cherry Orchard Farm adjacent to the eastern boundary;
- the geology at the site is anticipated to comprise superficial deposits of the Oadby Member, with the Wolston Sand and Gravel and Bosworth Clay Member possibly encroaching on the western boundary, overlying the Mercia Mudstone Group;
- the nearest surface watercourse (river or stream) is located 117 m to the south of the site;
- based on current information provided by the EA and contained in the Envirocheck Report, the site is not in an area likely to be affected by river flooding;
- the EA has no records of any licensed surface water abstractions within 250 m of the site;
- the EA has no records of any licensed discharge consents within 250 m of the site;
- the Oadby Member is classified by the EA as a 'Secondary – undifferentiated' aquifer;
- the Mercia Mudstone Group is classified by the EA as a 'Secondary – B' aquifer;
- the EA has no records of any licensed groundwater abstractions within 250 m of the site;
- the site is not mapped by the EA within a groundwater Source Protection Zone;
- the EA has no records of any licensed waste management facility (landfills) within 250 m of the site;
- the LA/EA have no records of any historic landfills within 250 m of the site;
- the EA has no records of any significant or major pollution incidents on, or within 250 m of, the site;
- the EA has no records of any sites within 250 m of the study area that are potential pollution hazards or potential sources of industrial pollution and regulated under the EC Integrated Pollution Prevention and Control Directive (IPPC);
- the Local Authority has no records of any sites within 250 m of the study area that operate under Local Authority Pollution Prevention and Control regulations;
- radon protection measures are not required for a new residential development at the site;
- the site is mapped in a 'Nitrate Vulnerable Zone';
- the risk of natural ground subsidence is generally negligible to low; however, there is a moderate risk associated with compressible deposits in the north-west of the site.

- 5.2 For full details of the Phase I information, reference should be made to the Phase I Geo-Environmental Desk Study by MEC, report reference 26277-04-DS-01 Rev B dated May 2021.

- 5.3 Based on the findings of the Phase I Geo-Environmental Desk Study, the strategy proposed for this investigation is presented in Table 1.

Exploratory Holes	Purpose
Dynamic percussive boreholes and trial pits: WS1 to WS8 and TP1 to TP9 respectively	To determine prevalent ground and groundwater conditions across site, including: • nature and extent of any Made Ground; • nature and extent of any soil contamination; • suitability of the ground for foundations and pavement design.
All dynamic percussive boreholes: WS1 to WS8	Undertake <i>in situ</i> Standard Penetration Tests (SPT) to determine a geotechnical strength profile.
Selected dynamic percussive boreholes: WS1, WS4 and WS6	Construction of groundwater and soil-gas monitoring installations to facilitate assessment of risk posed by any hazardous soil-gases and establish standing water levels.

Table 1: Investigation Strategy

6. FIELDWORK, MONITORING AND LABORATORY TESTING

6.1 Fieldwork

- 6.1.1 The fieldwork was carried out on 9 and 10 February 2023 and comprised the following elements:
- 8 No. dynamic percussive sampling boreholes, designated WS1 to WS8, formed to a maximum depth of 5.0 m below existing ground level (begl);
 - in-situ Standard Penetration Tests (SPT) in WS1 to WS8;
 - construction of combined soil-gas and groundwater monitoring wells in WS1, WS4 and WS6;
 - 9 No. trial pits, designated TP1 to TP9, excavated by JCB 3CX to a maximum depth of 4.2 m begl.
- 6.1.2 The positions of the exploratory holes were set out by Georisk and the locations are shown on the Exploratory Hole Location Plan included as Drawing No. 23018/1 in Appendix A.
- 6.1.3 The fieldwork was supervised by Georisk. All soil description and sample logging was carried out in general accordance with BS 5930 (2015+A1:2020) and the exploratory hole records are presented in Appendix B.
- 6.1.4 Small disturbed samples were recovered from the exploratory holes as necessary to facilitate sample description and for subsequent laboratory testing.
- 6.1.5 Observations of groundwater encountered during the fieldwork are included on the relevant exploratory hole records included in Appendix B.

6.2 Soil-Gas and Groundwater Monitoring

6.2.1 Combined soil-gas and groundwater monitoring installations were constructed in WS1, WS4 and WS6 as shown on the borehole records included in Appendix B. Monitoring has been carried out on four occasions between 17 February and 20 March 2023 with the following measurements being taken in sequence:

- atmospheric pressure (mb);
- relative pressure (mb);
- flow monitoring (l/hr);
- measurement of CO₂, CH₄ and O₂ gas concentrations (% by volume; % v/v);
- groundwater level (m begl).

6.2.2 The results of the soil-gas and groundwater monitoring programme are presented in Appendix C.

6.3 Chemical Testing

6.3.1 Based on the information contained in the Phase I Geo-Environmental Desk Study, a programme of chemical testing was scheduled by Georisk on selected soil samples retrieved from the exploratory holes. The testing was carried out at an independent UKAS accredited laboratory for the following potential contaminants of concern:

- selected toxic and phytotoxic metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc);
- speciated polycyclic aromatic hydrocarbons (PAH);
- pH;
- cyanide;
- phenol;
- sulphate;
- total petroleum hydrocarbon (TPH) screen;
- pesticide screen.

6.3.2 The chemical test results are presented in Appendix D.

6.4 Geotechnical Testing

6.4.1 Routine geotechnical testing comprising moisture content, Atterberg Limits and recompact California Bearing Ratio (CBR) was carried out on selected samples. The testing was carried out in accordance with BS1377 (1990) at an independent UKAS accredited laboratory and the results are presented in Appendix E.

7. GROUND AND GROUNDWATER CONDITIONS

7.1 General

7.1.1 Full details of the ground conditions encountered by Georisk are presented on the exploratory hole records included in Appendix B; however, a summary is presented below.

7.2 Topsoil

7.2.1 Topsoil was encountered across the site to depths of between 0.2 and 0.5 m begl (and commonly around 0.3 m in thickness) and typically consisted of dark brown sandy locally gravelly clay or dark brown clayey sand with rootlets.

7.3 Superficial Deposits

7.3.1 Superficial Deposits were encountered beneath the topsoil and were proved to a maximum penetrated depth of 5.0 m begl. These deposits typically comprised firm, firm to stiff or stiff brown or reddish brown sandy to very sandy locally gravelly clay with rare bands of brown or reddish-brown sand. Beneath the clay, loose or medium dense brown or reddish brown locally clayey or silty sand was encountered in WS3, WS4, WS5, WS6, WS7, WS8, TP3 and TP6 and directly beneath the topsoil in TP4.

7.3.2 Evidence of soft or loose material was encountered at the following locations:

- WS1: soft to firm clay at 1.1 to 1.3 m begl;
- WS2: soft to firm clay at 0.3 to 0.6 m begl;
- WS3: loose sand at 0.9 to 2.0 m begl, very soft clay from 2.7 to at least 3.0 m begl;
- WS4: soft to firm clay at 0.3 to 1.0 m begl, loose sand from 3.4 to at least 5.0 m begl;
- WS5: soft to firm clay at 2.0 to 2.8 m begl, loose sand at 3.2 to 4.0 m begl;
- WS8: very soft becoming soft to firm clay at 2.0 to 2.5 m begl, loose sand from 2.5 to at least 3.0 m begl.

7.3.3 The results of 27 No. Standard Penetration Tests (SPT) carried out in the superficial deposits at depths of between 1.0 and 5.0 m begl returned 'N' values of between 4 and 25, which are summarised in Table 2.

Depth (m begl)	Minimum SPT 'N' value	Maximum SPT 'N' value	Material Description
1.0	8	14	Soft to stiff CLAY, loose SAND
2.0	4	25	Very soft to stiff CLAY, medium dense SAND
3.0	4	25	Very soft and stiff CLAY, loose to medium dense SAND
4.0	6	15	Stiff CLAY, loose to medium dense SAND
5.0	9	-	Loose SAND

Table 2: Summary of SPT 'N' Values in the Superficial Deposits

7.3.4 Selected samples of clay superficial deposits were scheduled for Atterberg Limit determinations and natural moisture content testing. The test results are included in Appendix E and summarised in Table 3.

Test	Minimum (%)	Maximum (%)
Liquid Limit	41	50
Plastic Limit	18	23
Plasticity Index	22	27
Modified Plasticity Index	20	26
Moisture Content	15	27
Plasticity	Moderate	-
Volume Change Potential	Medium	-

Table 3: Summary of Atterberg Limit Tests on the Superficial Deposits

7.3.5 Recompacted CBR testing was carried out on selected samples of near-surface firm clay soils. The results are presented in Appendix E and can be summarised as follows:

- TP3 at 0.5 m begl: 3.8 %;
- TP6 at 0.5 m begl: 1.8 %.

7.4 Groundwater

7.4.1 During the fieldwork, groundwater was encountered at the following locations:

- WS3: 2.0 m begl;
- WS4: 2.6 m begl;
- WS5: 2.6 m begl;
- WS6: 1.5 m begl;
- WS7: 3.8 m begl;
- WS8: 2.6 m begl;
- TP2: 2.0 m begl;
- TP3: 3.0 m begl;
- TP6: 3.5 m begl;
- TP7: 1.8 m begl.

7.4.2 Groundwater monitoring standpipes were constructed in WS1, WS4 and WS6 as shown on the borehole records included in Appendix B which have been monitored on four occasions between 17 February and 20 March 2023. The results of the groundwater monitoring are included in Appendix C and summarised in Table 4.

Exploratory Hole	Standing Groundwater Levels (m begl)	
	Shallowest	Deepest
WS1	1.8	Dry
WS4	2.3	2.8
WS6	2.2	Dry

Table 4: Summary of Groundwater Level Monitoring Results

7.5 Evidence of Potential Contamination

7.5.1 No visual/olfactory evidence of potential significant contamination was recorded during the fieldwork.

7.6 Trial Pit Stability

7.6.1 During excavation, instability was recorded in the following trial pits:

- TP3: spalling of pit sides below 2.6 m begl in sand;
- TP4: collapse of pit sides from ground level;
- TP6: spalling of pit sides below 3.0 m begl in sand.

7.7 Development of Conceptual Site Model

- 7.7.1 Based on the ground and groundwater conditions revealed by the ground investigation carried out and detailed above, the preliminary conceptual site model described in the Phase I Geo-environmental Desk Study is generally considered to be representative of the actual site conditions in relation to the proposed development.
- 7.7.2 The Phase 1 Geo-environmental Desk Study identified a historical pond in the north-west corner of the site as well as the potential for TPH contamination from nearby commercial activity. During the investigation, no Made Ground or pond infill was identified on site and there was no visual or olfactory evidence of hydrocarbon impact in the soil or groundwater.

8. SOIL-GAS RISK ASSESSMENT

8.1 Risk Assessment Protocol

- 8.1.1 Current best practice for the assessment of soil-gas risk to new built development is given in CIRIA Report C665 *'Assessing Risks Posed by Hazardous Ground Gases to Buildings'* (2007) and BS8485 (2015+A1:2019) *'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'*.
- 8.1.2 C665 sets out a semi-quantitative procedure to estimate gas risk, which was proposed by Wilson & Card (1999) and is a development of a procedure given in CIRIA 149 (1995). This method also uses both gas concentrations and borehole flow rates to define a Characteristic Situation for a site based on the limiting gas volume flow for methane and carbon dioxide. For a given Characteristic Situation, a set of remedial measures can be applied to the development.

8.2 Monitoring Results

- 8.2.1 Soil-gas monitoring installations were constructed in WS1, WS4 and WS6 as shown on the borehole records included in Appendix B and have been monitored on four occasions between 17 February and 20 March 2023. The results of the soil-gas monitoring are presented in Appendix C and are summarised in Table 5 (in terms of maximum methane, steady carbon dioxide concentrations and maximum flow rate recorded).

Well	Methane Concentrations (% v/v)	Carbon Dioxide Concentrations (% v/v)	Positive Flow Rates (l/hr)	Methane Gas Screening Value (GSV) (l/hr)	Carbon Dioxide Gas Screening Value (GSV) (l/hr)
WS1	0.0	2.2 – 3.5	0.0	n/a	0.002
WS4	0.0	1.1 – 2.2	0.0	n/a	0.001
WS6	0.0	0.8 – 1.7	0.1	n/a	0.002

Table 5: Summary of Soil-Gas Monitoring Results

- 8.2.2 No methane has been recorded during the monitoring programme.
- 8.2.3 Steady state carbon dioxide levels ranged from 0.8 to 3.5 % by volume (% v/v) during the monitoring programme.
- 8.2.4 A maximum positive gas flow of 0.1 l/hr has been recorded and ambient atmospheric pressures ranged from 982 to 1016 mb.

8.3 Risk Assessment and Protection Strategy

- 8.3.1 For a 'Characteristic Situation 1' (CS1), the 'Typical Maximum Concentration' for methane (1 % v/v) and carbon dioxide (5 % v/v) have not been exceeded.
- 8.3.2 To provide a further detailed level of assessment, Gas Screening Values (GSV) have also been determined (see Table 5). The GSV is calculated by multiplying the maximum gas concentration and the maximum borehole flow rate recorded in a particular borehole and is then used to determine the level of gas protection necessary to protect future users of the proposed development. Where no positive gas flow has been recorded within boreholes, a flow of 0.05 l/hr has been assumed to calculate a GSV.
- 8.3.3 From the monitoring results for carbon dioxide, a maximum GSV of 0.002 l/hr has been calculated, which is below the 'Characteristic Situation 1' GSV of 0.07 l/hr. No methane has been recorded and therefore a GSV has not been calculated.
- 8.3.4 The GSV calculated from the monitoring results are indicative of a CS1 classification and the soil-gas levels are below the respective 'Typical Maximum Concentrations'.
- 8.3.5 The ground investigation did not identify any pond infill or Made Ground at the site with natural soil present beneath surface topsoil and no other potential significant sources of soil-gas have been identified.
- 8.3.6 On this basis, a CS1 classification is considered appropriate for the site - gas protection measures are not required for a CS1 classification.
- 8.3.7 In our opinion, no further monitoring is necessary; however, if required to satisfy planning or land quality conditions, this recommendation should be agreed with the Local Authority and/or NHBC/warranty provider in advance of development works starting on site that would lead to the removal of the borehole installations.
- 8.3.8 Based on the MEC Phase I report, radon protection measures are not required for the proposed development at the site.

9. HUMAN HEALTH RISK ASSESSMENT

9.1 General

- 9.1.1 The UK approach to the assessment of contaminated land is based upon the principles of risk assessment, which is founded on the use of '*source-pathway-receptor*' principles to establish the potential presence of '*pollutant linkage*'. The main legislative driver for dealing with historical land affected by contamination is Part 2A of the Environmental Protection Act 1990. Under Part 2A, land is contaminated if it is determined that there is a '*Significant Possibility of Significant Harm*' (SPOSH) to human health.
- 9.1.2 Georisk adopts a tiered approach to risk assessment in accordance with current UK guidance and good practice. The initial step of this process, known as Tier 1, is the comparison of site-derived data with relevant guideline levels.

- 9.1.3 Should the adopted criteria be exceeded then two courses of action are available. The first is to break the pollutant linkage by undertaking remedial works such as removing or treating the contaminated soil. Alternatively, a more detailed risk assessment can be carried out to determine whether a contamination risk exists.
- 9.1.4 The UK approach to the assessment of human health risk from contaminated land is set out in the CLEA (Contaminated Land Exposure Assessment) framework, which was first published in 2002 by the Department for Environment, Food and Rural Affairs (DEFRA) and the EA. The original guidance was withdrawn and revised guidance issued in 2009, which is set out in the following documents published by the EA:
- *Human health toxicological assessment of contaminants in soil.* Science Report SC050021/SR2;
 - *Updated technical background to the CLEA Model.* Science Report SC050021/SR3.
- 9.1.5 The CLEA model uses generic assumptions about the fate and transport of chemicals in the environment and a generic conceptual model for site conditions together with human behaviour to estimate long term human exposure to soil contaminants.
- 9.1.6 Soil Guideline Values (SGV) were derived using the CLEA Model by comparing estimated exposure with 'Health Criteria Values' (HCV) that represent a tolerable risk to health from chronic exposure. SGVs are scientifically based 'generic assessment criteria' that can be used to simplify the assessment of risk to human health from chronic exposure to contaminants in soil. SGVs are a screening tool for the 'generic quantitative risk assessment' of land contamination.
- 9.1.7 Since revised SGVs were developed in 2009, revised Part 2A statutory guidance was then published in 2012. The revised Part 2A statutory guidance introduces a four-category system for classifying land under Part 2A for cases of SPOSH to human health. Category 4 applies to land where the level of risk posed is acceptably low. DEFRA appointed CL:AIRE to develop '*Category 4 Screening Levels*' (C4SL), which would provide a simple test for deciding when land is suitable for use and definitely not contaminated. In March 2014, C4SLs were published for a limited number of contaminants.
- 9.1.8 Further to this, Suitable for Use Levels (S4UL) published by the Chartered Institute of Environmental Health (CIEH) and Land Quality Management (LQM) were issued in January 2015. These provide a comprehensive update of previous GAC published by CIEH. The S4UL are derived from the CLEA software produced by the EA and are based upon the concept of either 'tolerable' risk (where the relevant health criteria value is a tolerable daily intake), or 'minimal' risk (where the health criteria is an index dose).
- 9.1.9 The following hierarchy has been adopted by Georisk for determining which assessment criteria to be followed:
- Suitable 4 Use Levels (S4UL) developed by LQM/CIEH (2015);
 - C4SL (in the absence of other assessment criteria);
 - Soil Screening Values developed by Atkins ATRISKsoil (in the absence of other assessment criteria).

9.2 Human Health Risk Assessment Design

Proposed Development

- 9.2.1 It is understood that the site is to be developed for housing with private gardens together with hardstanding for access roads and parking.

Assessment Criteria

9.2.2 The assessment criteria used for the screening of contaminants is summarised in Table 6.

Contaminant Group	Determinands	Assessment Criteria Selected
ORGANIC CONTAMINANTS		
Non-halogenated hydrocarbons	Phenol	LQM/CIEH S4UL
	TPH CWG	LQM/CIEH S4UL
Polyaromatic Hydrocarbons (PAH)	USEPA 16 priority compounds	LQM/CIEH S4UL
INORGANIC CONTAMINANTS		
Metals	Lead	C4SL
	Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Selenium, Zinc	LQM/CIEH S4UL
Non-metals	Cyanide	Atkins AtRisk Soil Screening Value (SSV)

Table 6: Human Health Risk Assessment Criteria

9.2.3 It should be noted that there is no S4UL for lead and that the SGV for lead has been withdrawn. As such, the only available authoritative published criteria for lead is the DEFRA C4SL. The C4SL for lead is considerably more conservative than the former SGV and is therefore considered appropriate for use.

End Use

9.2.4 In view of the proposed development, a 'residential - with home-grown produce' end use conceptual model is considered appropriate for the site.

9.2.5 Considering the possibility of double digging in gardens and/or installation of garden features, it is considered that the top 1 m of soil will need to be considered within the risk assessment, as the critical receptor (i.e. occupiers of the residential area) is most likely to be exposed to these materials.

Statistical Analysis

9.2.6 Given the unbiased nature of the sampling and previous use of the site, it is considered appropriate to assess contaminant levels by comparing test results with the relevant S4UL, C4SL or SSV rather than carrying out statistical analysis.

Contaminants of Concern

9.2.7 The potential contaminants of concern are detailed in Section 6 and these contaminants have subsequently been targeted for chemical analysis.

9.3 Generic Quantitative Human Health Risk Assessment

9.3.1 The results of the chemical testing from the site can be summarised in Table 7.

Contaminant of Concern	Measured Concentration*		Critical Concentration (S4UL/C4SL/SSV*)	Number of test results above S4UL/C4SL/SSV
	Min	Max		
Arsenic	6.6	8.5	37	0 (6)
Cadmium	<0.2	-	11	0 (6)
Chromium	14	20	910	0 (6)
Copper	12	21	2400	0 (6)
Cyanide	<1.0	1.0	34	0 (6)
Lead	19	41	200	0 (6)
Mercury	<0.3	-	40	0 (6)
Nickel	9.5	17	130	0 (6)
Phenol	<1.0	-	120	0 (6)
Selenium	<1.0	-	250	0 (6)
Zinc	45	62	3700	0 (6)
PAH Compounds				
Acenaphthene	<0.05	-	210	0 (6)
Acenaphthylene	<0.05	-	170	0 (6)
Anthracene	<0.05	-	2400	0 (6)
Benzo(a)anthracene	<0.05	-	7.2	0 (6)
Benzo(a)pyrene	<0.05	-	2.2	0 (6)
Benzo(b)fluoranthene	<0.05	-	2.6	0 (6)
Benzo(ghi)perylene	<0.05	-	320	0 (6)
Benzo(k)fluoranthene	<0.05	-	77	0 (6)
Chrysene	<0.05	-	15	0 (6)
Dibenz(ah)anthracene	<0.05	-	0.24	0 (6)
Fluoranthene	<0.05	-	280	0 (6)
Fluorene	<0.05	-	170	0 (6)
Indeno(123-cd)pyrene	<0.05	-	27	0 (6)
Naphthalene	<0.05	-	2.3	0 (6)
Phenanthrene	<0.05	-	95	0 (6)
Pyrene	<0.05	-	620	0 (6)
* Concentration expressed in mg/kg except where stated. Assumption of 1 % soil organic matter.				

Table 7: Summary of Chemical Test Results

- 9.3.2 All test results for the potential contaminants of concern are below the relevant assessment criteria (S4UL/C4SL/SSV).
- 9.3.3 TPH screening tests were carried out on selected samples of near surface soil and no significant TPH concentrations were detected.
- 9.3.4 Pesticide screening tests were carried out on two samples of topsoil and pesticide levels were below the detection limit of the laboratory testing equipment.
- 9.3.5 Concentrations of phytotoxic metals are present at levels below those considered to present a risk to plant growth.
- 9.3.6 Based on the findings of the ground investigation and chemical test results presented above, no remedial action in respect of risk to human health is considered necessary for the proposed development at the site.
- 9.3.7 Site-won topsoil should be retained in all gardens and areas of soft landscaping to provide a clean growing medium.

- 9.3.8 Should any areas of previously unidentified potentially contaminated soil be encountered during construction works, we would recommend consultation with Georisk to ensure that our recommendations continue to apply. Any potentially contaminated soils should be left in situ pending further assessment.
- 9.3.9 During the redevelopment of the site, construction workers are likely to be in direct contact with the near surface soils and appropriate Health and Safety measures will need to be implemented based on the findings of this investigation.
- 9.3.10 Based on the findings of this investigation, it is considered that standard PE/PVC pipe laid in trenches with clean gravel surround should be suitable for use at the site; however, it is recommended that a copy of this report is supplied to utility companies and that their recommendations relating to appropriate supply pipes are adhered to.
- 9.3.11 If required to satisfy planning and/or land quality conditions, this report should be submitted to the Local Authority and/or NHBC/warranty provider for approval in advance of any development works starting on site.

10. ENGINEERING CONSIDERATIONS

10.1 Foundation Design

General

- 10.1.1 This investigation has identified the near-surface soil profile to comprise topsoil overlying variable Superficial Deposits comprising predominantly firm or stiff clay and locally loose or medium dense sand at depth.
- 10.1.2 Groundwater was encountered across much of the site during the fieldwork at depths of between 1.5 and 3.8 m begl, with subsequent groundwater monitoring recording standing water levels, where present, between 1.8 and 2.8 m begl.
- 10.1.3 The proposed development is anticipated to comprise traditional low-rise housing. Across most of the site, following site preparatory works, it is considered that conventional strip/trench fill foundations extending into competent Superficial Deposits should be viable for much of the proposed development.

Majority of Site

- 10.1.4 Geotechnical testing of the near-surface soil indicates it should be classified as a shrinkable soil of medium volume change potential and; therefore, a minimum founding depth of 0.9 m begl would need to be adopted in accordance with NHBC Standards ensuring at least 300 mm penetration into competent undisturbed strata is achieved.
- 10.1.5 Foundations near any trees and/or hedgerows would need to be deepened and heave protection measures adopted in accordance with NHBC Standards Chapter 4.2 'Building Near Trees'. This should be reviewed at detailed design stage once a layout and levels have been finalised. Where foundation depths exceed 2.5 m due to tree influence, the NHBC require a design by an Engineer to demonstrate that potential heave uplift forces can be resisted by the foundation and this usually entails the use of a piled foundation. Further ground investigation may be required for pile design purposes. Any

proposed deepened foundation dig depths should also be reviewed against the ground investigation data and the potential for encountering loose sands at depth. An alternative foundation solution may be appropriate in this instance.

- 10.1.6 For a strip/trench fill foundation bearing onto firm-stiff Superficial Deposits, an allowable bearing pressure of 100 kN/m² is considered appropriate for design purposes. Due to the variability of the Superficial Deposits (both laterally and with depth) it is recommended that mesh reinforcement is incorporated into all foundation construction to minimise the risk of unacceptable settlement. Total settlements would not be anticipated to exceed 25 mm.
- 10.1.7 Care should be taken to limit the exposure of any excavation prepared to receive concrete, which may cause deterioration and a reduction in bearing capacity. Foundation excavations should be inspected by qualified personnel and if any soft/loose material is encountered at formation level, foundations would need to be deepened further into competent material and infilled with lean mix concrete.

Central-Western Area

- 10.1.8 Towards the central and western areas of the site, the Superficial Deposits are typically more variable with soft or loose material near surface that is susceptible to collapse of excavation sides; these locations are identified on Drawing No. 23018/1 included in Appendix A. In these locations the use of traditional spread foundations is not considered viable, and consideration will need to be given to an abnormal foundation solution.
- 10.1.9 Shallow vibro treatment of near surface soft and loose superficial deposits, in conjunction with reinforced widened strip foundations could be considered as a potential foundation solution. However, reference should be made to specialist subcontractors for advice on the detailed design and application of their proprietary vibro treatment system in the prevailing ground conditions. To assess this further, they may wish to view the ground in trial pits which would be best undertaken once the housing layout has been finalised.
- 10.1.10 Mini piling is another potential option; however, discussions would need to be held with specialist contractors to determine the most suitable pile design and the piling scheme. As the load bearing characteristics of piles are dependent upon the type of pile used, method of installation, construction and workmanship, it is recommended that detailed discussions are held with suitably experienced piling contractors prior to finalising design. In any event, positive assurances should be sought from the piling contractor in respect of performance and a representative number of piles should be subject to pile loading tests. Further ground investigation comprising deeper boreholes may be required for pile design purposes.

10.2 Floor Slabs

- 10.2.1 Given the presence of shrinkable soil beneath the site, it is recommended that a suspended floor slab design (cast in situ or 'beam and block' with underfloor void) is adopted for the proposed development.

10.3 Buried Concrete Requirements

- 10.3.1 For the near-surface Superficial Deposits, water soluble sulphate testing results (expressed as SO₄ in a 2:1 water:soil extract) range from 0.0019 to 0.064 g/l with pH values of 7.2 to 8.1. Following the guidance given in the BRE Special Digest (2005) and assuming 'mobile' groundwater conditions for a

'natural ground' site, the Aggressive Chemical Environment (ACEC) classification has been determined. These indicate a Design Sulphate Class of DS-1 and an ACEC class of AC-1 apply at the site.

10.4 Road/Pavement Design

- 10.4.1 Final road and pavement levels are not known at this stage, however, assuming a firm clay subgrade and based on the laboratory test results from the present investigation, an equilibrium CBR value of 3% should be assumed for preliminary design purposes.
- 10.4.2 The proposed formation should be proof rolled and caution must be exercised to ensure that any soft/loose areas identified within the formation are excavated and filled with suitably compacted granular fill. The near-surface soils have the potential to be disturbed by weathering and site traffic. Suitable workings methods should therefore be employed to avoid this and therefore reduce the potential to create volumes of unsuitable fill material.
- 10.4.3 Once road alignments and levels have been finalised, in situ CBR tests should be undertaken to allow detailed design of road formations to be made.

10.5 Excavations

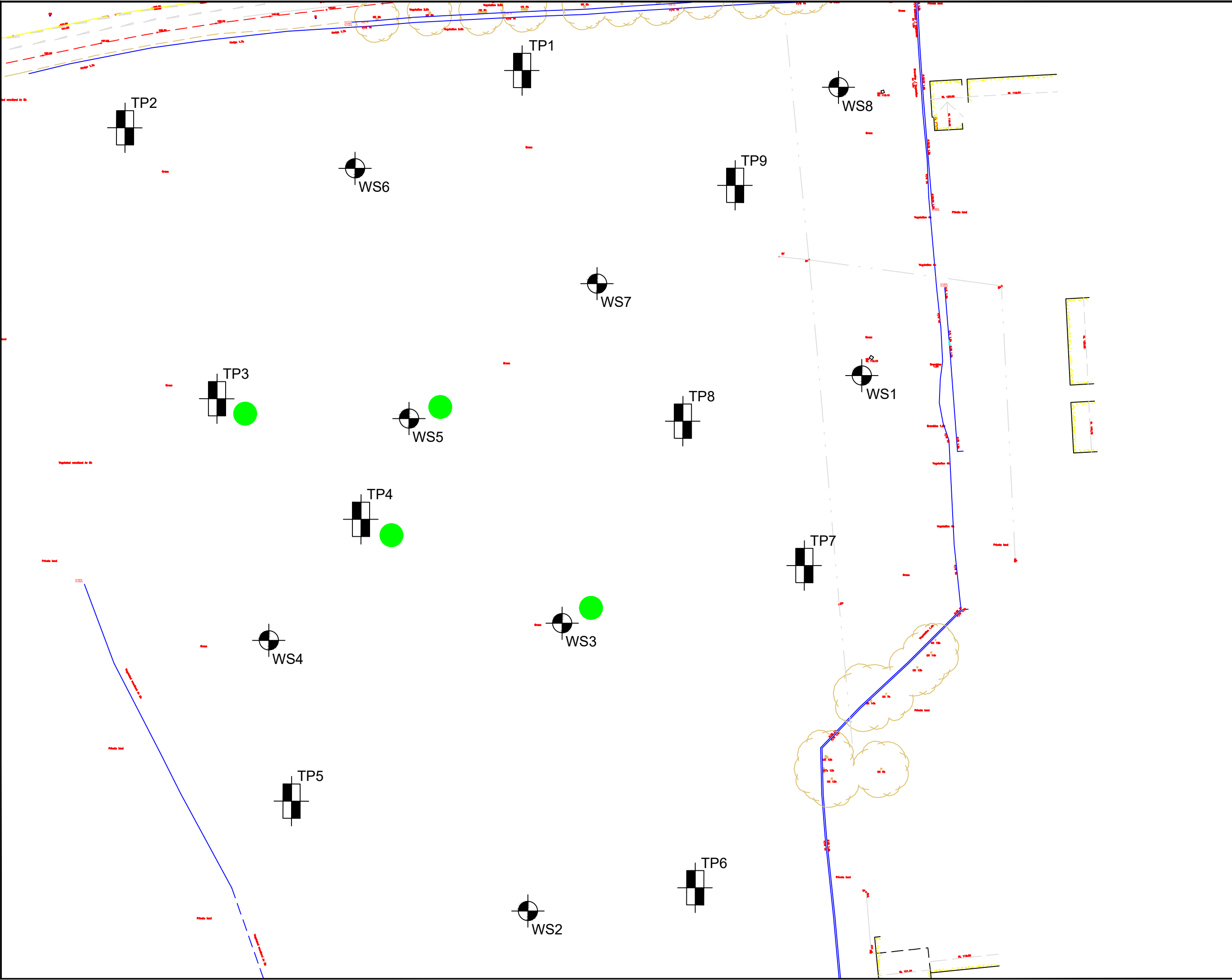
- 10.5.1 Conventional mechanical excavation should be readily achievable through the near-surface soils to depths of at least 3.0 m begl.
- 10.5.2 Trial pit instability was recorded in some locations where sand was encountered; however, shallow foundation excavations typically should not extend to this depth. Shallow excavations should remain stable in the short term; however, instability may occur in any deeper excavations or excavations left open for extended periods of time. Support should be provided in any excavations requiring man entry.
- 10.5.3 The findings of this investigation indicate that significant water ingress is unlikely to occur in shallow temporary excavations; however, any localised seepage should be controllable by sump pumping.

10.6 Soakaways

- 10.6.1 Infiltration testing has not been carried out as part of this investigation; however, due to the ground conditions encountered comprising predominantly clay with bands of sand with associated perched groundwater, it is considered that the use of soakaway drainage is not considered viable, and an alternative drainage solution will need to be adopted.

**APPENDIX A
DRAWING**

Drawing No.	Drawing Title
23018/1	Exploratory Hole Location Plan



Notes

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This drawing is to be read in conjunction with all development drawings, and designers risk assessments.

This drawing must not be scaled. Work to figured dimensions only.

KEY



Dynamic Percussive Sampling Borehole Location



Trial Pit Location



Locations of more variable Superficial Deposits at shallow depth

Rev	Date	Description	Initials

Client

OWL HOMES LIMITED



Varney House, 91 Spon Lane, West Bromwich, B70 6AB
T: 0121 553 4044, F: 0121 553 1112
www.georisk-uk.com, email: enquiries@georisk-uk.com

Contract

CHERRY ORCHARD FARM
HIGHAM ON THE HILL

Drawing Title

EXPLORATORY HOLE
LOCATION PLAN

Drawing Status

FINAL

Drawn By	RC	Date	23/02/23
Checked/Approved	AIB	Date	23/02/23

Scale	NTS	Drawing Number	23018/1
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APPENDIX B
EXPLORATORY HOLE RECORDS

Remarks: Groundwater not encountered during drilling.
Soil-gas and groundwater monitoring point installed on completion.

georiskMANAGEMENT Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com						Borehole No. WS2 Sheet 1 of 1				
Project Name Cherry Orchard Farm, Higham on the Hill				Project No. 23018		Co-ords: 437769.00 E 295246.00 N		Hole Type WLS		
Equipment: Dynamic Percussive Sampling Rig						Level: 111.89 m AOD		Scale 1:25		
Client: Owl Homes Limited						Dates: 09-02-2023		Logged By RC		
Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.20	D1		0.30	111.59		TOPSOIL: Grass over dark brown sandy slightly gravelly clay with rootlets.		
					0.60	111.29		Soft to firm light brown very sandy CLAY. (SUPERFICIAL DEPOSITS)		
								Firm becoming stiff a depth of approximately 0.9 m begl brown and grey sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and occasional sandstone. (SUPERFICIAL DEPOSITS)		
		1.00	SPT	N=13 (1,2/3,3,3,4)						1
		1.50	D2							
		2.00	SPT	N=16 (2,3/4,4,4,4)						2
		2.50	D3							
3.00	SPT	N=25 (3,4/5,7,7,6)	3.00	108.89		End of Borehole at 3.00 m	3			
									4	
Remarks: Groundwater not encountered during drilling. Backfilled with arisings on completion.										

Project Name

Cherry Orchard Farm, Higham on the Hill

Project No.

23018

Co-ords: 437775.00 E 295296.00 N

Hole Type

WLS

Equipment: Dynamic Percussive Sampling Rig

Level: 112.39 m AOD

Scale

1:25

Client: Owl Homes Limited

Dates: 09-02-2023

Logged By

RC

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.10	D1	N=8 (1,2/2,2,2,2)	0.30	112.09		TOPSOIL: Grass over dark brown clayey sand with rootlets.		
		1.00	SPT		0.70	111.69		Soft brown very sandy CLAY. (SUPERFICIAL DEPOSITS)		
					0.90	111.49		Brown clayey SAND. (SUPERFICIAL DEPOSITS)		
					2.00	SPT	N=14 (5,7/4,4,3,3)	2.50	109.89	
		2.70	109.69		Reddish brown clayey SAND. (SUPERFICIAL DEPOSITS)					
		3.00	SPT	N=5 (1,0/1,1,2,1)	3.00	109.39		Very soft silty very sandy CLAY with a band of firm clay at a depth of approximately 0.65 to 0.7 m begl. (SUPERFICIAL DEPOSITS)		
							End of Borehole at 3.00 m			

Remarks: Groundwater encountered at approximately 2.0 m bgl during drilling. Backfilled with arisings on completion.

Project Name

Cherry Orchard Farm, Higham on the Hill

Project No.

23018

Co-ords: 437724.00 E 295293.00 N

Hole Type

WLS

Equipment: Dynamic Percussive Sampling Rig

Level: 111.50 m AOD

Scale

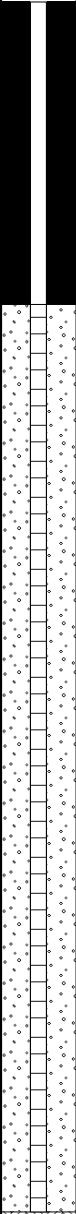
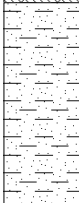
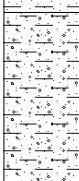
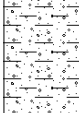
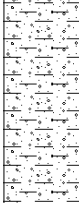
1:25

Client: Owl Homes Limited

Dates: 09-02-2023

Logged By

RC

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	D1					TOPSOIL: Grass over dark brown sandy slightly gravelly clay with rootlets.	
		0.40	D2		0.30	111.20		Soft to firm becoming firm to stiff at a depth of approximately 0.7 m begl brown and orangish brown very sandy CLAY with occasional gravel of quartzite. (SUPERFICIAL DEPOSITS)	
		1.00	SPT	N=12 (1,2/2,3,4,3)	1.00	110.50		Firm to stiff becoming stiff at a depth of approximately 1.5 m begl brown and grey sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	1
		1.60	D3						
		2.00	SPT	N=20 (3,3/4,5,6,5)					2
					2.65	108.85		Firm orangish brown very sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone.	
					2.70	108.80			
					2.80	108.70			
					2.90	108.60		(SUPERFICIAL DEPOSITS)	
		3.00	SPT	N=12 (2,3/3,3,3,3)				Brown gravelly SAND. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	3
								Firm brown very silty sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	
		3.60	D4		3.40	108.10		Firm to stiff brown very sandy CLAY. (SUPERFICIAL DEPOSITS)	
								Loose brown SAND. (SUPERFICIAL DEPOSITS)	
		4.00	SPT	N=6 (1,1/1,2,1,2)					4
		5.00	SPT Type	N=9 (2,1/2,2,3,2) Results	5.00	106.50		End of Borehole at 5.00 m	

Remarks: Groundwater encountered at approximately 2.6 m begl during drilling.
Soil-gas and groundwater monitoring point installed on completion.

Remarks: Groundwater encountered at approximately 2.6 m begl during drilling. Backfilled with arisings on completion.

Remarks: Groundwater encountered at approximately 1.5 m begl during drilling. Soil-gas and groundwater monitoring point installed on completion.

Remarks: Groundwater encountered at approximately 3.8 m begl during drilling. Backfilled with arisings on completion.

Remarks: Groundwater encountered at approximately 2.6 m begl during drilling. Backfilled with arisings on completion.

georiskMANAGEMENT		Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com			Trial Pit No. TP1 Sheet 1 of 1			
Project Name Cherry Orchard Farm, Higham on the Hill		Project No. 23018		Co-ords: 437768.00 E 295392.00 N Level: 111.32 m AOD		Date 10/02/2023		
Equipment: JCB 3CX				Dimensions: -		Scale 1:25		
Client: Owl Homes Limited				Depth: 3.40 m		Logged By RC		
Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.20	D1		0.30	111.02		TOPSOIL: Grass over dark brown sandy clay with rootlets and frequent gravel of quartzite.	
				0.80	110.52		Firm orangish brown, brown and light grey sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and occasional sandstone. (SUPERFICIAL DEPOSITS)	
	1.20	D2					Stiff brown and light grey sandy gravelly CLAY with a band of reddish brown very clayey sand at a depth of approximately 2.1 m begl and a pocket of yellowish brown gravelly cobbly sand at a depth of 2.9 m begl. Gravel is subrounded to subangular fine to coarse quartzite and occasional sandstone. (SUPERFICIAL DEPOSITS)	
	2.30	D3						
				3.40	107.92		End of Trial Pit at 3.40 m	
		Type	Results					
Remarks: Groundwater not encountered during excavation.								
Stability: Pit sides stable.								

georiskMANAGEMENT		Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com			Trial Pit No. TP2 Sheet 1 of 1			
Project Name Cherry Orchard Farm, Higham on the Hill		Project No. 23018		Co-ords: 437699.00 E 295382.00 N Level: 107.95 m AOD		Date 10/02/2023		
Equipment: JCB 3CX				Dimensions: -		Scale 1:25		
Client: Owl Homes Limited				Depth: 3.10 m		Logged By RC		
Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
▼	0.50	D1		0.30	107.65		TOPSOIL: Grass over dark brown sandy clay with rootlets and rare gravel of quartzite.	1
							Firm reddish brown very sandy CLAY with frequent gravel of quartzite. (SUPERFICIAL DEPOSITS)	
				0.80	107.15		Firm to stiff reddish brown very sandy gravelly CLAY with frequent cobble of quartzite. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	
	2.60	D2		1.90	106.05		Reddish brown silty SAND. (SUPERFICIAL DEPOSITS)	2
				2.20	105.75		Firm to stiff brown very silty slightly sandy CLAY. (SUPERFICIAL DEPOSITS)	
				2.50	105.45		Stiff brown becoming grey at a depth of approximately 2.7 m begl silty slightly sandy CLAY. (SUPERFICIAL DEPOSITS)	
			3.10	104.85		End of Trial Pit at 3.10 m	3	
								4
Remarks: Slight groundwater seepage at approximately 2.0 m begl during excavation. Stability: Pit sides stable.								

georiskMANAGEMENT		Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com		Trial Pit No. TP3 Sheet 1 of 1				
Project Name Cherry Orchard Farm, Higham on the Hill		Project No. 23018		Co-ords: 437715.00 E 295335.00 N Level: 110.72 m AOD				
Equipment: JCB 3CX		Dimensions: -		Scale 1:25				
Client: Owl Homes Limited		Depth: 3.60 m		Logged By RC				
Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
▼	0.50	D1		0.30	110.42		TOPSOIL: Grass over dark brown clayey sand with rootlets.	
				0.40	110.32		Reddish brown very clayey SAND. (SUPERFICIAL DEPOSITS)	
	1.60	D2					Firm light brown sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	
				0.90	109.82		Stiff brown and grey sandy very gravelly CLAY with pockets of reddish brown sand. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	1
	2.60	D3		1.50	109.22		Very soft yellowish brown, reddish brown and light grey very sandy very gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	
				2.00	108.72		Firm reddish brown and light grey very sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	2
				2.65	108.07		Reddish brown silty SAND. (SUPERFICIAL DEPOSITS)	3
				3.60	107.12		End of Trial Pit at 3.60 m	4
	Type	Results						
	Remarks: Slight groundwater seepage at approximately 3.0 m begl during excavation.							
Stability: Spalling of pit sides below 2.6 m begl in sand.								

Project Name Cherry Orchard Farm, Higham on the Hill	Project No. 23018	Co-ords: 437740.00 E 295314.00 N Level: 111.41 m AOD	Date 10/02/2023
Equipment: JCB 3CX		Dimensions: - Depth: 2.00 m	Scale 1:25
Client: Owl Homes Limited			Logged By RC

Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	1.50	D1		0.30	111.11		TOPSOIL: Brown slightly gravelly sand with rootlets.
							Reddish brown, orangish brown and light grey SAND. (SUPERFICIAL DEPOSITS)
				2.00	109.41		End of Trial Pit at 2.00 m 1 2 3 4
		Type	Results				

Remarks: Groundwater not encountered during excavation.

Stability: Collapse of pit sides from ground level.

georiskMANAGEMENT		Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com			Trial Pit No. TP5 Sheet 1 of 1			
Project Name Cherry Orchard Farm, Higham on the Hill		Project No. 23018	Co-ords: 437728.00 E 295265.00 N Level: 111.74 m AOD		Date 10/02/2023			
Equipment: JCB 3CX			Dimensions: -		Scale 1:25			
Client: Owl Homes Limited			Depth: 3.00 m		Logged By RC			
Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.10	D1		0.30	111.44		TOPSOIL: Grass over dark brown sandy clay with rootlets.	
				0.70	111.04		Soft to firm orangish brown and light grey very sandy CLAY. (SUPERFICIAL DEPOSITS)	
				1.10	110.64		Firm to stiff brown sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	1
	1.60	D2					Stiff brown and light grey sandy very gravelly CLAY with occasional cobble of quartzite. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	
				3.00	108.74		End of Trial Pit at 3.00 m	3
		Type	Results					4
Remarks: Groundwater not encountered during excavation.								
Stability: Pit sides stable.								

georiskMANAGEMENT		Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com			Trial Pit No. TP6 Sheet 1 of 1			
Project Name Cherry Orchard Farm, Higham on the Hill		Project No. 23018		Co-ords: 437798.00 E 295250.00 N Level: 112.36 m AOD		Date 10/02/2023		
Equipment: JCB 3CX				Dimensions: -		Scale 1:25		
Client: Owl Homes Limited				Depth: 3.80 m		Logged By RC		
Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
▼	0.50	D1		0.30	112.06		TOPSOIL: Grass over dark brown very clayey sand with rootlets.	1
							Firm brown very sandy CLAY. (SUPERFICIAL DEPOSITS)	
	2.00	D2		1.30	111.06		Stiff brown and grey sandy gravelly CLAY with occasional cobble of quartzite. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)	2
				3.00	109.36		Reddish brown SAND. (SUPERFICIAL DEPOSITS)	3
				3.80	108.56		End of Trial Pit at 3.80 m	4
		Type	Results					
Remarks: Groundwater seepage at approximately 3.5 m begl during excavation.								
Stability: Spalling of pit sides below 3.0 m begl in sand.								

georiskMANAGEMENT		Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com		Trial Pit No. TP7 Sheet 1 of 1					
Project Name Cherry Orchard Farm, Higham on the Hill		Project No. 23018	Co-ords: 437817.00 E 295306.00 N Level: 113.15 m AOD		Date 10/02/2023				
Equipment: JCB 3CX			Dimensions: -		Scale 1:25				
Client: Owl Homes Limited			Depth: 3.60 m		Logged By RC				
Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
▼	1.50	D1		0.30	112.85		TOPSOIL: Grass over dark brown sandy clay with rootlets.		1
				0.60	112.55		Firm reddish brown very sandy CLAY. (SUPERFICIAL DEPOSITS)		
							Firm brown very sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite. (SUPERFICIAL DEPOSITS)		
							Stiff light brown and grey very sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)		
				1.90	111.25		Stiff brown and bluish grey sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)		
2.60	D2						End of Trial Pit at 3.60 m		4
Remarks: Groundwater seepage at approximately 1.8 m begl during excavation.									
Stability: Pit sides stable.									

georiskMANAGEMENT		Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com			Trial Pit No. TP8 Sheet 1 of 1			
Project Name Cherry Orchard Farm, Higham on the Hill		Project No. 23018		Co-ords: 437796.00 E 295331.00 N Level: 112.60 m AOD		Date 10/02/2023		
Equipment: JCB 3CX				Dimensions: -		Scale 1:25		
Client: Owl Homes Limited				Depth: 4.20 m		Logged By RC		
Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.50	D1		0.40	112.20		TOPSOIL: Grass over dark brown sandy clay with rootlets.	
	1.20	D2		1.10	111.50		Firm to stiff brown slightly sandy slightly gravelly CLAY with pockets of reddish brown sand. Gravel is subrounded to subangular fine to coarse quartzite. (SUPERFICIAL DEPOSITS)	1
	2.20	D3					Stiff brown, grey and light grey silty slightly sandy CLAY. (SUPERFICIAL DEPOSITS)	2
				2.80	109.80		Reddish brown silty SAND with frequent pockets of firm reddish brown very silty sandy CLAY. (SUPERFICIAL DEPOSITS)	3
	4.00	D4		4.20	108.40		End of Trial Pit at 4.20 m	4
		Type	Results					
Remarks: Groundwater not encountered during excavation.								
Stability: Pit sides stable.								

georiskMANAGEMENT		Georisk Management Ltd. Tel: 0121 553 4044 email: enquiries@georisk-uk.com www.georisk-uk.com			Trial Pit No. TP9 Sheet 1 of 1							
Project Name Cherry Orchard Farm, Higham on the Hill		Project No. 23018		Co-ords: 437805.00 E 295372.00 N Level: 112.22 m AOD		Date 10/02/2023						
Equipment: JCB 3CX				Dimensions: -		Scale 1:25						
Client: Owl Homes Limited				Depth: 3.20 m		Logged By RC						
Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description					
	Depth (m)	Type	Results									
	1.50	D1		0.20	112.02		TOPSOIL: Grass over dark brown very clayey sand with rootlets.	1				
				0.60	111.62		Firm brown sandy CLAY. (SUPERFICIAL DEPOSITS)					
							Soft to firm orangish brown and light grey very sandy CLAY. (SUPERFICIAL DEPOSITS)					
									1.30	110.92		Stiff brown and grey slightly sandy gravelly CLAY with frequent pockets of reddish brown sand and locally soft clay. Gravel is subrounded to subangular fine to coarse quartzite and sandstone. (SUPERFICIAL DEPOSITS)
												1.70
3.10	D3		3.20	109.02		End of Trial Pit at 3.20 m	3					
								4				
Remarks: Groundwater not encountered during excavation.												
Stability: Pit sides stable.												

APPENDIX C
SOIL-GAS AND GROUNDWATER MONITORING RESULTS

Soil-Gas and Groundwater Monitoring Results

Monitoring Visit No. 1		Date 17/02/2023					Barometric Pressure (mb) - 1003							
Weather Conditions:		Cloudy					Equipment Used - GA5000 and In-Situ dip meter							
Surface Ground Conditions:		Dry												
Ambient Concentration (% Volume):		Bal: 79.2		CH ₄ : 0.0			CO ₂ : 0.1				O ₂ : 20.8			
Monitoring Point		Gas Concentration											Gas Flow	
		Highest					Steady					(Lowest)	Gas Flow Rate	Relative Pressure
Ref:	GWL	CH ₄		CO ₂	CO	H ₂ S	CH ₄		CO ₂	CO	H ₂ S	O ₂		
	(m) bgl	% lel	% v/v	(%)	ppm	ppm	% lel	% v/v	(%)	ppm	ppm	(%)	litre/hr	mb
WS1	Dry	0.0	0.0	2.2	0	0	0.0	0.0	2.2	0	0	18.1	0.0	-0.21
WS4	2.65	0.0	0.0	1.1	0	0	0.0	0.0	1.1	0	0	19.8	0.0	0.07
WS6	Dry	0.0	0.0	0.8	0	0	0.0	0.0	0.8	0	0	20.2	0.0	-0.17

Monitoring Visit No. 2		Date 02/03/2023				Barometric Pressure (mb) - 1016								
Weather Conditions:		Cloudy				Equipment Used - GA2000 and In-Situ dip meter								
Surface Ground Conditions:		Dry												
Ambient Concentration (% Volume):		Bal: 78.7		CH4: 0.0			CO2: 0.0			O2: 21.2				
Monitoring Point		Gas Concentration											Gas Flow	
		Highest					Steady				(Lowest)	Gas Flow Rate	Relative Pressure	
Ref:	GWL	CH4		CO2	CO	H2S	CH4		CO2	CO	H2S			O2
	(m) bgl	% lel	% v/v	(%)	ppm	ppm	% lel	% v/v	(%)	ppm	ppm	(%)	litre/hr	mb
WS1	Dry	0.0	0.0	3.2	-	-	0.0	0.0	3.2	-	-	17.9	0.0	-0.11
WS4	2.77	0.0	0.0	1.5	-	-	0.0	0.0	1.5	-	-	20.3	0.0	0.44
WS6	Dry	0.0	0.0	1.0	-	-	0.0	0.0	1.0	-	-	20.7	0.0	6.26

Monitoring Visit No. 3		Date		09/03/2023				Barometric Pressure (mb) - 982						
Weather Conditions:		Sleet						Equipment Used - GA2000 and In-Situ dip meter						
Surface Ground Conditions:		Snow covered												
Ambient Concentration (% Volume):		Bal: 78.5		CH ₄ : 0.0		CO ₂ : 0.1			O ₂ : 21.3					
Monitoring Point		Gas Concentration											Gas Flow	
		Highest					Steady				(Lowest)	Gas Flow Rate	Relative Pressure	
Ref:	GWL	CH ₄		CO ₂	CO	H ₂ S	CH ₄		CO ₂	CO	H ₂ S			O ₂
	(m) bgl	% lel	% v/v	(%)	ppm	ppm	% lel	% v/v	(%)	ppm	ppm	(%)	litre/hr	mb
WS1	Dry	0.0	0.0	3.5	-	-	0.0	0.0	3.5	-	-	18.0	0.0	0.00
WS4	2.76	0.0	0.0	1.7	-	-	0.0	0.0	1.7	-	-	20.3	0.0	0.03
WS6	Dry	0.0	0.0	1.1	-	-	0.0	0.0	1.1	-	-	20.7	0.0	-0.23

Monitoring Visit No. 4		Date 20/03/2023				Barometric Pressure (mb) - 1001/1002								
Weather Conditions:		Overcast				Equipment Used - GA5000 and In-Situ dip meter								
Surface Ground Conditions:		Damp with wet patches												
Ambient Concentration (% Volume):		Bal: 77.8		CH ₄ : 0.0			CO ₂ : 0.1			O ₂ : 21.6				
Monitoring Point		Gas Concentration											Gas Flow	
		Highest					Steady					(Lowest)	Gas Flow Rate	Relative Pressure
Ref:	GWL	CH ₄		CO ₂	CO	H ₂ S	CH ₄		CO ₂	CO	H ₂ S	O ₂		
	(m) bgl	% lel	% v/v	(%)	ppm	ppm	% lel	% v/v	(%)	ppm	ppm	(%)	litre/hr	mb
WS1	1.80	0.0	0.0	3.1	1	0	0.0	0.0	3.1	0	0	17.5	0.0	0.27
WS4	2.25	0.0	0.0	2.2	1	0	0.0	0.0	2.2	0	0	18.8	0.0	5.72
WS6	2.21	0.0	0.0	1.7	1	0	0.0	0.0	1.7	1	0	17.9	0.1	17.45

Notes:

(m) bgl - metres below ground level GWL - groundwater level

	Job Title:	Cherry Orchard Farm, Higham on the Hill	Job No:	23018
	Client:	Owl Homes Limited	Table Number:	1

APPENDIX D
CHEMICAL TEST RESULTS



Rowena Cameron
Georisk Management Limited
Varney House
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B70 6AB

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e: Rowena.Cameron@georisk-uk.com

t: 01923 225404
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Analytical Report Number : 23-18184

Project / Site name:	Cherry Orchard Farm Higham on the Hill	Samples received on:	16/02/2023
Your job number:	23018	Samples instructed on / Analysis started on:	16/02/2023
Your order number:	23018	Analysis completed by:	27/02/2023
Report Issue Number:	1	Report issued on:	27/02/2023
Samples Analysed:	6 soil samples		

Signed: _____

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 23-18184
Project / Site name: Cherry Orchard Farm Higham on the Hill
Your Order No: 23018

Lab Sample Number				2588988	2588989	2588990	2588991	2588992
Sample Reference				WS2	WS3	WS5	WS7	TP1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.30	0.10	0.20
Date Sampled				09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	14	13	16	18
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.8	0.8	2

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.5	5.2	5.2	5.8	5.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	1	< 1.0	< 1.0	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0092	0.0099	0.0047	0.0035	0.006

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.6	6.9	6.7	7.4	8.5
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.4	0.6	0.8	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	15	15	19	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	12	13	14	21
Lead (aqua regia extractable)	mg/kg	1	MCERTS	29	29	19	23	37
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	9.5	11	15	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	51	50	45	57	62

Petroleum Hydrocarbons

TPH C10 - C40_EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	15	< 10	< 10	< 10
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Analytical Report Number: 23-18184
Project / Site name: Cherry Orchard Farm Higham on the Hill
Your Order No: 23018

Lab Sample Number				2588988	2588989	2588990	2588991	2588992
Sample Reference				WS2	WS3	WS5	WS7	TP1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.30	0.10	0.20
Date Sampled				09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Pesticide and Herbicide Screen								
GCMS Pesticide Screen		N/A	NONE	-	-	-	-	None Detected

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number: 23-18184
Project / Site name: Cherry Orchard Farm Higham on the Hill
Your Order No: 23018

Lab Sample Number	2588993			
Sample Reference	TP5			
Sample Number	None Supplied			
Depth (m)	0.10			
Date Sampled	09/02/2023			
Time Taken	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	19
Total mass of sample received	kg	0.001	NONE	2

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0049

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.4
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	18
Lead (aqua regia extractable)	mg/kg	1	MCERTS	41
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	61

Petroleum Hydrocarbons

TPH C10 - C40_EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10
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Analytical Report Number: 23-18184
Project / Site name: Cherry Orchard Farm Higham on the Hill
Your Order No: 23018

Lab Sample Number				2588993
Sample Reference				TP5
Sample Number				None Supplied
Depth (m)				0.10
Date Sampled				09/02/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Pesticide and Herbicide Screen				
GCMS Pesticide Screen		N/A	NONE	None Detected

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number : 23-18184
Project / Site name: Cherry Orchard Farm Higham on the Hill

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2588988	WS2	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2588989	WS3	None Supplied	0.1	Brown clay and loam with gravel and vegetation.
2588990	WS5	None Supplied	0.3	Brown clay and loam with gravel and vegetation.
2588991	WS7	None Supplied	0.1	Brown clay and loam with gravel and vegetation.
2588992	TP1	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2588993	TP5	None Supplied	0.1	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 23-18184

Project / Site name: Cherry Orchard Farm Higham on the Hill

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
GC Pesticide Screen (TIC)	Analysis of unknown pesticides by GCMS	GC Pesticide Screen (TIC)	L064B	D	NONE



Analytical Report Number : 23-18184
Project / Site name: Cherry Orchard Farm Higham on the Hill

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Analytical Report Number : 23-18184
Project / Site name: Cherry Orchard Farm Higham on the Hill

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP1	None Supplied	S	2588992	c	Total cyanide in soil	L080-PL	c
TP5	None Supplied	S	2588993	c	Total cyanide in soil	L080-PL	c
WS2	None Supplied	S	2588988	c	Total cyanide in soil	L080-PL	c
WS3	None Supplied	S	2588989	c	Total cyanide in soil	L080-PL	c
WS5	None Supplied	S	2588990	c	Total cyanide in soil	L080-PL	c
WS7	None Supplied	S	2588991	c	Total cyanide in soil	L080-PL	c



Rowena Cameron
Georisk Management Limited
Varney House
91 Spon Lane
West Bromwich
B70 6AB

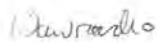
i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: Rowena.Cameron@georisk-uk.com

Analytical Report Number : 23-18487

Project / Site name:	Cherry Orchard Farm Higham on the Hill	Samples received on:	16/02/2023
Your job number:	23018	Samples instructed on/ Analysis started on:	16/02/2023
Your order number:	23018	Analysis completed by:	01/03/2023
Report Issue Number:	1	Report issued on:	02/03/2023
Samples Analysed:	8 soil samples		


Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-18487

Project / Site name: Cherry Orchard Farm Higham on the Hill

Your Order No: 23018

Lab Sample Number				2590981	2590982	2590983	2590984	2590985
Sample Reference				WS3	TP1	TP3	TP5	TP7
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.70	1.20	1.60	1.60	1.50
Date Sampled				09/02/2023	10/02/2023	10/02/2023	10/02/2023	10/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	13	23	14	13
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	8	7.9	8	8
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0019	0.0061	0.0061	0.027	0.0062

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-18487

Project / Site name: Cherry Orchard Farm Higham on the Hill

Your Order No: 23018

Lab Sample Number				2590986	2590987	2590988
Sample Reference				TP8	TP9	TP6
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.20	1.50	2.00
Date Sampled				10/02/2023	10/02/2023	10/02/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	19	16	13
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	7.2	8.1
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.064	0.007	0.024

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-18487

Project / Site name: Cherry Orchard Farm Higham on the Hill

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2590981	WS3	None Supplied	1.7	Brown sand.
2590982	TP1	None Supplied	1.2	Brown clay and sand with vegetation.
2590983	TP3	None Supplied	1.6	Brown clay and sand with gravel.
2590984	TP5	None Supplied	1.6	Brown loam and clay with gravel and chalk.
2590985	TP7	None Supplied	1.5	Brown clay and sand with gravel.
2590986	TP8	None Supplied	1.2	Brown clay and loam with gravel.
2590987	TP9	None Supplied	1.5	Brown clay and sand with gravel.
2590988	TP6	None Supplied	2	Brown clay and sand with gravel and vegetation.

Analytical Report Number : 23-18487

Project / Site name: Cherry Orchard Farm Higham on the Hill

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 23-18487

Project / Site name: Cherry Orchard Farm Higham on the Hill

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP1	None Supplied	S	2590979	c	None Supplied	None Supplied	None Supplied
TP5	None Supplied	S	2590980	c	None Supplied	None Supplied	None Supplied
WS2	None Supplied	S	2590975	c	None Supplied	None Supplied	None Supplied
WS3	None Supplied	S	2590976	c	None Supplied	None Supplied	None Supplied
WS5	None Supplied	S	2590977	c	None Supplied	None Supplied	None Supplied
WS7	None Supplied	S	2590978	c	None Supplied	None Supplied	None Supplied

APPENDIX E
GEOTECHNICAL TEST RESULTS

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Georisk Management Limited
Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB
Contact: Rowena Cameron
Site Address: Cherry Orchard Farm Higham on the Hill

Client Reference: 23018
Job Number: 23-18492-1
Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 27/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

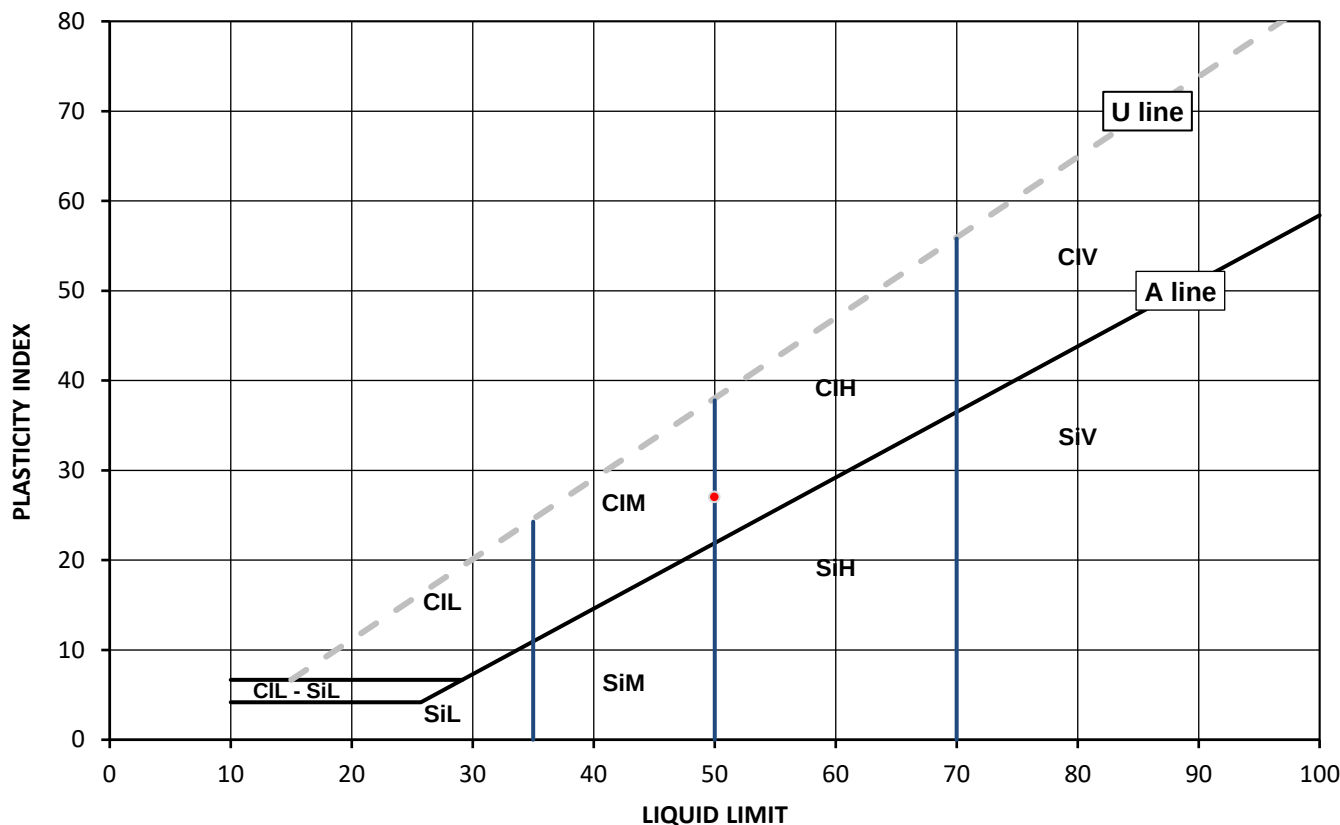
Test Results:

Laboratory Reference: 2591018
Hole No.: WS1
Sample Reference: Not Given
Sample Description: Brownish grey slightly gravelly slightly sandy CLAY

Depth Top [m]: 1.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
27	50	23	27	98



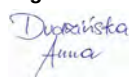
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Georisk Management Limited
Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB
Contact: Rowena Cameron
Site Address: Cherry Orchard Farm Higham on the Hill

Client Reference: 23018
Job Number: 23-18492-1
Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 27/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

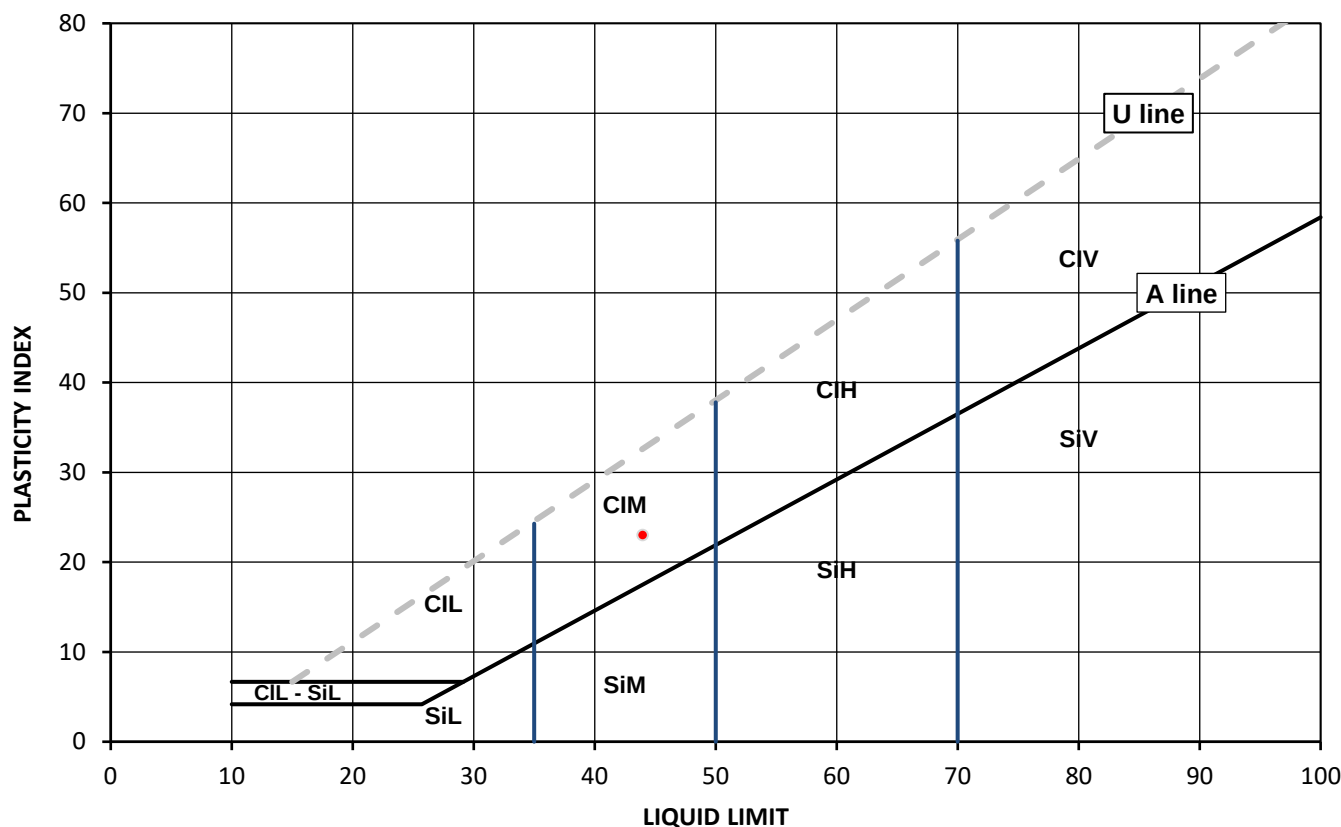
Test Results:

Laboratory Reference: 2591019
Hole No.: WS2
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 2.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	44	21	23	92



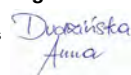
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Georisk Management Limited
Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB
Contact: Rowena Cameron
Site Address: Cherry Orchard Farm Higham on the Hill

Client Reference: 23018
Job Number: 23-18492-1
Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 27/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

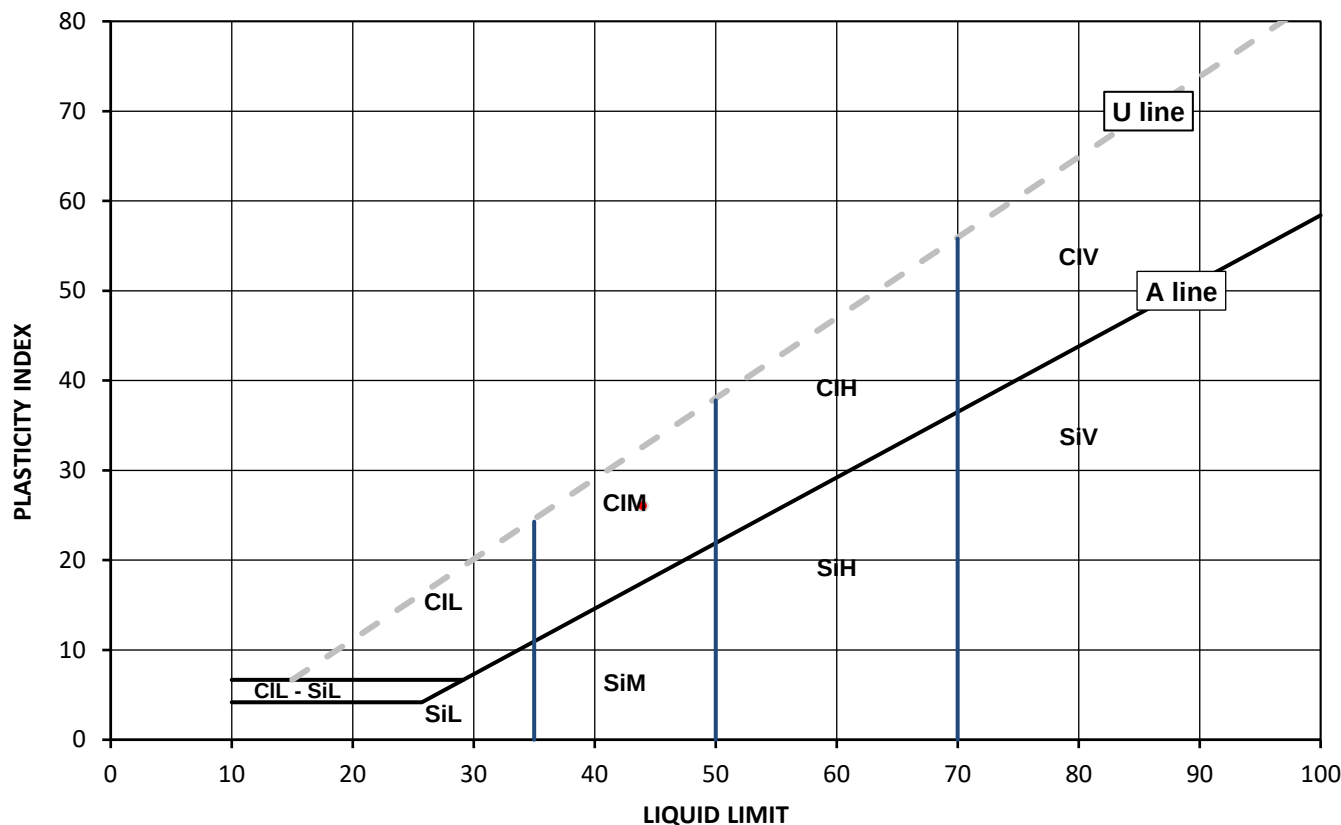
Test Results:

Laboratory Reference: 2591020
Hole No.: WS4
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 1.60
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
15	44	18	26	92



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Georisk Management Limited
Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB
Contact: Rowena Cameron
Site Address: Cherry Orchard Farm Higham on the Hill

Client Reference: 23018
Job Number: 23-18492-1
Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 27/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

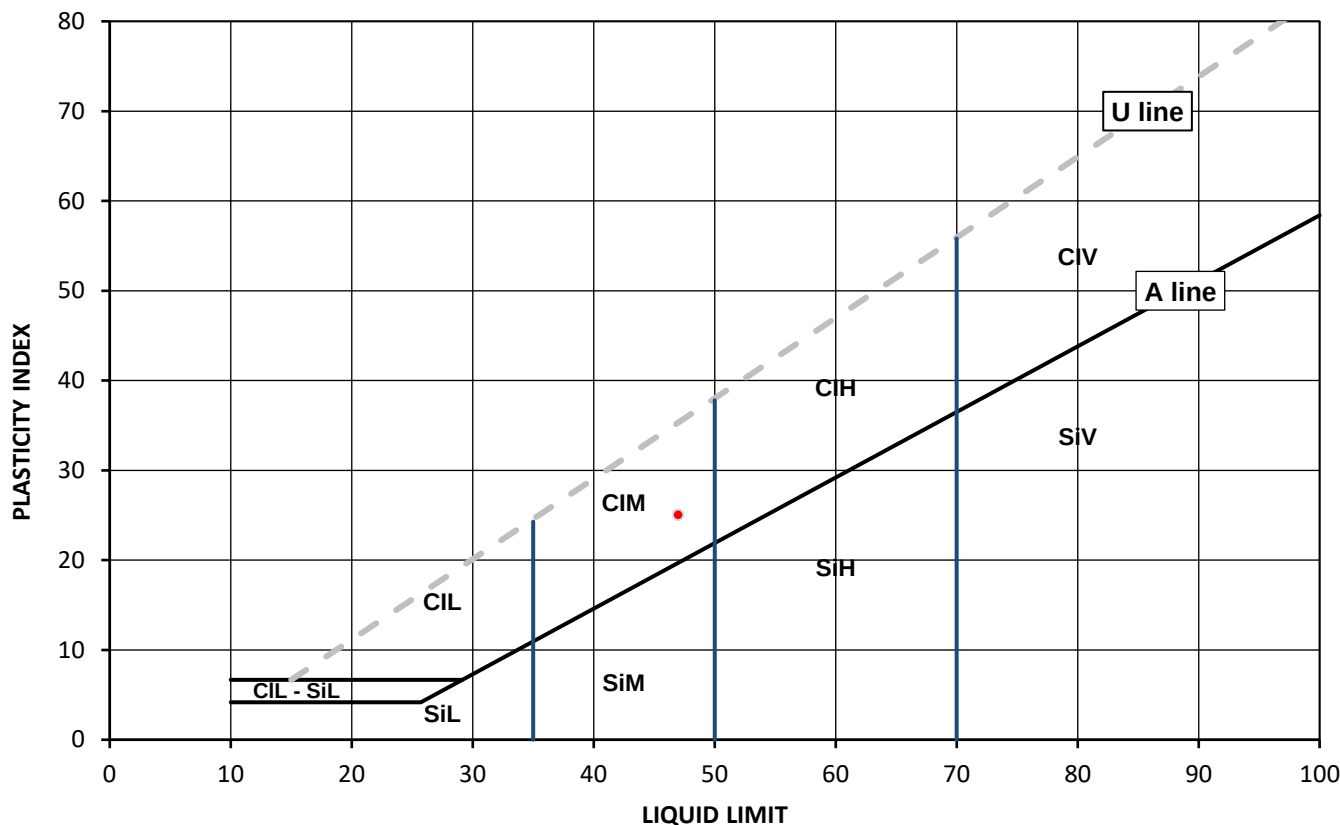
Test Results:

Laboratory Reference: 2591021
Hole No.: WS5
Sample Reference: Not Given
Sample Description: Brown slightly gravelly slightly sandy CLAY

Depth Top [m]: 1.80
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
20	47	22	25	95



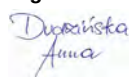
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
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Client: Georisk Management Limited
Client Address: Varney House, 91 Spon Lane,
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Site Address: Cherry Orchard Farm Higham on the Hill

Client Reference: 23018
Job Number: 23-18492-1
Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 27/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

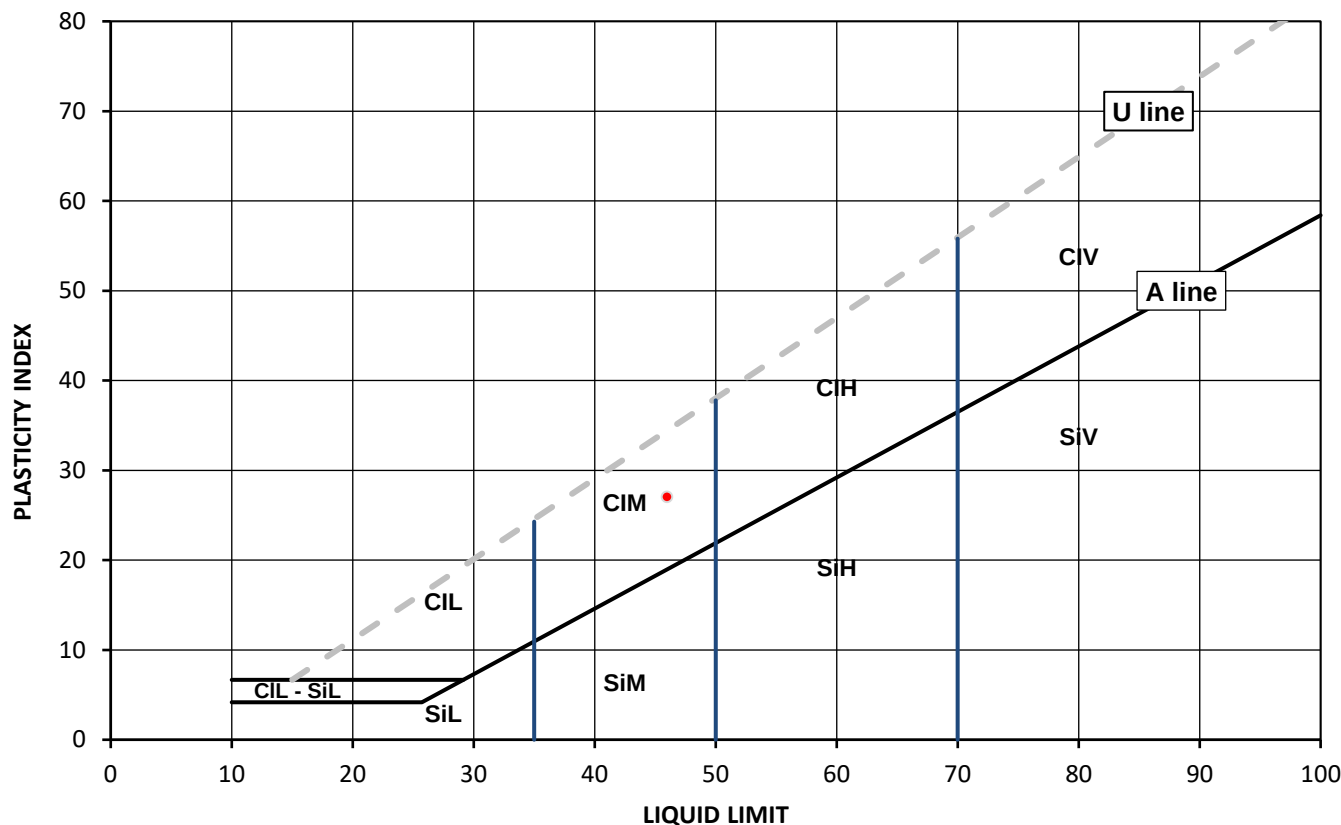
Test Results:

Laboratory Reference: 2591022
Hole No.: WS8
Sample Reference: Not Given
Sample Description: Brown slightly gravelly slightly sandy CLAY

Depth Top [m]: 1.30
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
19	46	19	27	92



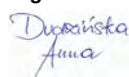
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Georisk Management Limited
Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB
Contact: Rowena Cameron
Site Address: Cherry Orchard Farm Higham on the Hill

Client Reference: 23018
Job Number: 23-18492-1
Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 27/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

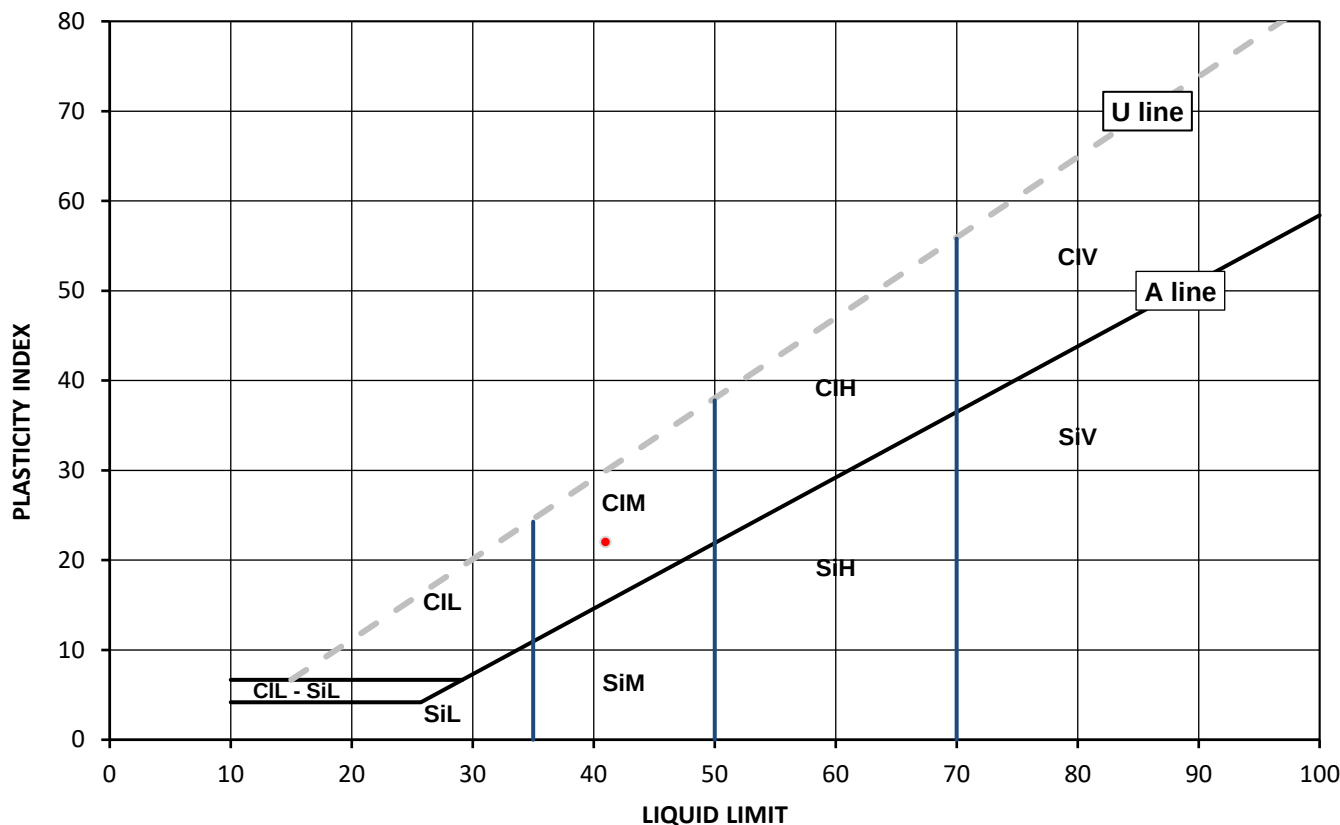
Test Results:

Laboratory Reference: 2591023
Hole No.: TP1
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 2.30
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	41	19	22	92



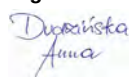
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Georisk Management Limited
Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB
Contact: Rowena Cameron
Site Address: Cherry Orchard Farm Higham on the Hill

Client Reference: 23018
Job Number: 23-18492-1
Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 27/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

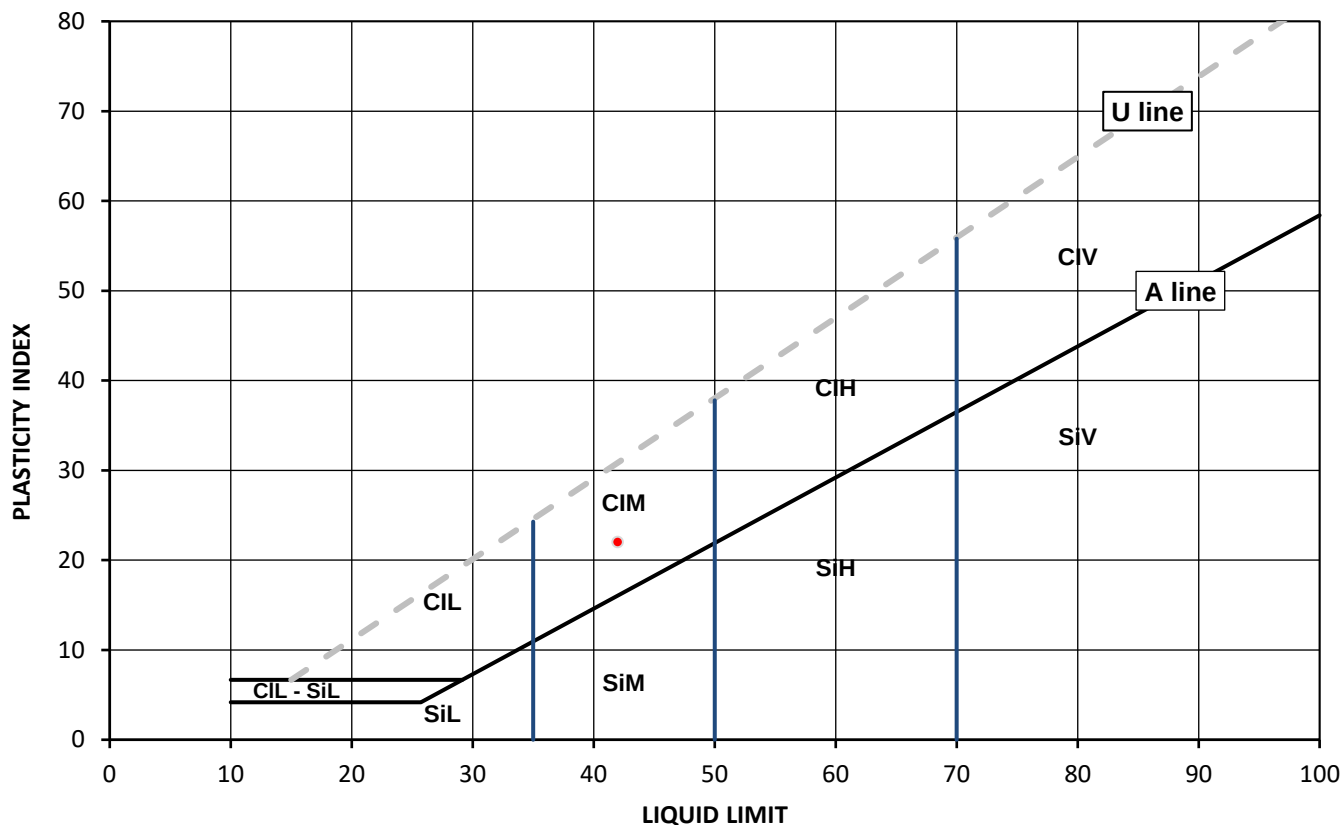
Test Results:

Laboratory Reference: 2591024
Hole No.: TP6
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 2.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	42	20	22	93



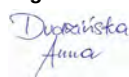
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Georisk Management Limited

Water Content by BS 1377-2:1990: Clause 3.2 Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5

Client Reference: 23018

Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB

Job Number: 23-18492-1

Contact: Rowena Cameron

Date Sampled: 10/02/2023

Site Address: Cherry Orchard Farm Higham on the Hill

Date Received: 16/02/2023

Date Tested: 27/02/2023

Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m						%	%	%	%	Mg/m3	Mg/m3	Mg/m3			
2591018	WS1	Not Given	1.50	Not Given	D	Brownish grey slightly gravelly slightly sandy CLAY	Atterberg 1 Point	27		98	50	23	27						
2591019	WS2	Not Given	2.50	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	17		92	44	21	23						
2591020	WS4	Not Given	1.60	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	15		92	44	18	26						
2591021	WS5	Not Given	1.80	Not Given	D	Brown slightly gravelly slightly sandy CLAY	Atterberg 1 Point	20		95	47	22	25						
2591022	WS8	Not Given	1.30	Not Given	D	Brown slightly gravelly slightly sandy CLAY	Atterberg 1 Point	19		92	46	19	27						
2591023	TP1	Not Given	2.30	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	17		92	41	19	22						
2591024	TP6	Not Given	2.00	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	17		93	42	20	22						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Dudzińska Anna

Anna Dudzińska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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4041

Client: Georisk Management Limited

Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB

Contact: Rowena Cameron

Site Address: Cherry Orchard Farm Higham on the Hill

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

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

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client Reference: 23018

Job Number: 23-18492-1

Date Sampled: 10/02/2023

Date Received: 16/02/2023

Date Tested: 27/02/2023

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2591018	WS1	Not Given	1.50	Not Given	D	Brownish grey slightly gravelly slightly sandy CLAY		27	Sample was quartered, oven dried at 107.5 °C			
2591019	WS2	Not Given	2.50	Not Given	D	Brown slightly gravelly sandy CLAY		17	Sample was quartered, oven dried at 107.5 °C			
2591020	WS4	Not Given	1.60	Not Given	D	Brown slightly gravelly sandy CLAY		15	Sample was quartered, oven dried at 107.5 °C			
2591021	WS5	Not Given	1.80	Not Given	D	Brown slightly gravelly slightly sandy CLAY		20	Sample was quartered, oven dried at 107.5 °C			
2591022	WS8	Not Given	1.30	Not Given	D	Brown slightly gravelly slightly sandy CLAY		19	Sample was quartered, oven dried at 107.5 °C			
2591023	TP1	Not Given	2.30	Not Given	D	Brown slightly gravelly sandy CLAY		17	Sample was quartered, oven dried at 107.5 °C			
2591024	TP6	Not Given	2.00	Not Given	D	Brown slightly gravelly sandy CLAY		17	Sample was quartered, oven dried at 107.5 °C			

Comments:

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Signed:

Dudzińska Anna

Anna Dudzińska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR)

Tested in Accordance with: BS 1377-4: 1990: Clause 7

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Georisk Management Limited
Client Address: Varney House, 91 Spon Lane,
West Bromwich, B70 6AB
Contact: Rowena Cameron
Site Address: Cherry Orchard Farm Higham on the Hill

Client Reference: 23018
Job Number: 23-18492-1
Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 28/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

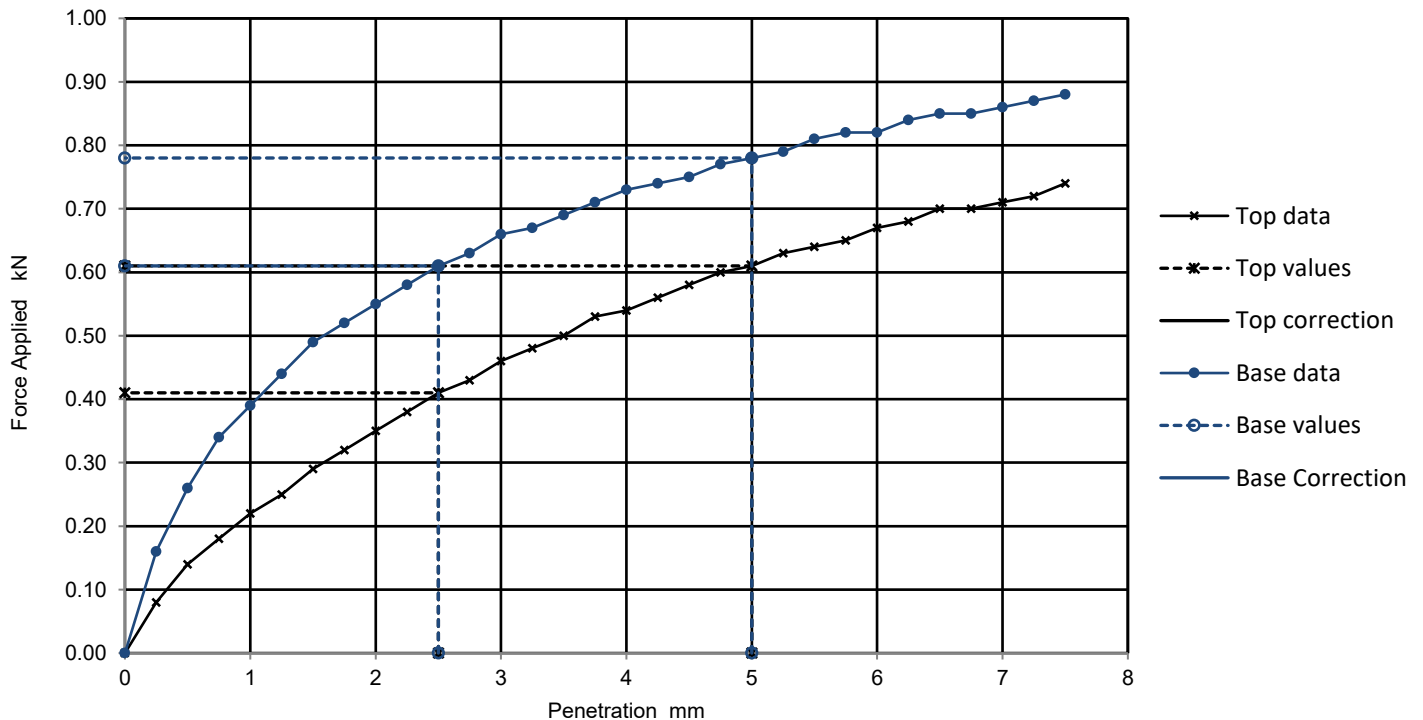
Laboratory Reference: 2591025
Hole No.: TP3
Sample Reference: Not Given
Sample Description: Brown slightly gravelly CLAY

Depth Top [m]: 0.50
Depth Base [m]: Not Given
Sample Type: B

Specimen Preparation:

Condition	Remoulded	Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer	Period of soaking	days
		Time to surface	days
		Amount of swell recorded	mm
		Dry density after soaking	Mg/m3
Material retained on 20mm sieve removed	1 %		
Initial Specimen details	Bulk density	1.97	Mg/m3
	Dry density	1.59	Mg/m3
	Moisture content	24	%
	Surcharge applied	8	kg
		4.9	kPa

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	3.1	3.1	3.1	
No	4.6	3.9	4.6	

Moisture Content %
24
22

Remarks:

Test/ Specimen specific remarks:

Signed:

Anna Dudzinska

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF THE CALIFORNIA BEARING RATIO (CBR)

Tested in Accordance with: BS 1377-4: 1990: Clause 7

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Unit 8 Harrowden Road
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Date Sampled: 10/02/2023
Date Received: 16/02/2023
Date Tested: 28/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

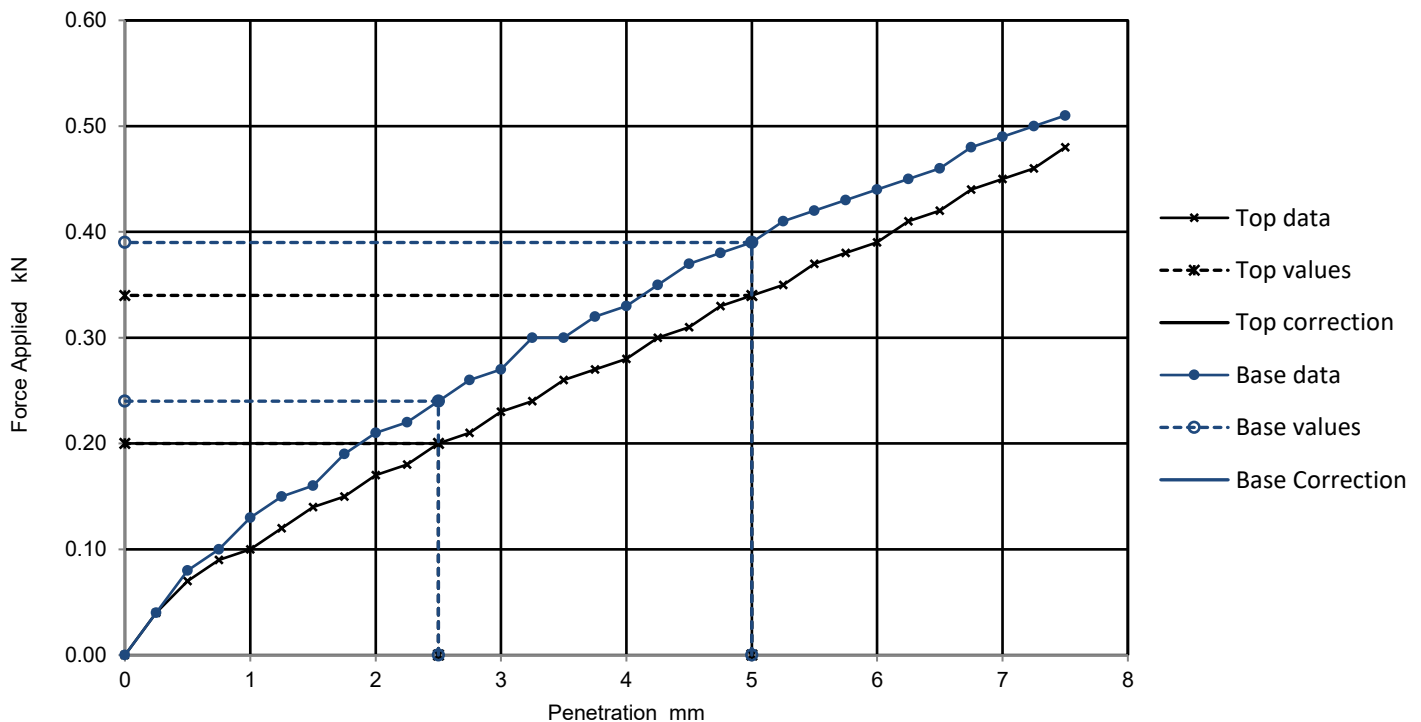
Laboratory Reference: 2591026
Hole No.: TP6
Sample Reference: Not Given
Sample Description: Brown slightly gravelly CLAY

Depth Top [m]: 0.50
Depth Base [m]: Not Given
Sample Type: B

Specimen Preparation:

Condition	Remoulded			Soaking details		Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days	
				Time to surface		days	
				Amount of swell recorded		mm	
Material retained on 20mm sieve removed	0	%		Dry density after soaking		Mg/m3	
Initial Specimen details	Bulk density	2.07	Mg/m3	Surcharge applied		8	kg
	Dry density	1.76	Mg/m3			4.8	kPa
	Moisture content	18	%				

Force v Penetration Plots



Results

TOP
BASE

Curve correction applied	CBR Values, %			
	2.5mm	5mm	Highest	Average
No	1.5	1.7	1.7	1.8
No	1.8	2.0	2.0	

Moisture Content %
17
17

Remarks:

Test/ Specimen specific remarks:

Signed:

Anna Dudzinska

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

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