



GEO

Environmental Engineering



PHASE 2: GROUND INVESTIGATION REPORT

PROPOSED RESIDENTIAL DEVELOPMENT OF

LAND OFF ULDALE VIEW, EGREMONT

CUMBRIA

FOR:

GLEESON REGENERATION LTD

GEO Environmental Engineering

DOCUMENT CONTROL SHEET

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1.0 Introduction

1.1 Brief

GEO Environmental Engineering Ltd (GEO) were commissioned by the Client, Gleeson Regeneration Ltd to carry out a ground investigation on land at Uldale View in Egremont, Cumbria.

The investigation was carried out to determine the ground conditions across the site to aid the design of foundations, roads and drainage and to assess the risk to human health and environmental receptors from possible contamination and ground gas.

1.2 Site Location and Description

The site, occupying an area of c.7.6ha is located in the southern part of Egremont in Cumbria as indicated on the site location plan included in Appendix I. Access to the site was from Uldale View to the west during the fieldworks.

- National Grid Reference: 300750, 510027
- Post Code: CA22 2LW

The site comprises two large agricultural fields. During the fieldworks, both fields had been sown with crops. The fields are delineated by a combination of hedgerows, post and wire fencing and dry-stone walls.

The site is surrounded by a mixture of agricultural fields (south and east) and housing (north and west). River Ehen is present c.370m north east of the site.

The site undulates gently. A topographical survey has not been provided, however, Ordnance Survey data suggests that the site is at an elevation of between c.50m and c.60m OD. It would be prudent to acquire a topographical survey of the site prior to development.

1.3 Proposed Development

It is understood that the Client plans to develop the site for residential end use. An outline plan of the proposed site layout has been provided and a copy is included in Appendix I. The plan shows conventional houses with private gardens, soft landscaping, access roads, car parking and other associated infrastructure.

1.4 Other Reports/Studies

GEO completed a Phase 1: Desk Top Study Executive Summary Report, details of which are included below:

- Phase 1: Desk Top Study (Preliminary Environmental Risk Assessment) Executive Summary, ref: 2020-4164, dated: April 2020.

A brief summary is included below, however, it is recommended that the DTS is read in conjunction with this report.

Historical mapping indicates that the site has not been previously developed and surrounding areas were agricultural prior to construction of the existing houses. The report indicated that some shallow reworking of the soils was likely given the current agricultural land use, however, deep made ground was considered unlikely and significant contamination was not anticipated.

Geological records indicate a mixture of glacial till (clays, sands and gravels) and glaciofluvial (sands and gravel) deposits. The solid strata is recorded as the St Bees Sandstone Formation which has a negligible risk of dissolution and mining hazards.

No landfills or potential sources of significant ground gas were encountered within 250m of the site.

2.0 Ground Investigation Reporting

2.1 Ground Investigation Aims and Objectives

The overall objective of this Ground Investigation is to provide information relating to the geotechnical and environmental properties of the ground and groundwater across the development area in order to facilitate foundation and drainage design and determine any risks to human health or the surrounding environment.

2.2 Guidelines, Codes of Practice and Third-Party Accreditations

This report contains information relating to the geotechnical properties of the soils encountered on site to aid foundation and highway design by a Structural Engineer. The report also incorporates a Level 1 Ground Contamination and Ground Gas Risk Assessment for Human Health (Generic Quantitative Risk Assessment – GQRA).

The laboratory testing (geotechnical and ground contamination) was completed by UKAS and MCERTS accredited laboratories with details given in Sections 6, with copies of the test reports contained within Appendix III.

This Ground Investigation Report has generally been completed in accordance with the following documents:

- Land Contamination Risk Management Stages 1 to 4 (LCRM – www.gov.uk) – April 2021.
- BS10175: 2017: Code of Practice for the Investigation of Potentially Contaminated Sites.
- BS5930: 2020: Code of Practice for Site Investigations.
- BS1377: 1990: Methods of test for soils for civil engineering purposes.
- BS8485: 2019: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- BS8576: 2013: Guidance on Ground Gas Investigations.
- CIRIA Report C665: 2015.
- Eurocode 7 – Geotechnical Design (Part 1: General Rules and; Part 2: Ground Investigation and Testing).
- UK Specification for Ground Investigation, 2nd Edition. Site Investigation Steering Group, 2011.
- Effective Site Investigation. Site Investigation Steering Group, 2013.
- SP1010 Development of Category 4 Screening Levels Main Report, 2014.
- The LQM/CIEH S4UL's for Human Health Risk Assessment, 2015.

2.3 Ground Investigation Limitations of Use

Although every effort is made to ensure a full and comprehensive investigation has been completed, it should always be borne in mind that ground conditions have the potential to vary between exploratory hole locations and it is recommended that the developer adopt a “watching brief” during the redevelopment works to ensure that any potential variations encountered are identified and dealt with in an appropriate manner.

The conclusions and recommendations presented within this report are considered reasonable based on the available information. However, these cannot be guaranteed to gain regulatory approval. Therefore, the report should be passed to the appropriate regulatory authorities and/or other key stakeholders, including warranty providers in order to seek their approval of the findings prior to undertaking any development works.

The Ground Investigation Report and its contents are limited to the boundaries of the site, as indicated on the Plans in Appendix I. Reliance on the report is for the named Client only. No reliance, copying or use of this report (in part or whole) by any Third Party is permitted without prior written approval from Geo Environmental Engineering Ltd, with intellectual copyright remaining the sole property of the author. Reliance on the report and its associated information is strictly in accordance with Geo Environmental Engineering Ltd Terms and Conditions, copies of which are available on request.

2.4 Consideration for Residential End Use

It is understood that the site will be developed for residential end use with houses, gardens, car parking, access roads, and other associated infrastructure. Consequently, when considering the intended development, the site is considered suitable for assessment using a Level 1 Generic Quantitative Risk Assessment (GQRA).

A GQRA provides details of potential future risks to Human Health (proposed end users) from any contamination which may be identified on site in made ground or natural soils. For the Human Health Risk Assessment, it is considered that the future residents will be subjected to the greatest exposure periods and consequently the most risk. Therefore, in accordance with current guidance and legislation a CLEA end use classification of *residential* has been considered most appropriate.

3.0 Ground Investigation Fieldwork

3.1 Intrusive Investigation Fieldworks Summary

The ground investigation works were completed on the 5th and 6th September 2022. The exploratory hole location plan is provided in Appendix I.

During the intrusive works, the southern field had already been planted with a winter crop. Therefore, in order to minimise disturbance and at the request of the landowner and tenant farmer, the trial pits were limited to the northern field only. The boreholes were positioned across both fields to provide suitable coverage while minimising disturbance. Additional trial pit investigations would be prudent across the southern field when access allows.

The ground investigation works comprised:

- 11 No. Dynamic (Windowless) Sampling Boreholes (BH01 to BH011) to depths of between c.1.40m and c.5.00m bgl.
- 28 No. Mechanically Excavated Trial Pits (TP01 to TP28) to depths of between c.1.60m and c.2.50m bgl.
- Installation of 5 No. gas and groundwater monitoring wells (c.2.50m to c.4.00m deep);
 - o Gas and groundwater monitoring (6 visits completed).
- 10 No. In-Situ Dynamic Cone Penetrometer (DCP) Tests.
- In-situ geotechnical testing (Standard Penetration Tests (SPT).
- Site supervision by a suitably qualified and experienced Geo-Environmental Engineer.
- In-situ hand shear vane tests in the trial pits (where possible and safe).
- Laboratory based geotechnical testing.
- Laboratory chemical screening of soil samples

The investigation fieldworks were undertaken in accordance with BS5930:2020, BS1377:1990 and Eurocode 7 (Part I and II).

At each exploratory hole location, the surfacing type, made ground, natural ground and groundwater conditions were observed, with in-situ testing undertaken and samples recovered. Details of the ground conditions are included on the exploratory hole logs which are included in Appendix II together with other relevant ground investigation data.

The results of the in-situ SPT tests are presented on the borehole logs included in Appendix II.

The results of the in-situ hand shear vane tests that were carried out in the trial pits are presented on the trial pit logs which are included in Appendix II.

The results of the Dynamic Cone Penetrometer (DCP) tests and the calculated CBR values are presented in Appendix II.

The geotechnical and chemical laboratory tests results are provided in Appendix III.

All depths included in the report are in metres below ground level (m bgl), unless stated otherwise.

4.0 Ground and Groundwater Conditions

4.1 General

The following section provides a summary of the ground conditions encountered across the site during the investigation. Reference should be made to the exploratory hole logs included in Appendix II for detailed descriptions of the strata and groundwater conditions.

All depths are reported in metres below ground level (m bgl) unless stated otherwise.

4.1.1 Made Ground and Topsoil

Made ground was not encountered during the ground investigation.

Topsoil was encountered across the site to depths of between c.0.24m and 0.38m bgl (typically c.0.27 to c.0.33m deep). The topsoil was described as dark grey brown silty sandy loam with occasional cobbles and organic material.

During the investigation, GEO did not identify any visual or olfactory evidence of fuel/oil type contamination (no staining, odour or free product) or any landfill type waste such as potentially biodegradable, decomposable or putrescible materials.

4.1.2 Natural Drift Deposits

The natural drift deposits varied significantly across the site as anticipated during the Desk Top Study which indicated both glacial till and glaciofluvial deposits. The drift deposits typically comprised:

- Silty very sandy gravel with occasional cobbles and boulders.
 - Frequent lenses / pockets of firm to stiff sandy gravelly clay were also noted within the gravel.
- Firm to stiff and stiff slightly sandy very gravelly clay with occasional cobbles and boulders.
 - Occasional lenses of silty sandy grave were also noted within the clay.
- Slightly silty fine to medium sand.

The topsoil in the north western part of the site was occasionally underlain by a firm brown sandy gravelly silt which was encountered to depths of between c.0.50m and c.1.20m bgl. This was noted in trial pits TP02, 03 and 10 only.

The predominant soil type at around 1m depth is indicated on a plan in Appendix I.

The change in ground conditions appeared to vary with the topography, i.e. the clay was generally encountered across the lower lying areas with sands and gravels encountered across the higher terrain.

The boundary between the sand and the clay deposits was encountered in trial pit TP15 in the centre of the northern field and this is highlighted on the log. The boundary is noted to be sub-vertical close to the surface, becoming less steep with depth.

The trial pits were predominantly noted as stable although occasional collapses were noted within the sand and gravel deposits, especially where groundwater ingress was noted. Running sand was also noted occasionally.

Hand shear vane tests were completed within the clay deposits at depths of between c.1.00 and c.1.20m bgl (where appropriate and safe to do so). The tests gave undrained shear strength values of between 80kPa and >120kPa which is indicative of clays of high strength.

Standard Penetration Tests (SPTs) were completed in the boreholes at c.1m intervals at depths of between c.1.00m and 5.00m bgl. The tests that were completed within the clay deposits gave N300 values of between 6 and 30 which is indicative of soils of medium and very high strength.

SPTs completed in the gravel deposits gave N300 values of between 18 and 37 which is indicative of medium dense deposits. SPTs within the sand deposits gave N300 values of between 2 and 30 but typically between 6 and 22, which is indicative of loose and medium dense deposits.

N.B: SPT tests that crossed different soil types have been discounted.

4.1.3 Solid Geological Deposits (Bedrock)

Solid strata/bedrock was not encountered during the ground investigation.

4.2 Groundwater

Groundwater ingress was noted in trial pits TP01 and 08 in the north western part as a slight seepage at depths of between c.1.60m and c.1.80m bgl, and in trial pits TP27 and 28 in the western part within the granular deposits at depths of between c.0.60m and 1.60m bgl. All of the boreholes remained dry during the intrusive ground investigation works.

Groundwater monitoring of installations placed in the boreholes has been carried out on six occasions between September 2022 and February 2023. Standing groundwater levels were recorded between c.0.45m and c.3.40m bgl, although boreholes BH01 and BH03 were often recorded as dry.

It is likely that the water is locally trapped/perched within the soils rather than a continuous groundwater table.

The trial pits were predominantly noted as stable although occasional collapses were noted within the sand and gravel deposits, especially where groundwater ingress was noted. Running sand was also noted occasionally.

Based on the results of the ground investigation, localised perched groundwater ingress should be anticipated across the site. It is recommended that allowance be made for some groundwater control measures (i.e. pumping equipment) particularly during wetter periods of the year, as the materials encountered may deteriorate following exposure to surface water.

5.0 Exploratory Hole Testing

In-situ site testing and monitoring was generally undertaken in accordance with BS5930:1999, BS1377:1990 and Eurocode 7 (Part I and II).

5.1 Standard Penetration Tests

5.1.1 Standard Penetration Test Methodology

To determine the relative density and strength of the underlying soils, Standard Penetration Tests (SPT's) were completed within the boreholes. The test uses a "split spoon" sample tube (external diameter of c.50mm, internal diameter of c.35mm and a length of around c.650mm) driven from the base of the borehole as it is progressed, usually at c.1.00m spacing's/intervals.

The sample tube is driven by blows of a slide hammer with a weight of c.63.5kg falling over a c.760mm drop. The sample tube is driven c.150mm into the ground (seating blows) and then the number of blows needed for the tube to penetrate each c.75mm increment up to a depth of c.450mm is recorded.

The number of blows for the final c.300mm of penetration is referred to as the "standard penetration resistance" or "N" value, which are presented on the exploratory hole logs adjacent to each sample depth. Where 50 blows are insufficient to advance the test through a c.75mm interval the amount of penetration after 50 blows is recorded and the test is referred to as a "refusal".

5.1.2 Standard Penetration Test Results

Standard Penetration Tests (SPTs) were completed in the boreholes at c.1m intervals at depths of between c.1.00m and 5.00m bgl. The tests that were completed within the clay deposits gave N300 values of between 6 and 30 which is indicative of soils of medium and very high strength.

SPTs completed in the gravel deposits gave N300 values of between 18 and 37 which is indicative of medium dense deposits. SPTs within the sand deposits gave N300 values of between 2 and 30 but typically between 6 and 22, which is indicative of loose and medium dense deposits.

N.B: SPT tests that crossed different soil types have been discounted.

The results of the standard penetration tests are presented on the borehole logs which are included in Appendix II.

5.2 Hand Shear Vane Tests

Hand shear vane tests were completed within the clay deposits at depths of between c.1.00 and c.1.20m bgl (where appropriate and safe to do so). The tests gave undrained shear strength values of between 80kPa and >120kPa which is indicative of clays of high strength.

The results of the hand shear vane tests are presented on the trial pit logs which are included in Appendix II.

5.3 Dynamic Cone Penetrometer Tests (DCP)

The Dynamic Cone Penetration (DCP) Test provides a measure of a material's in-situ resistance to penetration. The test is performed by driving a metal cone into the ground by repeated striking it with an 8kg weight dropped from a distance of 575 mm. The penetration of the cone is measured after each blow and is recorded to provide a continuous measure of shearing resistance up to c.0.85m

below the ground surface. Test results can be correlated to California Bearing Ratio to aid pavement design by a Civil Engineer.

The results of the Dynamic Cone Penetrometer tests and the calculations of the equivalent CBR values are included in Appendix II (Dynamic Cone Penetrometer Calculation Sheet).

It should be borne in mind that the results of the Dynamic Cone Penetrometer tests can be influenced by the coarse content (gravel, cobbles, etc...) within the materials tested, therefore, it is always recommended that the appropriate CBR value is confirmed by way of plate load testing at formation level.

5.4 Ground Gas Monitoring

To assess the on-site potential for hazardous ground gases, boreholes BH01, 03, 05, 06 and 07 were installed with ground gas monitoring wells to facilitate a period of ground gas monitoring.

The boreholes were installed to depths of between c.2.45m and c.4.00m bgl with a 50mm diameter HDPE standpipe. The top section of the well comprised solid pipe surrounded by a bentonite seal and the lower section comprised slotted pipe and a gravel filter. A plastic cap was placed at the base of the well and the rubber bung and gas valve were fitted at the surface. The installation details are presented on the borehole logs in Appendix II.

The monitoring and assessment has been completed in accordance with BS8485: 2015: Code of practice for the characterisation and remediation from ground gas affected developments, CIRIA Report C665, November 2015 and the NHBC Document; Guidance on the evaluation of development proposals on site where methane and carbon dioxide are present, March 2015.

As it is the intention of the Client to develop the site for Residential end use, the monitoring of ground gas monitoring must comprise at least six site visits over a minimum period of three months.

To date, the wells have been monitored on six occasions between September 2022 and February 2023 in general accordance with CIRIA C665 (Table 5.5a and 5.5b) using a GFM436 Gas Analyser with Integral Flow Pod.

The results of monitoring are included on the Ground Gas Monitoring Record Sheets included in Appendix II. The results of the monitoring and the ground gas risk assessment is presented in Section 8.3 of this report.

6.0 Laboratory Testing

6.1 Geotechnical Testing

Geotechnical testing was completed in general accordance with BS1377:1990: Part 1 to 4 by the following UKAS and MCERTS accredited laboratory:

- Northumberland County Council Highways Laboratory, Cramlington, Northumberland (NCC).

14 No. samples of the materials recovered from the exploratory holes at depths of between c.0.40m and c.4.10m bgl were subjected to the following laboratory based geotechnical tests:

- Moisture Content
- Atterberg - Liquid and Plastic Limits

6.2 Chemical Screening

6.2.1 Determination of pH and Water-Soluble Sulphate

In order to determine the correct concrete classification for buried structures (foundations), the following samples were scheduled for laboratory pH and water-soluble sulphate (SO₄) screening:

- 10 No. samples of topsoil (c.0.20m bgl)
- 19 No. samples of the natural drift deposits (c.0.40m and c.4.10m bgl)

The testing was completed in general accordance with BS1377:1990: Part 1 to 4 by the following UKAS and MCERTS accredited laboratory:

- Chemtech Environmental Testing of Stanley, County Durham.

The results of the testing are summarised in section 10 and presented in the Chemtech report (ref: 113429 and 113511) contained in Appendix III.

6.2.2 Contamination Testing for Human Health

To enable the completion of a Level 1 Generic Quantitative Risk Assessment (GQRA) for Human Health, the following samples were scheduled for chemical screening:

- 10 No. samples of topsoil (c.0.20m bgl)

The samples were subjected to analysis at the following UKAS and MCERTS accredited laboratory:

- Chemtech Environmental Testing of Stanley, County Durham.

Potential Contaminants of Concern (PCOC's) have been determined for the development area based on the descriptions of the materials encountered within the exploratory holes and the potential for made ground of an unknown source. The samples were screened for the contaminants detailed below:

- **Inorganic Soil Suite (Human Health Risk Assessment):** Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc), Cyanide and Total Organic Carbon.
- **Organic Soil Suite (Human Health Risk Assessment):** Speciated Polycyclic Aromatic Hydrocarbons (PAH – USEPA 16).

■ **Other:** Asbestos

The full catalogue of soil screening results and test detection limits can be seen in the Chemtech report (ref: 75849) contained in Appendix III.

No visual or olfactory evidence of organic contamination was identified during the fieldworks, therefore, the samples were not screened for petroleum hydrocarbons or associated compounds (TPH's, BTEX, MTBE, SVOC's or VOC'S).

No evidence of contamination was noted within the natural drift deposits, therefore, samples of the drift were scheduled not screened for potential contamination.

6.3 Controlled Waters Risk Assessment

The Phase 1: Desk Top Study did not identify any significant risks to Controlled Waters and the ground investigation did not encounter any evidence of made ground or potential contamination sources. As such, the risk to controlled waters from the site is considered negligible and no further assessment is deemed necessary in this respect.

7.0 Geotechnical Analysis

7.1 Testing for Moisture Content, Liquid and Plastic Limits

14 No. samples of the natural cohesive deposits recovered from the exploratory holes at depths of between c.0.40m and c.4.10m were scheduled for classification tests to determine their moisture content, liquid and plastic limits. The results of the testing are contained in the NCC report (ref: S1427) presented in Appendix III and summarised below.

Natural moisture contents of between 12.4% and 36% were observed, with liquid limits of between 29% and 39% and plasticity indices of between 6% and 18% being recorded. The results indicate clays/silts of predominantly low, occasionally intermediate plasticity and a low volume change potential.

It is recommended that a low volume change potential is adopted for design purposes.

8.0 Generic Quantitative Risk Assessment (GQRA)

8.1 Methodology for Assessing Risks to Human Health

Within the UK, the current framework for assessing potential ground contamination is utilising the Contaminated Land Exposure Assessment (CLEA) model as set out by the Department of the Environment, Farming and Rural Affairs (DEFRA) and comprises of the established pollutant linkage model of *Source – Pathway – Receptor*. For a risk to be present to the proposed end user (*Receptor*) there must be an identified *Source* and a plausible *Pathway*. Where one or more of the links are missing then risk is negated. In order for the land to be classified as contaminated under Part IIa of the Environmental Protection Act (EPA) 1990 all three elements of the pollutant linkage must be present.

A human health risk assessment can be completed using the contamination levels recorded in the soils by comparing the values against published Generic Assessment Criteria (GAC), such as CLEA Soil Guideline Values (SGV's), CL:AIRE/DEFRA Category 4 Screening Levels (C4SLs), Land Quality Management (LQM) and Chartered Institute of Environmental Health (CIEH) S4UL Values and Atkins ATRISK^{SOIL} Soil Screening Values (SSV's). The guidelines are generally based on three main land uses as outlined below:

■ *Residential*
(with or without plant uptake)

■ *Allotments*

■ *Commercial*

Where these land uses are not deemed appropriate, other land use values can be considered with the DEFRA C4SLs, LQM S4UL's values and the ATRISK^{SOIL} SSV's (i.e. parks/playing fields/Public Open Space). Alternatively, it is possible to determine site specific intervention values as part of a Detailed Quantitative Risk Assessment (DQRA).

It is anticipated that the proposed development will incorporate a residential development with private gardens. Therefore, for the purposes of this basic Human Health ground contamination risk assessment, the maximum site recorded values for the soil samples have been compared to GAC for a CLEA end use classification of: *Residential with Plant Uptake End Use* to determine if a potential risk is present to the proposed end users.

Contaminant Analysis Sheets that include the results of the relevant Human Health Risk Assessment and the Generic Assessment Criteria (GAC) values are presented in Appendix IV.

8.2 Human Health Risk Assessment – Comparison with Guidance Levels

8.2.1 Inorganic Contaminants – Soil

The maximum concentration values for each inorganic analyte have been compared to the most relevant published Generic Assessment Criteria (GAC) as part of the Maximum Value Test. The GAC have been selected using the following guidance documents:

- LQM/CIEH S4UL 2015 (Residential with Plant Uptake End Use).
- CL:AIRE/DEFRA Cat 4 Screening Levels C4SL (Residential with Plant Uptake End Use).
- Atkins ATRISK Screening Values (Residential with Consumption of Homegrown Produce).

As discussed in section 8.1, the contaminant concentrations have been assessed against GAC for a residential with plant uptake end use as it is anticipated that the proposed development will incorporate private gardens.

Based on the results of the contaminant analysis sheet contained in Appendix IV none of the inorganic contaminant concentrations exceed the assessment criteria and as such do not pose a risk to human health.

In addition, phytotoxic elements (copper, nickel and zinc) are within the acceptable limits for topsoil (BS3882: Specification for Topsoil, 2015).

8.2.2 Organic Contaminants – Soil

The maximum concentration values for the organic analytes (i.e. Speciated PAH) have been compared to the most relevant published guidance values (generic assessment criteria) as part of the Maximum Value Test. The GAC have been selected using the following guidance documents:

- LQM/CIEH S4UL 2015 (Residential with Plant Uptake End Use).

Taking in to account the average TOC of the soils on the site, this assessment has been completed utilising a 2.5% SOM.

Based on the results of the contaminant analysis sheet contained in Appendix IV it can be seen that none of the organic contaminant concentrations exceed the assessment criteria and as such do not pose a risk to human health.

8.2.3 Asbestos Containing Materials (ACM's) – Soil

10 No. samples of the topsoil have been subjected to laboratory microscopic analysis to determine the presence or not of Asbestos Containing Materials (ACM's) in accordance with the methodology within HSG 248.

Of the samples tested, all returned a negative result for ACM's and were recorded as NAD (no asbestos detected), i.e. no asbestos was encountered.

8.2.4 Human Health Risk Assessment – Summary

The following is a summary of the Human Health risk assessment based on a *Residential with Plant Uptake End Use*:

- **Generic Contamination:** None.
- **Organic Contamination:** None.

■ **Other Contamination:** None.

Based on the Human Health risk assessment above, none of the contaminants have been identified as posing a potential risk to human health with respect to a residential end use with plant uptake.

As such, the topsoil does not pose a risk to human health and is considered chemically suitable for re-use within a residential context. Remediation is not considered necessary required.

Based on visual inspection and the results of the chemical screening, the topsoil materials are considered suitable for re use in a residential context in accordance with BS3882: Specification for Topsoil, 2015.

Any imported materials required on site should be screened prior to placement on site to ensure contaminated materials are not being brought to site and that they are suitable for use within a residential setting.

If topsoil is brought on to site, the materials should be as specified in BS 3882:2015 as 'suitable for the intended purpose'. BS3882:2015 relates to nutrient content of topsoil and phytotoxic contamination and does not consider contaminants that pose a risk specifically to human health. Soils should be tested for contaminants that are considered to pose a risk to human health in addition to BS3882:2015 to ensure that they are suitable for their intended use. All materials brought on to site that are to be used as part of soft landscaped areas should be assessed with regards to human health criteria.

8.3 Ground Gas Risk Assessment

As indicated in section 5.5, gas and groundwater monitoring wells have been installed in five boreholes (BH01, 03 05, 06 and 07) and monitoring has been completed on six occasions.

During the monitoring, the atmospheric air pressure was varied between 986mb and 1031mb during both falling and rising pressure trends.

A maximum Carbon Dioxide (CO₂) concentration of 6.1%v/v has been recorded and no Methane (CH₄) was detected. The minimum Oxygen (O₂) concentration was 6.1% and the flow was <0.1l/h throughout.

In accordance with CIRIA C665 the maximum recorded CO₂ concentration has been converted to a Gas Screening Value (GSV), summarised as follows.

In this instance, the CO₂ GSV is:

- **CO₂ GSV = (Max CO₂ (%) / 100) x Max Flow (l/hr),**
- **Therefore; (6.1 / 100) x 0.1 = 0.006 l/hr GSV**

Since no Methane have been detected no GSV has or can be formulated.

Although the maximum concentration of carbon dioxide marginally exceeds the assessment criteria of 5% in Table 8.5, CIRIA C665, the flow rate was noted to be negligible throughout. As such, there is no mechanism by which gas will be forced into the proposed buildings. Furthermore, the average gas concentrations were typically very low and no significant gas sources were noted within the vicinity of the site. The risk to the proposed end user for the marginally elevated concentration of carbon dioxide is considered negligible.

Therefore, Characteristic Situation 1 (CS1) or the Green Classification (NHBC Characterisation System) is considered appropriate for the proposed development and gas precautions are not considered necessary.

8.4 Determination of pH and Water-Soluble Sulphate

As indicated in Section 6, selected samples of topsoil and natural soil have been screened to determine their pH and soluble sulphate potential to aid the design of buried concrete. The results of the chemical screening are presented in the Chemtech report (ref: 113429 and 113511) contained in Appendix III.

From the results, the following observations can be seen:

- pH values in the soils ranged from 6.4 to 7.7 (slightly acidic to neutral).
- Water Soluble Sulphate (SO₄) levels were recorded as ranging from 17mg/l to 425mg/l.

In accordance with BRE Special Digest 1: 2005 the results recorded equate to a Design Sulphate classification of DS-1 (for natural greenfield land).

With respect to the pH levels, the results equate to a slightly acidic to slightly alkali chemical environment which is not considered aggressive with respect to concrete. In view of this, an ACEC classification of AC-1 should be adopted (for mobile groundwater on natural greenfield land).

9.0 Construction Related Excavations and Off-Site Disposal

During the construction works it is likely that materials will be excavated on site (i.e. future foundations and buried utilities, etc.) that will not be able to be accommodated on site during to space and level constraints, ultimately requiring removal off site.

During the construction works, different materials should be stockpiled separately, and an appropriate waste disposal classification should be determined by the Design Team prior to removal. It may be the case that WAC testing is required to aid the assessment.

Where made ground materials or disturbed natural strata is to be removed, the results of the soil testing undertaken within this report can be used as a preliminary assessment and the anticipated waste disposal facility should be provided with a copy of the results for review. It may be the case that the waste facility requires additional contamination screening to aid the characterisation of the made ground for off-site disposal (i.e. Waste Acceptance Criteria – WAC) and it is recommended that this be confirmed by the design team prior to commencing on site.

During the construction phase, it may be the case that WAC screening is required to aid classification for disposal and it is recommended that all materials are classified prior to excavation and disposal off site.

Conversely, if materials are required to be brought to site to raise site levels or as part of a clean cover system then certification and/or soil testing results should be reviewed by a suitably experienced and qualified geo-environmental engineer to ensure that potentially contaminated materials are not being brought to site.

Any material movements may require a Material Management Plan (MMP) in accordance with CL:AIRE.

10.0 Discussion and Recommendations

10.1 Ground and Groundwater Conditions Summary

The ground investigation encountered a layer of topsoil overlying natural drift deposits which varied significantly across the site and comprised firm and stiff sandy gravelly clay (glacial till), medium dense sandy gravel deposits and very loose, loose and medium dense sands (fluvioglacial deposits). Bedrock was not encountered. The ground conditions appeared to vary with the topography, i.e. the clay was generally encountered across the lower lying areas with sands and gravels encountered across the higher terrain.

The exploratory holes were predominantly dry during the fieldworks; however, localised groundwater was encountered in the north western and western parts of the site where granular deposits were present. Standing groundwater was recorded between 0.45m and 2.45m bgl during the monitoring, although wells in the southern field were noted as dry.

It is likely that the water is locally trapped/perched within the soils rather than a continuous groundwater table. Localised groundwater ingress should be anticipated, and it is recommended that allowance is made for groundwater control measures particularly during wetter periods of the year, as the materials encountered may deteriorate following exposure to surface water. Care should be taken to avoid removing fines during dewatering as this could destabilise adjacent land and/or structures.

The granular deposits were noted to be locally unstable, especially where groundwater was encountered (north west and western parts) and running sands may also be encountered. As such, excavations should be appropriately shored to prevent collapse.

During the investigation, GEO did not identify any visual or olfactory evidence of fuel/oil type contamination (no staining, odour or free product) or any landfill type waste, with no potentially biodegradable, decomposable or putrescible materials.

10.2 Future Foundations, Pavements and Buried Structures

It is understood that the proposed development will incorporate conventional housing. The foundation design is likely to depend on the final site levels. Based on the results of the ground investigation, strip foundations are currently considered appropriate within the firm and stiff gravelly clay or the medium dense and dense sand and gravels deposits. Ideally, the foundations should be placed in the same ground type to minimise the potential for differential settlement. However, this is likely to be difficult given the variability in ground conditions across the site. Therefore, it would be prudent for the Structural Engineer to incorporate reinforcement within the foundations to accommodate and mitigate against potential differential settlement.

Standard Penetration Tests indicate variable and occasional loose and very loose sand deposits. These deposits which are not considered suitable as a bearing stratum (at or within 1m of formation level) due to possible ground movements under loading. Where loose deposits are encountered, consideration should be given to excavating and replacement, and/or ground improvement techniques such as compaction to improve the density.

Foundations should be at least 0.75m deep where cohesive soils are present. Given the presence of existing mature trees along the boundaries, some foundations may need to be over-deepened in accordance with NHBC Standards (Chapter 4.2, "Building Near Trees").

Any loose, soft or unsuitable deposits at formation should be excavated and replaced by compacted granular deposits or lean-mix concrete.

An allowable bearing capacity for the firm to stiff sandy gravelly clays or medium dense sands/gravels of 100kN/m² is considered appropriate.

With respect to buried structures (concrete), the pH levels and soluble sulphate concentrations in the soils equate to a Design Sulphate classification of DS-1 and an ACEC classification of AC-1 (BRE Special Digest 1: 2005).

Based on the ground conditions and the results of the DCP tests, conventional road and pavement construction techniques should be suitable. However, it is always recommended that the appropriate CBR value is confirmed by way of plate load testing at formation level prior to construction.

10.3 Ground Contamination

10.3.1 Ground Contamination – Human Health

Following the results of the contamination assessment it can be seen that none of the contaminant concentrations exceed the assessment criteria for a residential development with plant uptake and asbestos fibres have not been detected. As such, the topsoil does not pose a risk to human health and is suitable for re-use in areas of private gardens and soft landscaping. In addition, phytotoxic elements (copper, nickel and zinc) are within the acceptable limits for topsoil.

In view of the above, remediation is not considered necessary in order to develop the site for residential end use.

Given the results of the chemical screening, standard water supply pipes are considered appropriate. However, it is recommended that the relevant utility suppliers are contacted in this respect, as a site-specific risk assessment may be required.

If topsoil is brought on to site, the materials should be as specified in BS 3882:2015 as 'suitable for the intended purpose'. BS3882:2015 relates to nutrient content of topsoil and phytotoxic contamination and does not consider contaminants that pose a risk specifically to human health. Soils should be tested for contaminants that are considered to pose a risk to human health in addition to BS3882:2015 to ensure that they are suitable for their intended use. All materials brought on to site that are to be used as part of soft landscaped areas should be assessed with regards to human health criteria.

10.4 Ground Gas

The results of the ground gas monitoring indicate no methane with generally low concentrations of carbon dioxide and negligible flow rates. Marginally elevated carbon dioxide has been recorded, however, taking into consideration the ground conditions, lack of significant gas sources and the negligible flow rates, the risk to the end user is considered negligible and gas protection measures are not considered necessary.

Desk Top Study information indicated that Radon protection measures were not necessary at the time of writing. However, the UK Health Security Agency and BGS published an updated radon potential map for Great Britain in December 2022. A new GeoInsight report was acquired by GEO for the site to confirm the radon situation. This confirms that the site is not located within a Radon affected area as less than 1% of properties are above the action level. Consequently, radon protection measures are not necessary.

10.5 Post Investigation Works

Redundant boreholes should be made safe and secure and should not cause a preferential pathway for contaminants and ground gasses.

Based on the ground gas levels recorded on the site throughout the monitoring period and the ground conditions encountered, the wells that were installed as part of this investigation are not considered to pose a significant risk to the proposed development and are very unlikely to provide a preferential pathway for contaminants based on current or proposed land uses.

Where decommissioning is required, the works should be completed in accordance Environment Agency Guidelines: “Guidance on the design and installation of groundwater Monitoring points”, Section 5.5 Decommissioning (Page 59), and “Decommissioning abandoned boreholes and wells”.

10.6 General Comments

Consideration must be made for variations to occur in the ground conditions between the exploratory hole locations for which GEO holds no responsibility and areas where limited access was available. It is therefore recommended that a “watching brief” and “observational technique” be applied to this site to ensure that if ground conditions appear to vary from those identified within this investigation report then advice should be sought from a suitably qualified and experienced Engineering Geologist, Geotechnical or Geo-Environmental Engineer.

The recommendations and opinions expressed in this report are based on the strata observed within the exploratory holes in addition to the results of the site and laboratory tests commissioned by GEO. Consequently, GEO takes no responsibility for conditions that have not been revealed or which occur between them. GEO takes no responsibility for the accuracy of third party information provided by sub-contract drillers or laboratories.

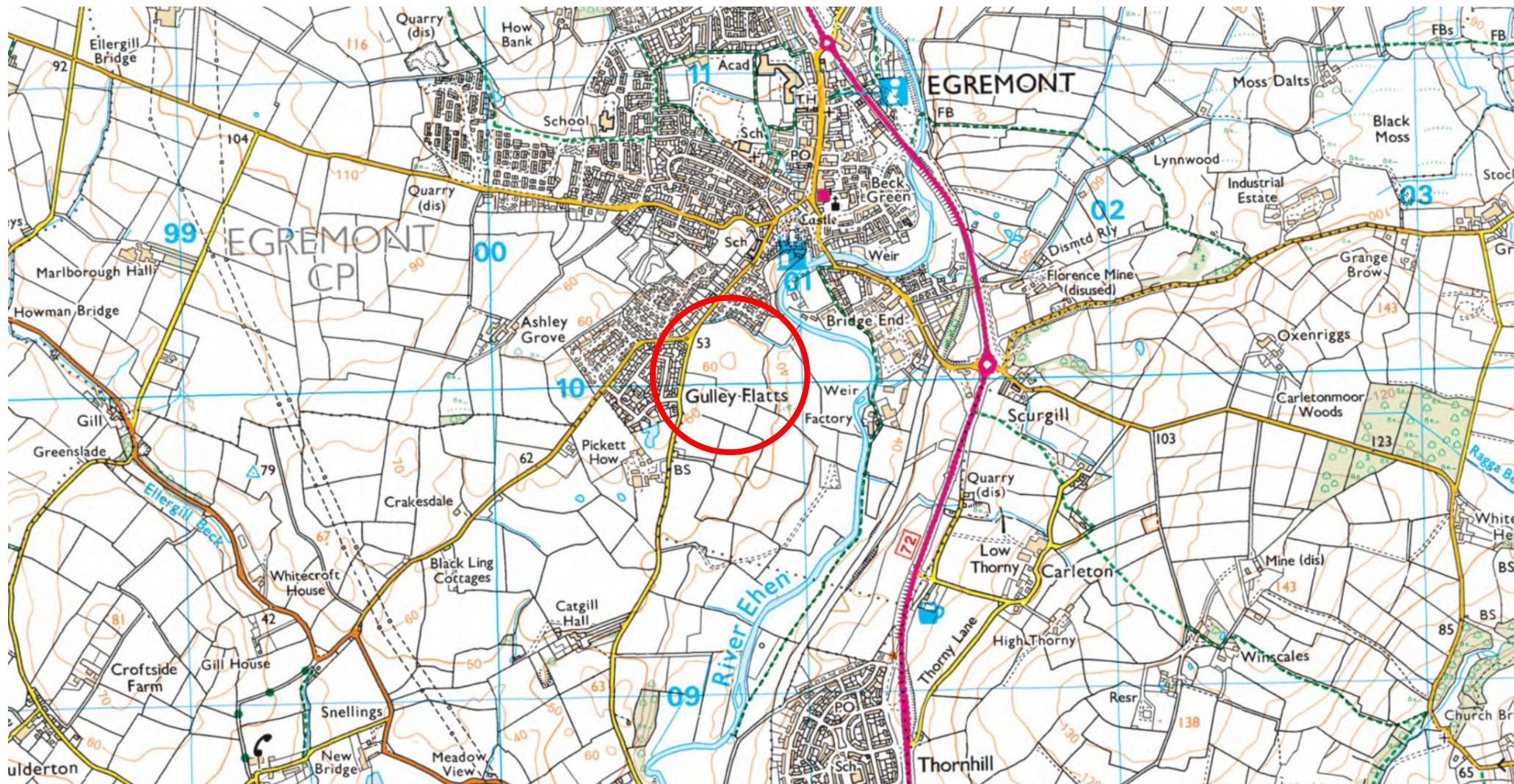
The conclusions and recommendations presented within this report are considered reasonable based on the available information. However, these cannot be guaranteed to gain regulatory approval. Therefore, the report should be passed to the appropriate regulatory authorities and/ or other key stakeholders including warranty providers in order to seek their approval of the findings prior to undertaking any works on site.

End of Report

Appendix I

- Site Location Plan
- Exploratory Hole Location Plan
- Proposed Site Layout Plan

GEO2022-5346: Uldale View, Egremont, Cumbria – Site Location



Website: www.geoenvironmentalengineering.com

Email: info@geoenvironmentalengineering.com

Telephone: 07883 440 186

GEO2022-5346: Uldale View, Egremont, Cumbria – Exploratory Hole Location Plan



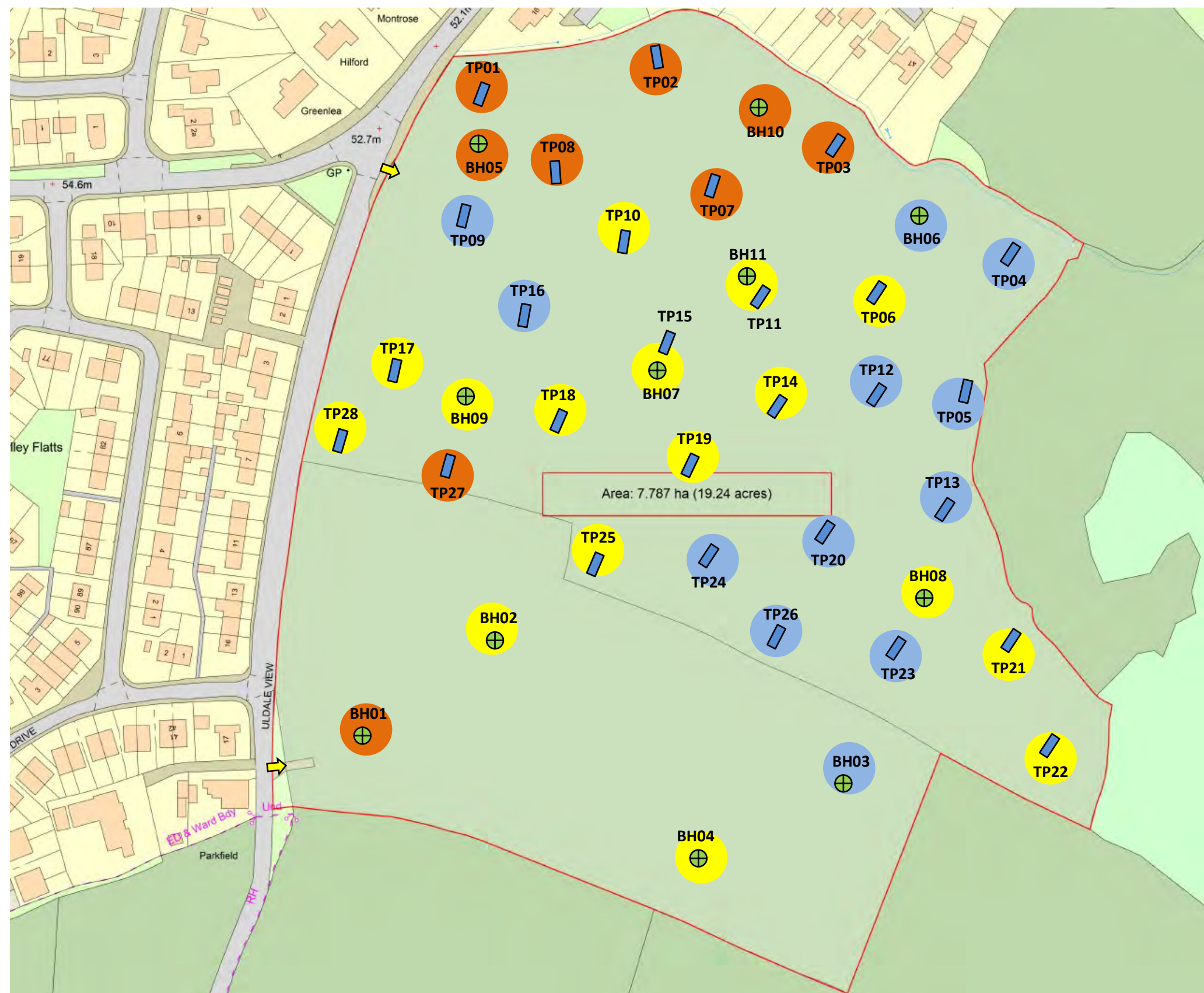
KEY:

-  Trial Pit Locations*
-  Borehole Locations*
-  Site Access

* - Locations are approximate only.

NB: Access to southern field not permitted with excavator due to crop.

GEO2022-5346: Uldale View, Egremont, Cumbria – Shallow Ground Conditions



KEY:

- Clay at Shallow Depth
- Sand at Shallow Depth
- Gravel at Shallow Depth

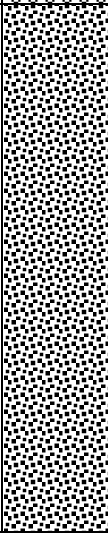
The drawing shows the predominant ground condition at c.1m bgl.



Appendix II

- Exploratory Hole Logs
- DCP Calculation Sheets
- Ground Gas Monitoring Sheets

GEO2022-5346: Uldale View, Egremont, Cumbria – TP01

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.28	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.28	2.10	Brown silty very sandy fine to coarse sub-rounded to sub-angular GRAVEL with occasional cobbles. Becoming less silty with depth. Occasional boulders. Pockets of firm to stiff sandy very gravelly clay from c.1.50m bgl.		1.00 - T
		End of trial hole at 2.10m. DCP test completed adjacent to trial pit. Trial hole remained stable on completion. Groundwater ingress (slight) from c.1.80m bgl. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 05/09/2022

Plant: Tracked 360 Excavator

Log Notes:

HSV = Hand Shear Vane (kN/m²)

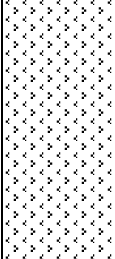
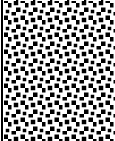
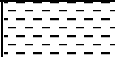
LP = Limited Penetration (HSV/CBR)

B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub



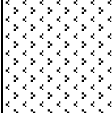
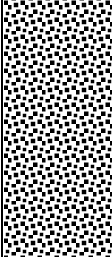
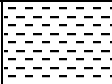
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GEO2022-5346: Uldale View, Egremont, Cumbria – TP02

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.29	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.29	1.20	Firm brown very sandy gravelly SILT.		
1.20	1.70	Brown silty very sandy fine to coarse sub-rounded to sub-angular GRAVEL with occasional cobbles. Becoming less silty with depth. Occasional boulders. Pockets of sand and firm to stiff sandy very gravelly clay from c.1.50m bgl.		1.50 - T
1.70	1.90	Stiff dark brown slightly sandy very gravelly CLAY.		
		End of trial hole at 1.90m. Trial hole remained dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator		Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		



GEO2022-5346: Uldale View, Egremont, Cumbria – TP03

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.30	0.70	Firm brown very sandy gravelly SILT.		0.50 - T
0.70	1.60	Brown silty very sandy fine to coarse sub-rounded to sub-angular GRAVEL with occasional cobbles.		1.20 - T
1.60	1.90	Stiff dark brown slightly sandy very gravelly CLAY.		
		End of trial hole at 1.90m. DCP test completed adjacent to trial pit. Trial hole remained dry and stable on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 05/09/2022

Plant: Tracked 360 Excavator

Log Notes:

HSV = Hand Shear Vane (kN/m²)

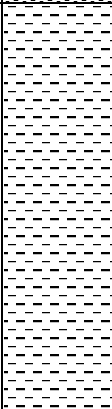
LP = Limited Penetration (HSV/CBR)

B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub



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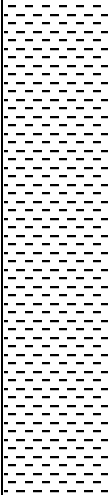
GEO2022-5346: Uldale View, Egremont, Cumbria – TP04

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.24	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.24	1.60	Firm to stiff brown sandy very gravelly CLAY with occasional cobbles and boulders. Lenses of silty sandy gravel. Many boulders from c.1.30m bgl. Refusal on boulders at c.1.60m bgl.		0.80 - T
		End of trial hole at 1.60m – refusal on boulders. Trial hole remained dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



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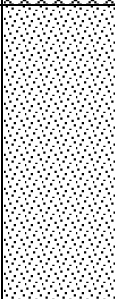
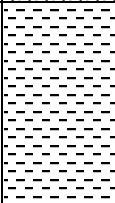
GEO2022-5346: Uldale View, Egremont, Cumbria – TP05

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.33	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.33	2.00	Firm to stiff becoming stiff dark brown sandy very gravelly CLAY with occasional cobbles and boulders. Lenses of silty sandy gravel. Stiff from c.1.20m bgl. Many boulders from c.1.50m bgl.		1.00 - T
		End of trial hole at 2.00m – refusal on boulders. Trial hole remained dry and stable on completion. Trial hole backfilled with arisings on completion.		Too gravelly for HSV.
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



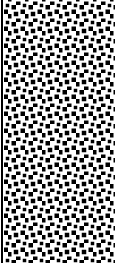
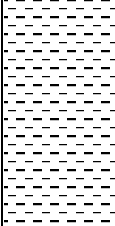
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GEO2022-5346: Uldale View, Egremont, Cumbria – TP06

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.34	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.34	1.30	Brown silty fine to medium SAND.		0.60 - T
1.30	2.00	Firm becoming firm to stiff dark brown sandy very gravelly CLAY with occasional cobbles and boulders.		1.70 - T
		End of trial hole at 2.00m. Trial hole remained dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2022-5346: Uldale View, Egremont, Cumbria – TP07

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.27	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.27	1.20	Dark brown clayey/silty sandy fine to coarse sub-rounded to sub-angular GRAVEL with occasional cobbles. Occasional lenses of sandy very gravelly clay.		
1.20	2.00	Firm to stiff dark brown silty sandy very gravelly CLAY with lenses of gravel.		
		End of trial hole at 2.00m. Trial hole remained dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

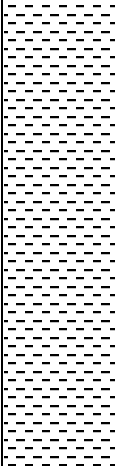


GEO2022-5346: Uldale View, Egremont, Cumbria – TP08

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.26	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.26	1.90	Firm to stiff dark brown sandy very gravelly CLAY with occasional lenses of sandy gravel. Occasional cobbles and boulders. Slight groundwater ingress at c.1.60m bgl. Running sand noted.		1.00 HSV = 85kPa 1.10 - T
		End of trial hole at 1.90m. Groundwater ingress (slight) at c.1.60m bgl. Trial hole remained stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2022-5346: Uldale View, Egremont, Cumbria – TP09

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.28	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.28	1.90	Firm to stiff becoming stiff dark brown sandy very gravelly CLAY with occasional lenses of sandy gravel. Occasional cobbles and boulders. Stiff from 0.70m bgl.		1.10 HSV = 120kPa 1.50 - T
		End of trial hole at 1.90m. Trial hole remained dry and stable on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 05/09/2022

Plant: Tracked 360 Excavator

Log Notes:

HSV = Hand Shear Vane (kN/m²)

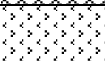
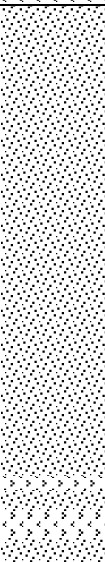
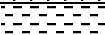
LP = Limited Penetration (HSV/CBR)

B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub



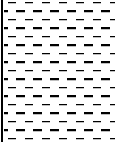
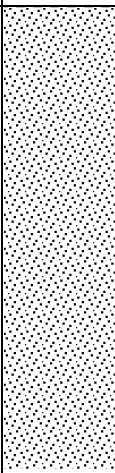
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GEO2022-5346: Uldale View, Egremont, Cumbria – TP10

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.28	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.28	0.50	Firm brown very sandy SILT with bands of fine sand.		0.40- T
0.50	2.40	Brown silty fine to medium SAND. Becoming less silty with depth. Occasional bands of firm sandy silt from 2.20m bgl.		
2.40	2.50	Possible firm to stiff clay at base.		
		End at 2.40m due to sand collapsing during excavation. DCP test completed adjacent to trial pit. GW and running sand (minor) noted at base. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

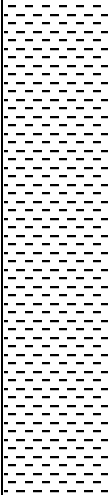


GEO2022-5346: Uldale View, Egremont, Cumbria – TP11

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.24	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.24	0.70	Firm to stiff dark brown sandy gravelly CLAY.		
0.70	2.20	Brown silty fine to medium SAND. Becoming less silty with depth.		1.00 - T
		End of trial pit at 2.20m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

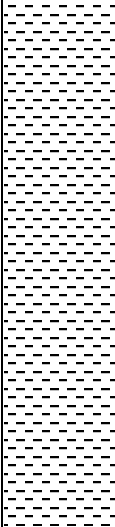


GEO2022-5346: Uldale View, Egremont, Cumbria – TP12

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.30	2.00	Stiff dark brown slightly sandy very gravelly CLAY.		1.00 - T 1.10 HSV - >120kPa
		End of trial pit at 2.20m. DCP test completed adjacent to trial pit. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

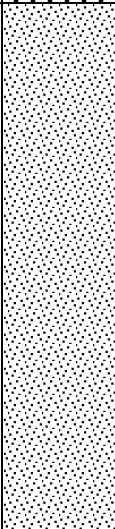


GEO2022-5346: Uldale View, Egremont, Cumbria – TP13

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.31	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.31	2.10	Stiff brown slightly sandy very gravelly CLAY with occasional lenses of sandy gravel. Occasional cobbles and boulders. .		1.00 HSV = >120kPa
		End of trial pit at 2.10m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2022-5346: Uldale View, Egremont, Cumbria – TP14

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.30	2.40	Brown silty fine to medium SAND. Becoming less silty with depth.		
		End of trial pit at 2.40m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 06/09/2022

Plant: Tracked 360 Excavator

Log Notes:

HSV = Hand Shear Vane (kN/m²)

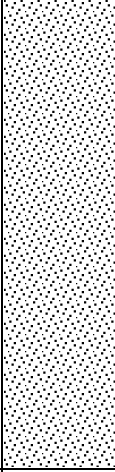
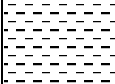
LP = Limited Penetration (HSV/CBR)

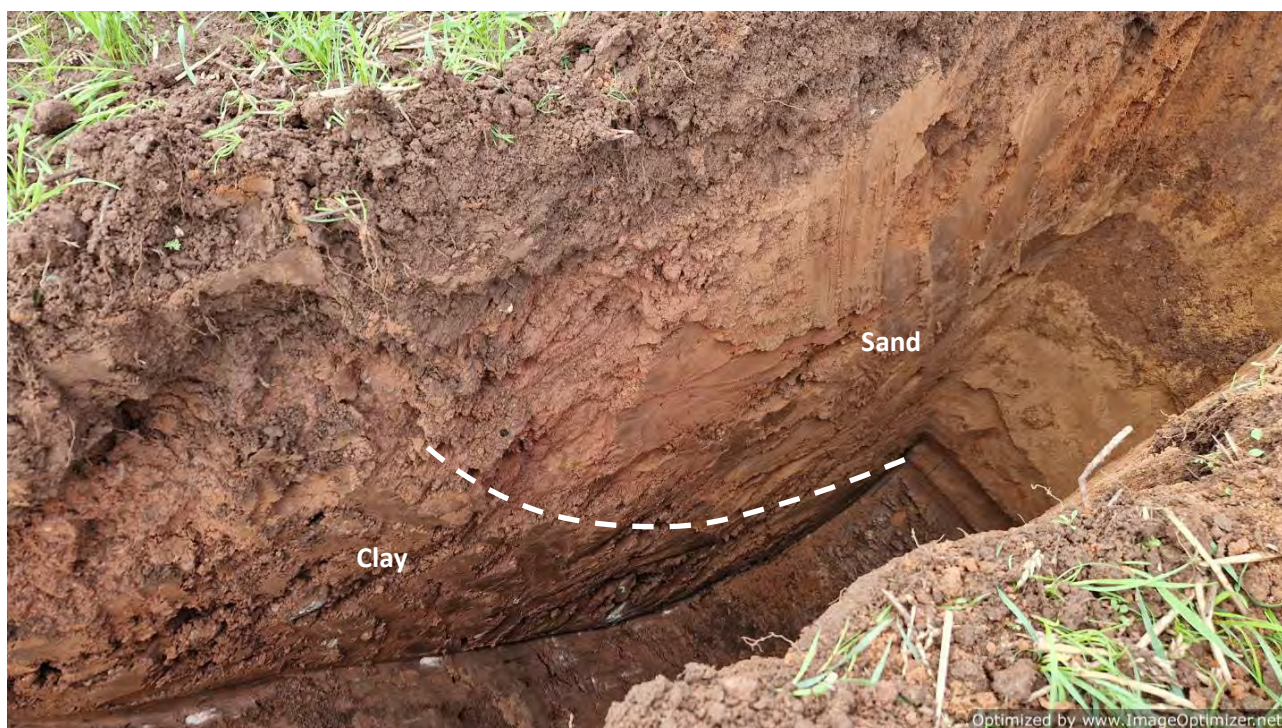
B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub



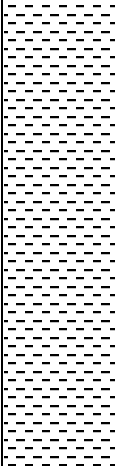
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GEO2022-5346: Uldale View, Egremont, Cumbria – TP15

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.24	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.24	1.80	Brown slightly silty fine to medium sand. Boundary between clay and sand present in pit – see image below.		1.20 HSV (clay) - >120kPa.
1.80	2.10	Stiff dark brown slightly sandy very gravelly CLAY.		
		End of trial pit at 2.10m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2022-5346: Uldale View, Egremont, Cumbria – TP16

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.32	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.32	1.90	Stiff dark brown sandy very gravelly CLAY with occasional lenses of sandy gravel.		1.50 - T
		End of trial pit at 1.90m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 06/09/2022

Plant: Tracked 360 Excavator

Log Notes:

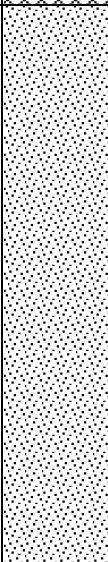
HSV = Hand Shear Vane (kN/m²)

LP = Limited Penetration (HSV/CBR)

B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub

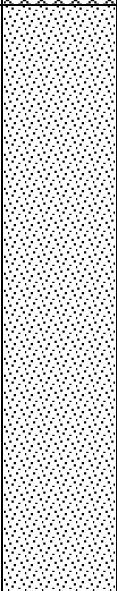


GEO2022-5346: Uldale View, Egremont, Cumbria – TP17

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.27	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.27	2.20	Brown silty fine to medium SAND with occasional lenses of stiff sandy gravelly clay.		
		End of trial pit at 2.20m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

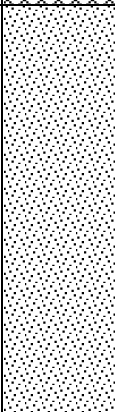


GEO2022-5346: Uldale View, Egremont, Cumbria – TP18

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.30	2.30	Brown silty fine to medium SAND with occasional lenses of stiff sandy gravelly clay.		
		End of trial pit at 2.30m. DCP test completed adjacent to trial pit. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator		Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		



GEO2022-5346: Uldale View, Egremont, Cumbria – TP19

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles and plastic. Occasional organic material.		0.20 - J
0.30	1.80	Brown silty fine to medium SAND with occasional lenses of stiff sandy gravelly clay.		0.80 - T
1.80	2.00	Stiff dark brown slightly sandy very gravelly CLAY with occasional lenses of sand.		
		End of trial pit at 2.00m. Trial pit dry on completion. Minor collapses. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 06/09/2022

Plant: Tracked 360 Excavator

Log Notes:

HSV = Hand Shear Vane (kN/m²)

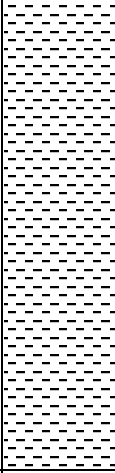
LP = Limited Penetration (HSV/CBR)

B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub



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GEO2022-5346: Uldale View, Egremont, Cumbria – TP20

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.26	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.26	2.00	Stiff dark brown slightly sandy very gravelly CLAY.		1.00 - T
		End of trial pit at 2.00m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 06/09/2022

Plant: Tracked 360 Excavator

Log Notes:

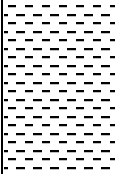
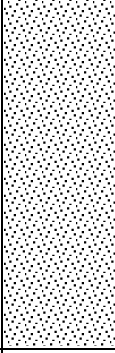
HSV = Hand Shear Vane (kN/m²)

LP = Limited Penetration (HSV/CBR)

B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub



GEO2022-5346: Uldale View, Egremont, Cumbria – TP21

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.26	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.26	0.90	Stiff dark brown slightly sandy very gravelly CLAY.		
0.90	2.10	Brown silty fine to medium SAND with occasional lenses of stiff sandy gravelly clay.		
		End of trial pit at 2.10m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 06/09/2022

Plant: Tracked 360 Excavator

Log Notes:

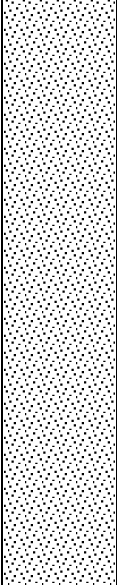
HSV = Hand Shear Vane (kN/m²)

LP = Limited Penetration (HSV/CBR)

B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub



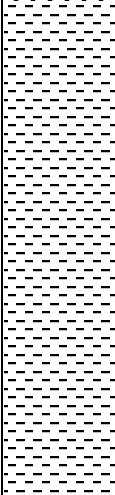
GEO2022-5346: Uldale View, Egremont, Cumbria – TP22

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.31	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.31	2.30	Brown silty fine to medium SAND.		
		End of trial pit at 2.30m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator		Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		



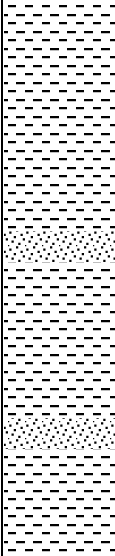
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GEO2022-5346: Uldale View, Egremont, Cumbria – TP23

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.34	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.34	2.00	Firm to stiff becoming stiff dark brown slightly sandy very gravelly CLAY with occasional cobbles.		1.50 - T
		End of trial pit at 2.00m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

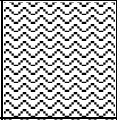
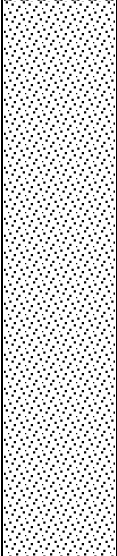


GEO2022-5346: Uldale View, Egremont, Cumbria – TP24

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.28	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.28	2.20	Firm to stiff becoming stiff dark brown slightly sandy very gravelly CLAY with bands of brown fine to medium sand.		
		End of trial pit at 2.20m. DCP test completed adjacent to trial pit. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator		Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

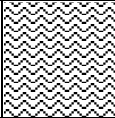
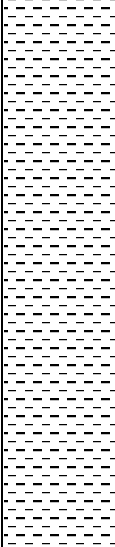


GEO2022-5346: Uldale View, Egremont, Cumbria – TP25

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.38	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.38	2.00	Brown silty fine to medium SAND with occasional lenses of firm to stiff dark brown sandy gravelly clay.		
		End of trial pit at 2.00m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock		Log Notes:		
Site Works Date: 06/09/2022		HSV = Hand Shear Vane (kN/m ²)		
Plant: Tracked 360 Excavator		LP = Limited Penetration (HSV/CBR)		
		B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		



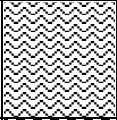
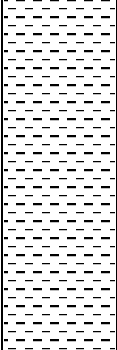
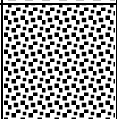
GEO2022-5346: Uldale View, Egremont, Cumbria – TP26

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.36	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.36	1.90	Stiff dark brown slightly sandy very gravelly CLAY with occasional cobbles. Becoming sandier with depth.		1.20 HSV = >120kPa
		End of trial pit at 2.00m. Trial pit dry and stable on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator		Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		



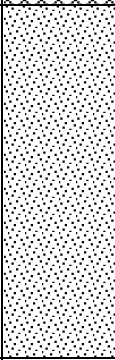
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GEO2022-5346: Uldale View, Egremont, Cumbria – TP27

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.43	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.43	1.60	Firm to stiff dark brown slightly sandy very gravelly CLAY with occasional cobbles. Becoming sandier with depth. Occasional lenses of gravelly sand.		1.20 HSV = 80kPa
1.60	2.00	Grey brown silty very sandy GRAVEL. Very fast groundwater ingress and running sand.		
		End of trial pit at 2.00m. Groundwater ingress (very fast) at 1.60m bgl. Running sand. Poor stability in gravel layer. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

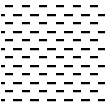
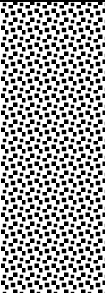
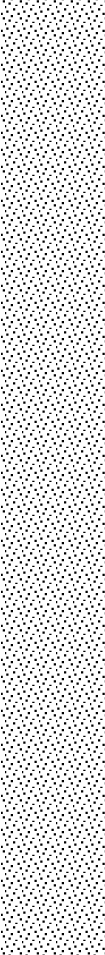


GEO2022-5346: Uldale View, Egremont, Cumbria – TP28

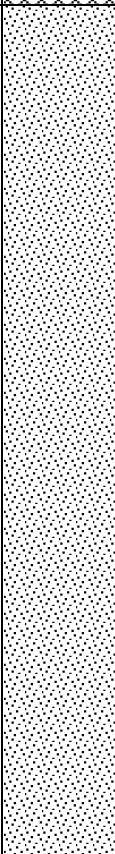
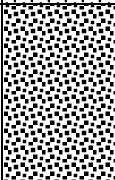
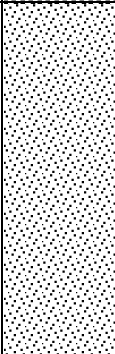
Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.28	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.28	2.20	Brown coarse SAND with flecks of coal. Appears dense – slow digging. Occasional bands of firm to stiff clay. Perched groundwater ingress (fast) at c.0.60m bgl.		
		End of trial pit at 2.20m. Groundwater ingress at 0.60m (perched). Trial pit remained stable. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) LP = Limited Penetration (HSV/CBR) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



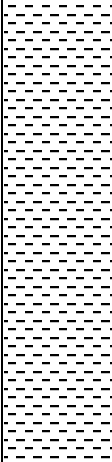
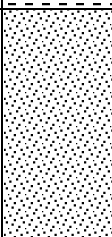
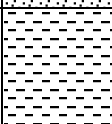
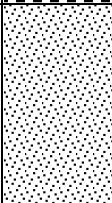
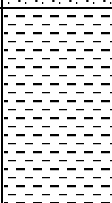
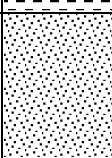
GEO2022-5346: Uldale View, Egremont, Cumbria – BH01

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.31	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.31	0.70	Firm dark brown sandy gravelly CLAY.		
0.70	1.70	Medium dense brown very silty sandy fine to coarse sub-rounded -sub-angular GRAVEL of mixed lithology.		1.00 SPT = N22
1.70	5.00	Loose becoming medium dense brown slightly silty fine to medium SAND.		2.00 SPT = N7 3.00 SPT = N6 4.00 SPT = N10 5.00 SPT = N18
Borehole remained open and dry on completion. Install: GL to 1m plain pipe and bentonite seal, 1m to 4m slotted pipe and gravel filter. DCP test completed adjacent to borehole.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

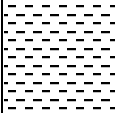
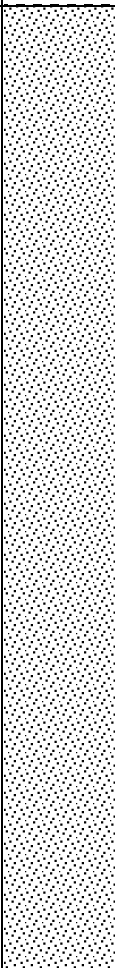
GEO2022-5346: Uldale View, Egremont, Cumbria – BH02

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.38	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.38	3.20	Medium dense becoming loose brown slightly silty medium SAND. Becoming fine to medium with depth.		0.80 - T 1.00 SPT = N12 2.00 SPT = N5 3.00 SPT = N7
3.20	3.80	Dark brown slightly silty very sandy fine to coarse sub-rounded GRAVEL of mixed lithology.		
3.80	5.00	Medium dense brown slightly silty fine to medium SAND.		4.00 SPT = N19 5.00 SPT = N18
Borehole remained open and dry on completion. Borehole backfilled with arisings. DCP test completed adjacent to borehole.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

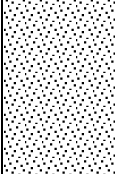
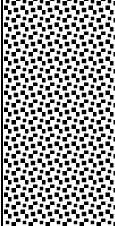
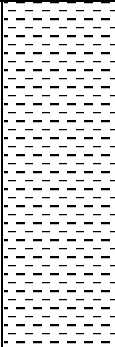
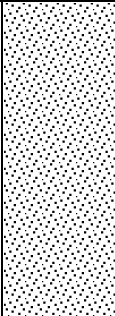
GEO2022-5346: Uldale View, Egremont, Cumbria – BH03

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.30	1.90	Stiff dark brown sandy gravelly CLAY.		1.00 SPT = N12 1.00 - T
1.90	2.70	Loose brown silty fine to medium SAND with occasional gravel.		2.00 SPT = N2
2.70	3.10	Stiff dark brown sandy gravelly CLAY.		3.00 SPT = N7
3.10	3.80	Loose brown silty fine to medium SAND.		
3.80	4.50	Firm brown sandy SILT/CLAY. Becoming stiff with depth.		4.00 SPT = N10 4.10 - T
4.50	5.00	Brown silty fine to medium SAND.		5.00 SPT = N12
Borehole remained open and dry on completion. Install: GL to 1m plain pipe and bentonite seal, 1m to 4m slotted pipe and gravel filter. DCP test completed adjacent to borehole.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Archway Competitor C130 Superheavy			Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

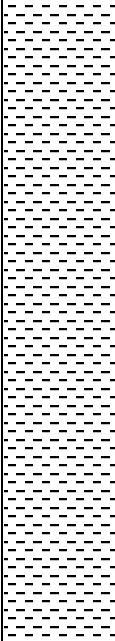
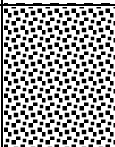
GEO2022-5346: Uldale View, Egremont, Cumbria – BH04

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		0.20 - J
0.30	0.70	Firm to stiff dark brown silty sandy gravelly CLAY.		
0.70	4.00	Medium dense (locally loose to medium dense) brown fine to medium SAND.		1.00 SPT = N16 1.50 - T 2.00 SPT = N9 3.00 SPT = N24 4.00 SPT = N>50/230mm
Borehole remained open and dry on completion. Borehole backfilled with arisings. DCP test completed adjacent to borehole.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

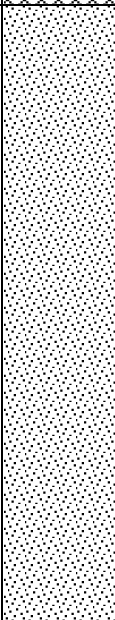
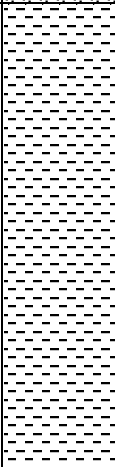
GEO2022-5346: Uldale View, Egremont, Cumbria – BH05

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.30	0.90	Brown silty slightly gravelly SAND.		
0.90	1.70	Medium dense dark brown slightly silty very sandy fine to coarse sub-rounded GRAVEL.		1.00 SPT = 18
1.70	2.90	Stiff dark brown slightly sandy very gravelly CLAY.		2.00 SPT = N9
2.90	4.00	Loose becoming dense fine to medium brown slightly silty SAND.		3.00 SPT = N6 4.00 SPT = N>50 _{/265mm}
Borehole remained open and dry on completion. Install: GL to 1m plain pipe and bentonite seal, 1m to 4.0m slotted pipe and gravel filter.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 05/09/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

GEO2022-5346: Uldale View, Egremont, Cumbria – BH06

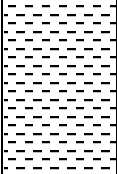
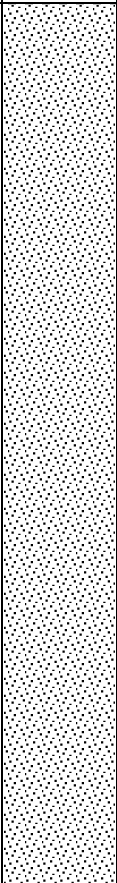
Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.30	2.50	Stiff dark brown gravelly CLAY.		1.00 SPT = N18 2.00 SPT = N30
2.50	3.00	Dense dark grey brown silty very sandy fine to coarse sub-rounded GRAVEL.		3.00 SPT = N>50 _{/150mm}
Borehole terminated due to refusal. Borehole remained open and dry on completion. Install: GL to 1m plain pipe and bentonite seal, 1m to 2.5m slotted pipe and gravel filter.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Archway Competitor C130 Superheavy			Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

GEO2022-5346: Uldale View, Egremont, Cumbria – BH07

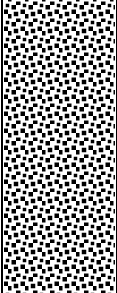
Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.30	2.40	Medium dense becoming dense brown fine to medium SAND. Occasional lenses of stiff clay from and very silty from c.1.90m bgl.		1.00 SPT = N16 2.00 SPT = N5
2.40	4.00	Stiff dark brown very gravelly CLAY.		3.00 SPT = N6 4.00 SPT = N18
Borehole remained open and dry on completion. Install: GL to 1m plain pipe and bentonite seal, 1m to 3.0m slotted pipe and gravel filter.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

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GEO2022-5346: Uldale View, Egremont, Cumbria – BH09

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.34	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.34	0.90	Stiff dark brown very gravelly CLAY.		
0.90	4.00	Medium dense brown slightly silty fine to medium SAND with flecks of coal.		1.00 SPT = N16 2.00 SPT = N10 3.00 SPT = N10 4.00 SPT = N22
Borehole remained open and dry on completion. Borehole backfilled with arisings.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

GEO2022-5346: Uldale View, Egremont, Cumbria – BH10

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.35	TOPSOIL: Dark grey brown sandy silty gravelly LOAM with occasional cobbles. Occasional organic material.		
0.35	1.40	Dense brown very sandy fine to coarse sub-rounded GRAVEL with many cobbles.		1.00 SPT = 37
Borehole terminated due to refusal with sampling tool. Borehole remained open and dry on completion. Borehole backfilled with arisings.				Hand dug to 1.00m
Engineer: J.Brock Site Works Date: 06/09/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

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[illegible]

1 - TRRL Equation, $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057\text{Log}_{10}(\text{mm/blow})$

[illegible]

1 - TRRL Equation, $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057\text{Log}_{10}(\text{mm/blow})$

[illegible]

1 - TRRL Equation, $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057\text{Log}_{10} (\text{mm/blow})$

[illegible][illegible]

1 - TRRL Equation, $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057\text{Log}_{10}(\text{mm/blow})$

[illegible]

1 - TRRL Equation, $\log_{10}(\text{CBR}) = 2.48 - 1.057 \log_{10} (\text{mm/blow})$

Ground Gas & Groundwater Monitoring Record Sheet 01

Site: Uldale View, Egremont, Cumbria

Project No: 2022-5346

Date: 28/09/2022

Borehole	Pressure (mb)	Methane Initial (% v/v)	Methane Residual (% v/v)	Carbon Dioxide Initial (% v/v)	Carbon Dioxide Residual (% v/v)	Oxygen Initial (% v/v)	Oxygen Residual (% v/v)	Flow Rate (l/h)	Water Level (m)	Depth of base (m)	Water Sample Recovered?
BH01	986 F	0	0	1.5	1.5	19.1	19.4	<0.1	DRY	4.00	-
BH03	986 F	0	0	1.7	1.7	19.0	19.3	<0.1	DRY	4.00	-
BH05	986 F	0	0	5.0	5.0	11.9	12.1	<0.1	2.20	4.00	-
BH06	986 F	0	0	3.8	3.8	12.1	16.3	<0.1	0.45	2.45	-
BH07	986 F	0	0	2.6	2.6	16.5	16.9	<0.1	2.45	3.00	-

Notes:

Initial Value = First recorded concentration taken immediately upon opening the gas valve; Residual Value = Constant or "steady" reading following peak.

Monitoring undertaken for a minimum of three minutes. Where high concentrations are initially noted then the monitoring should be increased to five minutes.

F = Falling Atmospheric Pressure, R = Rising Atmospheric Pressure, S = Steady Atmospheric Pressure

Nm – Not Monitored

Monitoring Completed By: SG

Equipment Used: GFM436 Gas Analyser with Flow Pod. Geotechnical Instruments Dipmeter.

Weather Conditions: Overcast and Dry

Temperature 15.0°C

Notes:

Website: www.geoenvironmentalengineering.com

Email: info@geoenvironmentalengineering.com

Telephone: 08456 768 895 / 07883 440 186

Ground Gas & Groundwater Monitoring Record Sheet 02

Site: Uldale View, Egremont, Cumbria

Project No: 2022-5346

Date: 11/10/2022

Borehole	Pressure (mb)	Methane Initial (% v/v)	Methane Residual (% v/v)	Carbon Dioxide Initial (% v/v)	Carbon Dioxide Residual (% v/v)	Oxygen Initial (% v/v)	Oxygen Residual (% v/v)	Flow Rate (l/h)	Water Level (m)	Depth of base (m)	Water Sample Recovered?
BH01	1010 F	0	0	1.8	1.8	18.9	19.1	<0.1	DRY	4.00	-
BH03	1010 F	0	0	1.8	1.8	18.9	19.3	<0.1	DRY	4.00	-
BH05	1010 F	0	0	4.8	4.7	12.1	12.4	<0.1	2.20	4.00	-
BH06	1010 F	0	0	3.1	3.1	12.1	12.4	<0.1	0.45	2.45	-
BH07	1010 F	0	0	2.2	2.2	17.8	17.9	<0.1	2.40	3.00	-

Notes:

Initial Value = First recorded concentration taken immediately upon opening the gas valve; Residual Value = Constant or "steady" reading following peak.

Monitoring undertaken for a minimum of three minutes. Where high concentrations are initially noted then the monitoring should be increased to five minutes.

F = Falling Atmospheric Pressure, R = Rising Atmospheric Pressure, S = Steady Atmospheric Pressure

Nm – Not Monitored

Monitoring Completed By: SG

Equipment Used: GFM436 Gas Analyser with Flow Pod. Geotechnical Instruments Dipmeter.

Weather Conditions: Overcast and Dry

Temperature 14.0°C

Notes:

Website: www.geoenvironmentalengineering.com

Email: info@geoenvironmentalengineering.com

Telephone: 08456 768 895 / 07883 440 186

Ground Gas & Groundwater Monitoring Record Sheet 03

Site: Uldale View, Egremont, Cumbria

Project No: 2022-5346

Date: 25/10/2022

Borehole	Pressure (mb)	Methane Initial (% v/v)	Methane Residual (% v/v)	Carbon Dioxide Initial (% v/v)	Carbon Dioxide Residual (% v/v)	Oxygen Initial (% v/v)	Oxygen Residual (% v/v)	Flow Rate (l/h)	Water Level (m)	Depth of base (m)	Water Sample Recovered?
BH01	990 R	0	0	1.5	1.5	19.3	19.7	<0.1	DRY	4.00	-
BH03	990 R	0	0	2.7	2.7	18.1	18.3	<0.1	DRY	4.00	-
BH05	990 R	0	0	3.7	3.1	12.9	13.9	<0.1	1.90	4.00	-
BH06	990 R	0	0	4.1	4.0	11.9	12.3	<0.1	0.90	2.45	-
BH07	990 R	0	0	3.5	3.5	13.5	13.7	<0.1	2.00	3.00	-

Notes:

Initial Value = First recorded concentration taken immediately upon opening the gas valve; Residual Value = Constant or "steady" reading following peak.

Monitoring undertaken for a minimum of three minutes. Where high concentrations are initially noted then the monitoring should be increased to five minutes.

F = Falling Atmospheric Pressure, R = Rising Atmospheric Pressure, S = Steady Atmospheric Pressure

Nm – Not Monitored

Monitoring Completed By: SG

Equipment Used: GFM436 Gas Analyser with Flow Pod. Geotechnical Instruments Dipmeter.

Weather Conditions: Overcast and Dry

Temperature 14.0°C

Notes:

Website: www.geoenvironmentalengineering.com

Email: info@geoenvironmentalengineering.com

Telephone: 08456 768 895 / 07883 440 186

Ground Gas & Groundwater Monitoring Record Sheet 04

Site: Uldale View, Egremont, Cumbria

Project No: 2022-5346

Date: 09/12/2022

Borehole	Pressure (mb)	Methane Initial (% v/v)	Methane Residual (% v/v)	Carbon Dioxide Initial (% v/v)	Carbon Dioxide Residual (% v/v)	Oxygen Initial (% v/v)	Oxygen Residual (% v/v)	Flow Rate (l/h)	Water Level (m)	Depth of base (m)	Water Sample Recovered?
BH01	1005 S	0	0	0.3	4.9	21.2	18.0	<0.1	DRY	4.00	-
BH03	1005 S	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm	4.00	-
BH05	1005 S	0	0	0.1	0.0	21.2	21.3	<0.1	1.20	4.00	-
BH06	1005 S	0	0	0.3	5.3	20.9	6.1	<0.1	0.70	2.45	-
BH07	1005 S	0	0	0.4	4.2	21.6	14.6	<0.1	1.60	3.00	-

Notes:

Initial Value = First recorded concentration taken immediately upon opening the gas valve; Residual Value = Constant or "steady" reading following peak.

Monitoring undertaken for a minimum of three minutes. Where high concentrations are initially noted then the monitoring should be increased to five minutes.

F = Falling Atmospheric Pressure, R = Rising Atmospheric Pressure, S = Steady Atmospheric Pressure

Nm – Not Monitored

Monitoring Completed By: TE

Equipment Used: GA2000 Gas Analyser with Flow Pod. Geotechnical Instruments Dipmeter.

Weather Conditions: Dry, Clear

Temperature -3.0°C

Notes: Unable to locate BH03 – crop too high/dense

Website: www.geoenvironmentalengineering.com

Email: info@geoenvironmentalengineering.com

Telephone: 08456 768 895 / 07883 440 186

Ground Gas & Groundwater Monitoring Record Sheet 05

Site: Uldale View, Egremont, Cumbria

Project No: 2022-5346

Date: 26.01/2022

Borehole	Pressure (mb)	Methane Initial (% v/v)	Methane Residual (% v/v)	Carbon Dioxide Initial (% v/v)	Carbon Dioxide Residual (% v/v)	Oxygen Initial (% v/v)	Oxygen Residual (% v/v)	Flow Rate (l/h)	Water Level (m)	Depth of base (m)	Water Sample Recovered?
BH01	1031 R	0	0	0.7	3.3	21.9	20.2	<0.1	DRY	4.00	-
BH03	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm	4.00	-
BH05	1031 R	0	0	0.6	4.7	21.9	17.4	<0.1	1.00	4.00	-
BH06	1031 R	0	0	0.6	2.1	22.2	18.5	<0.1	0.45	2.45	-
BH07	1031 R	0	0	0.2	2.7	21.0	19.3	<0.1	1.50	3.00	-

Notes:

Initial Value = First recorded concentration taken immediately upon opening the gas valve; Residual Value = Constant or "steady" reading following peak.

Monitoring undertaken for a minimum of three minutes. Where high concentrations are initially noted then the monitoring should be increased to five minutes.

F = Falling Atmospheric Pressure, R = Rising Atmospheric Pressure, S = Steady Atmospheric Pressure

Nm – Not Monitored

Monitoring Completed By: TE

Equipment Used: GA2000 Gas Analyser with Flow Pod. Geotechnical Instruments Dipmeter.

Weather Conditions: Dry, Clear

Temperature 5.0°C

Notes: Unable to locate BH03 – crop too high/dense

Website: www.geoenvironmentalengineering.com

Email: info@geoenvironmentalengineering.com

Telephone: 08456 768 895 / 07883 440 186

Ground Gas & Groundwater Monitoring Record Sheet 06

Site: Uldale View, Egremont, Cumbria

Project No: 2022-5346

Date: 13/02/2022

Borehole	Pressure (mb)	Methane Initial (% v/v)	Methane Residual (% v/v)	Carbon Dioxide Initial (% v/v)	Carbon Dioxide Residual (% v/v)	Oxygen Initial (% v/v)	Oxygen Residual (% v/v)	Flow Rate (l/h)	Water Level (m)	Depth of base (m)	Water Sample Recovered?
BH01	1026 F	0	0	0.3	3.8	21.2	19.4	<0.1	DRY	4.00	-
BH03	1026 F	0	0	0.6	3.6	20.5	19.0	<0.1	3.40	4.00	-
BH05	1026 F	0	0	0.4	6.1	21.4	15.6	<0.1	1.40	4.00	-
BH06	1026 F	0	0	0.4	5.9	21.0	19.0	<0.1	0.80	2.45	-
BH07	1026 F	0	0	0.3	3.9	20.7	17.0	<0.1	1.80	3.00	-

Notes:

Initial Value = First recorded concentration taken immediately upon opening the gas valve; Residual Value = Constant or "steady" reading following peak.

Monitoring undertaken for a minimum of three minutes. Where high concentrations are initially noted then the monitoring should be increased to five minutes.

F = Falling Atmospheric Pressure, R = Rising Atmospheric Pressure, S = Steady Atmospheric Pressure

Nm – Not Monitored

Monitoring Completed By: TE

Equipment Used: GA2000 Gas Analyser with Flow Pod. Geotechnical Instruments Dipmeter.

Weather Conditions: Dry, Clear

Temperature 9.0°C

Notes:

Website: www.geoenvironmentalengineering.com

Email: info@geoenvironmentalengineering.com

Telephone: 08456 768 895 / 07883 440 186

Appendix III

- Laboratory Test Results



ANALYTICAL TEST REPORT

Contract no: 113429

Contract name: Uldale, Egremont

Client reference: GEO2022-5346

Clients name: Geo Environmental Engineering

Clients address: 4 Culgarth Avenue
Cockermouth
Cumbria
CA13 9PL

Samples received: 12 September 2022

Analysis started: 12 September 2022

Analysis completed: 20 September 2022

Report issued: 20 September 2022

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
\$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing
NAD	No Asbestos Detected

Approved by:

Abbie Neasham-Bourn
Senior Reporting Administrator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
113429-1	BH01	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	12.3
113429-2	BH02	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	13.2
113429-3	BH02	0.80	Clayey Sand with Gravel & Roots	-	-	3.1
113429-4	BH03	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	12.4
113429-5	BH04	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	13.5
113429-6	BH04	1.50	Clayey Sand with Gravel	-	-	4.5
113429-7	TP01	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	13.6
113429-8	TP01	1.00	Clayey Sand with Gravel	-	-	8.0
113429-9	TP03	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	14.6
113429-10	TP06	0.60	Clayey Sand with Gravel	-	-	11.0
113429-11	TP10	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	14.6
113429-12	TP11	1.00	Clayey Sand with Gravel	-	-	6.6
113429-13	TP12	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	18.3
113429-14	TP16	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	13.8
113429-15	TP19	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	11.4

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SOILS

Lab number			113429-1	113429-2	113429-3	113429-4	113429-5	113429-6
Sample id			BH01	BH02	BH02	BH03	BH04	BH04
Depth (m)			0.20	0.20	0.80	0.20	0.20	1.50
Date sampled			07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Test	Method	Units						
Arsenic (total)	CE127 ^M	mg/kg As	15	17	-	19	20	-
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	<0.2	-	<0.2	0.2	-
Chromium (total)	CE127 ^M	mg/kg Cr	62	114	-	84	128	-
Chromium (III)	CE208	mg/kg CrIII	62	114	-	84	128	-
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	-	<1	<1	-
Copper (total)	CE127 ^M	mg/kg Cu	21	27	-	19	27	-
Lead (total)	CE127 ^M	mg/kg Pb	28	39	-	39	47	-
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	-	<0.5	<0.5	-
Nickel (total)	CE127 ^M	mg/kg Ni	23	31	-	19	28	-
Selenium (total)	CE127 ^M	mg/kg Se	0.9	1.0	-	1.1	1.2	-
Zinc (total)	CE127 ^M	mg/kg Zn	53	64	-	43	59	-
pH	CE004 ^M	units	6.7	6.6	7.1	6.6	6.4	7.4
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	262	48	19	24	20	14
Cyanide (total)	CE077	mg/kg CN	<1	<1	-	<1	<1	-
Total Organic Carbon (TOC)	CE197	% w/w C	1.5	3.1	-	2.5	2.7	-
PAH								
Naphthalene	CE087 ^M	mg/kg	<0.02	<0.02	-	<0.02	<0.02	-
Acenaphthylene	CE087 ^M	mg/kg	<0.02	<0.02	-	<0.02	<0.02	-
Acenaphthene	CE087 ^M	mg/kg	0.03	<0.02	-	<0.02	<0.02	-
Fluorene	CE087 ^U	mg/kg	0.03	<0.02	-	<0.02	<0.02	-
Phenanthrene	CE087 ^M	mg/kg	0.40	0.07	-	0.04	0.04	-
Anthracene	CE087 ^U	mg/kg	0.07	<0.02	-	<0.02	<0.02	-
Fluoranthene	CE087 ^M	mg/kg	1.11	0.13	-	0.08	0.08	-
Pyrene	CE087 ^M	mg/kg	0.86	0.11	-	0.06	0.07	-
Benzo(a)anthracene	CE087 ^U	mg/kg	0.48	0.06	-	0.03	0.04	-
Chrysene	CE087 ^M	mg/kg	0.43	0.06	-	0.04	0.04	-
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.51	0.07	-	0.04	0.05	-
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.19	0.03	-	<0.03	<0.03	-
Benzo(a)pyrene	CE087 ^U	mg/kg	0.36	0.05	-	0.02	0.04	-
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.19	0.02	-	<0.02	<0.02	-
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.05	<0.02	-	<0.02	<0.02	-
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.22	0.03	-	<0.02	<0.02	-
PAH (total of USEPA 16)	CE087	mg/kg	4.94	0.63	-	<0.34	0.36	-
Subcontracted analysis								
Asbestos (qualitative)	\$	-	NAD	NAD	-	NAD	NAD	-

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SOILS

Lab number			113429-7	113429-8	113429-9	113429-10	113429-11	113429-12
Sample id			TP01	TP01	TP03	TP06	TP10	TP11
Depth (m)			0.20	1.00	0.20	0.60	0.20	1.00
Date sampled			07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022
Test	Method	Units						
Arsenic (total)	CE127 ^M	mg/kg As	18	-	16	-	12	-
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	-	<0.2	-	<0.2	-
Chromium (total)	CE127 ^M	mg/kg Cr	86	-	89	-	81	-
Chromium (III)	CE208	mg/kg CrIII	86	-	89	-	81	-
Chromium (VI)	CE146	mg/kg CrVI	<1	-	<1	-	<1	-
Copper (total)	CE127 ^M	mg/kg Cu	18	-	22	-	15	-
Lead (total)	CE127 ^M	mg/kg Pb	34	-	44	-	33	-
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	-	<0.5	-	<0.5	-
Nickel (total)	CE127 ^M	mg/kg Ni	22	-	23	-	18	-
Selenium (total)	CE127 ^M	mg/kg Se	0.8	-	0.9	-	0.6	-
Zinc (total)	CE127 ^M	mg/kg Zn	39	-	45	-	33	-
pH	CE004 ^M	units	6.8	6.9	6.8	6.8	7.3	7.6
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	36	28	33	66	17	11
Cyanide (total)	CE077	mg/kg CN	<1	-	<1	-	<1	-
Total Organic Carbon (TOC)	CE197	% w/w C	2.2	-	2.8	-	2.1	-
PAH								
Naphthalene	CE087 ^M	mg/kg	<0.02	-	<0.02	-	<0.02	-
Acenaphthylene	CE087 ^M	mg/kg	<0.02	-	<0.02	-	<0.02	-
Acenaphthene	CE087 ^M	mg/kg	<0.02	-	<0.02	-	<0.02	-
Fluorene	CE087 ^U	mg/kg	<0.02	-	<0.02	-	<0.02	-
Phenanthrene	CE087 ^M	mg/kg	0.09	-	0.04	-	0.04	-
Anthracene	CE087 ^U	mg/kg	<0.02	-	<0.02	-	<0.02	-
Fluoranthene	CE087 ^M	mg/kg	0.26	-	0.10	-	0.08	-
Pyrene	CE087 ^M	mg/kg	0.20	-	0.08	-	0.07	-
Benzo(a)anthracene	CE087 ^U	mg/kg	0.10	-	0.04	-	0.04	-
Chrysene	CE087 ^M	mg/kg	0.10	-	0.05	-	0.04	-
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.13	-	0.06	-	0.04	-
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.05	-	<0.03	-	<0.03	-
Benzo(a)pyrene	CE087 ^U	mg/kg	0.08	-	0.04	-	0.03	-
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.04	-	<0.02	-	<0.02	-
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	-	<0.02	-	<0.02	-
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.05	-	0.02	-	<0.02	-
PAH (total of USEPA 16)	CE087	mg/kg	1.11	-	0.43	-	<0.34	-
Subcontracted analysis								
Asbestos (qualitative)	\$	-	NAD	-	NAD	-	NAD	-

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SOILS

Lab number			113429-13	113429-14	113429-15
Sample id			TP12	TP16	TP19
Depth (m)			0.20	0.20	0.20
Date sampled			07/09/2022	07/09/2022	07/09/2022
Test	Method	Units			
Arsenic (total)	CE127 ^M	mg/kg As	15	24	14
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	<0.2	<0.2
Chromium (total)	CE127 ^M	mg/kg Cr	94	94	94
Chromium (III)	CE208	mg/kg CrIII	94	94	94
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	17	23	15
Lead (total)	CE127 ^M	mg/kg Pb	34	35	23
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	22	40	26
Selenium (total)	CE127 ^M	mg/kg Se	0.7	0.8	0.6
Zinc (total)	CE127 ^M	mg/kg Zn	39	57	39
pH	CE004 ^M	units	7.2	7.3	6.7
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	19	425	172
Cyanide (total)	CE077	mg/kg CN	<1	<1	<1
Total Organic Carbon (TOC)	CE197	% w/w C	2.8	3.0	1.9
PAH					
Naphthalene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Acenaphthylene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Acenaphthene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Fluorene	CE087 ^U	mg/kg	<0.02	<0.02	<0.02
Phenanthrene	CE087 ^M	mg/kg	0.03	0.02	<0.02
Anthracene	CE087 ^U	mg/kg	<0.02	<0.02	<0.02
Fluoranthene	CE087 ^M	mg/kg	0.06	0.05	0.05
Pyrene	CE087 ^M	mg/kg	0.05	0.04	0.05
Benzo(a)anthracene	CE087 ^U	mg/kg	0.04	0.03	0.04
Chrysene	CE087 ^M	mg/kg	0.04	<0.03	<0.03
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.05	0.04	0.04
Benzo(k)fluoranthene	CE087 ^M	mg/kg	<0.03	<0.03	<0.03
Benzo(a)pyrene	CE087 ^U	mg/kg	0.04	0.03	0.03
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.03	0.02	0.02
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	<0.34	<0.34
Subcontracted analysis					
Asbestos (qualitative)	\$	-	NAD	NAD	NAD

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
113429-1	BH01	0.20	N	
113429-2	BH02	0.20	N	
113429-3	BH02	0.80	N	
113429-4	BH03	0.20	N	
113429-5	BH04	0.20	N	
113429-6	BH04	1.50	N	
113429-7	TP01	0.20	N	
113429-8	TP01	1.00	N	
113429-9	TP03	0.20	N	
113429-10	TP06	0.60	N	
113429-11	TP10	0.20	N	
113429-12	TP11	1.00	N	
113429-13	TP12	0.20	N	
113429-14	TP16	0.20	N	
113429-15	TP19	0.20	N	

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

For soils and solids, analytical results are inclusive of stones, where applicable.



Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**
Engineer: **James Brock/Curtis Evans**
Project: **GEO2022-5346 - Uldale, Egremont**
Location: **TP02 at 1.50m**
Material Type: **Brown, sandy CLAY with occasional gravel**

Sample Specification: Sampled by Site Staff/ClientSource: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%): **16.1** BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%): **32** Part 2 Clause 4.4 (One point method)

Plastic Limit (%): **17** Part 2 Clause 5.3

Plasticity Index (%): **15** Part 2 Clause 5.4

Passing 425mic (%): **88**

Soil Classification: **CL**

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**Engineer: **James Brock/Curtis Evans**Project: **GEO2022-5346 - Uldale, Egremont**Location: **TP03 at 0.50m**Material Type: **Brown, very sandy CLAY with occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

36.0

BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):

34

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

19

Part 2 Clause 5.3

Plasticity Index (%):

15

Part 2 Clause 5.4

Passing 425mic (%):

74

Soil Classification:

CL

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Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



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Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**
Engineer: **James Brock/Curtis Evans**
Project: **GEO2022-5346 - Uldale, Egremont**
Location: **TP04 at 0.80m**
Material Type: **Red sandy CLAY with occasional gravel**

Sample Specification: Sampled by Site Staff/ClientSource: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%): **17.9** BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%): **29** Part 2 Clause 4.4 (One point method)

Plastic Limit (%): **17** Part 2 Clause 5.3

Plasticity Index (%): **12** Part 2 Clause 5.4

Passing 425mic (%): **63**

Soil Classification: **CL**

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**Engineer: **James Brock/Curtis Evans**Project: **GEO2022-5346 - Uldale, Egremont**Location: **TP05 at 1.00m**Material Type: **Red sandy CLAY with occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

18.3

BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):

39

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

21

Part 2 Clause 5.3

Plasticity Index (%):

18

Part 2 Clause 5.4

Passing 425mic (%):

82

Soil Classification:

CI

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**Engineer: **James Brock/Curtis Evans**Project: **GEO2022-5346 - Uldale, Egremont**Location: **TP06 at 1.70m**Material Type: **Red very sandy CLAY with very occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

18.2

BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):

32

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

20

Part 2 Clause 5.3

Plasticity Index (%):

12

Part 2 Clause 5.4

Passing 425mic (%):

93

Soil Classification:

CL

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Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**
Engineer: **James Brock/Curtis Evans**
Project: **GEO2022-5346 - Uldale, Egremont**
Location: **TP08 at 1.10m**
Material Type: **Red very sandy CLAY with very occasional gravel**

Sample Specification: Sampled by Site Staff/ClientSource: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%): **15.5** BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%): **32** Part 2 Clause 4.4 (One point method)

Plastic Limit (%): **21** Part 2 Clause 5.3

Plasticity Index (%): **11** Part 2 Clause 5.4

Passing 425mic (%): **71**

Soil Classification: **CL**

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**
Engineer: **James Brock/Curtis Evans**
Project: **GEO2022-5346 - Uldale, Egremont**
Location: **TP09 at 1.50m**
Material Type: **Red sandy CLAY with very occasional gravel**

Sample Specification: Sampled by Site Staff/ClientSource: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%): **14.6** BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):	30	Part 2 Clause 4.4 (One point method)
Plastic Limit (%):	16	Part 2 Clause 5.3
Plasticity Index (%):	14	Part 2 Clause 5.4
Passing 425mic (%):	66	
Soil Classification:	CL	

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**Engineer: **James Brock/Curtis Evans**Project: **GEO2022-5346 - Uldale, Egremont**Location: **TP10 at 0.40m**Material Type: **Red sandy CLAY with very occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

15.5

BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):

30

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

24

Part 2 Clause 5.3

Plasticity Index (%):

6

Part 2 Clause 5.4

Passing 425mic (%):

98

Soil Classification:

ML

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**Engineer: **James Brock/Curtis Evans**Project: **GEO2022-5346 - Uldale, Egremont**Location: **TP12 at 1.00m**Material Type: **Red sandy CLAY with very occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

14.3

BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):

30

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

17

Part 2 Clause 5.3

Plasticity Index (%):

13

Part 2 Clause 5.4

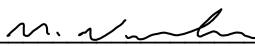
Passing 425mic (%):

76

Soil Classification:

CL

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐Signed: 

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**Engineer: **James Brock/Curtis Evans**Project: **GEO2022-5346 - Uldale, Egremont**Location: **TP16 at 1.50m**Material Type: **Red sandy CLAY with very occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

12.4

BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):

36

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

18

Part 2 Clause 5.3

Plasticity Index (%):

18

Part 2 Clause 5.4

Passing 425mic (%):

65

Soil Classification:

CI

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Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**Engineer: **James Brock/Curtis Evans**Project: **GEO2022-5346 - Uldale, Egremont**Location: **TP20 at 1.00m**Material Type: **Red very sandy CLAY with very occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

20.0

BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):

36

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

19

Part 2 Clause 5.3

Plasticity Index (%):

17

Part 2 Clause 5.4

Passing 425mic (%):

77

Soil Classification:

CI

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **31.04g retained on 20mm test sieve. This was removed prior to testing.**Certificate of sampling received: ☐

Signed: _____

☒ M. Newton, Laboratory Manager☐ P. Fletcher, Senior TechnicianStart of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**
Engineer: **James Brock/Curtis Evans**
Project: **GEO2022-5346 - Uldale, Egremont**
Location: **TP23 at 1.50m**
Material Type: **Red very sandy CLAY with very occasional gravel**

Sample Specification: Sampled by Site Staff/ClientSource: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%): **13.2** BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%): **30** Part 2 Clause 4.4 (One point method)

Plastic Limit (%): **16** Part 2 Clause 5.3

Plasticity Index (%): **14** Part 2 Clause 5.4

Passing 425mic (%): **78**

Soil Classification: **CL**

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **126.98g retained on 20mm test sieve. This was removed prior to testing.**

Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**Engineer: **James Brock/Curtis Evans**Project: **GEO2022-5346 - Uldale, Egremont**Location: **BH03 at 1.00m**Material Type: **Red very sandy CLAY with very occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

12.9

BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%):

32

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

17

Part 2 Clause 5.3

Plasticity Index (%):

15

Part 2 Clause 5.4

Passing 425mic (%):

71

Soil Classification:

CL

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering**
Engineer: **James Brock/Curtis Evans**
Project: **GEO2022-5346 - Uldale, Egremont**
Location: **BH03 at 4.10m**
Material Type: **Brown sandy CLAY with very occasional gravel**

Sample Specification: Sampled by Site Staff/ClientSource: **Site**

Date Sampled:

Date Received: **12/09/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%): **25.0** BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Liquid Limit (%): **33** Part 2 Clause 4.4 (One point method)

Plastic Limit (%): **20** Part 2 Clause 5.3

Plasticity Index (%): **13** Part 2 Clause 5.4

Passing 425mic (%): **98**

Soil Classification: **CL**

Results reported herein relate only to the material supplied or sampled by the laboratory. This report shall not be reproduced except in full without prior written consent. Sampling certificate Uncertainty available on request where applicable. All testing carried out at NCC Laboratory

Remarks: **None**Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager

[] P. Fletcher, Senior Technician

Start of Test Date: **12/09/2022**End of Test Date: **16/09/2022**Report Date: **16/09/2022**



ANALYTICAL TEST REPORT

Contract no: 113511

Contract name: Uldale, Egremont, Geo-Environmental Engineering

Client reference: S1427

Clients name: Northumberland County Council

Clients address: Highways Laboratory
Bassington Drive
Cramlington
NE23 8AJ

Samples received: 13 September 2022

Analysis started: 13 September 2022

Analysis completed: 21 September 2022

Report issued: 21 September 2022

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
\$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing

Approved by:

Abbie Neasham-Bourn
Senior Reporting Administrator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
113511-1	S1427/01	1.50	Sandy Loamy Clay	-	-	12.9
113511-2	S1427/02	0.50	Sandy Clayey Loam	-	-	14.6
113511-3	S1427/03	0.80	Sandy Clay	-	-	17.4
113511-4	S1427/04	1.00	Sandy Clay	-	-	13.6
113511-5	S1427/05	1.70	Sandy Clay	-	-	14.2
113511-6	S1427/06	1.10	Sandy Clay	-	-	13.3
113511-7	S1427/07	1.50	Sandy Clay	-	-	13.0
113511-8	S1427/08	0.40	Sandy Clay	-	-	13.7
113511-9	S1427/09	1.00	Sandy Clay	-	-	13.2
113511-10	S1427/10	1.56	Sandy Clay	-	-	10.3
113511-11	S1427/11	1.00	Sandy Clay	-	-	13.1
113511-12	S1427/12	1.50	Sandy Clay	-	-	13.7
113511-13	S1427/13	1.00	Sandy Clay	-	-	10.4
113511-14	S1427/14	4.10	Sandy Clay	-	-	18.5

Chemtech Environmental Limited

SOILS

Lab number			113511-1	113511-2	113511-3	113511-4	113511-5	113511-6
Sample id			S1427/01	S1427/02	S1427/03	S1427/04	S1427/05	S1427/06
Depth (m)			1.50	0.50	0.80	1.00	1.70	1.10
Date sampled			-	-	-	-	-	-
Test	Method	Units						
pH	CE004 ^M	units	7.7	7.6	7.4	7.3	7.3	7.3
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	32	31	29	27	22	24

Chemtech Environmental Limited

SOILS

Lab number			113511-7	113511-8	113511-9	113511-10	113511-11	113511-12
Sample id			S1427/07	S1427/08	S1427/09	S1427/10	S1427/11	S1427/12
Depth (m)			1.50	0.40	1.00	1.56	1.00	1.50
Date sampled			-	-	-	-	-	-
Test	Method	Units						
pH	CE004 ^M	units	7.2	7.1	6.9	6.8	7.0	6.6
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	27	42	44	34	42	41

Chemtech Environmental Limited

SOILS

Lab number			113511-13	113511-14
Sample id			S1427/13	S1427/14
Depth (m)			1.00	4.10
Date sampled			-	-
Test	Method	Units		
pH	CE004 ^M	units	7.0	7.6
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	37	30

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
113511-1	S1427/01	1.50	Y	All (NSD)
113511-2	S1427/02	0.50	Y	All (NSD)
113511-3	S1427/03	0.80	Y	All (NSD)
113511-4	S1427/04	1.00	Y	All (NSD)
113511-5	S1427/05	1.70	Y	All (NSD)
113511-6	S1427/06	1.10	Y	All (NSD)
113511-7	S1427/07	1.50	Y	All (NSD)
113511-8	S1427/08	0.40	Y	All (NSD)
113511-9	S1427/09	1.00	Y	All (NSD)
113511-10	S1427/10	1.56	Y	All (NSD)
113511-11	S1427/11	1.00	Y	All (NSD)
113511-12	S1427/12	1.50	Y	All (NSD)
113511-13	S1427/13	1.00	Y	All (NSD)
113511-14	S1427/14	4.10	Y	All (NSD)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

For soils and solids, analytical results are inclusive of stones, where applicable.

Appendix IV

- GEO Chemical Assessment Sheet

Geo Environmental Engineering Ltd

Chemical Assessment Sheets - Soils

Lab number			113429-1	113429-2	113429-3	113429-4	113429-5	113429-6	113429-7	113429-8	113429-9	113429-10	113429-11	113429-12	113429-13	113429-14	113429-15	Generic Assessment Criteria Residential With Plant Uptake 2.5% SOM		
Sample id			BH01	BH02	BH02	BH03	BH04	BH04	TP01	TP01	TP03	TP06	TP10	TP11	TP12	TP16	TP19	GAC	GAC Exceeded?	GAC Ref:
Depth (m)			0.20	0.20	0.80	0.20	0.20	1.50	0.20	1.00	0.20	0.60	0.20	1.00	0.20	0.20	0.20			
Date sampled			07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022	07/09/2022			
Test	Method	Units	TOPSOIL	TOPSOIL	SAND	TOPSOIL	TOPSOIL	SAND	TOPSOIL	GRAVEL	TOPSOIL	SAND	TOPSOIL	SAND	TOPSOIL	TOPSOIL	TOPSOIL			
Arsenic (total)	CE127 ^M	mg/kg As	15	17	-	19	20	-	18	-	16	-	12	-	15	24	14	37	No	LQM S4UL
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	<0.2	-	<0.2	0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	<0.2	<0.2	11	No	LQM S4UL
Chromium (III)	CE208	mg/kg CrIII	62	114	-	84	128	-	86	-	89	-	81	-	94	94	94	910	No	LQM S4UL
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	-	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	<1	6	No	LQM S4UL
Copper (total)	CE127 ^M	mg/kg Cu	21	27	-	19	27	-	18	-	22	-	15	-	17	23	15	2400	No	LQM S4UL
Lead (total)	CE127 ^M	mg/kg Pb	28	39	-	39	47	-	34	-	44	-	33	-	34	35	23	200	No	CL:AIRE C4SL
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	40	No	LQM S4UL
Nickel (total)	CE127 ^M	mg/kg Ni	23	31	-	19	28	-	22	-	23	-	18	-	22	40	26	130	No	LQM S4UL
Selenium (total)	CE127 ^M	mg/kg Se	0.9	1.0	-	1.1	1.2	-	0.8	-	0.9	-	0.6	-	0.7	0.8	0.6	250	No	LQM S4UL
Zinc (total)	CE127 ^M	mg/kg Zn	53	64	-	43	59	-	39	-	45	-	33	-	39	57	39	3700	No	LQM S4UL
pH	CE004 ^M	units	6.7	6.6	7.1	6.6	6.4	7.4	6.8	6.9	6.8	6.8	7.3	7.6	7.2	7.3	6.7	N/A	N/A	N/A
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	262	48	19	24	20	14	36	28	33	66	17	11	19	425	172	N/A	N/A	N/A
Cyanide (total)	CE077	mg/kg CN	<1	<1	-	<1	<1	-	<1	-	<1	-	<1	-	<1	<1	<1	34	No	ATRISK SSV
Total Organic Carbon (TOC)	CE197	% w/w C	1.5	3.1	-	2.5	2.7	-	2.2	-	2.8	-	2.1	-	2.8	3.0	1.9	-	-	-
PAH																				
Naphthalene	CE087 ^M	mg/kg	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	5.6	No	LQM S4UL
Acenaphthylene	CE087 ^M	mg/kg	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	420	No	LQM S4UL
Acenaphthene	CE087 ^M	mg/kg	0.03	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	510	No	LQM S4UL
Fluorene	CE087 ^U	mg/kg	0.03	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	400	No	LQM S4UL
Phenanthrene	CE087 ^M	mg/kg	0.40	0.07	-	0.04	0.04	-	0.09	-	0.04	-	0.04	-	0.03	0.02	<0.02	220	No	LQM S4UL
Anthracene	CE087 ^U	mg/kg	0.07	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	5400	No	LQM S4UL
Fluoranthene	CE087 ^M	mg/kg	1.11	0.13	-	0.08	0.08	-	0.26	-	0.10	-	0.08	-	0.06	0.05	0.05	560	No	LQM S4UL
Pyrene	CE087 ^M	mg/kg	0.86	0.11	-	0.06	0.07	-	0.20	-	0.08	-	0.07	-	0.05	0.04	0.05	1200	No	LQM S4UL
Benzo(a)anthracene	CE087 ^U	mg/kg	0.48	0.06	-	0.03	0.04	-	0.10	-	0.04	-	0.04	-	0.04	0.03	0.04	11	No	LQM S4UL
Chrysene	CE087 ^M	mg/kg	0.43	0.06	-	0.04	0.04	-	0.10	-	0.05	-	0.04	-	0.04	<0.03	<0.03	22	No	LQM S4UL
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.51	0.07	-	0.04	0.05	-	0.13	-	0.06	-	0.04	-	0.05	0.04	0.04	3.3	No	LQM S4UL
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.19	0.03	-	<0.03	<0.03	-	0.05	-	<0.03	-	<0.03	-	<0.03	<0.03	<0.03	93	No	LQM S4UL
Benzo(a)pyrene	CE087 ^U	mg/kg	0.36	0.05	-	0.02	0.04	-	0.08	-	0.04	-	0.03	-	0.04	0.03	0.03	2.7	No	LQM S4UL
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.19	0.02	-	<0.02	<0.02	-	0.04	-	<0.02	-	<0.02	-	0.03	0.02	0.02	36	No	LQM S4UL
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.05	<0.02	-	<0.02	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	0.28	No	LQM S4UL
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.22	0.03	-	<0.02	<0.02	-	0.05	-	0.02	-	<0.02	-	<0.02	<0.02	<0.02	340	No	LQM S4UL
PAH (total of USEPA 16)	CE087	mg/kg	4.94	0.63	-	<0.34	0.36	-	1.11	-	0.43	-	<0.34	-	<0.34	<0.34	<0.34	-	-	-
Subcontracted analysis																				
Asbestos (qualitative)	\$	-	NAD	NAD	-	NAD	NAD	-	NAD	-	NAD	-	NAD	-	NAD	NAD	NAD	Present	No	Presence

Notes:
GAC = Generic Assessment Criteria
YES = GAC Exceeded
CLEA SGV = Clea Soil Guideline Value (Residential with Plant Uptake End Use based on 2.5% SOM)
LQM S4UL = LQM/CIEH 'Suitable 4 Use Levels' S4ULs (Residential with Plant Uptake End Use based on 2.5% SOM)
CL:AIRE C4SL = Category 4 Screening Levels (Residential with Plant Uptake End Use based on 2.5% SOM)
ATRISK SSV = Atkins Soil Screening Values (Residential with Consumption of Home Grown Produce at 1% SOM)



GEO Environmental Engineering Ltd
Geotechnical
&
Environmental Drilling Experts
&
Consultants

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