



GEO

Environmental Engineering



PHASE 2: GROUND INVESTIGATION REPORT

PROPOSED COMMERCIAL DEVELOPMENT OF LAND TO

SOUTH OF VALE VIEW, EGREMONT

CUMBRIA

FOR:

THOMAS GRAHAM AND SONS LTD

GEO Environmental Engineering

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CONTENTS

Section		Page
1.0	Introduction	1
2.0	Ground Investigation Report	3
3.0	Ground Investigation Fieldwork	5
4.0	Ground and Groundwater Conditions	6
5.0	Exploratory Hole Testing	8
6.0	Laboratory Testing	10
7.0	Geotechnical Analysis	12
8.0	Generic Quantitative Risk Assessment	13
9.0	Construction Related Excavations and Off-Site Disposal	17
10.0	Discussions and Recommendations	18
Appendix I:	Site Location Plan Exploratory Hole Location Plan Topographical Survey Drawing	
Appendix II:	Exploratory Hole Logs Ground Gas Monitoring Sheets	
Appendix III:	Laboratory Test Results (including WAC results)	
Appendix IV:	GEO Chemical Assessment Sheet	

1.0 Introduction

1.1 Brief

GEO Environmental Engineering Ltd (GEO) were commissioned by Consultant, A L Daines & Partners LLP on behalf of the Client, Thomas Graham and Sons Ltd to carry a ground investigation for land to the south of Vale View in Egremont, Cumbria as indicated on the site location plan included in Appendix I.

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.5.55ha is located in the southern part of Egremont, immediately west of the A595 trunk road as indicated on the site location plan included in Appendix I. Access to the site is from Vale View to the North.

- National Grid Reference: 301421, 509819
- Post Code: CA22 2RW (approximate only)

The site comprises a large agricultural field used for pasture which is predominantly surfaced with long unkempt grasses, occasional scrub vegetation and exposed soils. Evidence of a former railway siding is present in the east of the site in the form of mounds of coarse granular material including possible railway ballast and a cutting in the south-eastern part.

A former railway was also present along the western boundary and evidence of this can be seen in the site topography where the ground appears to have been raised and levelled. The western boundary slopes steeply to the fields below.

Evidence of a spring or possible leaking pipe was noted in the northern part of the site. The ground surrounding the feature was noted as saturated and very soft. Much of the land surrounding the spring was surfaced with marsh grasses.

A culvert was noted in the southern part of the site.

The presence of former railway lines/sidings and associated made ground is a potential source of made ground. However, no other sources of potential contamination sources were noted on site.

The site undulates with areas of steep ground in places. Overall, levels fall from the highest part in the north east at c.63m OD to the lowest part along the south west boundary at c.42m OD. A copy of the topographical survey drawing is included in Appendix I.

1.3 Proposed Development

It is understood that the site will be developed for commercial end use. A proposed site layout plan has not been provided, however, it is anticipated that the development will comprise a large warehouse and yard for storage and distribution with associated offices and infrastructure. The offices and warehousing are likely to be located along the north east boundary.

Further details relating to the proposed development should be obtained from the Consultant.

1.4 Other Reports/Studies

GEO completed a Phase 1: Desk Top Study (DTS) Report, details of which are included below:

- Phase I Desk Top Study (Preliminary Environmental Risk Assessment), ref: 2021-4760, dated: 05.04.2022.

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

The DTS indicated a low to moderate geotechnical risk associated the site. The risk is dependent on the location of the proposed buildings/structures due to possible deep made ground across the western parts which could necessitate alternative foundation solutions such as piles, and consideration should be given to the slope stability. Other risks include a culvert in the southern parts of the site and a possible spring in the northern part. The risk of coal or iron ore mining was considered negligible.

The risk of ground contamination was deemed very low. Although there is a potential for localised contaminants within the soil associated with the former land uses and possible made ground, the risk to human health based on a commercial end use was considered very low. The report recommended intrusive investigations to confirm the shallow ground conditions.

The risk of groundwater contamination was deemed negligible.

A very low risk of ground gas was deemed appropriate due to the potential for deep made ground which could be a potential source.

The site is not located within a Radon Affected Area as defined by the British Geological Survey and Public Health England.

2.0 Ground Investigation Report

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, Part 2: Ground Investigation & 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.
- CIRIA C758D 2019 - Abandoned Mine Workings Manual

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 a prudent 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. 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 Commercial End Use

It is understood that the site will be developed for a commercial end use with comprise a large warehouse and yard for storage and distribution with associated offices and 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 staff and customers 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 *commercial / industrial* is considered most appropriate.

3.0 Ground Investigation Fieldwork

3.1 Intrusive Investigation Fieldworks Summary

The ground investigation works were completed over two days commencing on the 22nd March 2022. The exploratory holes were located across the site to provide general site coverage taking into consideration buried utilities (gas, water, culvert and electricity), steep ground and surface obstructions.

Areas of suspected made ground were targeted as part of the intrusive fieldworks as indicated in Table 1 below:

Area of Concern:	Exploratory Hole:
Area of former mounds in northeast part of the site.	TP05 to TP07 TP15 and TP16
Possible deep made ground across western part of the site.	BH04 TP02, TP09 to TP11 TP25 and TP26
Former railway and cutting in southeast of the site.	TP14, 17, 20 and 22
Exposed granular soils and steep ground.	TP07

Table 1: Areas of concern/interest targeted during intrusive investigations

The exploratory hole location plan is provided in Appendix I.

The ground investigation works comprised:

- 7 No. Dynamic (Windowless) Sampling Boreholes (BH's 01 to 07) to depths of between c.2.00m and c.5.00m bgl.
- 26 No. Mechanically Excavated Trial Pits (TP's 01 to 26) to depths of between c.1.30m and c.2.50m bgl.
- Gas / Groundwater monitoring wells installed (BH's 01, 03, 04, 06 & 07)
- Gas and groundwater monitoring (4 visits completed).
- 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.
- Laboratory based geotechnical testing.
- Laboratory chemical screening of soil samples for human health assessment and waste disposal.

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 (Gas and Groundwater Monitoring results).

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 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 encountered across the site to a maximum depth of c.1.80m bgl. As predicted in the desk top study, the made ground was typically encountered along the routes of the former railway lines, and in the north eastern part which was previously occupied by unspecified heaps (possible spoil mounds).

Historical records indicate that several mounds were present across the north east part of the site during the mid-1900s and remnants of these mounds are still present close to the site boundary. As such, made ground was anticipated in this area. The trial pits confirmed made ground (typically less than c.0.70m deep) comprising gravel, cobbles and boulders of aggregate within a loamy soil matrix. Trial pits TP's 05 and 06 were positioned on the mounds and encountered similar ground conditions.

The route of the former railway line is evident in the south eastern part of the site due to the topography which includes a cutting and areas of raised ground. Within the cutting the made ground was generally less than c.1m deep and comprised gravel, cobbles and boulders of aggregate, shale, ash, sandstone and occasional clinker. Where the ground was raised to the north of the cutting, the made ground was generally deeper, extending to a depth of c.1.80m bgl and comprising clayey sandy gravel of clinker, slag, coal, aggregate and reworked silty clay with occasional gravel (clinker, ash, aggregate and coal), fabric and metal.

Made ground was anticipated across the western part of the site where the ground appears to have been raised to facilitate construction of the former railway line. The exploratory holes encountered made ground to a maximum depth of c.1.60m bgl, although it is anticipated that the made ground will be significantly deeper along the boundary. The exploratory holes were located several metres away from the boundary due to dense vegetation and the presence of a gas main. The made ground comprised gravel, cobbles and boulders of aggregate with much clinker, ash, shale and occasional metal and brick.

Topsoil was encountered across the site to depths of between c.0.05m and 0.30m bgl. The topsoil was described as dark brown sandy gravelly loam. The made ground was often capped with topsoil.

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

Natural drift deposits were encountered in all of the exploratory holes and typically comprised firm, firm to stiff and stiff sandy very gravelly clay with occasional cobbles, and bands of silty sandy gravel of mixed lithology. Locally, the ground was occasionally soft directly beneath the made ground, possibly due to former weathering.

Hand shear vane tests were carried in trial pits TP01 and TP03 at depths of c.0.80m and c.0.90m bgl respectively. The tests gave undrained shear values of 90kN/m² and in excess of 120kN/m².

In-situ Standard Penetration Tests (SPTs) were completed in the boreholes at 1m intervals at depths of between c.1.00m and c.5.00m bgl. The tests gave 'N' values of between 14 and 49 which is indicative of clays of medium to very high strength.

4.1.3 Solid Geological Deposits (Bedrock)

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

4.2 Groundwater

With the exception of occasional minor pockets of perched groundwater at depths of between c.1.40m and c.2.20m bgl, the exploratory holes typically remained dry during the intrusive ground investigation works.

Groundwater monitoring of installations placed in the boreholes has been carried out on four occasions between April and June 2022. Standing groundwater levels have been recorded between c.0.10m and c.1.90m bgl. However, given the ground conditions (stiff clay), it is likely that the water has resulted from surface ingress which has been trapped/perched within the boreholes rather than a continuous groundwater table.

Based on the results of the ground investigation, significant groundwater ingress is not anticipated. However, 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

In-situ Standard Penetration Tests (SPTs) were completed in the boreholes at 1m intervals at depths of between c.1.00m and c.5.00m bgl. The tests gave 'N' values of between 14 and 49 which is indicative of clays of medium to very high strength.

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 carried in trial pits TP01 and TP03 at depths of c.0.80m and c.0.90m bgl respectively to confirm field descriptions and to aid foundation design. The tests gave undrained shear values of 90kN/m² and in excess of 120kN/m².

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

5.3 Ground Gas Monitoring

To assess the on-site potential for hazardous ground gases, boreholes BH's 01, 03, 04, 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.2.80m and c.3.80m 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 the following documents:

- BS8485: 2015: Code of practice for the characterisation and remediation from ground gas affected developments.
- CIRIA Report C665, November 2015.
- NHBC 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 Commercial end use, the monitoring of ground gas monitoring must comprise at least four site visits over a minimum period of 4 weeks.

The wells have been monitored on four occasions between April and June 2022 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 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).

Samples of the materials recovered from the exploratory holes at depths of between c.0.80m and c.1.50m 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:

- 5 No. samples of topsoil (c.0.20m bgl)
- 12 No. samples of made ground (c.0.20m to c.1.00m bgl)
- 7 No. samples of the natural drift deposits (c.0.60m to c.1.80m 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 Chemtech reports (ref's: 107640(1) & 107754) 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:

- 5 No. samples of topsoil (c.0.20m bgl)
- 10 No. samples of made ground (c.0.30m to 1.00m 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 site's historical land uses. 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), Total Petroleum Hydrocarbons (TPH), BTEX and MTBE.
- **Other:** Asbestos

The full catalogue of soil screening results and test detection limits can be seen in the Chemtech report (ref: 107640(1)) contained in Appendix III.

No evidence of contamination was noted within the natural drift deposits, therefore, no samples of the drift were scheduled for chemical screening.

6.3 Controlled Waters Risk Assessment

The Phase I Desk Top Study indicated that the risk to Controlled Waters was considered negligible based on the site's history and the lack of sensitive receptors. During the intrusive site works, no evidence of significant contamination or mobile contaminants was encountered. As such, no further assessment is deemed to be required with respect to controlled waters.

6.4 Waste Acceptance Criteria Testing

As requested by the Client, samples of the made ground were scheduled to Waste Acceptance Criteria (WAC) tests to aid the disposal of excess material which may be generated during construction that cannot be accommodated on site.

The following samples were scheduled to WAC tests:

- TP06 at c.0.50m bgl - Made Ground (mound)
- TP07 at c.0.30m bgl - Made Ground
- TP10 at c.0.30m bgl - Made Ground
- TP15 at c.0.40m bgl - Made Ground
- TP17 at c.0.40m bgl - Made Ground
- TP20 at c.0.60m bgl - Made Ground

Copies of the WAC test results are presented in Appendix III.

The results of the tests should be provided to the waste carrier together with the logs and general chemical tests results in order to determine a suitable landfill for the excess soils.

7.0 Geotechnical Analysis

7.1 Testing for Moisture Content, Liquid and Plastic Limits

7 No. samples of the natural clay deposits recovered from the exploratory holes at a depth of between c.0.80m and c.1.50m bgl 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: S1266) presented in Appendix III and summarised below.

Natural moisture contents of between 11.3% and 19.8% were observed, with liquid limits of between 24% and 39% and plasticity indices of between 12% and 20% being recorded. The results indicate clays of low and intermediate plasticity and a low volume change potential.

Based on the results of the geotechnical tests, it is recommended that foundations placed in cohesive soils are founded at a depth of no less than 0.75 bgl. Deepening of foundations is recommended where existing or proposed trees are/will be located.

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*

■ *Allotments*

■ *Commercial / Industrial*

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 commercial development. 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: Commercial / Industrial 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 (Commercial / Industrial End Use).
- CL:AIRE/DEFRA Cat 4 Screening Levels C4SL (Commercial / Industrial End Use).
- Atkins ATRISK Screening Values (Commercial / Industrial End Use).

As discussed in Section 8.1, the contaminant concentrations have been assessed against GAC for a commercial / industrial end use as it is anticipated that the proposed development will comprise an office, warehousing and associated infrastructure.

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.

8.2.2 Organic Contaminants – Soil

The maximum concentration values for the organic analytes tested for (i.e. Speciated PAH, TPH, BTEX and MTBE) have been compared to the most relevant and appropriate 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 (Commercial / Industrial 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

15 No. samples of the topsoil and made ground were 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 *Commercial / Industrial 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 Commercial / Industrial end use.

As such, the made ground and topsoil is not considered to pose a risk to human health and remediation is not considered necessary.

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.

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 5.3, gas and groundwater monitoring wells have been installed in five boreholes (BH's 01, 03, 04, 06 and 07) and monitoring has been completed on four occasions between April and June 2022.

During the monitoring, atmospheric air pressures varied between 995mb and 1011mb and included both rising and falling pressure trends.

A maximum Carbon Dioxide (CO₂) concentration of 0.9%v/v has been recorded and no Methane (CH₄) was detected. The minimum Oxygen (O₂) concentration was 19.8% 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; (0.9 / 100) x 0.1 = 0.0009 l/hr GSV**

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

Therefore, in accordance with CIRIA C665 Table 8.5, taking into consideration the GSV for CO₂ and the maximum gas concentrations, the site falls into Characteristic Situation 1 (CS1). This indicates that gas precautions are not necessary.

As detailed in the previously completed DTS, no radon protection measures are required.

8.4 Determination of pH and Water-Soluble Sulphate

As indicated in Section 6, selected samples of topsoil, made ground 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 reports (ref's: 107640(1) & 107754) contained in Appendix III.

From the results, the following observations can be seen:

- pH values in the soils ranged from 6.1 to 8.8 (slightly acidic to slightly alkali).

- Water Soluble Sulphate (SO₄) levels were recorded as ranging from <10mg/l to 1607mg/l.

The results for the water soluble sulphate were typically low (<150mg/l), however, a high concentration of water-soluble sulphate was encountered in TP17 at 0.40m bgl (1607mg/l). It is likely that this is associated with fragments of slag encountered within the made ground.

In accordance with BRE Special Digest 1: 2005 the results recorded for the topsoil and made ground equate to a Design Sulphate classification of DS-2 (based on the average value for the top 10% of the results).

With respect to the pH levels, the results equate to a slightly acidic to slightly alkali chemical environment which. An ACEC classification of AC-3z should be adopted.

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.

As part of this report, the Client has requested that samples be scheduled for Waste Acceptance Criteria (WAC) and these results should be provided along with the logs and general chemical tests results to the waste carrier to determine an appropriate waste disposal classification.

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 and it is recommended that this be confirmed by the design team prior to commencing on site and prior to excavation and disposal off site.

During the construction works, different materials should be stockpiled separately.

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 has encountered topsoil overlying localised made ground associated with the former railway lines and an area of historical spoil mounds in the north east. The made ground was encountered to a maximum depth of c.1.80m bgl but is likely to be deeper along the western boundary given the site topography. The made ground typically comprised gravel, cobbles and boulders of aggregate with occasional slag, shale, clinker, ash, brick, concrete, metal and other anthropogenic material.

Natural drift deposits typically comprised firm, firm to stiff and stiff sandy gravelly clay with lenses of silty sandy gravel and occasional sand. Bedrock was not encountered.

The exploratory holes were typically dry with the exception of occasional minor perched groundwater ingress between c.1.40m and c.2.20m bgl. Monitoring of the wells indicated variable levels which are unlikely to be representative of a continuous groundwater table. Based on the results of the ground investigation, significant groundwater ingress is not anticipated. However, it is recommended that allowance be made for some groundwater control measures (i.e. pumping equipment) particularly during wetter periods of the year.

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 warehouses and offices for commercial end use. A site layout plan has not been provided, however, it is understood that the buildings will be located across the eastern part of the site.

Based on the results of the ground investigation, conventional strip and/or pad foundations are considered appropriate. The foundations should be at least 0.75m deep and extend through the topsoil and made ground into the firm to stiff and/or stiff sandy gravelly clay (glacial till).

Deepening of the foundations may be required in the vicinity of existing or proposed trees. It is recommended that the foundations are designed in accordance with NHBC Standards (Chapter 4.2, "Building Near Trees").

An allowable bearing capacity for the firm to stiff and stiff sandy gravelly clays of 100kN/m² is considered appropriate. The formation level should be carefully inspected to ensure suitable ground conditions. Deepening of the foundations may be required where made ground, soft or unsuitable deposits are encountered.

With respect to buried structures (concrete), the pH levels and soluble sulphate concentrations in the soils equate to a Design Sulphate classification of DS-2 and an ACEC classification of AC-3z (BRE Special Digest 1: 2005 – (brownfield site assuming mobile groundwater)).

Based on the ground conditions, 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 commercial / industrial development and asbestos fibres have not been detected. As such, the topsoil and made ground does not pose a risk to human health.

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

WAC testing has been completed to aid the disposal of made ground from the site. The results of this report should be presented to the waste carrier in order to determine a suitable landfill criteria.

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, low concentrations of carbon dioxide and low flow rates. Therefore, gas protection measures are not considered necessary.

Radon protection measures are not considered necessary at this time.

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.

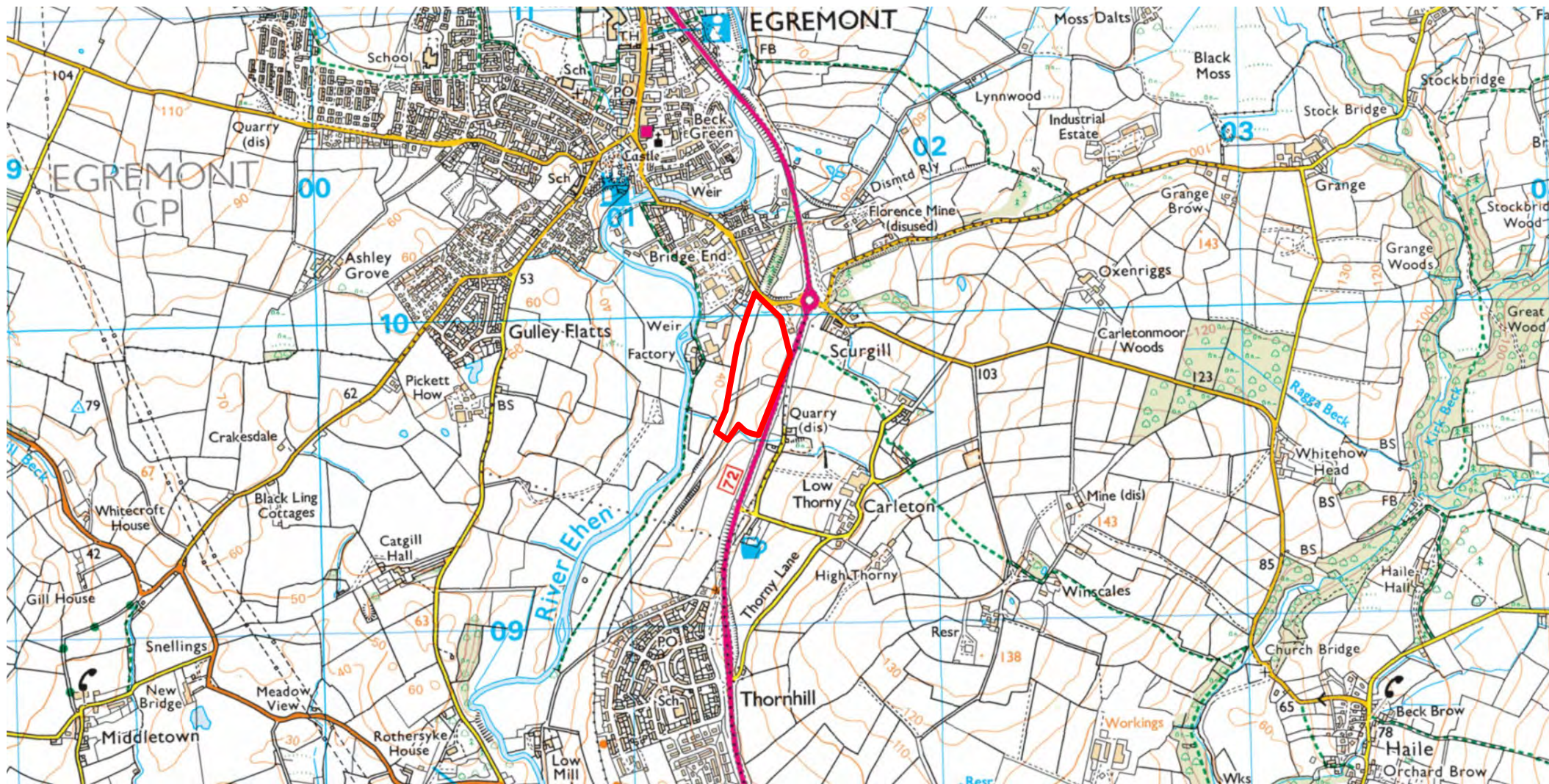
The conclusions and recommendations presented within this report are considered reasonable based on the available information. However, these cannot be guaranteed to gain regulatory approval. Therefore, the report should be passed to the appropriate regulatory authorities and/ or other key stakeholders 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
- Topographical Survey Drawing

GEO2021-4760: Vale View, Egremont – Site Location

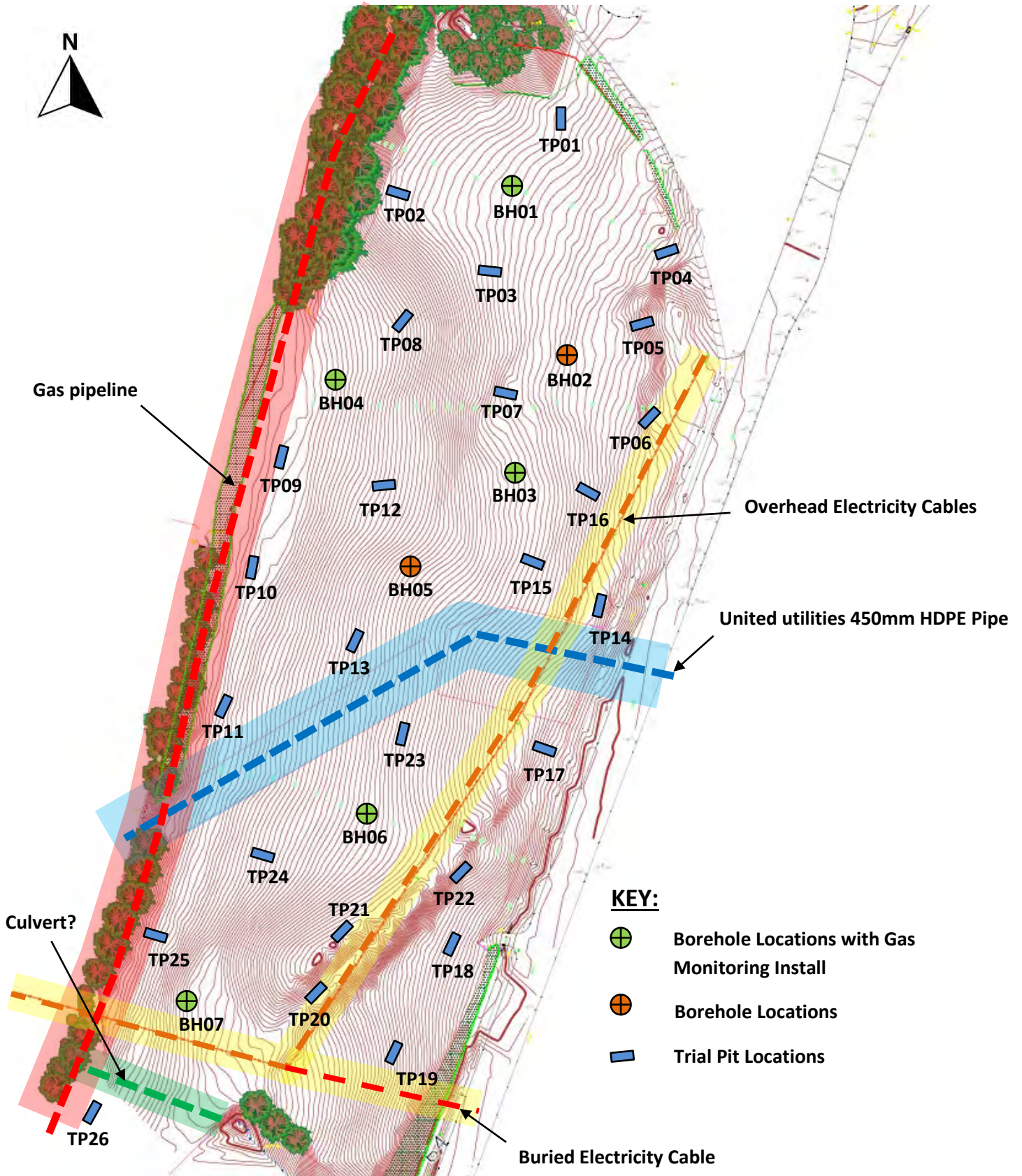


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GEO2021-4760: Vale View, Egremont – Exploratory Hole Location Plan

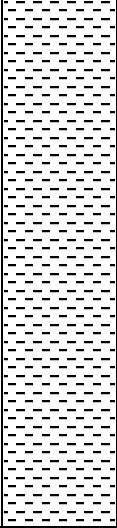
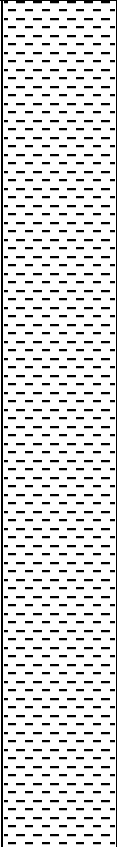




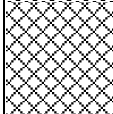
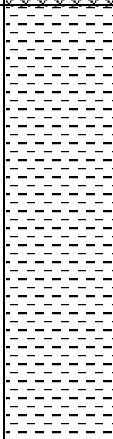
Appendix II

- Exploratory Hole Logs
- Ground Gas Monitoring Sheets

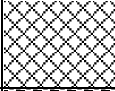
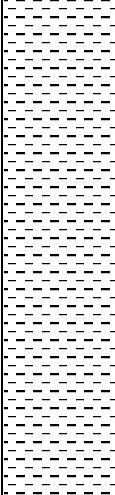
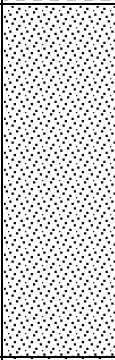
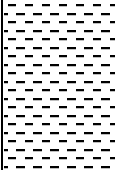
GEO2021-4760: Vale View, Egremont – BH01

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.26	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.26	2.10	Firm to stiff dark brown slightly sandy gravelly CLAY.		1.00 SPT = N14 2.00 SPT = N15
2.10	5.00	Firm to stiff becoming stiff dark grey brown slightly sandy gravelly CLAY.		3.00 SPT = N16 4.00 SPT = N24 5.00 SPT = N26
End of borehole at 5.00m. Groundwater ingress from c.2.00m bgl.		Borehole installed: GL to 0.80m - plain pipe and bentonite seal. 0.8 to 3.8m - Slotted pipe and gravel filter.		
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

GEO2021-4760: Vale View, Egremont – BH02

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.10	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.10	0.50	MADE GROUND: Grey angular GRAVEL of aggregate within loamy soil matrix.		
0.50	2.00	Firm to stiff dark brown slightly sandy gravelly CLAY. Refusal on suspected cobble at c.2.00m bgl.		1.00 SPT = N15 2.00 SPT = N>50 ^{/35mm}
End of borehole at 2.00m due to refusal with SPT and sampling tools. Groundwater at c.1.20m bgl on completion.			Borehole backfilled with arisings.	
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Archway Competitor C130 Superheavy			Log Notes: SPT = Standard Penetration test (N value) HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

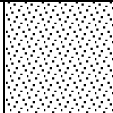
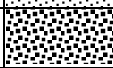
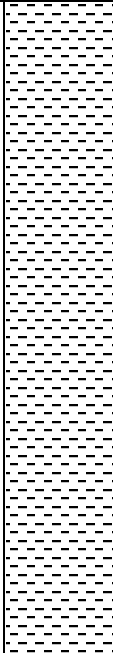
GEO2021-4760: Vale View, Egremont – BH03

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.20	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.20	0.50	MADE GROUND: Grey brown sandy angular GRAVEL and COBBLES of aggregate.		
0.50	2.20	Firm to stiff becoming stiff dark brown slightly sandy gravelly CLAY.		1.00 SPT = N15 2.00 SPT = N35
2.20	3.40	Medium dense brown silty gravelly SAND.		3.00 SPT = N18
3.40	4.00	Stiff dark grey brown slightly sandy gravelly CLAY.		4.00 SPT = N49
End of borehole at 4.00m. Groundwater ingress from c.2.00m bgl.		Borehole installed: GL to 0.80m - plain pipe and bentonite seal. 0.8 to 2.8m - Slotted pipe and gravel filter.		
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

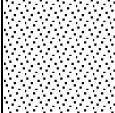
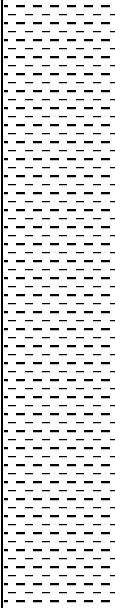
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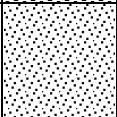
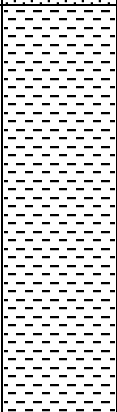
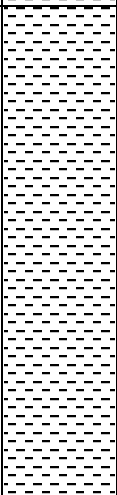
GEO2021-4760: Vale View, Egremont – BH05

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.24	TOPSOIL: Dark brown sandy gravelly LOAM.		0.10 - J
0.24	0.60	Light brown slightly silty gravelly fine to coarse SAND.		0.45 - T
0.60	0.82	Dark red brown sandy fine to coarse sub-rounded GRAVEL.		
0.82	3.10	Firm reddish brown sandy gravelly CLAY with occasional cobbles. Firm to stiff from 1.50m bgl.		1.00SPT = N24 2.00 SPT = N37 2.00 – T 2.50 – T 3.00 SPT = N35
End of borehole at 3.10m. Borehole dry on completion.		Borehole backfilled with arisings.		
Engineer: J.Brock / G.Evans Site Works Date: 23/03/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

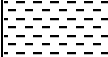
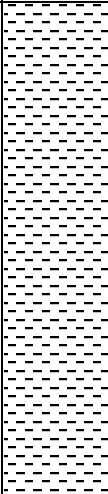
GEO2021-4760: Vale View, Egremont – BH06

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.27	TOPSOIL: Dark brown sandy gravelly LOAM.		0.15 - J
0.27	0.65	Reddish brown slightly silty very gravelly fine to coarse SAND. Occasional cobbles.		
0.65	2.80	Firm to stiff becoming stiff dark brown slightly sandy gravelly CLAY.		0.80 - T 1.00 SPT = N18 2.00 SPT = N19 2.00 - T 2.70 - T 2.80 SPT = N49
End of borehole at 2.80m. Borehole dry on completion.		Borehole installed: GL to 0.80m - plain pipe and bentonite seal. 0.8 to 2.8m - Slotted pipe and gravel filter.		
Engineer: J.Brock / G.Evans Site Works Date: 22/03/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

GEO2021-4760: Vale View, Egremont – BH07

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.21	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.21	0.60	Light brown very clayey gravelly fine to coarse SAND. Occasional cobbles.		
0.60	2.00	Soft brown silty sandy gravelly CLAY with occasional partings of silt and sand.		1.00 SPT = N4
2.00	3.65	Firm to stiff becoming stiff dark brown slightly sandy gravelly CLAY.		2.00 SPT = N17 3.00 SPT = N12 3.65 SPT = N>50/20mm
End of borehole at 3.65m. Borehole dry on completion.		Borehole installed: GL to 0.80m - plain pipe and bentonite seal. 0.8 to 2.8m - Slotted pipe and gravel filter.		
Engineer: J.Brock / G.Evans Site Works Date: 22/03/2022 Plant: Archway Competitor C130 Superheavy		Log Notes: SPT = Standard Penetration test (N value) HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		

GEO2021-4760: Vale View, Egremont – TP01

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.27	TOPSOIL: Dark brown sandy gravelly LOAM.		0.20 - J
0.27	0.50	Firm light brown slightly sandy gravelly CLAY.		
0.50	2.20	Firm to stiff dark brown slightly sandy very gravelly CLAY with many sub-rounded to sub-angular gravel of mixed lithology. Occasional boulders and lenses of clayey sandy gravel. 1.10 – Becoming stiff from 1.10m bgl.		0.80 HSV = 90kPa 0.90 - T
		End of trial hole at 2.20m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 22/03/2022

Plant: Tracked 360 Excavator

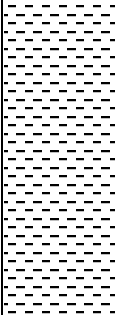
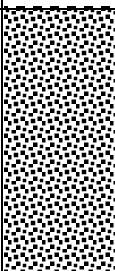
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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

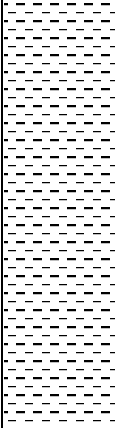
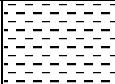


GEO2021-4760: Vale View, Egremont – TP02

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark brown sandy gravelly LOAM.		0.20 - J
0.30	1.40	Firm to stiff brown sandy very gravelly CLAY with many sub-rounded cobbles. Occasional boulders and lenses of gravel.		1.10 - T
1.40	2.30	Brown silty very sandy fine to coarse sub-rounded GRAVEL and COBBLES with occasional boulders. Occasional lenses of firm to stiff gravelly clay. Stability of gravel is generally poor. Localised collapses.		1.80 - T
		End of trial hole at 2.30m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP03

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.21	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.21	1.70	Firm to stiff, becoming stiff brown sandy very gravelly CLAY with many sub-rounded cobbles. Occasional boulders.		0.90 HSV - >120kPa
1.70	2.00	Firm to stiff dark grey brown CLAY.		
		End of trial hole at 2.00m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 22/03/2022

Plant: Tracked 360 Excavator

Log Notes:

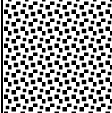
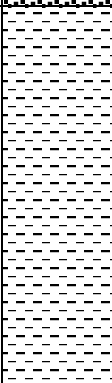
HSV = Hand Shear Vane (kN/m²)

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



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GEO2021-4760: Vale View, Egremont – TP04

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.26	TOPSOIL: Dark brown sandy gravelly LOAM.		0.20 - J
0.26	0.70	Brown very clayey sub-rounded GRAVEL and COBBLES within matrix of firm sandy clay.		
0.70	2.00	Firm to stiff brown slightly sandy very gravelly CLAY with occasional cobbles and boulders.		1.20 - T
		End of trial hole at 2.00m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 22/03/2022

Plant: Tracked 360 Excavator

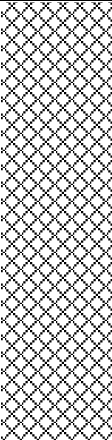
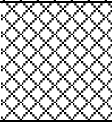
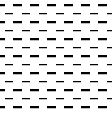
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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

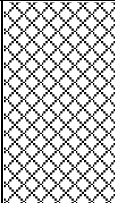
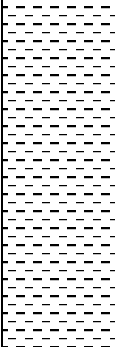


GEO2021-4760: Vale View, Egremont – TP05 (On Mound)

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	1.50	MADE GROUND: Red brown very clayey/loamy fine to coarse angular GRAVEL, COBBLES and BOULDERS of aggregate. Occasional rare fragments of metal.		0.50 - J
1.50	1.80	MADE GROUND: Grey brown very silty sandy angular GRAVEL of aggregate.		
1.80	2.20	Firm brown sandy very gravelly CLAY. Becoming firm to stiff with depth.		
		End of trial hole at 2.20m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP06 (Side of Mound)

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.70	MADE GROUND: Dark grey angular GRAVEL and COBBLES of aggregate with occasional clinker within a loamy soil matrix. Occasional boulders.		0.50 - J
0.70	1.90	Firm brown sandy very gravelly CLAY with many cobbles and occasional boulders. Occasional bands of clayey sandy gravel.		1.50 - T
		End of trial hole at 1.90m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 22/03/2022

Plant: Tracked 360 Excavator

Log Notes:

HSV = Hand Shear Vane (kN/m²)

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

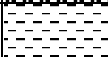
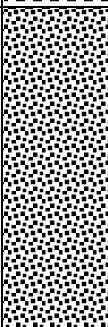
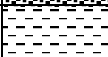


GEO2021-4760: Vale View, Egremont – TP07

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.05	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.05	0.70	MADE GROUND: Dark grey and red brown silty sandy angular GRAVEL, COBBLES and BOULDERS of aggregate. Occasional roots.		0.30 - J
0.70	2.20	Firm to stiff brown mottled grey slightly sandy gravelly CLAY with occasional cobbles and boulders. Becoming stiff with depth.		0.90 - T
		End of trial hole at 2.20m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP08

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark brown sandy gravelly LOAM.		0.20 - J
0.30	0.50	Brown and grey sub-rounded COBBLES and BOULDERS within a matrix of soft to firm sandy gravelly clay.		
0.50	0.70	Firm grey brown silty sandy gravelly CLAY.		
0.70	1.80	Grey silty very sandy fine to coarse sub-rounded GRAVEL and COBBLES with occasional lenses of soft very gravelly clay.		1.00 - T
1.80	2.00	Stiff dark grey brown slightly sandy very gravelly CLAY with occasional cobbles and boulders.		
		End of trial hole at 2.00m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 22/03/2022

Plant: Tracked 360 Excavator

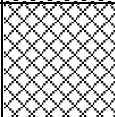
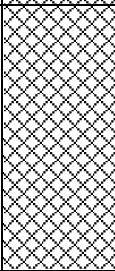
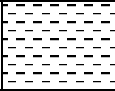
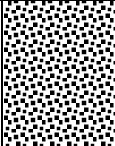
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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

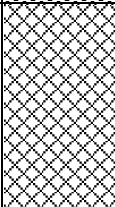
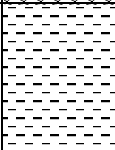
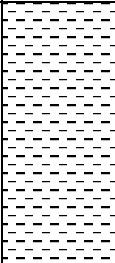


GEO2021-4760: Vale View, Egremont – TP09

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.10	TOPSOIL: Dark brown sandy gravelly LOAM with much clinker and ash.		
0.10	0.50	MADE GROUND: Red brown and dark grey fine to coarse angular GRAVEL of clinker, ash, shale and aggregate.		0.30 – J
0.50	1.40	MADE GROUND: Red brown and dark grey fine to coarse angular GRAVEL, COBBLES and BOULDERS of aggregate with much clinker, ash and shale. Occasional metal and brick. Stability is poor. Collapsing during excavation.		1.00 – J&T
1.40	1.70	Soft to firm brown sandy very gravelly CLAY.		
1.70	2.20	Brown silty sandy fine to coarse sub-rounded GRAVEL of mixed lithology.		
		End of trial hole at 2.20m. Trial hole remained open and dry on completion. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

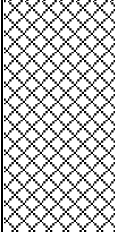
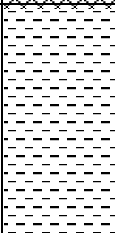


GEO2021-4760: Vale View, Egremont – TP10

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.10	TOPSOIL: Dark brown sandy gravelly LOAM with occasional clinker and ash.		
0.10	0.80	MADE GROUND: Red brown and dark grey fine to coarse angular GRAVEL of clinker, ash, coal, shale and aggregate.		0.30 – J&T
0.80	1.30	Soft to firm brown sandy very gravelly CLAY. Occasional cobbles and boulders.		
1.30	2.20	Firm to stiff brown slightly sandy very gravelly CLAY with occasional cobbles and boulders. Occasional minor pockets of perched groundwater near base (otherwise dry).		1.50 - T
		End of trial hole at 2.20m. Occasional minor pockets of perched groundwater near base. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP11

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.22	TOPSOIL: Dark brown sandy gravelly LOAM with occasional clinker and ash.		
0.22	1.00	MADE GROUND: Red brown and dark grey fine to coarse angular GRAVEL of clinker, ash, coal, shale and aggregate.		0.50 – J&T
1.00	1.80	Firm to stiff brown sandy very gravelly CLAY. Occasional cobbles and boulders. Minor pockets of perched water from 1.40m bgl (otherwise dry).		
		End of trial hole at 1.80m. Occasional minor pockets of perched groundwater near base. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 22/03/2022

Plant: Tracked 360 Excavator

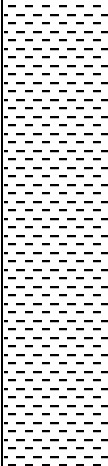
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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



GEO2021-4760: Vale View, Egremont – TP12

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.27	TOPSOIL: Dark brown sandy gravelly LOAM. Many sub-rounded cobbles.		0.20 - J
0.27	1.90	Firm to stiff brown mottled grey slightly sandy very gravelly CLAY with occasional lenses of very clayey gravel. Occasional cobbles and boulders.		1.50 - T
		End of trial hole at 1.90m. Trial pit remained dry and stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 22/03/2022

Plant: Tracked 360 Excavator

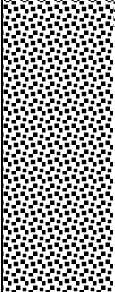
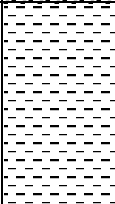
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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



GEO2021-4760: Vale View, Egremont – TP13

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.16	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.16	1.20	Brown silty very sandy fine to coarse sub-rounded GRAVEL with many cobbles.		0.60 – T
1.20	1.90	Firm to stiff brown mottled grey slightly sandy very gravelly CLAY with occasional lenses of very clayey gravel. Occasional cobbles and boulders. Occasional pockets of perched water from c.1.40m bgl.		
		End of trial hole at 1.90m. Occasional perched water from 1.40m bgl. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 22/03/2022

Plant: Tracked 360 Excavator

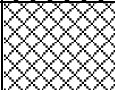
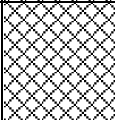
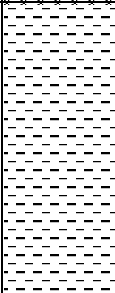
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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

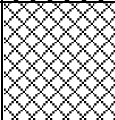
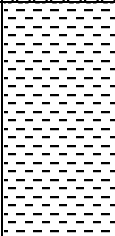


GEO2021-4760: Vale View, Egremont – TP14

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.05	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.05	0.40	MADE GROUND: Dark grey to black angular GRAVEL of clinker, shale, coal and aggregate.		0.20 – J&T
0.40	0.80	MADE GROUND: Dark grey angular GRAVEL, COBBLES and BOULDERS of aggregate.		
0.80	1.80	Firm brown silty sandy gravelly CLAY with occasional sub-rounded cobbles and boulders. Occasional lenses of GRAVEL and cobbles.		
		End of trial hole at 1.80m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 22/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP15

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.12	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.12	0.52	MADE GROUND: Dark grey and red brown angular GRAVEL, COBBLES and BOULDERS of aggregate within a loamy soil matrix.		0.40 - J
0.52	1.30	Firm to stiff brown sandy gravelly CLAY with occasional sub-rounded cobbles and boulders.		
		End of trial hole at 1.30m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 23/03/2022

Plant: Tracked 360 Excavator

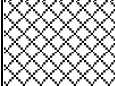
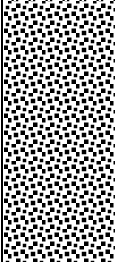
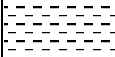
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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

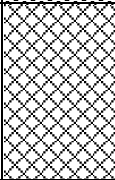
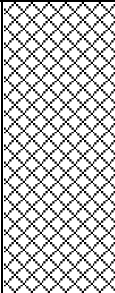


GEO2021-4760: Vale View, Egremont – TP16

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.16	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.16	0.47	MADE GROUND: Grey brown angular GRAVEL, COBBLES and BOULDERS of aggregate within a loamy clay matrix.		
0.47	1.40	Orangey brown silty slightly sandy sub-rounded GRAVEL and COBBLES of mixed lithology.		
1.40	1.60	Firm to stiff brown sandy gravelly CLAY with occasional sub-rounded cobbles and boulders.		
		End of trial hole at 1.60m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 23/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP17

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.23	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.23	0.80	MADE GROUND: Grey brown very clayey sandy angular GRAVEL of clinker, slag, coal and aggregate with pockets of soft gravelly clay.		0.40 - J
0.80	1.80	MADE GROUND: reworked soft to firm grey brown silty sandy gravelly CLAY with pockets of angular gravel (clinker, ash, aggregate and coal). Occasional fabric and metal. Many boulders.		
1.80	2.00	Firm brown sandy gravelly CLAY with occasional sub-rounded cobbles and boulders.		
		End of trial hole at 2.00m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 23/03/2022

Plant: Tracked 360 Excavator

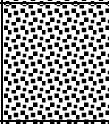
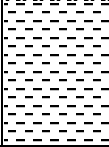
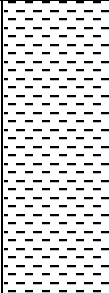
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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

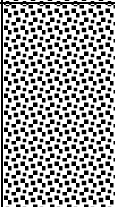
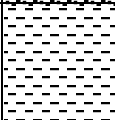
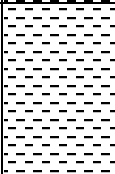


GEO2021-4760: Vale View, Egremont – TP18

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.21	TOPSOIL: Dark brown sandy gravelly LOAM.		0.20 - J
0.21	0.60	Brown silty sandy sub-rounded GRAVEL ox mixed lithology.		
0.60	1.10	Firm brown very sandy gravelly CLAY with occasional sub-rounded cobbles.		
1.10	2.10	Firm to stiff slightly sandy very gravelly CLAY.		1.40 - T
		End of trial hole at 2.10m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 23/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP19

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.17	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.17	0.90	Brown silty sandy sub-rounded GRAVEL ox mixed lithology.		
0.90	1.30	Firm brown very sandy gravelly CLAY with occasional sub-rounded cobbles.		
1.30	1.90	Firm to stiff dark grey slightly sandy very gravelly CLAY.		
		End of trial hole at 1.90m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 23/03/2022

Plant: Tracked 360 Excavator

Log Notes:

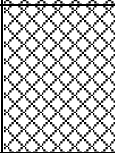
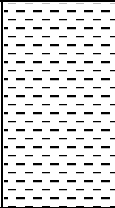
HSV = Hand Shear Vane (kN/m²)

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



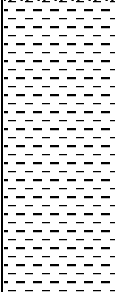
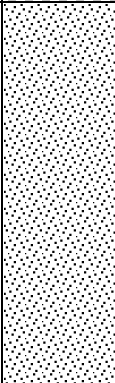
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GEO2021-4760: Vale View, Egremont – TP20

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.27	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.27	0.80	MADE GROND: Grey brown fine to coarse angular GRAVEL, COBBLES and BOULDERS of aggregate shale, sandstone and occasional clinker. Field drain at base.		0.60 - J
0.80	1.50	Firm to stiff dark brown slightly sandy very gravelly CLAY with occasional cobbles and boulders. Becoming stiff with depth.		
		End of trial hole at 1.50m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 23/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP21

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.20	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.20	1.20	Firm to stiff dark brown slightly sandy very gravelly CLAY with occasional cobbles and boulders. Becoming stiff with depth. Becoming very sandy with depth.		1.00 - T
1.20	2.50	Brown slightly silty medium SAND.		1.50 - T
		End of trial hole at 2.50m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 23/03/2022

Plant: Tracked 360 Excavator

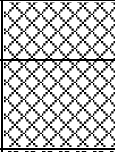
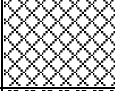
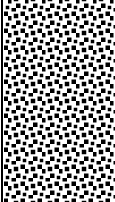
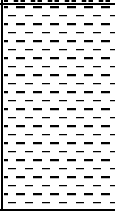
Log Notes:

HSV = Hand Shear Vane (kN/m²)

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



GEO2021-4760: Vale View, Egremont – TP22

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.20	MADE GROUND: Dark grey fine to coarse sub-angular GRAVEL of clinker, ash and shale.		0.10 - J
0.20	0.50	MADE GROUND: Angular GRAVEL, COBBLES and BOULDERS of aggregate shale, sandstone and occasional clinker.		
0.50	1.20	Brown sub-rounded COBBLES and BOULDERS within a matrix of sandy very gravelly CLAY.		
1.20	1.90	Firm to stiff dark brown slightly sandy very gravelly CLAY with occasional cobbles and boulders.		
		End of trial hole at 1.90m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 23/03/2022

Plant: Tracked 360 Excavator

Log Notes:

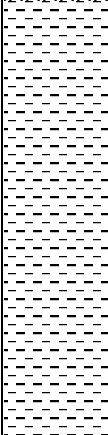
HSV = Hand Shear Vane (kN/m²)

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



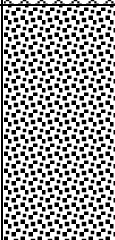
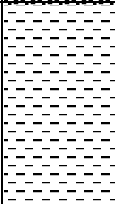
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GEO2021-4760: Vale View, Egremont – TP23

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.23	TOPSOIL: Dark brown sandy gravelly LOAM.		0.20 - J
0.23	1.70	Firm to stiff dark orangey brown mottled grey slightly sandy very gravelly CLAY. Occasional minor perched water from c.1.30m bgl.		0.80 - T
		End of trial hole at 1.90m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 23/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	

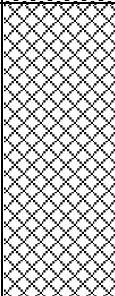
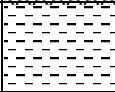
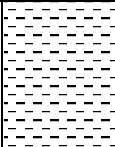


GEO2021-4760: Vale View, Egremont – TP24

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.30	1.10	Brown very clayey sub-rounded GRAVEL and COBBLES.		
1.10	1.70	Firm to stiff dark brown sandy very gravelly CLAY. Slight minor ingress of groundwater near base of pit.		
		End of trial hole at 1.90m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock Site Works Date: 23/03/2022 Plant: Tracked 360 Excavator			Log Notes: HSV = Hand Shear Vane (kN/m ²) B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub	



GEO2021-4760: Vale View, Egremont – TP25

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.18	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.18	1.20	MADE GROUND: Black and dark grey sandy angular GRAVEL of clinker, coal, ash and occasional aggregate. Becoming more coarse with many cobbles at the base.		0.30 - J
1.20	1.50	Firm dark brown sandy very gravelly CLAY.		
1.50	2.00	Firm to stiff dark brown sandy very gravelly CLAY.		
		End of trial hole at 2.00m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		

Engineer: J.Brock

Site Works Date: 23/03/2022

Plant: Tracked 360 Excavator

Log Notes:

HSV = Hand Shear Vane (kN/m²)

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



GEO2021-4760: Vale View, Egremont – TP26

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.05	TOPSOIL: Dark brown sandy gravelly LOAM.		
0.05	0.50	MADE GROUND: Black and dark grey sandy angular GRAVEL of clinker, coal, ash and occasional aggregate. Becoming more coarse with depth.		
0.50	1.60	MADE GROUND: Red brown and grey brown sandy angular GRAVEL, COBBLES and BOULDERS of aggregate within a sandy matrix of ash and clinker. Poor stability – collapsing during excavation.		
1.60	2.30	Firm to stiff dark brown sandy very gravelly CLAY.		
		End of trial hole at 2.30m. Trial pit remained stable during excavation. Trial hole backfilled with arisings on completion.		
Engineer: J.Brock		Log Notes:		
Site Works Date: 23/03/2022		HSV = Hand Shear Vane (kN/m ²)		
Plant: Tracked 360 Excavator		B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub		



Ground Gas & Groundwater Monitoring Record Sheet 01

Site: Vale View, Egremont

Project No: 2021-4760

Date: 21/04/2022

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	1007 F	0.0	0.0	0.0	0.0	21.5	21.5	<0.1	0.95	3.80	-
BH03	1007 F	0.0	0.0	0.0	0.0	21.8	21.8	<0.1	0.20	2.80	-
BH04	1007 F	0.0	0.0	0.0	0.0	21.8	21.8	<0.1	0.60	2.80	-
BH06	1007 F	0.0	0.0	0.6	0.5	21.2	21.1	<0.1	1.90	2.80	-
BH07	1007 F	0.0	0.0	0.4	0.4	21.3	21.3	<0.1	DRY	2.80	-

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: JB

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

Weather Conditions: Sunny and Dry

Temperature 18.0°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: Vale View, Egremont

Project No: 2021-4760

Date: 13/05/2022

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	995 R	0.0	0.0	0.5	0.1	20.8	21.2	<0.1	0.65	3.80	-
BH03	995 R	0.0	0.0	0.9	0.8	19.3	19.2	<0.1	0.10	2.80	-
BH04	995 R	0.0	0.0	0.0	0.0	21.2	21.2	<0.1	0.72	2.80	-
BH06	995 R	0.0	0.0	0.2	0.2	21.2	21.0	<0.1	1.80	2.80	-
BH07	995 R	0.0	0.0	0.1	0.1	21.3	21.1	<0.1	DRY	2.80	-

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: JB

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

Weather Conditions: Overcast and Dry

Temperature 16.0°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: Vale View, Egremont

Project No: 2021-4760

Date: 24/05/2022

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	998 R	0.0	0.0	0.1	0.0	21.7	21.7	<0.1	0.80	3.80	-
BH03	998 R	0.0	0.0	0.3	0.2	21.0	21.0	<0.1	0.10	2.80	-
BH04	998 R	0.0	0.0	0.2	0.1	21.2	21.3	<0.1	0.90	2.80	-
BH06	998 R	0.0	0.0	0.1	0.0	21.5	21.5	<0.1	0.60	2.80	-
BH07	998 R	0.0	0.0	0.0	0.0	21.6	21.7	<0.1	DRY	2.80	-

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 Integral Flow Pod. Geotechnical Instruments Dipmeter.

Weather Conditions: Overcast and Dry

Temperature 16.0°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: Vale View, Egremont

Project No: 2021-4760

Date: 11/06/2022

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	1011 R	0.0	0.0	0.0	0.0	20.0	20.2	<0.1	1.30	3.80	-
BH03	1011 R	0.0	0.0	0.1	0.0	21.2	21.2	<0.1	1.10	2.80	-
BH04	1011 R	0.0	0.0	0.0	0.0	21.4	21.4	<0.1	0.10	2.80	-
BH06	1011 R	0.0	0.0	0.0	0.0	21.4	21.4	<0.1	0.50	2.80	-
BH07	1011 R	0.0	0.0	0.1	0.1	21.0	19.8	<0.1	DRY	2.80	-

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 Integral 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

Appendix III

- Laboratory Test Results



ANALYTICAL TEST REPORT

Contract no: 107640(1)

Contract name: Vale View, Egremont

Client reference: GEO2021-4760

Clients name: Geo Environmental Engineering

Clients address: 4 Culgarth Avenue
Cockermouth
Cumbria
CA13 9PL

Samples received: 30 March 2022

Analysis started: 30 March 2022

Analysis completed: 30 April 2022

Report issued: 30 April 2022

This is a supplementary report to report number 107640 issued 14 April 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:

Rachael Burton

Reporting Team Lead

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
107640-1	TP01	0.20	Sandy Clayey Loam with Roots	-	-	35.4
107640-2	TP02	1.80	Sandy Loamy Clay	-	-	10.4
107640-3	TP04	0.20	Sandy Clayey Loam with Roots	-	-	20.1
107640-4	TP05	0.50	Sandy Clay with Gravel	-	-	11.2
107640-5	TP06	0.50	Sandy Clayey Loam with Gravel & Roots	-	-	17.7
107640-6	TP07	0.30	Clay Sand with Gravel&Roots	-	-	19.0
107640-8	TP08	1.00	Sandy Clay Loam with Gravel	-	-	22.1
107640-7	TP09	0.30	Sandy Loamy Clay with Gravel	-	-	10.4
107640-9	TP09	1.00	Sandy Clay Loam with Gravel	-	-	12.6
107640-10	TP10	0.30	Sandy Clay Loam with Gravel	-	-	19.4
107640-12	TP11	0.50	Sandy Clayey Loam with Roots	-	-	32.8
107640-11	TP12	0.20	Loamy Sand with Gravel	-	-	17.8
107640-14	TP13	0.60	Sandy Clayey Loam with Gravel	-	-	14.8
107640-15	TP14	0.20	Sandy Clayey Loam with Roots	-	-	18.8
107640-13	TP15	0.40	Sandy Clayey Loam with Roots	-	-	13.3
107640-16	TP17	0.40	Sandy Clayey Loam with Roots	-	-	18.6
107640-17	TP18	0.20	Sandy Clayey Loam with Roots	-	-	13.8
107640-18	TP20	0.60	Sandy Clayey Loam with Gravel	-	-	18.7
107640-19	TP23	0.20	Sandy Loamy Clay with Roots	-	-	33.0
107640-20	TP25	0.30	Sandy Clayey Loam with Gravel	-	-	17.8

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SOILS

Lab number			107640-1	107640-2	107640-3	107640-4	107640-5	107640-6
Sample id			TP01	TP02	TP04	TP05	TP06	TP07
Depth (m)			0.20	1.80	0.20	0.50	0.50	0.30
Date sampled			29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Test	Method	Units						
Antimony (total)	CE127 ^U	mg/kg Sb	-	-	-	-	4.8	18
Arsenic (total)	CE127 ^M	mg/kg As	11	-	13	88	23	68
Barium (total)	CE127 ^M	mg/kg Ba	-	-	-	-	809	521
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	-	<0.2	0.3	<0.2	<0.2
Chromium (total)	CE127 ^M	mg/kg Cr	52	-	43	42	67	45
Chromium (III)	CE208	mg/kg CrIII	52	-	43	42	67	45
Chromium (VI)	CE146	mg/kg CrVI	<1	-	<1	<1	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	13	-	9.9	5.9	71	7.9
Lead (total)	CE127 ^M	mg/kg Pb	40	-	42	38	29	27
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	-	<0.5	<0.5	<0.5	<0.5
Molybdenum (total)	CE127 ^M	mg/kg Mo	-	-	-	-	9.6	5.8
Nickel (total)	CE127 ^M	mg/kg Ni	15	-	17	15	128	14
Selenium (total)	CE127 ^M	mg/kg Se	1.3	-	0.9	1.4	2.4	1.7
Zinc (total)	CE127 ^M	mg/kg Zn	47	-	32	34	53	35
pH	CE004 ^M	units	6.2	7.3	6.7	8.5	7.9	8.3
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	35	<10	23	16	57	17
Cyanide (total)	CE077	mg/kg CN	<1	-	<1	<1	I/S	I/S
Total Organic Carbon (TOC)	CE197	% w/w C	4.1	-	2.1	0.8	6.8	1.9
PAH								
Naphthalene	CE087 ^M	mg/kg	<0.02	-	<0.02	<0.02	0.04	<0.02
Acenaphthylene	CE087 ^M	mg/kg	<0.02	-	<0.02	<0.02	0.03	<0.02
Acenaphthene	CE087 ^M	mg/kg	<0.02	-	<0.02	<0.02	<0.02	<0.02
Fluorene	CE087 ^U	mg/kg	<0.02	-	<0.02	<0.02	<0.02	<0.02
Phenanthrene	CE087 ^M	mg/kg	0.06	-	0.03	0.04	0.11	0.04
Anthracene	CE087 ^U	mg/kg	<0.02	-	<0.02	<0.02	0.26	<0.02
Fluoranthene	CE087 ^M	mg/kg	0.21	-	0.08	0.09	0.39	0.12
Pyrene	CE087 ^M	mg/kg	0.17	-	0.06	0.09	0.35	0.11
Benzo(a)anthracene	CE087 ^U	mg/kg	0.11	-	0.05	0.06	0.24	0.06
Chrysene	CE087 ^M	mg/kg	0.11	-	0.05	0.05	0.26	0.06
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.17	-	0.06	0.09	0.25	0.11
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.06	-	<0.03	0.04	0.09	0.05
Benzo(a)pyrene	CE087 ^U	mg/kg	0.11	-	0.04	0.05	0.10	0.06
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.10	-	0.04	0.05	0.08	0.09
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	-	<0.02	<0.02	<0.02	0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.08	-	0.03	0.04	0.06	0.07
PAH (total of USEPA 16)	CE087	mg/kg	1.17	-	0.43	0.61	2.24	0.79
BTEX & TPH								
MTBE	CE192 ^U	mg/kg	-	-	-	-	<0.02	<0.02
Benzene	CE192 ^U	mg/kg	-	-	-	-	<0.01	<0.01
Toluene	CE192 ^U	mg/kg	-	-	-	-	<0.01	<0.01
Ethylbenzene	CE192 ^U	mg/kg	-	-	-	-	<0.01	<0.01

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SOILS

Lab number Sample id Depth (m) Date sampled			107640-1 TP01 0.20 29/03/2022	107640-2 TP02 1.80 29/03/2022	107640-3 TP04 0.20 29/03/2022	107640-4 TP05 0.50 29/03/2022	107640-5 TP06 0.50 29/03/2022	107640-6 TP07 0.30 29/03/2022
Test	Method	Units						
m & p-Xylene	CE192 ^U	mg/kg	-	-	-	-	<0.02	<0.02
o-Xylene	CE192 ^U	mg/kg	-	-	-	-	<0.01	<0.01
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	-	-	-	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	-	-	-	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	-	-	-	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	-	-	-	-	<1	<1
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	-	-	-	-	<1	<1
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	-	-	-	-	<1	<1
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	-	-	-	-	<1	<1
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	-	-	-	-	<1	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	-	-	-	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	-	-	-	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	-	-	-	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE250	mg/kg	-	-	-	-	<6	<6
EPH Aliphatic (>C12-C16)	CE250	mg/kg	-	-	-	-	<6	<6
EPH Aliphatic (>C16-C35)	CE250	mg/kg	-	-	-	-	<15	<15
EPH Aliphatic (>C35-C44)	CE250	mg/kg	-	-	-	-	<10	<10
Subcontracted analysis								
Asbestos (qualitative)	\$	-	NAD	-	NAD	NAD	NAD	NAD

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SOILS

Lab number			107640-7	107640-8	107640-9	107640-10	107640-11	107640-12
Sample id			TP09	TP08	TP09	TP10	TP12	TP11
Depth (m)			0.30	1.00	1.00	0.30	0.20	0.50
Date sampled			29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Test	Method	Units						
Antimony (total)	CE127 ^U	mg/kg Sb	-	-	-	6.5	-	-
Arsenic (total)	CE127 ^M	mg/kg As	7.8	-	27	54	50	-
Barium (total)	CE127 ^M	mg/kg Ba	-	-	-	662	-	-
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	-	<0.2	0.4	<0.2	-
Chromium (total)	CE127 ^M	mg/kg Cr	58	-	54	81	55	-
Chromium (III)	CE208	mg/kg CrIII	58	-	54	81	55	-
Chromium (VI)	CE146	mg/kg CrVI	<1	-	<1	<1	<1	-
Copper (total)	CE127 ^M	mg/kg Cu	18	-	29	166	125	-
Lead (total)	CE127 ^M	mg/kg Pb	16	-	22	80	55	-
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	-	<0.5	<0.5	<0.5	-
Molybdenum (total)	CE127 ^M	mg/kg Mo	-	-	-	27	-	-
Nickel (total)	CE127 ^M	mg/kg Ni	28	-	45	273	219	-
Selenium (total)	CE127 ^M	mg/kg Se	1.2	-	1.3	4.4	4.0	-
Zinc (total)	CE127 ^M	mg/kg Zn	36	-	42	164	89	-
pH	CE004 ^M	units	7.8	7.9	8.8	7.7	8.1	6.7
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	25	64	63	73	129	33
Cyanide (total)	CE077	mg/kg CN	<1	-	<1	<1	<1	-
Total Organic Carbon (TOC)	CE197	% w/w C	0.4	-	2.5	8.5	12.8	-
PAH								
Naphthalene	CE087 ^M	mg/kg	<0.02	-	0.02	0.03	0.15	-
Acenaphthylene	CE087 ^M	mg/kg	<0.02	-	<0.02	<0.02	<0.02	-
Acenaphthene	CE087 ^M	mg/kg	<0.02	-	<0.02	<0.02	<0.02	-
Fluorene	CE087 ^U	mg/kg	<0.02	-	<0.02	<0.02	<0.02	-
Phenanthrene	CE087 ^M	mg/kg	<0.02	-	0.16	0.03	0.17	-
Anthracene	CE087 ^U	mg/kg	<0.02	-	0.03	<0.02	0.04	-
Fluoranthene	CE087 ^M	mg/kg	<0.02	-	0.22	0.03	0.17	-
Pyrene	CE087 ^M	mg/kg	<0.02	-	0.17	0.02	0.15	-
Benzo(a)anthracene	CE087 ^U	mg/kg	<0.02	-	0.09	<0.02	0.10	-
Chrysene	CE087 ^M	mg/kg	<0.03	-	0.09	<0.03	0.11	-
Benzo(b)fluoranthene	CE087 ^M	mg/kg	<0.02	-	0.11	0.03	0.20	-
Benzo(k)fluoranthene	CE087 ^M	mg/kg	<0.03	-	0.04	<0.03	0.08	-
Benzo(a)pyrene	CE087 ^U	mg/kg	<0.02	-	0.07	<0.02	0.06	-
Indeno(123cd)pyrene	CE087 ^M	mg/kg	<0.02	-	0.07	0.03	0.14	-
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	-	<0.02	<0.02	0.02	-
Benzo(ghi)perylene	CE087 ^M	mg/kg	<0.02	-	0.05	0.03	0.10	-
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	-	1.12	<0.34	1.49	-
BTEX & TPH								
MTBE	CE192 ^U	mg/kg	-	-	-	<0.02	-	-
Benzene	CE192 ^U	mg/kg	-	-	-	<0.01	-	-
Toluene	CE192 ^U	mg/kg	-	-	-	<0.01	-	-
Ethylbenzene	CE192 ^U	mg/kg	-	-	-	<0.01	-	-

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SOILS

Lab number			107640-7	107640-8	107640-9	107640-10	107640-11	107640-12
Sample id			TP09	TP08	TP09	TP10	TP12	TP11
Depth (m)			0.30	1.00	1.00	0.30	0.20	0.50
Date sampled			29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Test	Method	Units						
m & p-Xylene	CE192 ^U	mg/kg	-	-	-	<0.02	-	-
o-Xylene	CE192 ^U	mg/kg	-	-	-	<0.01	-	-
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	-	-	<0.01	-	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	-	-	<0.01	-	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	-	-	<0.01	-	-
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	-	-	-	<1	-	-
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	-	-	-	<1	-	-
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	-	-	-	<1	-	-
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	-	-	-	<1	-	-
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	-	-	-	<1	-	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	-	-	<0.1	-	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	-	-	<0.1	-	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	-	-	<0.1	-	-
EPH Aliphatic (>C10-C12)	CE250	mg/kg	-	-	-	<6	-	-
EPH Aliphatic (>C12-C16)	CE250	mg/kg	-	-	-	<6	-	-
EPH Aliphatic (>C16-C35)	CE250	mg/kg	-	-	-	<15	-	-
EPH Aliphatic (>C35-C44)	CE250	mg/kg	-	-	-	<10	-	-
Subcontracted analysis								
Asbestos (qualitative)	\$	-	NAD	-	NAD	NAD	NAD	-

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SOILS

Lab number			107640-13	107640-14	107640-15	107640-16	107640-17	107640-18
Sample id			TP15	TP13	TP14	TP17	TP18	TP20
Depth (m)			0.40	0.60	0.20	0.40	0.20	0.60
Date sampled			29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Test	Method	Units						
Antimony (total)	CE127 ^U	mg/kg Sb	1.4	-	-	1.9	-	2.1
Arsenic (total)	CE127 ^M	mg/kg As	15	-	-	11	13	17
Barium (total)	CE127 ^M	mg/kg Ba	124	-	-	303	-	112
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	-	-	<0.2	<0.2	<0.2
Chromium (total)	CE127 ^M	mg/kg Cr	56	-	-	43	52	65
Chromium (III)	CE208	mg/kg CrIII	56	-	-	43	52	65
Chromium (VI)	CE146	mg/kg CrVI	<1	-	-	<1	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	18	-	-	9.8	14	41
Lead (total)	CE127 ^M	mg/kg Pb	20	-	-	17	18	16
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	-	-	<0.5	<0.5	<0.5
Molybdenum (total)	CE127 ^M	mg/kg Mo	2.5	-	-	2.4	-	7.2
Nickel (total)	CE127 ^M	mg/kg Ni	34	-	-	11	25	61
Selenium (total)	CE127 ^M	mg/kg Se	1.9	-	-	2.2	1.4	1.4
Zinc (total)	CE127 ^M	mg/kg Zn	62	-	-	29	38	48
pH	CE004 ^M	units	7.8	7.6	7.7	8.8	7.1	7.9
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	<10	25	26	1607	208	37
Cyanide (total)	CE077	mg/kg CN	I/S	-	-	I/S	<1	I/S
Total Organic Carbon (TOC)	CE197	% w/w C	1.3	-	-	2.4	1.1	4.7
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	<0.02	-	-	<0.02	<0.02	<0.02
Fluorene	CE087 ^U	mg/kg	<0.02	-	-	<0.02	<0.02	<0.02
Phenanthrene	CE087 ^M	mg/kg	<0.02	-	-	0.26	<0.02	0.19
Anthracene	CE087 ^U	mg/kg	<0.02	-	-	0.04	<0.02	0.04
Fluoranthene	CE087 ^M	mg/kg	<0.02	-	-	0.55	0.05	0.54
Pyrene	CE087 ^M	mg/kg	<0.02	-	-	0.41	0.04	0.44
Benzo(a)anthracene	CE087 ^U	mg/kg	<0.02	-	-	0.25	0.03	0.30
Chrysene	CE087 ^M	mg/kg	<0.03	-	-	0.24	<0.03	0.26
Benzo(b)fluoranthene	CE087 ^M	mg/kg	<0.02	-	-	0.30	0.04	0.38
Benzo(k)fluoranthene	CE087 ^M	mg/kg	<0.03	-	-	0.13	<0.03	0.14
Benzo(a)pyrene	CE087 ^U	mg/kg	<0.02	-	-	0.18	0.03	0.25
Indeno(123cd)pyrene	CE087 ^M	mg/kg	<0.02	-	-	0.19	0.03	0.24
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	-	-	0.03	<0.02	0.04
Benzo(ghi)perylene	CE087 ^M	mg/kg	<0.02	-	-	0.14	<0.02	0.17
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	-	-	2.73	<0.34	2.96
BTEX & TPH								
MTBE	CE192 ^U	mg/kg	-	-	-	<0.02	-	-
Benzene	CE192 ^U	mg/kg	-	-	-	<0.01	-	-
Toluene	CE192 ^U	mg/kg	-	-	-	<0.01	-	-
Ethylbenzene	CE192 ^U	mg/kg	-	-	-	<0.01	-	-

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SOILS

Lab number			107640-13	107640-14	107640-15	107640-16	107640-17	107640-18
Sample id			TP15	TP13	TP14	TP17	TP18	TP20
Depth (m)			0.40	0.60	0.20	0.40	0.20	0.60
Date sampled			29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022	29/03/2022
Test	Method	Units						
m & p-Xylene	CE192 ^U	mg/kg	-	-	-	<0.02	-	-
o-Xylene	CE192 ^U	mg/kg	-	-	-	<0.01	-	-
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	-	-	<0.01	-	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	-	-	<0.01	-	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	-	-	<0.01	-	-
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	-	-	-	<1	-	-
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	-	-	-	<1	-	-
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	-	-	-	<1	-	-
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	-	-	-	<1	-	-
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	-	-	-	<1	-	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	-	-	<0.1	-	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	-	-	<0.1	-	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	-	-	<0.1	-	-
EPH Aliphatic (>C10-C12)	CE250	mg/kg	-	-	-	<6	-	-
EPH Aliphatic (>C12-C16)	CE250	mg/kg	-	-	-	<6	-	-
EPH Aliphatic (>C16-C35)	CE250	mg/kg	-	-	-	<15	-	-
EPH Aliphatic (>C35-C44)	CE250	mg/kg	-	-	-	<10	-	-
Subcontracted analysis								
Asbestos (qualitative)	\$	-	NAD	-	-	NAD	NAD	NAD

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SOILS

Lab number			107640-19	107640-20
Sample id			TP23	TP25
Depth (m)			0.20	0.30
Date sampled			29/03/2022	29/03/2022
Test	Method	Units		
Antimony (total)	CE127 ^U	mg/kg Sb	-	-
Arsenic (total)	CE127 ^M	mg/kg As	12	54
Barium (total)	CE127 ^M	mg/kg Ba	-	-
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	0.2
Chromium (total)	CE127 ^M	mg/kg Cr	67	86
Chromium (III)	CE208	mg/kg CrIII	67	86
Chromium (VI)	CE146	mg/kg CrVI	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	12	191
Lead (total)	CE127 ^M	mg/kg Pb	32	68
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5
Molybdenum (total)	CE127 ^M	mg/kg Mo	-	-
Nickel (total)	CE127 ^M	mg/kg Ni	16	247
Selenium (total)	CE127 ^M	mg/kg Se	1.1	5.7
Zinc (total)	CE127 ^M	mg/kg Zn	37	148
pH	CE004 ^M	units	6.1	6.8
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	33	156
Cyanide (total)	CE077	mg/kg CN	<1	<1
Total Organic Carbon (TOC)	CE197	% w/w C	3.9	6.6
PAH				
Naphthalene	CE087 ^M	mg/kg	<0.02	0.06
Acenaphthylene	CE087 ^M	mg/kg	<0.02	<0.02
Acenaphthene	CE087 ^M	mg/kg	<0.02	0.02
Fluorene	CE087 ^U	mg/kg	<0.02	<0.02
Phenanthrene	CE087 ^M	mg/kg	<0.02	0.34
Anthracene	CE087 ^U	mg/kg	<0.02	0.06
Fluoranthene	CE087 ^M	mg/kg	0.05	0.32
Pyrene	CE087 ^M	mg/kg	0.04	0.25
Benzo(a)anthracene	CE087 ^U	mg/kg	0.03	0.16
Chrysene	CE087 ^M	mg/kg	<0.03	0.16
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.04	0.20
Benzo(k)fluoranthene	CE087 ^M	mg/kg	<0.03	0.06
Benzo(a)pyrene	CE087 ^U	mg/kg	0.03	0.13
Indeno(123cd)pyrene	CE087 ^M	mg/kg	<0.02	0.11
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	<0.02	0.09
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	2.00
BTEX & TPH				
MTBE	CE192 ^U	mg/kg	-	<0.02
Benzene	CE192 ^U	mg/kg	-	<0.01
Toluene	CE192 ^U	mg/kg	-	<0.01
Ethylbenzene	CE192 ^U	mg/kg	-	<0.01

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SOILS

Lab number			107640-19	107640-20
Sample id			TP23	TP25
Depth (m)			0.20	0.30
Date sampled			29/03/2022	29/03/2022
Test	Method	Units		
m & p-Xylene	CE192 ^U	mg/kg	-	<0.02
o-Xylene	CE192 ^U	mg/kg	-	<0.01
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	-	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	-	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	-	<0.01
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	-	<1
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	-	<1
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	-	<1
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	-	<1
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	-	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	-	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	-	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	-	<0.1
EPH Aliphatic (>C10-C12)	CE250	mg/kg	-	<6
EPH Aliphatic (>C12-C16)	CE250	mg/kg	-	<6
EPH Aliphatic (>C16-C35)	CE250	mg/kg	-	<15
EPH Aliphatic (>C35-C44)	CE250	mg/kg	-	<10
Subcontracted analysis				
Asbestos (qualitative)	\$	-	NAD	NAD

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Antimony (total)	Aqua regia digest, ICP-MS	Dry	U	0.2	mg/kg Sb
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Barium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ba
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	Molybdenum (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Mo
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
CE192	MTBE	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	Benzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Toluene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Ethylbenzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	m & p-Xylene	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	o-Xylene	Headspace GC-FID	As received	U	0.01	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE250	EPH Aromatic (>EC10-EC12)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC12-EC16)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC16-EC21)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC21-EC35)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC35-EC44)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE250	EPH Aliphatic (>C10-C12)	Solvent extraction, GCxGC-FID	As received		6	mg/kg
CE250	EPH Aliphatic (>C12-C16)	Solvent extraction, GCxGC-FID	As received		6	mg/kg
CE250	EPH Aliphatic (>C16-C35)	Solvent extraction, GCxGC-FID	As received		15	mg/kg
CE250	EPH Aliphatic (>C35-C44)	Solvent extraction, GCxGC-FID	As received		10	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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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)
107640-1	TP01	0.20	N	
107640-2	TP02	1.80	N	
107640-3	TP04	0.20	N	
107640-4	TP05	0.50	N	
107640-5	TP06	0.50	N	
107640-6	TP07	0.30	N	
107640-7	TP09	0.30	N	
107640-8	TP08	1.00	N	
107640-9	TP09	1.00	N	
107640-10	TP10	0.30	N	
107640-11	TP12	0.20	N	
107640-12	TP11	0.50	N	
107640-13	TP15	0.40	N	
107640-14	TP13	0.60	N	
107640-15	TP14	0.20	N	
107640-16	TP17	0.40	N	
107640-17	TP18	0.20	N	
107640-18	TP20	0.60	N	
107640-19	TP23	0.20	N	
107640-20	TP25	0.30	N	

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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 6 weeks from initial receipt unless otherwise instructed.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

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.

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TEST REPORT REVISIONS

The table below identifies amendments that have been made to this test report for each revision.

Test Report Reference	Details of amendments to test report	Issue Date
107640	Original report issued	14 April 2022
107640(1)	WAC metals added for samples 107640-6,13	19 April 2022

Waste Acceptance Criteria Testing BS EN 12457-Part 2, Single Stage Process



Sample Details

Contract Name Vale View, Egremont
Lab Number 107640(1)-6
Sample ID TP07 0.30m
Date Sampled -
Date Received 30 March 2022
Particle Size (<4mm) -
Method of size reduction N/A
Non-crushable matter N/A

Test Values

Mass of Raw Test Portion (kg) 0.111
Mass of Dried Test Portion (kg) 0.090
Moisture Content Ratio (%) 23.47
Dry Matter Content Ratio (%) 80.99
Leachant Volume (litre) 0.879

Eluate Analysis	Conc in Eluate	Amount leached
Liquid : Waste Ratio	10:1	
pH (units)	8.0	
Temperature (°C)	20	10:1
Conductivity (µS/cm)	159	mg / kg

Antimony (µg/l Sb)	1.8	0.018
Arsenic (µg/l As)	5.62	0.056
Barium (µg/l Ba)	31.4	0.314
Cadmium (µg/l Cd)	<0.07	<0.0007
Chromium (µg/l Cr)	<0.2	<0.002
Copper (µg/l Cu)	1.6	0.016
Lead (µg/l Pb)	0.7	0.007
Mercury (µg/l Hg)	<0.008	<0.00008
Molybdenum (µg/l Mo)	3.5	0.035
Nickel (µg/l Ni)	<0.5	<0.005
Selenium (µg/l Se)	0.28	0.003
Zinc (µg/l Zn)	<1	<0.01
Chloride (mg/l Cl)	1.9	19
Fluoride (mg/l F)	0.6	6.2
Sulphate (mg/l SO ₄)	<1.7	<17
Total Dissolved Solids (mg/l TDS)	100	1000
Phenol Index (µg/l PhOH)	<10	<0.1
Dissolved Organic Carbon (mg/l C)	10	100

Waste Analysis	Units	Result
Total Organic Carbon	% w/w	1.9
Loss on Ignition	% w/w	4.5
BTEX	mg/kg	<0.06
PCBs (7 congeners)	mg/kg	<0.045
TPH (C10 - C40)	mg/kg	30
PAH (total)	mg/kg	0.79
pH	pH units	8.3
Acid Neutralisation Capacity (pH4)	mol/kg	0.06
Acid Neutralisation Capacity (pH7)	mol/kg	0.22

BS EN 12457-2 Limit Values mg / kg at L:S 10:1		
Inert Waste	Non-reactive Hazardous Waste	Hazardous Waste

0.06	0.7	5
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.5	10	50
0.01	0.2	2
0.5	10	30
0.4	10	40
0.1	0.5	7
4	50	200
800	15000	25000
10	150	500
1000	20000	50000
4000	60000	100000
1		
500	800	1000

3%	5%	6%
		10%
6		
1		
500		
100		
	>6	
	To be evaluated	
	To be evaluated	

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Comments

Authorised by:

Name:

Rachael Burton

Report date:

30 April 2022

Position:

Reporting Team Lead

Unit 6 Parkhead, Greencroft Industrial Park, Stanley, County Durham, DH9 7YB
Tel 01207 528578 Email customerservices@chemtech-env.co.uk
Vat Reg No. 772 5703 18 Registered in England number 4284013

Waste Acceptance Criteria Testing

BS EN 12457-Part 2, Single Stage Process



Sample Details

Contract Name Vale View, Egremont
 Lab Number 107640(1)-13
 Sample ID TP15 0.40m
 Date Sampled -
 Date Received 30 March 2022
 Particle Size (<4mm) -
 Method of size reduction N/A
 Non-crushable matter N/A

Test Values

Mass of Raw Test Portion (kg) 0.111
 Mass of Dried Test Portion (kg) 0.090
 Moisture Content Ratio (%) 23.10
 Dry Matter Content Ratio (%) 81.24
 Leachant Volume (litre) 0.879

Eluate Analysis	Conc in Eluate	Amount leached
Liquid : Waste Ratio	10:1	
pH (units)	8.1	
Temperature (°C)	20	10:1
Conductivity (µS/cm)	64	mg / kg

Antimony (µg/l Sb)	<0.1	<0.001
Arsenic (µg/l As)	0.90	0.009
Barium (µg/l Ba)	10.9	0.109
Cadmium (µg/l Cd)	0.50	0.005
Chromium (µg/l Cr)	<0.2	<0.002
Copper (µg/l Cu)	1.9	0.019
Lead (µg/l Pb)	0.7	0.007
Mercury (µg/l Hg)	<0.008	<0.00008
Molybdenum (µg/l Mo)	0.4	0.004
Nickel (µg/l Ni)	<0.5	<0.005
Selenium (µg/l Se)	0.15	0.002
Zinc (µg/l Zn)	1	0.013
Chloride (mg/l Cl)	0.9	8.9
Fluoride (mg/l F)	0.1	1.4
Sulphate (mg/l SO ₄)	<1.7	<17
Total Dissolved Solids (mg/l TDS)	40	400
Phenol Index (µg/l PhOH)	<10	<0.1
Dissolved Organic Carbon (mg/l C)	5.9	59

Waste Analysis	Units	Result
Total Organic Carbon	% w/w	1.3
Loss on Ignition	% w/w	4.1
BTEX	mg/kg	<0.06
PCBs (7 congeners)	mg/kg	<0.045
TPH (C10 - C40)	mg/kg	<19
PAH (total)	mg/kg	<0.36
pH	pH units	7.8
Acid Neutralisation Capacity (pH4)	mol/kg	<0.02
Acid Neutralisation Capacity (pH7)	mol/kg	<0.02

BS EN 12457-2 Limit Values mg / kg at L:S 10:1		
Inert Waste	Non-reactive Hazardous Waste	Hazardous Waste

0.06	0.7	5
0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.5	10	50
0.01	0.2	2
0.5	10	30
0.4	10	40
0.1	0.5	7
4	50	200
800	15000	25000
10	150	500
1000	20000	50000
4000	60000	100000
1		
500	800	1000

3%	5%	6%
		10%
6		
1		
500		
100		
	>6	
	To be evaluated	
	To be evaluated	

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Waste Acceptance Criteria Testing BS EN 12457-Part 3, 2 Stage Process



Sample Details

Contract Name Vale View, Egremont
Lab Number 107640-5
Sample ID TP06 0.50m
Date Sampled 29 March 2022
Date Received 30 March 2022
Particle Size (<4mm) -
Method of size reduction N/A
Non-crushable matter N/A

Test Values

Mass of Raw Test Portion (MW) kg 0.213
Mass of Dried Test Portion (MD) kg 0.175
Moisture Content Ratio (MC) % 21.57
Dry Matter Content Ratio (DR) % 82.26
Leachant Volume (1) (L2) Litre 0.312
Leachant Volume (2) (L8) Litre 1.400
Eluate Volume (1) (VE1) Litre 0.105
Eluate Volume (2) (VE2) Litre 0.550

Eluate Analysis	Conc in Eluate	
Liquid : Waste Ratio	2:1	8:1
pH (units)	7.5	7.7
Temperature (°C)	20	20
Conductivity (µS/cm)	235	121
Antimony (µg/l Sb)	1.81	0.62
Arsenic (µg/l As)	7.87	7.14
Barium (µg/l Ba)	130.2	71.4
Cadmium (µg/l Cd)	<0.07	<0.07
Chromium (µg/l Cr)	0.4	<0.2
Copper (µg/l Cu)	7.8	2.7
Lead (µg/l Pb)	0.9	0.3
Mercury (µg/l Hg)	0.046	0.026
Molybdenum (µg/l Mo)	3.8	1.3
Nickel (µg/l Ni)	5.4	1.3
Selenium (µg/l Se)	0.72	1.57
Zinc (µg/l Zn)	10	<1
Chloride (mg/l Cl)	5.0	1.5
Fluoride (mg/l F)	0.7	0.4
Sulphate (mg/l SO ₄)	46	14
Total Dissolved Solids (mg/l TDS)	140	75
Phenol Index (µg/l PhOH)	<10	<10
Dissolved Organic Carbon (mg/l C)	26	16

Amount Leached		BS EN 12457-3 Limit Values mg / kg at L:S 10:1		
2:1 mg / kg	10:1 mg / kg	Inert Waste	Non-reactive Hazardous Waste	Hazardous Waste
0.004	0.007	0.06	0.7	5
0.016	0.072	0.5	2	25
0.260	0.749	20	100	300
<0.0002	<0.0007	0.04	1	5
0.001	<0.002	0.5	10	70
0.016	0.030	2	50	100
0.002	0.003	0.5	10	50
0.00009	0.00027	0.01	0.2	2
0.008	0.014	0.5	10	30
0.011	0.015	0.4	10	40
0.001	0.015	0.1	0.5	7
0.019	<0.015	4	50	200
10	17	800	15000	25000
1.4	4.3	10	150	500
93	164	1000	20000	50000
280	789	4000	60000	100000
<0.02	<0.1	1		
52	166	500	800	1000

Waste Analysis	Units	Result			
Total Organic Carbon	% w/w	6.8	3%	5%	6%
Loss on Ignition	% w/w	4.0			10%
BTEX	mg/kg	<0.06	6		
PCBs (7 congeners)	mg/kg	I / S	1		
TPH (C10 - C40)	mg/kg	97	500		
PAH (total)	mg/kg	2.24	100		
pH	pH units	7.9		>6	
Acid Neutralisation Capacity (pH4)	mol/kg	0.16		To be evaluated	
Acid Neutralisation Capacity (pH7)	mol/kg	0.04		To be evaluated	

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Waste Acceptance Criteria Testing

BS EN 12457-Part 3, 2 Stage Process



Sample Details

Contract Name Vale View, Egremont
 Lab Number 107640-10
 Sample ID TP10 0.30m
 Date Sampled 29 March 2022
 Date Received 30 March 2022
 Particle Size (<4mm) -
 Method of size reduction N/A
 Non-crushable matter N/A

Test Values

Mass of Raw Test Portion (MW) kg 0.217
 Mass of Dried Test Portion (MD) kg 0.175
 Moisture Content Ratio (MC) % 24.14
 Dry Matter Content Ratio (DR) % 80.56
 Leachant Volume (1) (L2) Litre 0.308
 Leachant Volume (2) (L8) Litre 1.400
 Eluate Volume (1) (VE1) Litre 0.230
 Eluate Volume (2) (VE2) Litre 1.150

Eluate Analysis	Conc in Eluate	
Liquid : Waste Ratio	2:1	8:1
pH (units)	7.2	7.6
Temperature (°C)	20	20
Conductivity (µS/cm)	166	124
Antimony (µg/l Sb)	1.30	0.59
Arsenic (µg/l As)	3.06	2.15
Barium (µg/l Ba)	100.6	112.6
Cadmium (µg/l Cd)	<0.07	<0.07
Chromium (µg/l Cr)	0.3	0.2
Copper (µg/l Cu)	3.5	2.3
Lead (µg/l Pb)	1.1	0.8
Mercury (µg/l Hg)	0.025	0.035
Molybdenum (µg/l Mo)	7.9	4.9
Nickel (µg/l Ni)	2.0	1.0
Selenium (µg/l Se)	0.92	1.24
Zinc (µg/l Zn)	3	3
Chloride (mg/l Cl)	3.4	1.2
Fluoride (mg/l F)	1.0	0.6
Sulphate (mg/l SO ₄)	15	7.7
Total Dissolved Solids (mg/l TDS)	100	75
Phenol Index (µg/l PhOH)	<10	<10
Dissolved Organic Carbon (mg/l C)	17	13

Amount Leached		BS EN 12457-3 Limit Values		
		mg / kg at L:S 10:1		
2:1	10:1	Inert Waste	Non-reactive Hazardous Waste	Hazardous Waste
mg / kg	mg / kg			
0.003	0.007	0.06	0.7	5
0.006	0.023	0.5	2	25
0.201	1.110	20	100	300
<0.0002	<0.0007	0.04	1	5
0.001	0.002	0.5	10	70
0.007	0.025	2	50	100
0.002	0.008	0.5	10	50
0.00005	0.00034	0.01	0.2	2
0.016	0.053	0.5	10	30
0.004	0.011	0.4	10	40
0.002	0.012	0.1	0.5	7
0.007	0.028	4	50	200
6.8	15	800	15000	25000
2.0	6.2	10	150	500
30	86	1000	20000	50000
200	783	4000	60000	100000
<0.02	<0.1	1		
34	135	500	800	1000

Waste Analysis	Units	Result			
Total Organic Carbon	% w/w	8.5	3%	5%	6%
Loss on Ignition	% w/w	5.4			10%
BTEX	mg/kg	<0.06	6		
PCBs (7 congeners)	mg/kg	<0.045	1		
TPH (C10 - C40)	mg/kg	68	500		
PAH (total)	mg/kg	<0.36	100		
pH	pH units	7.7		>6	
Acid Neutralisation Capacity (pH4)	mol/kg	0.02		To be evaluated	
Acid Neutralisation Capacity (pH7)	mol/kg	0.02		To be evaluated	

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Report date:

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 Vat Reg No. 772 5703 18 Registered in England number 4284013

Waste Acceptance Criteria Testing BS EN 12457-Part 3, 2 Stage Process



Sample Details

Contract Name Vale View, Egremont
Lab Number 107640-16
Sample ID TP17 0.40m
Date Sampled 29 March 2022
Date Received 30 March 2022
Particle Size (<4mm) -
Method of size reduction N/A
Non-crushable matter N/A

Test Values

Mass of Raw Test Portion (MW) kg 0.215
Mass of Dried Test Portion (MD) kg 0.175
Moisture Content Ratio (MC) % 22.84
Dry Matter Content Ratio (DR) % 81.41
Leachant Volume (1) (L2) Litre 0.310
Leachant Volume (2) (L8) Litre 1.400
Eluate Volume (1) (VE1) Litre 0.070
Eluate Volume (2) (VE2) Litre 0.440

Eluate Analysis	Conc in Eluate	
Liquid : Waste Ratio	2:1	8:1
pH (units)	7.6	6.9
Temperature (°C)	20	20
Conductivity (µS/cm)	255	172
Antimony (µg/l Sb)	1.32	0.50
Arsenic (µg/l As)	0.89	1.17
Barium (µg/l Ba)	132.2	226.1
Cadmium (µg/l Cd)	<0.07	<0.07
Chromium (µg/l Cr)	0.4	0.2
Copper (µg/l Cu)	3.6	2.0
Lead (µg/l Pb)	<0.2	<0.2
Mercury (µg/l Hg)	0.014	0.024
Molybdenum (µg/l Mo)	2.3	1.2
Nickel (µg/l Ni)	0.8	<0.5
Selenium (µg/l Se)	2.66	1.00
Zinc (µg/l Zn)	<1	<1
Chloride (mg/l Cl)	3.3	1.7
Fluoride (mg/l F)	4.1	2.6
Sulphate (mg/l SO ₄)	26	14
Total Dissolved Solids (mg/l TDS)	155	105
Phenol Index (µg/l PhOH)	<10	<10
Dissolved Organic Carbon (mg/l C)	24	16

Amount Leached		BS EN 12457-3 Limit Values mg / kg at L:S 10:1		
2:1 mg / kg	10:1 mg / kg	Inert Waste	Non-reactive Hazardous Waste	Hazardous Waste
0.003	0.005	0.06	0.7	5
0.002	0.012	0.5	2	25
0.264	2.223	20	100	300
<0.0002	<0.0007	0.04	1	5
0.001	0.002	0.5	10	70
0.007	0.021	2	50	100
<0.0004	<0.002	0.5	10	50
0.00003	0.00023	0.01	0.2	2
0.005	0.013	0.5	10	30
0.002	<0.005	0.4	10	40
0.005	0.011	0.1	0.5	7
<0.002	<0.010	4	50	200
6.5	18	800	15000	25000
8.1	26.4	10	150	500
51	148	1000	20000	50000
310	1070	4000	60000	100000
<0.02	<0.1	1		
48	163	500	800	1000

Waste Analysis	Units	Result			
Total Organic Carbon	% w/w	2.4	3%	5%	6%
Loss on Ignition	% w/w	6.4			10%
BTEX	mg/kg	<0.06	6		
PCBs (7 congeners)	mg/kg	I / S	1		
TPH (C10 - C40)	mg/kg	78	500		
PAH (total)	mg/kg	2.75	100		
pH	pH units	8.8		>6	
Acid Neutralisation Capacity (pH4)	mol/kg	0.76		To be evaluated	
Acid Neutralisation Capacity (pH7)	mol/kg	0.30		To be evaluated	

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Waste Acceptance Criteria Testing BS EN 12457-Part 3, 2 Stage Process



Sample Details

Contract Name Vale View, Egremont
Lab Number 107640-18
Sample ID TP20 0.60m
Date Sampled 29 March 2022
Date Received 30 March 2022
Particle Size (<4mm) -
Method of size reduction N/A
Non-crushable matter N/A

Test Values

Mass of Raw Test Portion (MW) kg 0.215
Mass of Dried Test Portion (MD) kg 0.175
Moisture Content Ratio (MC) % 22.97
Dry Matter Content Ratio (DR) % 81.32
Leachant Volume (1) (L2) Litre 0.310
Leachant Volume (2) (L8) Litre 1.400
Eluate Volume (1) (VE1) Litre 0.035
Eluate Volume (2) (VE2) Litre 0.430

Eluate Analysis	Conc in Eluate	
Liquid : Waste Ratio	2:1	8:1
pH (units)	7.6	7.7
Temperature (°C)	20	20
Conductivity (µS/cm)	353	189
Antimony (µg/l Sb)	3.66	1.24
Arsenic (µg/l As)	14.20	10.75
Barium (µg/l Ba)	66.1	30.8
Cadmium (µg/l Cd)	0.08	<0.07
Chromium (µg/l Cr)	2.3	0.9
Copper (µg/l Cu)	25.2	10.3
Lead (µg/l Pb)	11.9	2.1
Mercury (µg/l Hg)	0.170	0.052
Molybdenum (µg/l Mo)	6.6	3.6
Nickel (µg/l Ni)	7.0	2.7
Selenium (µg/l Se)	1.28	0.44
Zinc (µg/l Zn)	13	4
Chloride (mg/l Cl)	6.8	2.1
Fluoride (mg/l F)	0.5	0.3
Sulphate (mg/l SO ₄)	13	3.1
Total Dissolved Solids (mg/l TDS)	210	115
Phenol Index (µg/l PhOH)	<10	<10
Dissolved Organic Carbon (mg/l C)	49	28

Amount Leached		BS EN 12457-3 Limit Values mg / kg at L:S 10:1		
2:1 mg / kg	10:1 mg / kg	Inert Waste	Non-reactive Hazardous Waste	Hazardous Waste
0.007	0.013	0.06	0.7	5
0.028	0.108	0.5	2	25
0.132	0.316	20	100	300
0.0002	<0.0007	0.04	1	5
0.005	0.009	0.5	10	70
0.050	0.106	2	50	100
0.024	0.023	0.5	10	50
0.00034	0.00055	0.01	0.2	2
0.013	0.037	0.5	10	30
0.014	0.028	0.4	10	40
0.003	0.005	0.1	0.5	7
0.027	0.044	4	50	200
14	22	800	15000	25000
1.0	3.2	10	150	500
26	33	1000	20000	50000
420	1169	4000	60000	100000
<0.02	<0.1	1		
98	284	500	800	1000

Waste Analysis	Units	Result			
Total Organic Carbon	% w/w	4.7	3%	5%	6%
Loss on Ignition	% w/w	5.5			10%
BTEX	mg/kg	<0.06	6		
PCBs (7 congeners)	mg/kg	<0.045	1		
TPH (C10 - C40)	mg/kg	97	500		
PAH (total)	mg/kg	2.99	100		
pH	pH units	7.9		>6	
Acid Neutralisation Capacity (pH4)	mol/kg	0.02		To be evaluated	
Acid Neutralisation Capacity (pH7)	mol/kg	0.02		To be evaluated	

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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, 4 Culgarth Avenue, CA13 9PL**Engineer: **James Brock**Project: **GEO2021-4760 - Vale View, Egremont**Location: **TP01 at 0.90m**Material Type: **Orange, brown, friable, sandy CLAY with occasional gravel****Sample Specification: Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **31/03/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

17.0

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 (%):

20

Part 2 Clause 5.3

Plasticity Index (%):

14

Part 2 Clause 5.4

Passing 425mic (%):

87

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: **31/03/2022**End of Test Date: **08/04/2022**Report Date: **08/04/2022**



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, 4 Culgarth Avenue, CA13 9PL**Engineer: **James Brock**Project: **GEO2021-4760 - Vale View, Egremont**Location: **TP04 at 1.20m**Material Type: **Brown, sandy CLAY with gravel****Sample Specification: Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **31/03/2022**Sampled By: **Clients Staff**

	<u>Test Results</u>	<u>Specification</u>
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Water Content (%):	18.9	BS EN ISO 17892-1;2014
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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)
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Plastic Limit (%):	18	Part 2 Clause 5.3
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Plasticity Index (%):	14	Part 2 Clause 5.4
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Passing 425mic (%):	92	
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Soil Classification:	CL	
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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: **31/03/2022**End of Test Date: **08/04/2022**Report Date: **08/04/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering, 4 Culgarth Avenue, CA13 9PL**Engineer: **James Brock**Project: **GEO2021-4760 - Vale View, Egremont**Location: **TP07 at 0.90m**Material Type: **Brown, grey, friable, sandy CLAY with gravel****Sample Specification: Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **31/03/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):	19.8	BS EN ISO 17892-1;2014
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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)
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Plastic Limit (%):	19	Part 2 Clause 5.3
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Plasticity Index (%):	20	Part 2 Clause 5.4
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Passing 425mic (%):	83	
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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: **31/03/2022**End of Test Date: **08/04/2022**Report Date: **08/04/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering, 4 Culgarth Avenue, CA13 9PL**Engineer: **James Brock**Project: **GEO2021-4760 - Vale View, Egremont**Location: **TP10 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: **31/03/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

11.3

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 (%):

38

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

18

Part 2 Clause 5.3

Plasticity Index (%):

20

Part 2 Clause 5.4

Passing 425mic (%):

70

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 TechnicianStart of Test Date: **31/03/2022**End of Test Date: **08/04/2022**Report Date: **08/04/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering, 4 Culgarth Avenue, CA13 9PL**Engineer: **James Brock**Project: **GEO2021-4760 - Vale View, Egremont**Location: **TP18 at 1.40m**Material Type: **Red, sandy CLAY with very occasional gravel**Sample Specification: **Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **31/03/2022**Sampled By: **Clients Staff**

	<u>Test Results</u>	<u>Specification</u>
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Water Content (%):	11.8	BS EN ISO 17892-1;2014
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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 (%):	24	Part 2 Clause 4.4 (One point method)
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Plastic Limit (%):	12	Part 2 Clause 5.3
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Plasticity Index (%):	12	Part 2 Clause 5.4
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Passing 425mic (%):	78	
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Soil Classification:	CL	
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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 TechnicianStart of Test Date: **31/03/2022**End of Test Date: **08/04/2022**Report Date: **08/04/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering, 4 Culgarth Avenue, CA13 9PL**Engineer: **James Brock**Project: **GEO2021-4760 - Vale View, Egremont**Location: **TP21 at 1.00m**Material Type: **Red, clayey SAND with gravel****Sample Specification: Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **31/03/2022**Sampled By: **Clients Staff**

	<u>Test Results</u>	<u>Specification</u>
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Water Content (%):	15.9	BS EN ISO 17892-1;2014
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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 (%):	27	Part 2 Clause 4.4 (One point method)
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Plastic Limit (%):	15	Part 2 Clause 5.3
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Plasticity Index (%):	12	Part 2 Clause 5.4
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Passing 425mic (%):	64	
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Soil Classification:	CL	
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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: **31/03/2022**End of Test Date: **08/04/2022**Report Date: **08/04/2022**



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CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **GEO Environmental Engineering, 4 Culgarth Avenue, CA13 9PL**Engineer: **James Brock**Project: **GEO2021-4760 - Vale View, Egremont**Location: **TP23 at 0.80m**Material Type: **Brown, grey, friable, sandy CLAY with very occasional gravel****Sample Specification: Sampled by Site Staff/Client**Source: **Site**

Date Sampled:

Date Received: **31/03/2022**Sampled By: **Clients Staff**Test ResultsSpecification

Water Content (%):

19.2

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 (%):

35

Part 2 Clause 4.4 (One point method)

Plastic Limit (%):

18

Part 2 Clause 5.3

Plasticity Index (%):

17

Part 2 Clause 5.4

Passing 425mic (%):

87

Soil Classification:

CL/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: **31/03/2022**End of Test Date: **08/04/2022**Report Date: **08/04/2022**



ANALYTICAL TEST REPORT

Contract no: 107754

Contract name: Geo Environmental Vale View, Egremont

Client reference: S1266

Clients name: Northumberland County Council

Clients address: Highways Laboratory
Bassington Drive
Cramlington
NE23 8AJ

Samples received: 01 April 2022

Analysis started: 01 April 2022

Analysis completed: 07 April 2022

Report issued: 07 April 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:

Rachael Burton

Reporting Team Lead

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
107754-1	S1266/02	1.20	Sandy Clay	-	-	10.5
107754-2	S1266/04	1.50	Sandy Clay	-	-	9.9
107754-3	S1266/06	1.00	Sandy Clay	-	-	12.4
107754-4	S1266/07	1.50	Sand	-	-	15.1

Chemtech Environmental Limited

SOILS

Lab number			107754-1	107754-2	107754-3	107754-4
Sample id			S1266/02	S1266/04	S1266/06	S1266/07
Depth (m)			1.20	1.50	1.00	1.50
Date sampled			23/03/2022	23/03/2022	23/03/2022	23/03/2022
Test	Method	Units				
pH	CE004 ^M	units	8.3	8.3	6.9	7.9
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	<10	80	13	<10

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)
107754-1	S1266/02	1.20	N	
107754-2	S1266/04	1.50	N	
107754-3	S1266/06	1.00	N	
107754-4	S1266/07	1.50	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 6 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
Geotechnical
&
Environmental Drilling Experts
&
Consultants

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(GEO Standard Terms and Conditions Apply)