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PHASE 2: GROUND INVESTIGATION REPORT

MR ALI

PROPOSED RESIDENTIAL DEVELOPMENT

LAND ADJACENT TO SCAR MILLS

LOCKWOOD SCAR

HUDDERSFIELD

HD4 6BL

Project No: 20-153

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03/04/2021

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The information and/or advice contained in this Phase 2: Ground Investigation Report is based solely on, and is limited to, the boundaries of the site, the immediate area around the site, and the historical use(s) unless otherwise stated. This 'Report' has been prepared in order to collate information relating to the physical, environmental and industrial setting of the site, and to highlight, where possible, the likely problems that might be encountered when considering the future development of this site for the proposed end use. All comments, opinions, diagrams, cross sections and/or sketches contained within the report, and/or any configuration of the findings is conjectural and given for guidance only and confirmation of the anticipated ground conditions should be considered before development proceeds. Agreement for the use or copying of this report by any Third Party must be obtained in writing from Arc Environmental Limited (ARC). If a change in the proposed land use is envisaged, then a reassessment of the site should be carried out.

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1.0 Introduction

April 2021

As requested by Faum Architecture, on behalf of Mr Ali, Phase 2: Ground Investigation works have been carried out over an area of land adjacent to Scar Mills, Lockwood Scarm Huddersfield, where proposals have been made to redevelop the site with the construction of 5 no. residential dwellings with private gardens and areas of hard standing.

A Phase 1 Desk Top Study has been carried out for this site by Mugen GEO Ltd (Ref. MGEO 1902 HD4 6BP), this was reviewed when completing this Ground Investigation Report.

The intrusive investigation works comprised 3 no. windowless sampling boreholes (WS01 – WS03), incorporating the installation of combined gas and groundwater monitoring wells and 5 no. mechanically excavated trial pits (TP01 – TP05). The positions of which can be seen on the Borehole & Trial Pit Location Plan, a copy of which can be seen in Appendix II. It should be noted that this plan should be used for orientating purposes only, as the positions shown are approximate, and the plans are not to a standard scale.

2.0 Site Details

Table 2.1

N = north, S = south, E = east, W = west

Site Name & Address:	Land Adjacent to Scar Mill, Lockwood Scar, Huddersfield, HD4 6BL.
OS Grid Reference:	413845, 415104 (representative of the centre of the site).
Description of Location:	The site is located adjacent to Scar Mills, to the south-west of Huddersfield Town Centre.
Site Boundaries:	N = Comercial properites, S = Residential properties and Lockwood Scar (road), E = Enoch Lane wih residential properties, W = Residential properties / Wood End (road).

3.0 Scope of Works

Table 3.1

Client:	Mr Ali.
Project type:	Residential.
Site Location plan:	See Appendix I.
Layout plans (existing):	See Appendix I.
Layout plans (proposed):	See Appendix I.
Laboratory Testing:	Geotechnical & Ground Contamination.
Reporting:	Factual & Interpretative including Level 1 Risk Assessment. Works carried out in accordance with British Standards

The information contained in this report is limited to the areas of the site, as indicated on the Existing & Proposed Site Layout Plans shown in Appendix I, and to those areas accessible during the ground investigation. The depths of strata on the record sheets are recorded from current ground levels. No topographical survey was requested or undertaken. When considering the full scope of the development any features and / or issues not specifically mentioned in this report cannot be assumed to have been covered.

4.0 Investigation Rationale

This ground investigation has been designed to provide information on the general ground and groundwater conditions around the proposed development areas and potential areas of geotechnical concern. The rationale behind the location of each exploratory hole is summarised in Table 4.1 below.

Table 4.1

<u>Potential issue</u>	<u>Exploratory hole</u>
Geotechnical considerations around areas of proposed development	WS01 – WS03 & TP01 – TP05
Shallow groundwater and ground gas monitoring	WS01 – WS03
General site wide contamination assessment	WS01 – WS03 & TP01 – TP05

4.0 Investigation Rationale (Cont'd)

4.1 Contamination Related Sampling & Site Protocols: -

All works associated with this ground contamination assessment and investigations have generally been completed in accordance with BS10175:2011 + A2:2017: British Standard Code of Practice for the Investigation of Potentially Contaminated Sites (2011) & Environment Agency (EA) Land Contamination Risk Management (LCRM), October 2020, which superseded CLR11, with the following precautions specific to this project.

4.1.1 Ground Contamination Sampling: -

Samples were recovered by a representative of ARC Environmental Ltd. during the intrusive investigation works. All samples were stored at approximately 2°C - 8°C using cool boxes and ice packs prior to delivery to a UKAS/MCERTS accredited laboratory. Sampling was carried out in accordance with 'Technical Policy Statement 63: UKAS Policy on Deviating Samples'.

4.1.2 Avoiding Cross-Contamination between Sample Locations: -

To avoid possible cross-contamination of materials between soil horizons in the boreholes, drill casing was used to seal off the made ground. In addition, disposable plastic liners were used to collect samples from the windowless sampling boreholes carried out. With regards to the trial pits, the samples were recovered manually using dedicated disposable plastic gloves, replaced between each sample recovery.

5.0 Ground Conditions

For an accurate description of the ground conditions encountered at each investigation position, reference should be made to the borehole & trial pit record sheets in Appendix II. It should be noted that there is always the possibility of variation in the ground conditions around and between the investigation locations.

5.1 Soil Profile: -

A summary of the soil profile for this site can be seen in Table 5.1 below.

Table 5.1

BGL = Below ground level

<u>Type of Strata</u>	<u>Depths Recorded (BGL)</u>	<u>Description & General Comments</u>
MADE GROUND:	From 0.00m up to c.0.28m to c.3.20m	Comprised initial site surfacing of either limestone gravel with broken tarmac or compact brown sandy gravels, underlain by very soft to soft dark brown / brown sandy gravelly clay with anthropogenic debris (i.e., brick, ash etc).
DRIFT GEOLOGY:	Not Encountered.	N/A.
SOLID GEOLOGY: (Lower Coal Measures)	From c.0.28m to c.2.80m up to At least c.6.44m	Comprised very weak weathered MUDSTONE, recorded within WS01-WS03 & TP02 only.

There was no visual and / or olfactory evidence of significant ground contamination (i.e. fuel-derived contaminants, asbestos, etc.) present at any of the exploratory positions undertaken across the site. However, fragments of ash were recorded within the made ground.

5.0 Ground Conditions (Cont'd)

5.2 Coal Mining Assessment: -

The site is recorded to be underlain by the Lower Coal Measures of Carboniferous age. In accordance with the Coal Authority Interactive Map Viewer, the site is recorded to lie in a coal mining reporting area however, the site does not lie within an inferred 'Development High Risk Area' or Area of Past / Probable or Underground Workings. Published BGS maps show the Soft Bed Coal (SB) coal seam to subcrop to the east of the site dipping to the east away from the site, no shallow coal seams are recorded below the site. As a result, the site is not felt to be at risk from potential shallow coal workings and no further assessment and / or intrusive investigation works will be required.

5.3 Groundwater: -

An ingress of water was encountered within WS02 only at depth of c.1.60m bgl. This is likely to be representative of trapped pockets of surface infiltration rather than that of a shallow continuous groundwater surface (water table).

Combined ground gas & groundwater monitoring wells were installed at the locations of WS01 – WS03 in order to carry out a subsequent programme of gas and groundwater monitoring. The results are discussed further in Section 6.2.

6.0 Insitu Testing

6.1 Insitu Standard Penetration Tests: -

Standard penetration tests (SPT's) were carried out with the use of a normal split spoon sampler on the made ground and solid geological deposits encountered within the boreholes to determine the relative / density strength of the materials tested. The results are shown as 'N' values on the graphic borehole record sheets, adjacent to the appropriate sample level. A summary of the test results can be seen in Table 6.1 below;

Table 6.1

<u>Type of Strata</u>	<u>Range of SPT 'N' Values</u>	<u>Result details</u>
MADE GROUND	2 - 6	Loose / very soft to soft deposits
MUDSTONE	17 - 45 And blows of 50 for limited penetration	Very weak deposits

6.2 Insitu Gas & Groundwater Monitoring: -

Although no sources of hazardous ground gas generation were recorded within the Desk Top Study previously carried out, deep made ground was recorded within the exploratory positions. As a result, soil gas & water monitoring standpipes were installed within the boreholes primarily to check for the possible presence of hazardous ground gas migration, as well as to monitor insitu groundwater levels.

A standard 50mm diameter HDPE standpipe, with gravel and/or geo-wrap surround, bentonite seal, gas valve cap and security cover, was installed to a depth of c.3.00m (WS01 & WS02) and c.5.00m (WS03) below current ground levels, and the soil gas and water levels were allowed to reach equilibrium, prior to the first monitoring visit. Monitoring was undertaken using a GFM 435 series soil gas analyser, with integral flow meter, and a Geotechnical Instruments electronic dip-meter.

In accordance with CIRIA Report C665, November 2007, the current NHBC Document; Guidance on evaluation of development proposals on site where methane and carbon dioxide are present, Report Edition No. 04, March 2007 and BS8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, it is felt that an adequate risk assessment can be undertaken based on the following limiting factors:

6.0 Insitu Testing (Cont'd)

6.2 Insitu Gas & Groundwater Monitoring (Cont'd): -

- The Residential development has been considered as **high sensitivity** (Table 5.5 – Typical/Idealised frequency and period of monitoring, after Wilson et al, 2005).
- The risk associated with the generation potential of a source is considered as **very low**, (assessment based on the environmental setting) as well as observations noted during the fieldworks.
- Monitoring over a **minimum of three months** with **six recorded** readings (Table 5.5 – Typical /idealised frequency and period of monitoring after Wilson et al, 2005).
- **Negligible** flow rates have been recorded (Table 8.5 – Modified Wilson & Card classification).
- A targeted and phased program of gas monitoring should be completed obtaining gas monitoring readings during varying atmospheric conditions, which covers the 'worst case' scenario for ground gas emissions to occur, particularly during rapid falls in atmospheric pressure (i.e. from c.1020mb and c.1010mb).

Monitoring of the weather conditions and predicated atmospheric pressures (Met Office Surface Pressure Charts) are carried out up to 72 hours in advance of proposed monitoring visits, in order that a reasonable period of data is obtained to determine atmospheric trends, and also to target the 'worst case' scenario. A summary of the results for the 3 no. visits undertaken to date, compared with the 'inert' background gas levels are presented in Table 6.2 below with a copy of the monitoring certificate attached in Appendix III.

Table 6.2

Atmospheric trend taken from www.weatheronline.com for Leeds Bradford Airport

Atmospheric data taken from www.weatherlink.com for Leeds Bradford Airport								
Position	Date	Atmospheric Pressure (mbar)	Water (m bgl)	CH ₄ (%v/v)	LEL (%v/v)	CO ₂ (%v/v)	O ₂ (%v/v)	Flow Rate (l/hr)
Background		~	~	0	0	0	21.0	0
WS01	25/02/2021	1003 (Rising 1012-1035)	1.57	0.0	0.0	2.8	18.3	<0.1
WS02			1.47	0.0	0.0	0.5	19.6	<0.1
WS03			4.49	0.0	0.0	0.5	19.3	<0.1
WS01	11/03/2021	973 (Falling 1008-992)	1.16	0.0	0.0	0.2	19.5	<0.1
WS02			1.57	0.0	0.0	0.7	19.3	<0.1
WS03			4.76	0.0	0.0	0.4	19.8	<0.1
WS01	25/03/2021	1010 (Rising 1002-1020)	1.22	0.0	0.0	0.6	19.4	<0.1
WS02			1.60	0.0	0.0	0.3	19.8	<0.1
WS03			4.52	0.0	0.0	0.4	19.6	<0.1
3 outstanding visits to be completed								

As can be seen from the results undertaken to date, no concentrations of Methane (CH₄) were recorded within any of the boreholes. However, detectable levels of Carbon Dioxide (CO₂) were recorded within the boreholes, up to a maximum level of 2.8% v/v, with associated slightly depleted oxygen (O₂) concentrations (minimum 18.3 v/v). In addition, negligible flow rates of <0.1l/hr have been recorded during the monitoring visits completed to date.

Based upon the results recorded, in accordance with CIRIA Report C665, the risk to the site from ground gases has been assessed by converting the results in Table 6.3 to gas screening values (GSV's), calculated by multiplying the typical maximum gas concentrations with the recorded maximum positive flow rates (after Wilson & Card).

At this stage, as no levels of CH₄ have been recorded to date, the gas screening value (GSV) for CO₂ only has been calculated, using the maximum recorded value of 2.8% v/v, with a maximum flow rate of <0.1l/hr. The GSV can be calculated as follows:

$$\text{Carbon Dioxide GSV} = 0.028 (2.8\%) \times 0.1 = 0.0028 \text{ l/hr}$$

6.0 Insitu Testing (Cont'd)

6.2 Insitu Gas & Groundwater Monitoring (Cont'd): -

When considering these results, in accordance with CIRIA C665, and considering the NHBC Traffic light system (low rise housing with ventilated underfloor void), the GSV value for CO₂ is below the assessment GSV of 0.78 l/hr (Green classification), resulting in no gas protection measures being required. Alternatively, if the proposed development were to comprise ground bearing floor slabs within the structure, in accordance with CIRIA C665, the GSV for CO₂ would also fall below the lower target concentration of 0.07l/hr and would equate to a Characteristic Situation 1 site classification, resulting in no gas protective measures being required for the proposed development.

Following completion of the remaining 3 no. gas monitoring visits, a final assessment of these results and recommendations will follow as an addendum to this report.

When considering the results of the groundwater monitoring, it can be seen that standing levels were recorded at depths of between c.1.16m to c.4.76m during the monitoring visits undertaken. These levels are likely to be attributable to 'perched' water collecting within the standpipe which will be effectively acting as a conduit for trapped surface infiltration.

As can be seen from the results of the water monitoring undertaken and from the observations noted during the fieldworks, significant shallow water ingress should not be experienced during any future construction related excavations. However, it would be prudent to allow for the introduction of suitable groundwater control measures, in order to take care of any localised ingresses of groundwater which may occur during the construction period, especially during the wetter periods of the year.

7.0 Laboratory Testing

All geotechnical testing was carried out in accordance with BS1377-1:2016 unless otherwise stated, at a UKAS accredited laboratory. Ground contamination screening was undertaken by a suitably experienced and qualified laboratory (UKAS and MCERTS accredited, unless otherwise stated).

7.1 Determination of pH & SO₄: -

Representative samples (6 no.) of the made ground and natural deposits recovered during the investigation, were tested in order to determine their acidic (pH) and soluble sulphate (SO₄) levels. The results are shown in Table 7.1 below and are also contained within the Chemtech Environmental Limited Analytical Report (Ref no: 93476), a copy of which can be seen in Appendix IV.

Table 7.1

Position	Depth (m)	Strata	pH	SO₄(mg/l)	Design SO₄ Class	ACEC Class
TP02	0.10-0.60	Made Ground	8.3	37	DS-1	AC-1
TP05	0.20-1.00	Made Ground	8.2	25	DS-1	AC-1
WS01	0.25-1.00	Made Ground	8.3	24	DS-1	AC-1
WS01	1.70-2.00	Natural Strata	8.6	12	DS-1	AC-1
WS02	0.90-1.25	Natural Strata	5.4	35	DS-1	AC-2z
WS03	0.00-0.30	Made Ground	6.7	125	DS-1	AC-1

ACEC = Aggressive Chemical Environment for Concrete site classification

From these results it can be seen that the pH values for the samples of soil tested range from 5.4 to 8.6 and the amount of soluble sulphate present ranges from 12mg/l to 125mg/l. Therefore, in accordance with BRE Special Digest 1: 2005, the site should be given a classification of Class DS-1. When considering the nature of the materials tested and assuming mobile groundwater the assessment of the Aggressive Chemical Environment for Concrete (ACEC), is AC-2z, due to the acidic nature of some of the soils tested.

7.0 Laboratory Testing (Cont'd)

7.2 Determination of Liquid & Plastic Limits: -

Representative samples (4 no.) of the natural mudstone recovered from the proposed development area were tested to determine their liquid and plastic limits, so that these materials could be classified. The results are summarised in Table 7.2 below and are also contained in the PSL Analytical Report (Ref no.: PSL21/1436), a copy of which is contained in Appendix IV.

Table 7.2

M/C = Moisture Content, LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index

Position	Depth(m)	M/C (%)	LL	PL	PI	Class	% Passing 425µm Sieve
WS01	1.70-2.00	11	37	22	15	CI	96
WS02	0.90-1.25	19	41	25	16	CI	84
WS03	2.80-3.00	18	53	37	26	CH	86
TP02	2.00	12	39	21	18	CI	81

From these results it can be seen that the samples tested, when plotted on the plasticity chart, fall within the intermediate and high plasticity range, and from the resulting plasticity indices, are of a low and moderate volume change potential, when taking into account the amount passing the 425µm sieve. Therefore, it can be seen that some of the mudstone deposits tested may undergo significant changes in volume, if large changes in their natural moisture content were to occur due to seasonal variations or the like and if new foundations were to be based within these materials, they would need to be taken down to a minimum depth of 0.90m below finished ground levels.

However, an increase in founding depth may be required to reach competent strata and also if the proposed development is within close proximity to existing or envisaged vegetation. An increase in the minimum foundation depth may also be required, even if trees are to be removed, in order to ensure no additional future shrinkage and swelling of these materials occurs. Reference should be made to BS5837: 2012, 'Trees in Relation to Design, Demolition and Construction' along with the NHBC Standards, 'Building near trees'.

7.3 Contamination Screening/Screening Strategy: -

Representative samples of the made ground recovered from across the proposed development area were passed onto Chemtech Environmental of Stanley, Co. Durham, so that soil contamination screening could be carried out. The samples were screened using a standard generic contamination suite (based on the historical CLEA SGV listed analytes with additions) which is used to assess typical made ground (disturbed natural strata mixed with anthropogenic debris) of an unknown source.

Although no significant evidence of any fuel /oil type contamination, etc., was noted within the exploratory positions carried out, fragments of ash was noted within the made ground. Therefore, representative samples were tested for Speciated PAH (Polycyclic Aromatic Hydrocarbons) and Speciated TPH (Total Petroleum Hydrocarbons). In addition, although no visual evidence of asbestos containing materials (ACM's) were noted, representative samples were also screened for asbestos.

The catalogue of testing results can be found in the Chemtech Analytical Report (ref no. 93476), attached in Appendix IV, and the total analysis carried out is summarised below and on the following page.

- 4 no. samples screened using a Generic Soils Suite - based on the current CLEA SGV listed analytes with historical additions and which is used to assess typical made ground, comprising disturbed natural strata mixed with anthropogenic debris, of an unknown source (suite comprises; Arsenic, Cadmium, Chromium (Total), Copper, Lead, Mercury, Nickel, Selenium, Zinc & Cyanide)
- 4 no. samples screened for Speciated PAH's – based on the current USEPA 16 PAH's

7.0 Laboratory Testing (Cont'd)

7.3 Contamination Screening/Screening Strategy (Cont'd): -

- 4 no. samples screened for Speciated Total Petroleum Hydrocarbons (full Aliphatic & Aromatic split)
- 4 no. samples screened for BTEX (Benzene, Toluene, Ethylbenzene, m & p-Xylene & o-Xylene)
- 4 no. samples screened for the presence of asbestos (presence)

The results have been used to carry out a Level 1: Quantitative Human Health Risk Assessment for the ground contamination present and are discussed in further detail in Section 8.0 below and continued on the following pages.

8.0 Ground Contamination Risk Assessment

8.1 Methodology: -

Following completion of the contamination screening undertaken on various samples from this site, a Level 1 generic quantitative ground contamination risk assessment has been undertaken, generally in accordance with Environment Agency (EA) Land Contamination Risk Management (LCRM), October 2020, which superseded CLR11: Model Procedures for the Management of Land Contamination.

This quantitative ground contamination risk assessment uses the current UK practice for assessing the risks from land contamination, which is based on the established *source-pathway-receptor* pollutant linkage methodology and 'suitable for use' approach (Part IIA, EPA 1990 - inserted through Section 57 EA 1995). Based on the Conceptual Site Model (CSM) for this site (described further in Section 8.2), a site specific screening strategy for the site has been developed (see Section 7.3) and risks from potential contaminants have been assessed for human health. The results of the risk assessments can be found in Section 8.3.

8.2 Conceptual Site Model (CSM): -

Following the results of the intrusive investigation works, a Conceptual Site Model (CSM) has been developed for this site, Table 8.1 below summarises the various contaminant *sources*, plausible migration *pathways* and potentially sensitive *receptors* identified for this site, assuming no remediation, additional protection measures and/or removal of the *sources* contamination takes place.

Table 8.1

* = Not included in the Human Health & Controlled Waters Risk assessment

<u>Sources (S)</u>		<u>Pathways (P)</u>		<u>Receptors (R)</u>	
S1	Made ground comprising disturbed natural strata with anthropogenic debris.	P1	Ingestion.	R1	Human health (End users and construction workers).
S2	Hazardous ground gas associated with off-site sources – No elevated levels recorded to date.	P2	Air – inhalation of vapours and direct contact with dust.	R2	Controlled Waters – River Holme c.80m to the northwest & groundwater within the solid geological deposits (Secondary A Aquifer).
		P3	Consumption of homegrown produce and attached soil.		
		P4	Migration through existing services.		
		P5	Direct contact with building materials.	R3	Adjacent sites.
		P6	Surface runoff & Infiltration.	R4	Building materials & protection of water supply pipes *.
				R5	Flora and fauna*.

8.0 Ground Contamination Risk Assessment (Cont'd)

8.2 Conceptual Site Model (CSM) (Cont'd): -

8.2.1 Sources: -

The site is covered by a layer of made ground (up to c.3.20m thick) which represents a potential source of ground contamination for this site. The majority of the made ground contains some anthropogenic debris mixed with disturbed natural strata, and these materials have been assessed using a standard generic soil suite, with the site considered as a single averaging area for these analytes.

There was no significant visual, olfactory or analytical evidence of significant heavy or gross contamination, such as waste oils, fuels, ash, etc. However, when considering the presence of ash within the made ground, the potential for hydrocarbon based contamination (PAH's & TPH's) for this site have also been assessed. In addition, although no visual evidence of Asbestos (fibres or fragments) were noted, the potential for Asbestos has also been assessed.

8.2.2 Pathways: -

When considering the proposed end use, and without considering treatment, removal or protection measures, there are some potential plausible pathways available for direct contact, dermal contact, ingestion, inhalation, wind (dust / particulate), volatilization, and vertical and lateral transportation below the site, where there is no hard cover or vapour barriers present. Within the CLEA Risk Assessment Model for Human Health, there are 3 exposure mediums considered for on site receptors, comprising ingestion of soil containing contaminants, inhalation of contaminated dust/vapours and dermal contact, with up to 10 no. exposure pathways considered, as shown below.

- 1. Ingestion of soil and indoor dust 2. Consumption of homegrown produce and attached soil 3. Dermal contact (indoor) 4. Dermal contact (outdoor) 5. Inhalation of dust (indoor) 6. Inhalation of dust (outdoor) 7. Inhalation of vapour (indoor) 8. Inhalation of vapour (outdoor) 9. Oral background intake 10. Inhalation background intake.

Where the future site has hard cover and below new structures, a number of these pathways may not be available. In addition, when considering the potential pathways for leachate migration, where either hard cover and/or future surface water drainage systems are present, the potential effects of surface infiltration or contaminated surface water runoff will be greatly reduced. Similarly, when considering the construction work force, exposure pathways through direct contact, ingestion and dust inhalation will be available during part of the construction process, and therefore adequate PPE should be provided to protect the work force during this period

8.2.3 Receptors: -

Within the CLEA Risk Assessment Model for Human Health, the potential receptors are assessed initially on site end use, followed by a delineation of age category (i.e. child or adult), with default settings for *Residential*, *Allotment* and *Public Open Space (Park)* end uses based on a child aged 0 to 6 years, *Public Open Space (Residential)* based on a child aged 3 to 9 and *Commercial* end uses based upon a working exposure period of up to 49 years (i.e. 16 to 65).

Key generic assumptions for *Residential* and *Public Open Space (Residential)* are based upon a typical residential property, consisting of a two-storey small terraced house, with private garden, and a *Commercial* end use based upon a typical commercial or light industrial property, consisting of a three-storey office building (pre-1970). No buildings are anticipated for *Allotment* or *Public Open Space (Park)* end uses. Within the CLEA Risk Assessment Model for Human Health there are 6 no. generic end use categories presently in use, as follows;

- 1) *Residential - with home grown produce*, 2) *Residential - without home grown produce*, 3) *Allotments*, 4) *Commercial*
5) *Public Open Space – Residential*, 6) *Public Open Space - Park*

8.0 Ground Contamination Risk Assessment (Cont'd)

8.2 Conceptual Site Model (CSM) (Cont'd): -

8.2.3 Receptors (Cont'd): -

Therefore, for this Level 1 Risk Assessment, the best fit end use category for this site has been taken as:

1) Residential - with home grown produce

When considering the environmental setting with no Groundwater Abstractions or Source Protection Zones (SPZ's) within c.500m of the site boundaries, no testing has been carried out with regards to Controlled Waters Risk Assessment.

8.3 Level 1 Risk Assessment (Human Health): -

8.3.1 Generic Screening: -

The generic soil screening results have been assessed by comparing the maximum values recorded for each analyte to the critical concentration values chosen for this site. The results of the analysis and risk assessment have been summarised in Table 8.2 below and have identified the following:-

Table 8.2

Bold = Elevated result

Analyte	Critical Conc. (C _C) mg/kg	No. of Samples Screened	Max. Conc. (C _M) recorded mg/kg	Does C _M exceed C _C	No. of Samples > C _C
Arsenic	37 ⁽¹⁾	4	57	YES	1 _(WS01)
Cadmium	11 ⁽¹⁾	4	0.7	NO	0
Chromium III	910 ⁽¹⁾	4	420	NO	0
Chromium VI	6 ⁽¹⁾	4	<1*	NO	0
Copper	2400 ⁽¹⁾	4	260	NO	0
Lead	200 ⁽²⁾	4	1931	NO	2 _(WS01&WS03)
Mercury	40 ⁽¹⁾	4	<0.5*	NO	0
Nickel	130 ⁽¹⁾	4	81	NO	0
Selenium	250 ⁽¹⁾	4	3.2	NO	0
Zinc	3700 ⁽¹⁾	4	3.5	NO	0
Cyanide	34 ⁽³⁾	4	<1*	NO	0

⁽¹⁾ = LQM CIEH Suitable 4 Use Levels (S4UL Nov 2014 (Revised August 2015)) – Commercial, ⁽²⁾ = C4SL Values (Residential with homegrown produce), ⁽³⁾ = ATRISK^{soil} SSV * = Site Value (C_M) less than analytical detection limit

- The maximum concentration (C_M) values for Arsenic & Lead exceed the critical concentration (C_C) values for this site.
- When considering these results, the made ground below the site represents a potential risk to the end users with regards to generic metals, and therefore either treatment, removal, protection measures and / or further detailed quantitative risk assessment will be required.

8.3.2 Hydrocarbon Screening:-

Although no visual, olfactory or analytical evidence of significant heavy or gross contamination, such as waste oils, fuels, etc. was noted, fragments of ash were recorded within the made ground. Therefore, representative samples of the made ground were recovered and screened for Speciated PAH's & Speciated TPHs.. A summary of the results for the Level 1 Risk Assessment based on the results of the soil concentrations for the end users can be seen in Tables 8.3 & 8.4 on the following page and have identified the following:

8.0 Ground Contamination Risk Assessment (Cont'd)

8.3 Level 1 Risk Assessment (Human Health) (Cont'd): -

8.3.2 Hydrocarbon Screening (Cont'd): -

Table 8.3 (Speciated PAH's)

Bold = Elevated result

Analyte	Critical Conc. (C _C) mg/kg	No. of samples tested	Max. Conc. (C _M) (mg/kg)	Has C _M exceeded C _C	No. of Samples > C _C
Acenaphthene	1100 ⁽¹⁾	4	3.0	NO	0
Acenaphthylene	920 ⁽¹⁾	4	0.07	NO	0
Anthracene	11000 ⁽¹⁾	4	7.7	NO	0
Benzo(a)anthracene	13 ⁽¹⁾	4	11	NO	0
Benzo(a)pyrene	3.0 ⁽¹⁾	4	9.6	YES	1 _(WS03)
Benzo(b)fluoranthene	3.7 ⁽¹⁾	4	12	YES	1 _(WS03)
Benzo(ghi)perylene	350 ⁽¹⁾	4	5.2	NO	0
Benzo(k)fluoranthene	100 ⁽¹⁾	4	4.4	NO	0
Chrysene	27 ⁽¹⁾	4	11	NO	0
Dibenz(ah)anthracene	0.3 ⁽¹⁾	4	1.5	YES	1 _(WS03)
Fluoranthene	890 ⁽¹⁾	4	25	NO	0
Fluorene	860 ⁽¹⁾	4	2.1	NO	0
Indeno(123cd)pyrene	41 ⁽¹⁾	4	5.3	NO	0
Naphthalene	13 ⁽¹⁾	4	4.4	NO	0
Phenanthrene	440 ⁽¹⁾	4	24	NO	0
Pyrene	2000 ⁽¹⁾	4	22	NO	0

⁽¹⁾ = LQM/CIEH S4UL's - Residential with homegrown produce (6% SOM) * = Site Value (C_M) less than analytical detection limit

Table 8.4 (Speciated TPH's & BTEX)

Analyte	Critical Conc. (C _C) mg/kg	No. of samples tested	Max. Conc. (C _M) (mg/kg)	Has C _M exceeded C _C	No. of Samples > C _C
Benzene	0.37 ⁽¹⁾	4	<0.01*	NO	0
Toluene	660 ⁽¹⁾	4	0.02	NO	0
Ethylbenzene	260 ⁽¹⁾	4	0.01	NO	0
m & p-Xylene	310 ⁽¹⁾	4	0.08	NO	0
o-Xylene	330 ⁽¹⁾	4	0.05	NO	0
VPH Aliphatic (>C5-C6)	160 ⁽¹⁾	4	<0.1*	NO	0
VPH Aliphatic (>C6-C8)	530 ⁽¹⁾	4	<0.1*	NO	0
VPH Aliphatic (>C8-C10)	150 ⁽¹⁾	4	0.2	NO	0
EPH Aliphatic (>C10-C12)	760 ⁽¹⁾	4	6.4	NO	0
EPH Aliphatic (>C12-C16)	4300 ⁽¹⁾	4	11	NO	0
EPH Aliphatic (>C16-C35)	110000 ⁽¹⁾	4	172	NO	0
EPH Aliphatic (>C35-C44)	110000 ⁽¹⁾	4	63	NO	0
VPH Aromatic (>EC5-EC7)	300 ⁽¹⁾	4	<0.01*	NO	0
VPH Aromatic (>EC7-EC8)	660 ⁽¹⁾	4	0.02	NO	0
VPH Aromatic (>EC8-EC10)	190 ⁽¹⁾	4	0.13	NO	0
EPH Aromatic (>EC10-EC12)	380 ⁽¹⁾	4	5	NO	0
EPH Aromatic (>EC12-EC16)	660 ⁽¹⁾	4	4	NO	0
EPH Aromatic (>EC16-EC21)	930 ⁽¹⁾	4	81	NO	0
EPH Aromatic (>EC21-EC35)	1700 ⁽¹⁾	4	55	NO	0
EPH Aromatic (>EC35-EC44)	1700 ⁽¹⁾	4	6	NO	0

⁽¹⁾ = LQM/CIEH S4UL's - Commercial (6 0% SOM) * = Site Value (C_M) less than analytical detection limit

- The C_M values for Benzo(a)pyrene, Benzo(b)fluoranthene & Dibenz(ah)anthracene exceed the chosen C_C value for this site.

8.0 Ground Contamination Risk Assessment (Cont'd)

8.3 Level 1 Risk Assessment (Human Health) (Cont'd): -

8.3.2 Hydrocarbon Screening (Cont'd): -

- None of the C_M values for any of the remaining analytes screened for exceed the chosen C_C values for this site
- When considering these results, the made ground below the site represents a potential risk to the end users, and therefore either treatment, removal, protection measures and / or further detailed quantitative risk assessment will be required.

8.3.3 Asbestos fibres: -

Representative samples of the made ground recovered from below the proposed development area have been screened for Asbestos, to determine whether any unidentified asbestos was present within these materials. The results are summarised in Table 8.5 below and have identified the following;

Table 8.5

NAD = No Asbestos Detected

Position	Depth (m)	Chrysotile (white)	Amosite (brown)	Crocidolite (blue)	Anthophyllite	Actinolite	Tremolite
TP02	0.10-0.60	NAD	NAD	NAD	NAD	NAD	NAD
TP05	0.20-1.00	NAD	NAD	NAD	NAD	NAD	NAD
WS01	0.25-1.00	NAD	NAD	NAD	NAD	NAD	NAD
WS03	0.00-0.30	NAD	NAD	NAD	NAD	NAD	NAD

- No asbestos fibres have been detected and therefore the made ground below the proposed development area is not felt to represent a risk with regards to asbestos.

9.0 Conclusions & Recommendations

9.1 Ground Conditions: -

From the information gained during these intrusive ground investigation works, made ground was recorded to depths of between c.0.28m to c.3.20m below current ground level (bcgl), generally comprising of an initial site surfacing of either limestone gravel with broken tarmac or compact brown sandy gravels, underlain by very soft to soft dark brown / brown sandy gravelly clay with anthropogenic debris (i.e., brick, ash etc).

No natural drift deposits were recorded with very weak, highly weathered mudstone recorded below the made ground within several of the exploratory positions to depths of between c.2.20m to c.6.44m (WS01-WS03 & TP02).

9.2 Groundwater: -

An ingress of water was encountered at depth of c.1.60m bgl within WS02 only. From the results of the groundwater monitoring, it can be seen that standing water levels were recorded at depths of between c.1.16m to c.4.76m during the monitoring visits undertaken to date.

As a result, significant shallow water ingress should not be experienced during any future construction related excavations. However, it would be prudent to allow for the introduction of suitable groundwater control measures, in order to take care of any localised ingresses of groundwater which may occur during the construction period, especially during the wetter periods of the year.

9.0 Conclusions & Recommendations (Cont'd)

9.3 Foundation Options: -

When considering the proposed development and ground conditions identified, strip foundations utilising trench fill may be suitable for the proposed development with foundations taken down through the made ground and based wholly within the weathered mudstone where a maximum allowable bearing pressure of 120kN/m² is available. However, further works (including site preparation works) may be required to determine the depth to mudstone across the site where this was not encountered.

Alternatively, piling may be a more suitable foundation option for the proposed development and if this were to be considered, this report should be forwarded onto a specialist piling contractor for their assessment. However, deeper boreholes may be required to allow a suitable scheme to be designed.

When considering the results of the pH and soluble sulphate testing, it can be seen that future foundations and buried concrete should be constructed utilising a concrete design class of DS-1 and ACEC class of AC-2z. Recourse to the relevant utility suppliers should be made for their advice / comments regarding any service material precautions necessary.

9.4 Gas Protection Measures: -

From the results of the gas monitoring undertaken to date, detectable levels of Carbon Dioxide (CO₂) have been recorded, up to a maximum level of 2.8% v/v, whilst depleted oxygen (O₂) concentrations (minimum 17.7 v/v) have also been recorded. Flow rates of <0.11/hr have been recorded during the monitoring visits completed to date.

When considering these results in accordance with CIRIA Report C665, the resulting GSV for this site would be 0.00281/hr. Therefore, this result would suggest the site should be given either a Green or Characteristic Situation 1 classification (depending upon floor slab construction), resulting in no gas protective measures being required for the proposed development.

Following completion of the remaining 3 no. gas monitoring visits, a final assessment of these results and recommendations will follow as an addendum to this report

9.5 Ground Contamination: -

From the results of the contamination screening carried out, it can be seen that elevated levels of Arsenic, Lead and several Speciated PAH's have been recorded in the made ground that represent a potential risk to future end users, where exposure pathways are available. As a result it is recommended that treatment, removal, protection measures and / or further detailed quantitative risk assessment is required, potential remedial measures available are discussed further in Section 9.6.

When considering the risks to the construction workforce, standard PPE should prove adequate protection against the levels of potential contaminants recorded during these investigation works. Similarly, the results can also be used by the Main Contractor / Project Coordinator, when devising an adequate Site Health & Safety Plan, in accordance with current CDM Regulations. For further guidance reference should be made to the Health and Safety Executive (HSE) document EH40/2005 Workplace exposure limits.

9.6 Preliminary Remediation Statement: -

From the results of the Level 1 Risk Assessment, it can be seen that elevated levels of Arsenic, Lead and several Speciated PAH's have been recorded within the made ground that represents a potential risk to the proposed end users.

9.0 Conclusions & Recommendations (Cont'd)

9.6 Preliminary Remediation Statement (Cont'd): -

When considering the elevated levels of contamination, where buildings and areas of hardstanding are proposed/present then the *source-pathway-receptor* model will not exist and there is not considered to be a health risk to the future end users. However, in areas of soft landscaping there is the potential for dermal contact, plant uptake and inhalation of dust.

Taking into account the nature of the proposed development it is felt that the most suitable remedial option available will be the installation of a clean cover system within any areas of soft landscaping / private gardens, at this stage an estimated minimum 600mm thick cover is envisaged.

Where remedial works are completed across the site, confirmatory validation testing and photographic evidence of the chosen remediation strategy would be required by the Local Authorities. Prior to any remedial works being undertaken, a remediation strategy may need to be prepared, this should be agreed with the LA, and once implemented, the remediation work should be validated by a suitably qualified Geo-environmental Engineer to ensure that all works are being completed in strict accordance with the agreed Remediation Strategy.

9.7 General Comments: -

If during future redevelopment works, any excavated materials are to be discarded and removed from this site as a waste to landfill, these materials will need to be classified in accordance with the 'Guidance on the Classification and Assessment of Waste (1st Edition 2015) – Technical Guidance WM3'. Where possible, removal of materials from site as a 'waste' should be kept to a minimum and ideally excavated materials should all be reused on site.

However, if excavated materials have to be discarded to accommodate finished ground levels etc., it should be noted that additional analysis and screening may be required once each specific waste stream has been identified and the volume of material to be disposed of has been calculated, since the amount of screening required, including any pre-disposal WAC screening, will be dependent upon the final volume of material to be disposed of.

With regard to asbestos in soil, where we have sampled and tested for asbestos this is discussed in the report. Whilst we would target any asbestos sampling and testing in accordance with a Conceptual Site Model and site findings, there is always the possibility, along with other contamination, that undiscovered asbestos exists between sample locations and the possibility of unknown asbestos exists on all sites, particularly brownfield sites where previous buildings have been demolished.

For future site works, adequate lateral trench support will be required for excavations, in order to prevent trench wall collapse or over excavations, as well as to create a safe working environment below a depth of 1.20m, and any excavations on this site should remain open for as short a period as possible, since some of these materials may be susceptible to deterioration, if left open to the natural elements for any significant period of time.

It is also recommended for any new developments, adequate surface drainage should be designed and installed by a competent contractor, in order to prevent surface water 'ponding' or collection, during and post construction, particularly where the existing surface drainage system is disrupted or damaged.

In addition, for deeper excavations, drainage, service runs or the like that may pass close to or beneath any proposed new foundations, these should be undertaken with care and completed prior to the preparation of any new foundations, so as not to allow any loose or granular material to move or 'flow', thus causing settlement to occur to any new foundations based at a higher level.

9.0 Conclusions & Recommendations (Cont'd)

9.7 General Comments (Cont'd): -

From the Desk Top Study previously carried out, the site is not located within an area that requires radon protective measures within proposed new developments.

An “observational technique” can be applied to the design and construction of this site, and where ground conditions seem to vary from that indicated from the conceptual ground model derived from works to date, then advice from a suitably qualified Engineering Geologist/Geotechnical Engineer should be sought.

END OF REPORT

APPENDIX I

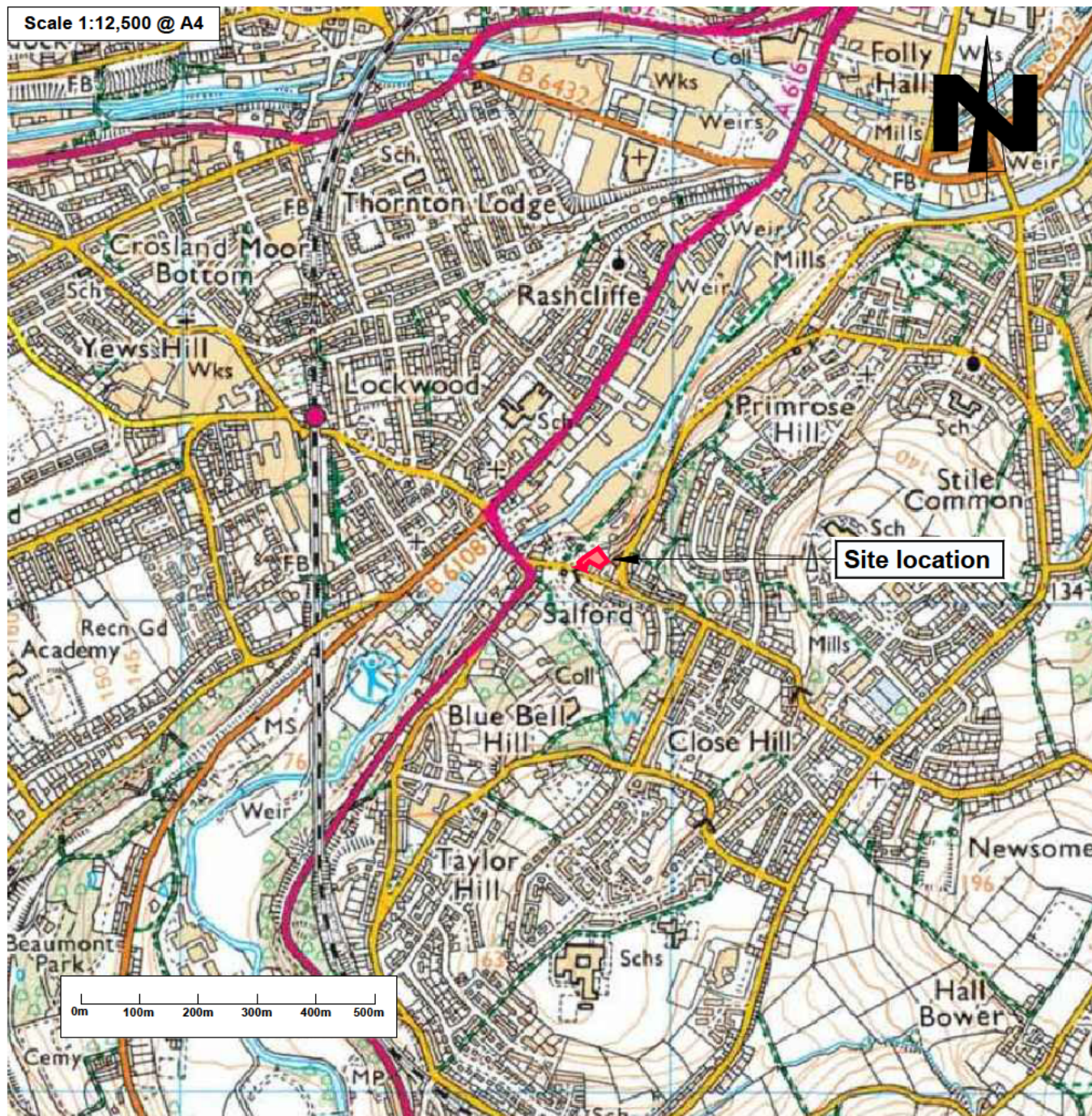
Location Plan

Aerial Photograph

Existing Site Layout Plan

Proposed Development Layout Plan

Scale 1:12,500 @ A4



Client:

FAUM ARCHITECTURE

Project Title:

Proposed Residential Development

Land Adjacent to Scar Mills

Lockwood Scar, Huddersfield

Drawing Title:

Location Plan

Job Reference:

20-153

Drawing Number:

-

Revision:

-

Drawn by:

P.D

Date:

01.04.21

Scale at A4:

As Shown

Checked by:

D.M

Approved by:

D.M

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rev.	date	amendments	drawn	chckd	

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LEGEND	
	APPROXIMATE SITE BOUNDARY

rev.	date	amendments	drawn	chckd
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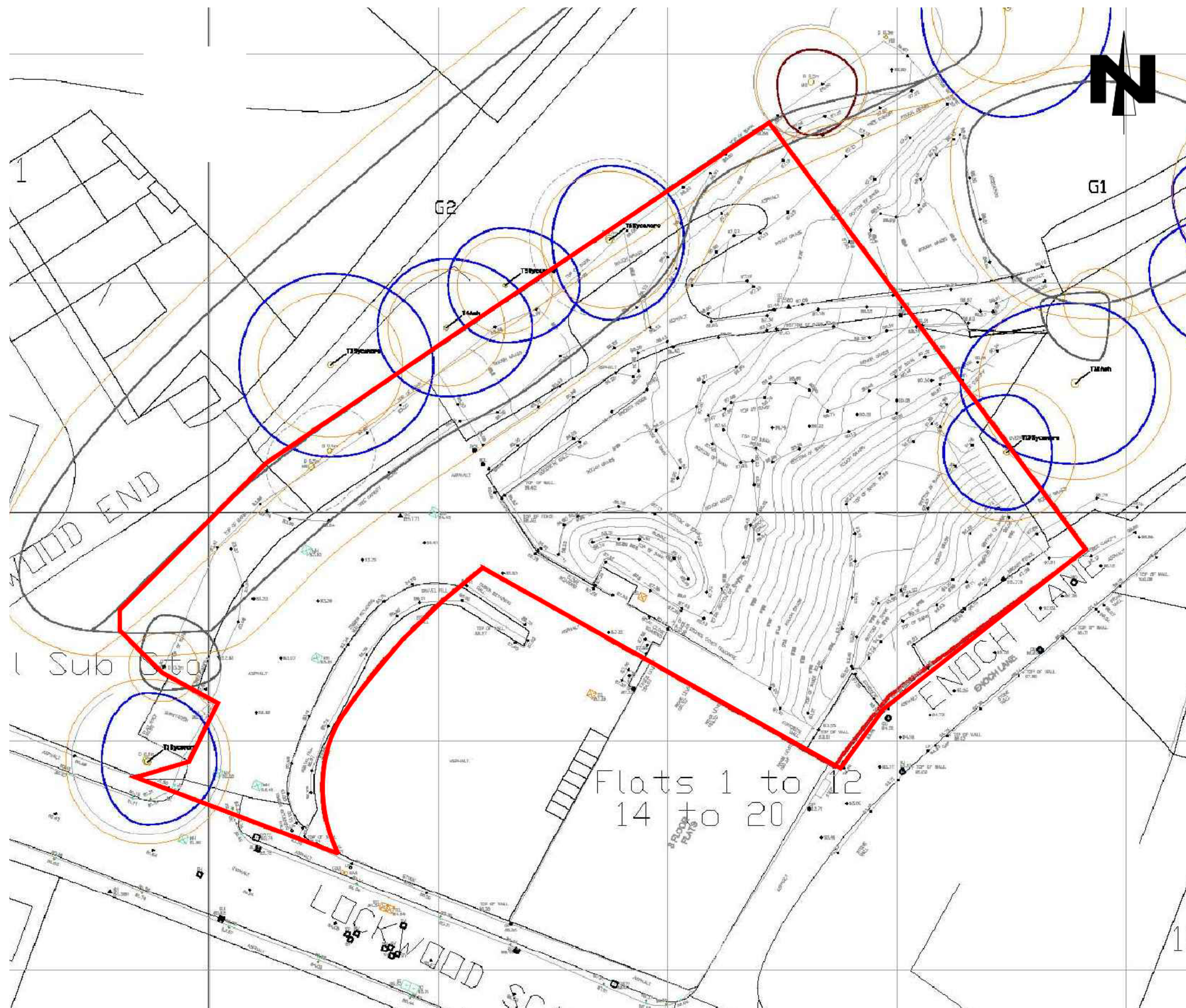
Client:
FAUM ARCHITECTURE

Project Title:
Proposed Residential Development
Land Adjacent to Scar Mills
Lockwood Scar, Huddersfield

Drawing Title:
Aerial Photograph

Scale of A3:	Date:	Drawn by:	Approved by:
NTS @ A3	31.03.21	P.D	D.M

Job Ref:	Drg no:	Rev:
20-153	—	—



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— APPROXIMATE
SITE BOUNDARY

rev.	date	amendments	drawn	chkd

Client:

FAUM ARCHITECTURE

Project Title:

Proposed Residential Development

Land Adjacent to Scar Mills

Lockwood Scar, Huddersfield

Drawing Title:

Existing Site Layout Plan

Scale of A3:	Date:	Drawn by:	Approved by:
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Job Ref:	Drg no:	Rev:
20-153	—	—



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SITE BOUNDARY

rev.	date	amendments	drawn	chkd

Client:

FAUM ARCHITECTURE

Project Title:

Proposed Residential Development

Land Adjacent to Scar Mills

Lockwood Scar, Huddersfield

Drawing Title:

Proposed Development Layout Plan

Scale of A3:	Date:	Drawn by:	Approved by:
NTS @ A3	31.03.21	P.D	D.M

Job Ref:	Drg no:	Rev:
20-153	—	—



APPENDIX II

Borehole & Trial Pit Location Plan

Borehole & Trial Pit Record Sheets



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LEGEND

	APPROXIMATE SITE BOUNDARY
	MECHANICALLY EXCAVATED TRIAL PIT POSITION
	WINDOWLESS SAMPLING BOREHOLE POSITION
	COMBINED GAS AND GROUNDWATER MONITORING WELL

rev.	date	amendments	drawn	chkd

Client:

FAUM ARCHITECTURE

Project Title:

Proposed Residential Development

Land Adjacent to Scar Mills

Lockwood Scar, Huddersfield

Drawing Title:

Borehole and Trial Pit Location Plan (Proposed)

Scale of A3:	Date:	Drawn by:	Approved by:
NTS @ A3	31.03.21	P.D	D.M

Job Ref:	Drg no:	Rev:
20-153	—	—





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BOREHOLE LOG

Project Land Ajaent Scar Mills, Lockwood Scar, Huddersfield				BOREHOLE No WS01	
Job No 20-153	Date 02-02-21	Ground Level (m)	Co-Ordinates ()		
Contractor Arc Environmental Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.25-1.00	D J					0.10	Compact brown sandy gravel with rootlets (MADE GROUND)		
						0.15	Concrete slab (MADE GROUND)		
0.25-1.00	J					(0.85)	Compact brown very sandy sandstone and mudstone gravel with coal, ash and brick fragments. Becoming soft clay from c.0.85m bgl (MADE GROUND)		
1.00-1.70	D					1.00	Very soft becoming firm (c.1.50m) brown / dark brown silty sandy gravelly clay with ash and brick fragments. Gravel comprises angular to subangular sandstone and mudstone (MADE GROUND)		
1.00-1.70	J					(0.70)			
1.00-1.45	SPT	N=2				1.70			
1.70-2.00	B					(1.69)	Very weak highly weathered brown / orange brown friable MUDSTONE recovered as stiff friable clay (LOWER COAL MEASURES)		
2.00-2.45	SPT	N=45				3.39			
3.00	B						Borehole terminated at c 3.39m bgl due to refusal of sampling equipment		
3.00-3.39	SPT	50 Blows							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											WATER: Hole remained dry during exploratory period.

All dimensions in metres Scale 1:25	Client Faum Architecture	Method/ Plant Used Windowless Sampling	Logged By SC
--	-----------------------------	--	-----------------

AGS3 UK BH 20-153 TP AND BH LOGS 1.GPJ AGS3 ALL.GDT 9/2/21



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BOREHOLE LOG

Project Land Ajaent Scar Mills, Lockwood Scar, Huddersfield				BOREHOLE No WS02	
Job No 20-153	Date 02-02-21	Ground Level (m)	Co-Ordinates ()		
Contractor Arc Environmental Ltd				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.10-0.28	D					0.10	Loose limestone gravel overlaying broken tarmac (MADE GROUND)		
0.10-0.28	J					0.28	Compact dark brown sandy gravelly clay. Gravel comprises angular to subangular sandstone and mudstone (MADE GROUND)		
0.28-0.90	B					(0.62)	Completely weathered dark grey / black / dark orange brown shaley clayey MUDSTONE		
0.90-1.25	J					0.90	Very weak highly weathered black / dark orange brown shaley MUDSTONE recovered as firm to stiff clay. Becoming friable from c.3.00m bgl. (LOWER COAL MEASURES)		
1.25-1.70	SPT	N=17							
2.00	B								
2.00-2.45	SPT	N=24				(2.50)			
3.00	B								
3.00-3.40	SPT	50 Blows				3.40			
							Borehole terminated at c 3.40m bgl due to refusal of sampling equipment		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											WATER: Ground water encountred at c.1.60m below ground level

All dimensions in metres Scale 1:25	Client Faum Architecture	Method/ Plant Used Windowless Sampling	Logged By SC
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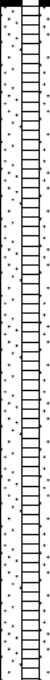
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BOREHOLE LOG

Project Land Ajaent Scar Mills, Lockwood Scar, Huddersfield				BOREHOLE No WS03
Job No 20-153	Date 02-02-21	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)		
0.00-0.32 0.00-0.32 0.32-1.20 0.32-1.20	D J D J	N=6			0.32	Compact dark brown sandy clayey gravel with roots, ash and brick fragments (MADE GROUND)		
1.20-2.00 1.20-2.00 1.20-1.65	D J SPT				(1.68)	Compact yellowish brown sandy sandstone gravel with ash and rootlets, to c.1.70m bgl (MADE GROUND)		
2.00-2.80 2.00-2.45	B SPT				2.00	Soft dark brown / brown / orange brown sandy gravelly clay. Gravel comprises angular to subangular sandstone and mudstone (MADE GROUND)		
2.80-3.00 3.00-3.45	B SPT				(0.80) 2.80	Very weak highly weathered black / dark orange brown shaley MUDSTONE, recovered as firm to stiff clay. Becoming friable from c.3.00m bgl (LOWER COAL MEASURES)		
4.00 4.00-4.45	B SPT	N=28			(3.64)			
5.00 5.00-5.45	B SPT	N=18						
6.00 6.00-6.44	B SPT	50 Blows			6.44			
Borehole terminated at c.6.44m bgl								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											WATER: Hole remained dry during exploratory period.

All dimensions in metres Scale 1:43.75	Client Faum Architecture	Method/ Plant Used Windowless Sampling	Logged By SC
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AGS3 UK BH 20-153 TP AND BH LOGS 1.GPJ AGS3 ALL.GDT 9/2/21



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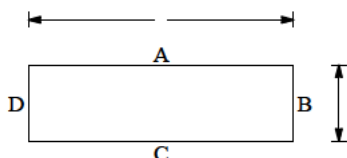
TRIAL PIT LOG

Project Land Ajaent Scar Mills, Lockwood Scar, Huddersfield				TRIAL PIT No TP01
Job No 20-153	Date 02-02-21	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1

0	A	B	C	D	0	Legend
1					1	
2					2	
3					3	
4					4	

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.04		Loose limestone gravel overlaying broken tarmac (MADE GROUND)	0.20-1.00	J/D	
0.04-0.20		Compact light brown very sandy gravel with coal, ash and brick fragments (MADE GROUND)			
0.20-1.60		Dark brown sandy gravelly clay with ash, plastic and brick fragments. Gravel comprises angular to subangular sandstone and mudstone (MADE GROUND)			
1.60-3.20		Very soft brown sandy gravelly clay with ash and brick fragments. Gravel comprises angular to subangular sandstone and mudstone (MADE GROUND)	1.50	J/D	
			3.00	J/D	

Shoring/Support:
Stability:



GENERAL
REMARKS

WATER: Hole remained dry and unstable during exploratory period.

All dimensions in metres
Scale 1:50

Client Faum Architecture

Method/
Plant Used Machine excavated

Logged By
TI

AGS3 UK TP 20-153 TP AND BH LOGS 1.GPJ AGS3 ALL GDT 92/21



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TRIAL PIT LOG

Project Land Ajaent Scar Mills, Lockwood Scar, Huddersfield				TRIAL PIT No TP02
Job No 20-153	Date 02-02-21	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1

0	A	B	C	D	0	Legend
1					1	
2					2	
3					3	
4					4	

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.70		Compact brown sandy gravel with rootlets, ash and brick fragments (MADE GROUND)	0.10-0.60	J/D	
0.70-1.40		Soft brown orange mottled gravelly sandy clay with occassional brick fragments (MADE GROUND)	1.00	J/D	
1.40-2.20		Completely / highly weathered brown / orange brown friable MUDSTONE recovered as stiff friable clay (LOWER COAL MEASURES)	2.00	B	

Shoring/Support: Stability: 				GENERAL REMARKS	
				WATER: Hole remained dry and unstable during exploratory period.	

All dimensions in metres Scale 1:50	Client Faum Architecture	Method/ Plant Used Machine excavated	Logged By TI
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AGS3 UK TP 20-153 TP AND BH LOGS 1.GPJ AGS3 ALL GDT 92/21



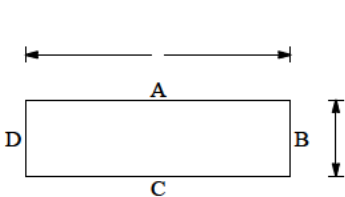
Solum House, Unit 1 Elliott Court
St Johns Road, Meadowfield
Durham, DH7 8PN
Telephone: 01913786380

TRIAL PIT LOG

Project Land Ajacent Scar Mills, Lockwood Scar, Huddersfield				TRIAL PIT No TP03
Job No 20-153	Date 02-02-21	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1

A		B		C		D		Legend	
0									
1									
2									
3									
4									

STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION		Depth	No	Remarks/Tests
0.00-0.60		Compact dark brown sandy clayey gravel with roots, ash and brick fragments (MADE GROUND)		0.10-0.50	J/D	
0.60-2.00		Compact yellowish brown sandy sandstone gravel with ash, rootlets and brick fragments (MADE GROUND)		1.50	J/D	

Shoring/Support: Stability: 				GENERAL REMARKS	
				WATER: Hole remained dry and unstable during exploratory period.	

All dimensions in metres Scale 1:50	Client Faum Architecture	Method/ Plant Used Machine excavated	Logged By TI
--	-----------------------------	--	-----------------

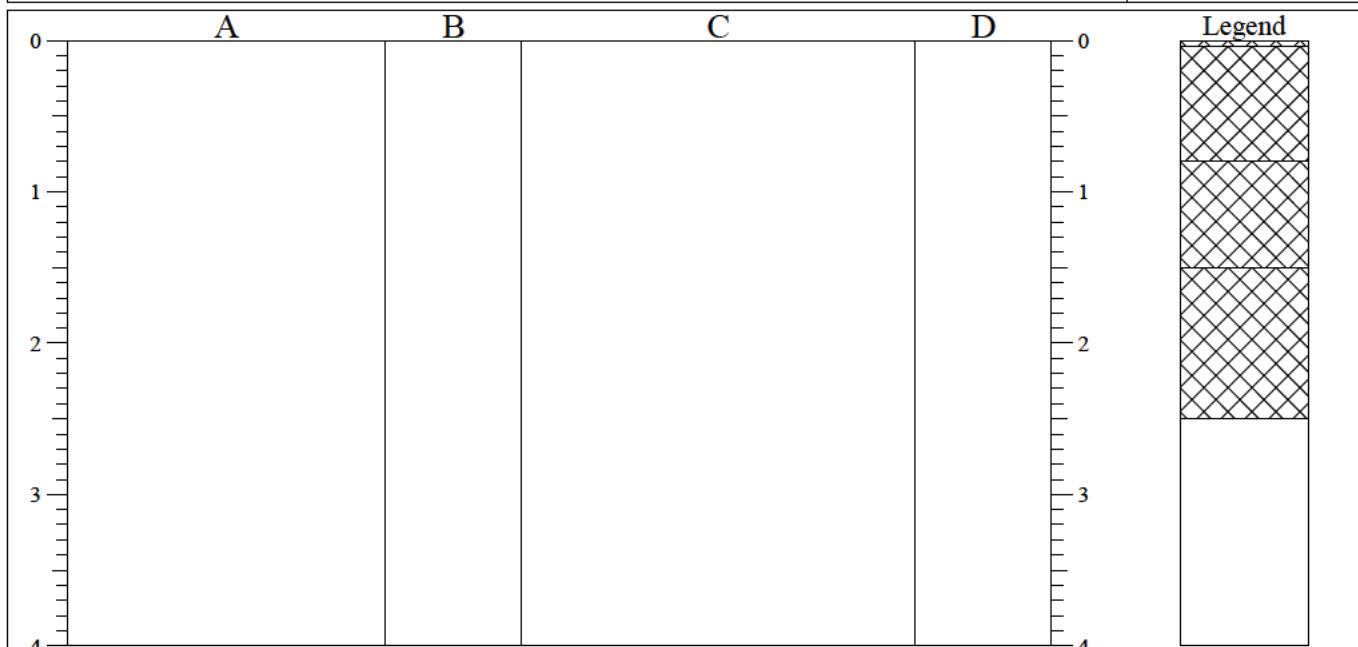
AGS3 UK TP 20-153 TP AND BH LOGS 1.GPJ AGS3 ALL GDT 92/21



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St Johns Road, Meadowfield
Durham, DH7 8PN
Telephone: 01913786380

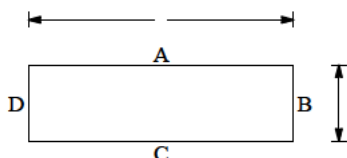
TRIAL PIT LOG

Project Land Ajaent Scar Mills, Lockwood Scar, Huddersfield				TRIAL PIT No TP04
Job No 20-153	Date 02-02-21	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.04		Loose limestone gravel overlaying broken tarmac (MADE GROUND)	0.50	J/D	
0.04-0.80		Compact dark brown sandy gravelly clay with ash and brick fragments. Gravel comprises angular to subangular sandstone and mudstone (MADE GROUND)			
0.80-1.50		Soft brown orange mottled gravelly sandy clay with occassional brick fragments (MADE GROUND)			
1.50-2.50		Dark brown sandy gravelly clay with ash, roots and brick fragments. Gravel comprises angular to subangular sandstone and mudstone (MADE GROUND)	2.00	J/D	

Shoring/Support:
Stability:



GENERAL
REMARKS

WATER: Hole remained dry and unstable during exploratory period.

All dimensions in metres
Scale 1:50

Client Faum Architecture

Method/
Plant Used Machine excavated

Logged By
TI



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St Johns Road, Meadowfield
Durham, DH7 8PN
Telephone: 01913786380

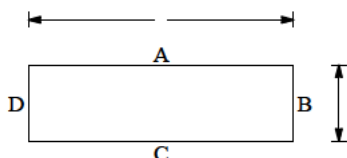
TRIAL PIT LOG

Project Land Ajaent Scar Mills, Lockwood Scar, Huddersfield				TRIAL PIT No TP05
Job No 20-153	Date 02-02-21	Ground Level (m)	Co-Ordinates ()	
Contractor Arc Environmental Ltd				Sheet 1 of 1

0	A	B	C	D	0	Legend
1					1	
2					2	
3					3	
4					4	

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.04		Loose limestone gravel overlaying broken tarmac (MADE GROUND)			
0.04-0.20		Compact light brown very sandy gravel with coal, ash and brick fragments (MADE GROUND)	0.20-1.00	J/D	
0.20-3.00		Dark brown sandy gravelly clay with ash, plastic and brick fragments. Gravel comprises angular to subangular sandstone and mudstone (MADE GROUND)	2.50	J/D	

Shoring/Support:
Stability:



GENERAL
REMARKS

WATER: Hole remained dry and unstable during exploratory period.

All dimensions in metres
Scale 1:50

Client Faum Architecture

Method/
Plant Used Machine excavated

Logged By
TI

APPENDIX III

Gas Monitoring Certificate

Arc Environmental Ground Gas & Groundwater Monitoring Certificate



Site	Scar Mills, Huddersfield
Ref	20-153

Visit	Date	Time	Equipment	Weather	Initials	Comments	Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mb)	Trend	Methane (% v/v)		Methane (% LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Hydrocarbons (GFM 435 only)		Other Gases (PPM)			Depth to Water (m bgl)
											Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Hex %	PID Cf	PID (Isobutylene)	H ₂ S	CO	
1	25/02/2021	12.10PM	GFM435	Mostly Sunny	KC		1	<0.1	1003	Rising (1012-1035)		0.0		0.0		2.8		18.3				0.0	0.0	1.57
							2	<0.1	1003	Rising (1012-1035)		0.0		0.0		0.5		19.6				0.0	0.0	1.47
							3	<0.1	1003	Rising (1012-1035)		0.0		0.0		0.5		19.3				0.0	0.0	4.49
2	11/03/2021	11.20AM	GFM435	Sunny Spells	KC		1	<0.1	973	Falling (1008-992)		0.0		0.0		0.2		19.5				0.0	0.0	1.16
							2	<0.1	973	Falling (1008-992)		0.0		0.0		0.7		19.3				0.0	0.0	1.57
							3	<0.1	973	Falling (1008-992)		0.0		0.0		0.4		19.8				0.0	0.0	4.76
3	25/03/2021	9.45AM	GFM435	Sligh Overcast	KC		1	<0.1	1010	Rising (1002-1020)		0.0		0.0		0.6		19.4				0.0	0.0	1.22
							2	<0.1	1010	Rising (1002-1020)		0.0		0.0		0.3		19.8				0.0	0.0	1.60
							3	<0.1	1010	Rising (1002-1020)		0.0		0.0		0.4		19.6				0.0	0.0	4.52
4																								
5																								
6																								

Notes
Detection limits - Methane 0.0%, Carbon Dioxide 0.0%, LEL 0.0%, Oxygen 0.0%, Flow 0.1l/hr
Monitoring order is from **Left to Right** across table
Monitoring should be for **Not Less** than 3 minutes However, if high concentrations of gasses initially recorded, monitoring should be for up to 10 minutes
N/A Not applicable Off the scale

Cf PID compensation Factor (1-10) - Must be used to multiply the PID reading to give an accurate measure of the total hydrocarbons in the borehole when methane is present
Hex Hexane (Valid and in range up to 2.000%) - Recorded when abnormally high methane is present.
PID Photo Ionisation Detector (Cal brated to Isobutylene)

APPENDIX IV

Laboratory Testing Results (Geotechnical & Ground Contamination)



LABORATORY REPORT



4043

Contract Number: PSL21/1436

Report Date: 09 March 2021

Client's Reference: 20-153

Client Name: Arc Environmental
Solum House
Unit 1 Elliott Court
St Johns Road, Meadowfield
Durham
DH7 8PN

For the attention of: Tarric Igun

Contract Title: Scar Mills, Lockwood Scar

Date Received: 16/2/2021

Date Commenced: 16/2/2021

Date Completed: 9/3/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins
(Director)

L Knight
(Senior Technician)

R Berriman
(Quality Manager)

S Eyre
(Senior Technician)

S Royle
(Laboratory Manager)

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Page 1 of

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

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



4043

PSL

Professional Soils Laboratory

Scar Mills, Lockwood Scar

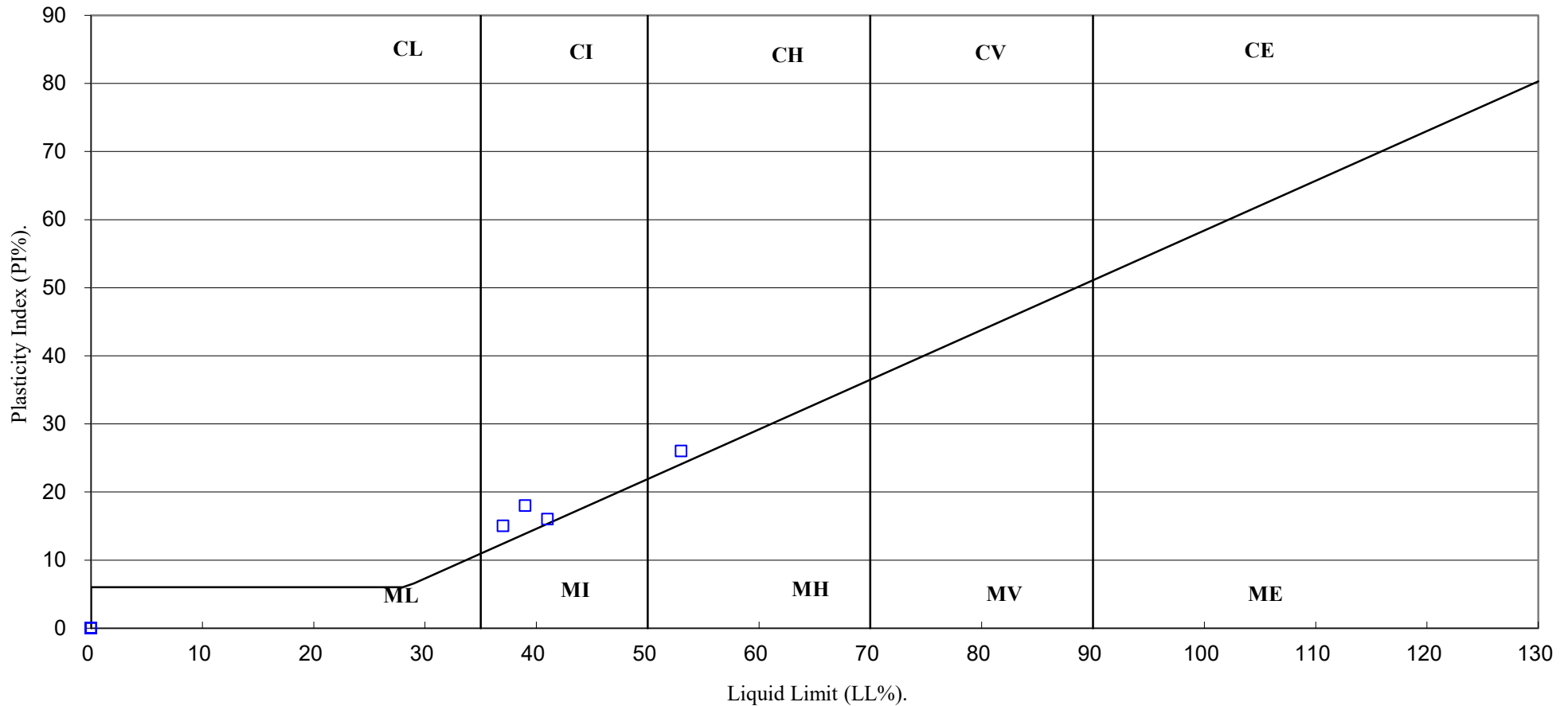
Contract No:

PSL21/1436

Client Ref:

20-153

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

Scar Mills, Lockwood Scar

Contract No:

PSL21/1436

Client Ref:

20-153



ANALYTICAL TEST REPORT

Contract no: 93476
Contract name: Scar Mills, Lockwood Scar
Client reference: 20-153
Clients name: ARC Environmental
Clients address: Solum House, Unit 1 Elliott Court
St Johns Road
Meadowfield
DH7 8PN

Samples received: 15 February 2021

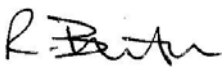
Analysis started: 15 February 2021

Analysis completed: 22 February 2021

Report issued: 22 February 2021

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.

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
Customer Support Squad Leader

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.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
93476-1	TP02	0.10-0.60	Sand w th Gravel	-	-	22.8
93476-2	TP05	0.20-1.00	Sand w th Gravel	-	-	14.6
93476-3	WS01	0.25-1.00	Sandy Clay with Gravel	-	-	17.9
93476-4	WS01	1.70-2.00	Sandy Clay with Gravel	-	-	10.6
93476-5	WS02	0.90-1.25	Sandy Clay with Gravel	-	-	14.1
93476-6	WS03	0.00-0.30	Sandy Loam with Gravel & Roots	-	-	18.9

Chemtech Environmental Limited

SOILS

Lab number Sample id Depth (m) Date sampled			93476-1 TP02 0.10-0.60 02/02/2021	93476-2 TP05 0.20-1.00 02/02/2021	93476-3 WS01 0.25-1.00 02/02/2021	93476-4 WS01 1.70-2.00 02/02/2021	93476-5 WS02 0.90-1.25 02/02/2021	93476-6 WS03 0.00-0.30 02/02/2021
Test	Method	Units						
Arsenic (total)	CE127 ^M	mg/kg As	16	9.9	57	-	-	7.0
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	0.3	0.7	-	-	0.5
Chromium (total)	CE127 ^M	mg/kg Cr	76	111	420	-	-	102
Chromium (III)	CE208	mg/kg CrIII	76	111	420	-	-	102
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	-	-	<1
Copper (total)	CE127 ^M	mg/kg Cu	55	44	260	-	-	49
Lead (total)	CE127 ^M	mg/kg Pb	90	48	1931	-	-	255
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	<0.5	-	-	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	47	47	81	-	-	25
Selenium (total)	CE127 ^M	mg/kg Se	1.7	1.7	3.2	-	-	1.2
Zinc (total)	CE127 ^M	mg/kg Zn	65	68	305	-	-	63
pH	CE004 ^M	units	8.3	8.2	8.3	8.6	5.4	6.7
Sulphate (2:1 water soluble)	CE061	mg/l SO ₄	37	25	24	12	35	125
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1	-	-	<1
Total Organic Carbon (TOC)	CE197	% w/w C	15.8	3.2	3.9	-	-	4.5
PAH								
Acenaphthene	CE087 ^M	mg/kg	<0.02	<0.02	0.02	-	-	3.0
Acenaphthylene	CE087 ^M	mg/kg	<0.02	0.07	<0.02	-	-	0.1
Anthracene	CE087 ^U	mg/kg	0.08	0.21	0.14	-	-	7.7
Benzo(a)anthracene	CE087 ^U	mg/kg	0.11	0.53	0.36	-	-	11
Benzo(a)pyrene	CE087 ^U	mg/kg	0.06	0.55	0.28	-	-	9.6
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.10	0.64	0.34	-	-	12
Benzo(ghi)perylene	CE087 ^M	mg/kg	<0.02	0.37	0.19	-	-	5.2
Benzo(k)fluoranthene	CE087 ^M	mg/kg	<0.03	0.24	0.13	-	-	4.4
Chrysene	CE087 ^M	mg/kg	0.12	0.42	0.29	-	-	11
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02	-	-	1.5
Fluoranthene	CE087 ^M	mg/kg	0.17	0.71	0.50	-	-	25
Fluorene	CE087 ^U	mg/kg	<0.02	0.03	<0.02	-	-	2.1
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.02	0.32	0.21	-	-	5.3
Naphthalene	CE087 ^M	mg/kg	0.03	0.05	0.02	-	-	4.4
Phenanthrene	CE087 ^M	mg/kg	0.31	0.25	0.27	-	-	24
Pyrene	CE087 ^M	mg/kg	0.15	0.71	0.47	-	-	22
PAH (total of USEPA 16)	CE087	mg/kg	1.16	5.10	3.23	-	-	147
Benzo(j)fluoranthene	CE087	mg/kg	<0.02	0.08	0.04	-	-	1.45
PAH (total of OIL 8)	CE087	mg/kg	0.41	2.78	1.65	-	-	55.8
BTEX & TPH								
Benzene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01	-	-	<0.01
Toluene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01	-	-	0.02
Ethylbenzene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01	-	-	0.01
m & p-Xylene	CE192 ^U	mg/kg	<0.02	<0.02	<0.02	-	-	0.08
o-Xylene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01	-	-	0.05

Chemtech Environmental Limited

SOILS

Lab number Sample id Depth (m) Date sampled			93476-1 TP02 0.10-0.60 02/02/2021	93476-2 TP05 0.20-1.00 02/02/2021	93476-3 WS01 0.25-1.00 02/02/2021	93476-4 WS01 1.70-2.00 02/02/2021	93476-5 WS02 0.90-1.25 02/02/2021	93476-6 WS03 0.00-0.30 02/02/2021
Test	Method	Units						
VPH Aliphatic c (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	-	-	<0.1
VPH Aliphatic c (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	-	-	<0.1
VPH Aliphatic c (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	-	-	0.2
EPH Aliphatic (>C10-C12)	CE068	mg/kg	8	<4	<4	-	-	6.4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	10	<4	<4	-	-	11
EPH Aliphatic (>C16-C35)	CE068	mg/kg	4	153	11	-	-	172
EPH Aliphatic (>C35-C44)	CE068	mg/kg	<10	28	<10	-	-	63
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	-	-	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	-	-	0.02
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	-	-	0.13
EPH Aromatic c (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	-	-	5
EPH Aromatic c (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	-	-	4
EPH Aromatic c (>EC16-EC21)	CE068	mg/kg	<1	3	2	-	-	81
EPH Aromatic c (>EC21-EC35)	CE068	mg/kg	<1	4	3	-	-	55
EPH Aromatic c (>EC35-EC44)	CE068	mg/kg	<1	<1	<1	-	-	6
Subcontracted analysis								
Asbestos (qual tative)	\$	-	NAD	NAD	NAD	-	-	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsen c (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extract on, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	un ts
CE061	Sulphate (2:1 water soluble)	Aqueous extract on, ICP-OES	Dry		10	mg/l SO ₄
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE087	Acenaphthene	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	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Benzo(b)fluoranthene	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	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluoranthene	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	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Phenanthrene	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	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE087	Benzo(j)fluoranthene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	PAH (total of OIL 8)	Solvent extraction, GC-MS	As received		0.18	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 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
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	As received		4	mg/kg

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	As received		10	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
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	As received		1	mg/kg
\$	Asbestos (qual tative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

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

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

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

Key

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

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
93476-1	TP02	0.10-0.60	N	
93476-2	TP05	0.20-1.00	N	
93476-3	WS01	0.25-1.00	N	
93476-4	WS01	1.70-2.00	N	
93476-5	WS02	0.90-1.25	N	
93476-6	WS03	0.00-0.30	N	