

Mrs Leanne Megson Brown and William Brown  
Appletree cottage, Gildersome Lane, Gildersome Leeds, Ls277BJ  
Application number: **22/06682/FU**

Thanks again Mike for your help with how to submit conditions. Please find all the relevant information for each condition which needs extra information below.

Please find the details requested for condition number 3, 4, 5, 6, 7 and 8

### **Condition number 2**

Following several emails and telephone communications between LK consultant limited and Greg Gibson they came to the conclusion that given the building is established the following tests had to be conducted to satisfy condition 3.

Hand Dug pit, sampling tests and gas risk tests.

The full report is shown on the next page:

Leanne Megson and Will Brown

Email: [leannemegson@hotmail.com](mailto:leannemegson@hotmail.com)  
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Date: 14<sup>th</sup> November 2023

LKC Reference: LKC 23 1535 - Gas Risk Assessment & Hand Pit Investigation

**RE: Appletree Cottage, Gildersome Lane, Morley –  
Soil Contamination, Hazardous & Ground Gas Risk  
Assessment**

## 1.0 Introduction

LK Consult Ltd (LKC) has been commissioned by Leanne Megson and Will Brown to undertake ground investigation, soil sampling and a contamination assessment, and also to provide an updated hazardous and ground gas risk assessment for the proposed residential redevelopment / change of use for the site. The proposed development includes repurposing of an existing barn for use as a residential home with associated infrastructure.

The site location, site boundary and proposed redevelopment plans are included in Appendix A - Drawings.

A desk study report has been undertaken for the site, as listed below;

- Desk Study Site Investigation Report for Appletree Cottage, Gildersome Lane, Leeds, March 2010, by Geo Investigate Ltd, ref. G22278, dated July 2022.

Additional reporting was undertaken for sites adjacent to the study site, as listed below:

### **Hillycroft, Gildersome Lane – Opposite (south) of the study site**

- Ground Investigation Report for Hillycroft, Gildersome Lane, May 2023, by Arc Environmental Ltd, ref. G22278, dated July 2022.

### **Three Acres, Gildersome Lane – 25m north of the study site**

- Phase 2 Intrusive Investigation Report for Three Acres, Gildersome Lane, Leeds, by Geo Investigate Ltd, ref. G20285, dated October 2022.
- Gas Addendum Report for Three Acres, Gildersome Lane, Leeds, by Geo Investigate Ltd, ref. G20285, dated October 2022.
- Remediation and Validation Strategy for Three Acres, Gildersome Lane, Leeds, by Geo Investigate Ltd, ref. G20427, dated October 2022.

It is recommended that these reports are read in conjunction with this letter report.

The objectives of this report are:

- Provide an updated hazardous and ground gas risk assessment for the study site based on a detailed assessment of existing onsite and proximal data with recourse to current UK guidance.
- Provide an updated Radon assessment with recourse to recently revised UK Radon risk mapping.
- Undertake a contamination assessment for areas of proposed soft landscaping.

Relevant profile logs and gas monitoring data taken from the above existing reports and assessed in this report are provided in Appendix B.

## 2.0 Site Visit Photos

A site visit was undertaken on 20<sup>th</sup> October 2023 to carry out and hand pitting and soil sampling, the following representative photos were undertaken during the visit.



Plate 2-1: Site visit photos

The site is shown to be covered by mixed hardstanding and generally slopes to the north-east. The existing structure is a modern barn of brick and cinderblock construction with a clear void below a suspended block and beam floor. The void is externally ventilated with air bricks at c.2m centres.

## 3.0 Appletree Cottage Ground Investigation

### 3.1 Investigation Scope of Works

A ground investigation was undertaken on 20<sup>th</sup> October 2023 and comprised.

- 3no hand dug pits within the proposed garden area to >600mbgl.
- Soil sampling of shallow surface soils.

The sampling location plan is provided in Appendix A.

## 3.2 Soil Sampling and Chemical Testing

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation<sup>i</sup>.

Soil was collected for onsite testing for total volatile organic compounds (TVOCs) using a photoionisation detector (PID) fitted with a 10.6eV lamp and moisture trap. A plastic zip bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested. Results of the PID readings are presented on the profile logs (Appendix B). The on-site monitoring was carried out in line CIRIA C665<sup>ii</sup> to aid in screening samples for volatile analysis.

Soil samples of approximately 500g were recovered in amber jars and plastic tubs. All the samples were sent to DETS laboratory for chemical testing.

Many of the contamination tests are UKAS or MCERTS accredited and further details are given in the Certificate of Analysis presented in Appendix C. Table 3-1 shows the soil testing undertaken.

| Testing   | No. Samples | Justification  |
|---|-------------|--|
| Metals / metalloids, pH, sulphate, speciated PAHs and organic matter. | 3           | A basic suite with a broad selection of contaminants where no significant evidence of contamination was identified (except for occasional ash and coal). |

Table 3-1: Summary of Soil Testing.

**Notes:**

If asbestos present during screen identification and quantification will be undertaken.

Metal/metalloids=arsenic, cadmium, chromium, (total and hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc; PAH=polycyclic aromatic hydrocarbons, SOM=Soil Organic Matter.

## 3.3 Ground Conditions

The ground conditions beneath the site are summarised below. Logs are appended to this report in Appendix C.

### 3.3.1 Made Ground

Made ground was recorded in all hand dug pits to depths of >0.9mbgl. Once the surface layer of tarmac was removed, the made ground comprised a layer of sand and gravel rich in anthropogenic material including ash, brick, plastic and metal waste, overlying gravelly clay with anthropogenic material including brick.

### 3.3.2 Natural Strata

No natural strata was logged in the hand dug pits.

### 3.3.3 Visual / Olfactory Contamination

Except for the anthropogenic material encountered in the made ground (as described above), no further contamination was identified.

There was no visual / olfactory evidence of hydrocarbons or volatile contaminants in any locations, however a strong organic smell was present in strata from depths of 0.45-0.50mbgl. The PID recorded a maximum of 0.3ppm TVOC in the samples.

### 3.3.4 Groundwater

Due to weather conditions, discerning the presence of groundwater was not viable.

### 3.3.5 Obstructions

No obstructions were identified within any investigation location.

## **4.0 Contamination Assessment**

### **4.1 Methodology**

With regards to the soil risk assessment LKC will use the following hierarchy:

- Category 4 Screening Levels (C4SLs) <sup>iii, iv</sup>.
- LQM Suitable 4 Use Levels (S4ULs) <sup>v, vi, vii, viii</sup>.
- ATRISK Soil Screening Values (SSVs) and CL:AIRE Generic Assessment Criteria (GACs)<sup>ix</sup>.

The proposed development is for residential houses with gardens, therefore the assessment criteria for residential with plant uptake has been used.

All criteria have been generated using the CLEA V1.06 model<sup>x</sup> based either on 1%, 2.5% and 6% Soil Organic matter (SOM). Results will be compared to the nearest appropriate SOM.

A summary of the results and generic assessment criteria used in this assessment is provided in the Appendix D.

#### *4.1.1 Soil Results Comparison against Assessment Criteria*

Results have been compared to the relevant assessment criteria and no elevated contaminants were identified.

#### *4.1.2 Garden Growing Medium Option*

As no contamination has been observed, but made ground has been observed, the garden areas will require a simple nominal 300mm clean and inert growing medium of at least 150mm topsoil and 150mm subsoil.

## 5.0 Hazardous and Ground Gas Risk Assessment

### 5.1 Source Assessment

#### 5.1.1 Site History and Environmental Setting

Geo Investigate Ltd (GIL) undertook a review of historical features and hazard identification with influencing distance of the site, as shown in their table 1 below.

GIL highlighted the land uses most likely to present (or have presented) a hazard or source of potentially harmful contamination to the study area.

The primary features of interest are Cud Hill Colliery and Three Acres Riding Stables.

| Map Feature                | Location               | Appears | Absent  | Notes  |
|----------------------------|------------------------|---------|---------|--|
| Residential Dwellings      | 15m southwest          | 1893    | present | Potential source of made ground from potential ground movement during development.   |
| Cud Hill Colliery          | 100m to 230m northwest | 1908    | 1922    | Though the Colliery was no longer present by 1922, the associated spoil heaps were levelled slightly by 1986, and levelled completely by 1994. |
| Reservoir                  | 90m south              | 1921    | 2010    | Identified as 'covered reservoir' in 1993.   |
| Three Acres Riding Stables | 3m north               | 1994    | present | Multiple buildings present. Potential source of made ground.   |
| Unspecified dwelling       | Onsite                 | 1994    | present | Potential source of made ground from construction.   |

NB. Arbitrary potential hazard assessment: High (Red), Moderate (Amber), Low (Yellow), Very Low (Green), Negligible (uncoloured)

Table 5-1: Reproduction of Table 1 from GIL Report

The extract of the 1: 50,000 BGS Solid & Drift geological map (BGS Sheet 77 – Huddersfield) indicates that little to no drift deposits will be present at the site with mudstone/siltstone/sandstone bedrock belonging to the Pennine Lower Coal Measures (secondary A aquifer) probably present commencing from shallow depth, with known workings in the area.

Nearby BGS borehole records generally show thin topsoil or made ground deposits over silty clay to 1.80m then stiff silty clay to termination at 4.25m.

The hazardous gas risk was assessed to be Low – Moderate, due to the potential for unrecorded shallow coal mining beneath the site.

### 5.1.2 Coal Mine Gas Assessment

The site is within a coal mining reporting area, and as such, a mine gas risk assessment has been undertaken using CL:AIRE guidance<sup>xi</sup>.

Table 5-2 summarises the risk assessment set out by CL:AIRE, the assessment is moved to next line of questioning when an assessment statement criterion is failed.

| Risk Level Assessment          | Assessment Statement  | Site Specific Answer                      |
|--------------------------------|---|---|
| No Risk                        | Is site within a coal mining reporting area                                     | Yes                                       |
| Negligible Risk                | Mine Entries >50m from site   | Yes                                       |
|                                | Workings >150mbgl   | No (57m)                                  |
| Low Risk                       | Workings between 30mbgl and 50mbgl  | No (57m)                                  |
|                                | Mine Entries >50m from site   | Yes                                       |
|                                | Site underlain by low permeability superficial deposits of sufficient thickness | stiff clay anticipated, unknown thickness |
| Moderate Risk                  | Mine entries on site, or <20m   | No  |
|                                | Workings below the site <30m  | No  |
|                                | Faults or pathways connecting the site to deep workings                         | No  |
|                                | Within area of past or shallow workings on Coal Authority viewer                | No  |
| <b>Site Risk Determination</b> |   | <b>Moderate Risk</b>                      |

Table 5-2: CL:AIRE Site Specific Risk Assessment

### 5.1.3 Ground Conditions

This section will summarise the findings from the two intrusive investigations undertaken by third party consultancies.

#### Hillicroft, Gildersome Lane Investigation – Arc Environmental (AE)

| Type of Strata                       | Depths Recorded (BCGL)                                 | Description & General Comments  |
|--------------------------------------|--|---|
| MADE GROUND:                         | From 0.00m up to c.0.15m to c.2.00m.                   | The initial surfacing generally comprised grass, with asphalt at the location of BH08, underlain by brown sandy clay 'topsoil' to a depth of c.0.30m bcgl, with dark grey colliery spoil noted from ground level to c.0.40m bcgl within boreholes BH06 and BH07. The underlying made ground materials comprised dark grey colliery spoil and reworked sandy clay with occasional broken bricks and was generally recorded to depths of between c.0.15m and c.1.40m bcgl, with locally deeper made ground recorded to a depth of c.2.00m bcgl at the location of borehole BH05. A circular feature c.4m in diameter (suspected former mine entry / bell pit) comprising dark grey colliery spoil with occasional broken bricks was noted within the centre of TP01 and extended to a depth of at least c.0.75m bcgl. |
| RESIDUAL SOIL:                       | From c.0.18m and c.1.30m up to c.1.50m and c.2.80m.    | Firm and stiff orangish brown and grey mottled CLAY was recorded to depths of between c.1.50m and c.2.80m bcgl, with the residual soil deposits absent at the location of borehole BH05 where the solid geological deposits were noted to be immediately underlying the deeper made ground materials.   |
| SOLID GEOLOGY: (Lower Coal Measures) | From between c.1.50m and c.2.80m to at least c.25.00m. | The solid geological deposits were recorded to comprise moderately weak and stronger greyish and orangish brown (occasionally weathered) MUDSTONE, with the windowless sampling boreholes drilled to refusal of the sampling equipment on the more competent solid geological deposits at depths of between c.2.21m and c.3.12m bcgl. Evidence of shallow workings i.e. broken ground, was recorded within the rotary boreholes and is discussed further in Section 5.2.  |

Table 5-3: AE Ground Conditions Summary

Other than made ground, AE saw no evidence of significant or gross contamination within the exploratory locations.

AE undertook a coal mining investigation (RBH01-RBH03) which found workings at depths of 4.70mbgl, 6.50mbgl and 6.90mbgl with thickness of 1.90mbgl, 2.40mbgl and 2.30mbgl.

### Three Acres, Gildersome Lane Investigation – Geo Investigate (GIL)

GIL encountered made ground of dense sandy gravel of brick, sandstone, concrete, plastic, ash and slag and firm clay with gravel of sandstone, brick, concrete and coal. Underlain by natural firm natural gravelly clay then very weak highly weathered mudstone with ironstone inclusions.

The granular made ground was encountered to depths of between 0.40mbgl and 0.90mbgl underlain by further cohesive fill to depths of between 0.70mbgl and 1.20mbgl.

Below the made ground firm natural gravelly clay to depths of between 1.20mbgl and 2.40mbgl, underlain by very weak weathered mudstone with ironstone inclusions to refusal at the base of each at borehole at depths of between 2.00mbgl and 4.00mbgl.

GIL also undertook a mining investigation and found voids and broken ground indicative of shallow coal mine workings. Voids were encountered in RH1 at depths between 7.60m to 9.40m, RH2 at depths between 8.40m to 9.50m, RH3 at depths between 6.90m to 8.10m, RH5 at depths between 7.10m to 9.10m and in RH6 at depths between 25.50m to 26.30m.

#### 5.1.4 Gas Monitoring

Gas data has been collated from both investigations on surrounding properties, to allow for a line of evidence assessment of the potential risk at the site of interest.

### Hillicroft, Gildersome Lane Investigation – Arc Environmental (AE)

AE undertook monitoring of three wells on four occasions, with two visits remaining. The boreholes were installed with response zones in made ground, clay and mudstone strata.

| Position  | Date     | Atmospheric Pressure (mbar) | Water (m bgl) | CH <sub>4</sub> (%v/v) | LEL (%v/v) | CO <sub>2</sub> (%v/v) | O <sub>2</sub> (%v/v) | Flow Rate (l/hr) |
|---|----------|-----------------------------|---------------|------------------------|------------|------------------------|-----------------------|------------------|
| Background  |          | ~                           | ~             | 0                      | 0          | 0                      | 21.0                  | <0.1             |
| BH01  | 03/03/23 | 1014                        | DRY           | 0.0                    | 0.0        | 1.9                    | 17.0                  | <0.1             |
| BH04  |          | (*Falling 1030 – 1000)      | DRY           | 0.0                    | 0.0        | 2.3                    | 15.9                  | <0.1             |
| BH06  |          |                             | DRY           | 0.0                    | 0.0        | 0.0                    | 17.9                  | <0.1             |
| BH01  | 20/03/23 | 996                         | 2.89          | 0.0                    | 0.0        | 1.9                    | 16.7                  | <0.1             |
| BH04  |          | (*Falling 1014 – 990)       | DRY           | 0.0                    | 0.0        | 2.3                    | 16.6                  | <0.1             |
| BH06  |          |                             | 1.66          | 0.0                    | 0.0        | 2.3                    | 16.5                  | <0.1             |
| BH01  | 11/04/23 | 989                         | 1.62          | 0.0                    | 0.0        | 1.9                    | 16.9                  | <0.1             |
| BH04  |          | (*Falling 1025 – 988)       | DRY           | 0.0                    | 0.0        | 2.5                    | 16.1                  | <0.1             |
| BH06  |          |                             | 1.26          | 0.0                    | 0.0        | 4.6                    | 12.6                  | <0.1             |
| BH01  | 28/04/23 | 994                         | 2.91          | 0.0                    | 0.0        | 1.7                    | 19.4                  | <0.1             |
| BH04  |          | (*Rising 1012 – 1020)       | DRY           | 0.0                    | 0.0        | 3.9                    | 18.5                  | <0.1             |
| BH06  |          |                             | 1.52          | 0.0                    | 0.0        | 7.2                    | 12.4                  | <0.1             |
| 2 no. outstanding visits to be completed – results to follow as Addendum Letter Report. |          |                             |               |                        |            |                        |                       |                  |

Table 5-4: AE Gas Monitoring Data

No methane (CH<sub>4</sub>) or flow readings have been observed above the limit of detection.

Detectable levels of carbon dioxide (CO<sub>2</sub>) have been recorded up to a maximum concentration of 7.2%, with only this one result exceeding the 'typical' CS1/CS2 threshold of 5%. These increased levels of CO<sub>2</sub> are observed with depleted oxygen (O<sub>2</sub>) levels, which at worse case levels, are 12.4% in BH06.



When the gas screening value (GSV) is calculated using the worst-case CO<sub>2</sub> concentration and peak flow rate, a GSV of 0.0072l/h is determined. This is significantly lower than the threshold of 0.07l/h. Indicating a CS1 classification.

The reduced oxygen levels are ostensibly linked to increased levels of CO<sub>2</sub>, so it is considered likely that the reduced oxygen is linked to its replacement by CO<sub>2</sub> within the boreholes, and the reduced levels may be discounted.

A ternary plot assessment of the gas monitoring results has been undertaken, as shown in Plate 5-1, this indicates that what gas has been produced, is derived from oxidation of organic materials in made ground/coal.

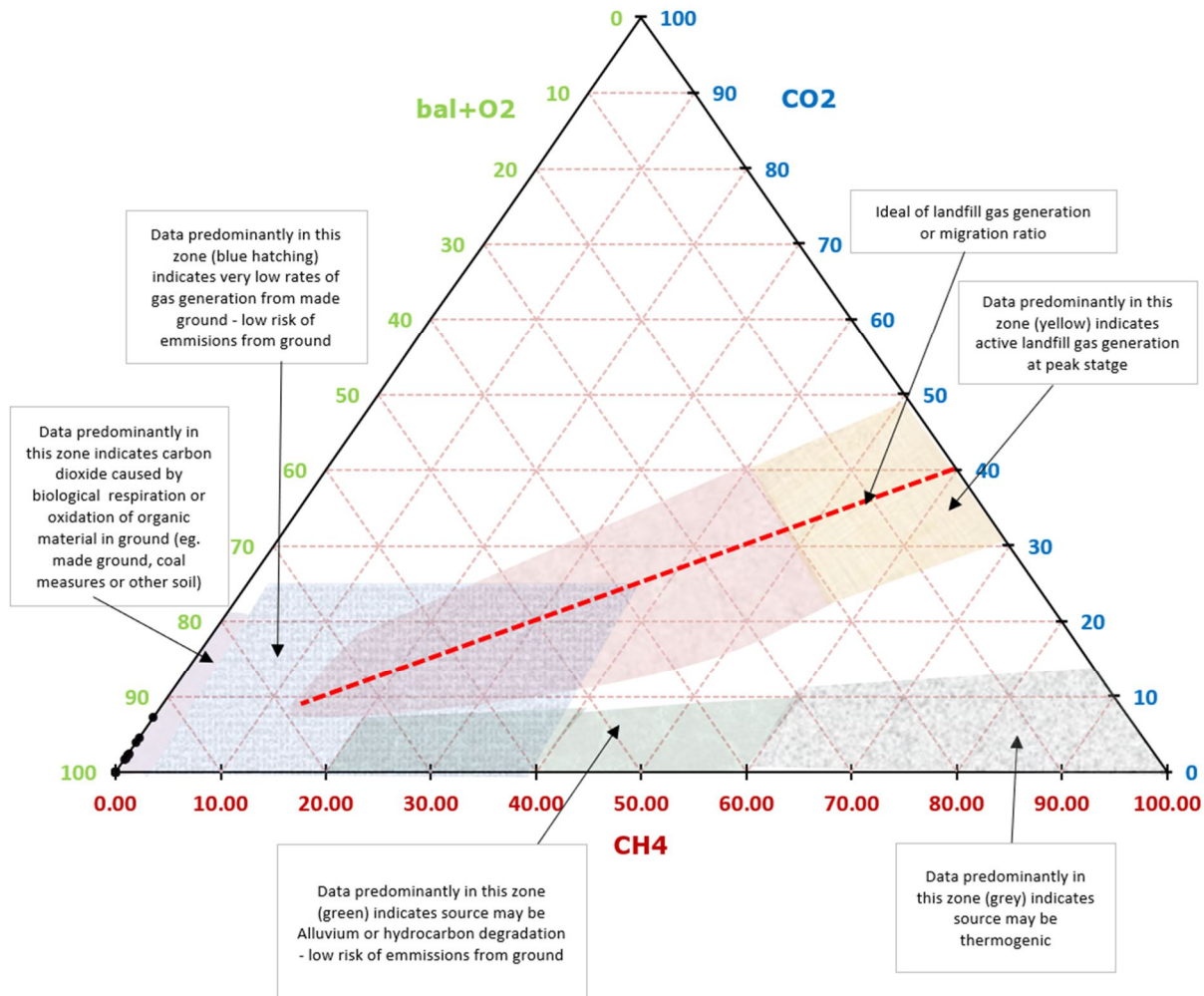


Plate 5-1: Ternary Plot Showing AE Gas Monitoring Data.

**Note:**

Interpretative zones taken from NHBC 2023 and Wilson *et al.*

- Gas data points

Plate 5-1 summarises the AE gas monitoring data using the methodology described by Wilson *et al* which is also included in the NHBC 2023<sup>1</sup> document.

From the above, LKC consider that there is no significant source of gas in influencing the site of interest, as no significant gas has been observed in any of the responses zones in various strata, including Pennine Lower Coal Measures and deep made ground. On the basis of the lack of significant gas, the study site is not deemed at risk from ground or hazardous gas based on the data from the Hillycroft investigation.

<sup>1</sup> Hazardous ground gas - an essential guide for housebuilders" NHBC Foundation 2023.

## Three Acres, Gildersome Lane Investigation – Geo Investigate Ltd (GIL)

GIL undertook monitoring of three wells on six occasions. The boreholes were installed with response zones in made ground, clay, mudstone strata and a void / broken ground. The data is reproduced as Table 5-5.

| Borehole | Number of Visits | CH <sub>4</sub> (%) |      | CO <sub>2</sub> (%) |      | O <sub>2</sub> (%) |      | Flow Rate (l/hr) | H <sub>2</sub> S (ppm) | CO (ppm) | Atmospheric Pressure (mb) |
|----------|------------------|---------------------|------|---------------------|------|--------------------|------|------------------|------------------------|----------|---------------------------|
|          |                  | Min.                | Max. | Min.                | Max. | Min.               | Max. |                  |                        |          |                           |
| BH1      | 6                | 0                   | 0    | 0.6                 | 1.8  | 18.9               | 19.9 | <0.1             | 0                      | 0        | 958                       |
| BH3      | 6                | 0                   | 0    | 0.2                 | 1    | 19.4               | 20.2 | <0.1             | 0                      | 0        | to                        |
| BH4      | 6                | 0                   | 0    | 0                   | 2.2  | 15.8               | 20.6 | <0.1             | 0                      | 0        | 1012                      |

Table 5-5: GIL Gas Monitoring Data Summary

GIL monitoring, recorded at pressures of between 958mb and 1012mb, returned results of O<sub>2</sub> between 15.8% and 20.6%, with a CO<sub>2</sub> content ranging from below detectable limits up to 2.2%, and CH<sub>4</sub>, CO and H<sub>2</sub>S concentrations were consistently below detectable limits. Gas flow rates were below detectable limits (<0.01lt/hr) at all locations on each monitoring occasion. All of the wells were dry on each monitoring visit.

BH4 was installed within a recorded void, and no significant gas was observed, indicating that no significant mine gas is being produced in underlying workings, and therefore no significant sources are present that can affect the site of interest.

On the basis of the monitoring within various strata, including a mining void, LKC consider that there is no significant source of gas influencing the study site, based on the Three Acres data provided.

### 5.1.5 Pathway

There are no regular significant pathways anticipated for the preferential flow of ground gases in the subsurface, as demonstrated in the previous ground investigations.

Based on the ground conditions encountered during the site investigation, and nearby investigations, it is considered unlikely that significant sources of gas exist in positions where they may affect the study site.

## 5.2 Radon Assessment

A Radon report was obtained from UKHSA, this has indicated that the site is within a 0-1% radon area. No further assessment is made or required. The report is available in Appendix E.

## 5.3 Ground and Hazardous Gas Risk Assessment

On the basis of the ground investigation undertaken, and the associated lines of evidence gathered from proximal sites, including monitoring from within a void / broken ground, LKC consider the study site is at Moderate/Low from ground gas (mine gas and radon) and hazardous gas, and therefore no further assessment or remedial measures are required.

The method for risk evaluation is a qualitative method of interpreting the output from the risk estimation stage of the assessment, based on CIRIA 552<sup>xii</sup>. It involves the classification of the:

- Magnitude of the potential consequence (severity) of the risk occurring.
- Magnitude if the probability (likelihood) of the risk occurring.

These classifications are then compared to indicate the risk presented by each source pathway receptor linkage.

Where a very low risk or low risk is identified no specific remediation is required. Where there is a moderate / low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

Where LKC identifies a moderate or higher risk, remediation or further investigation work is recommended.

This is summarised in Table 5-6 below;

| Gas Type  | Contaminants of Concern (source) | Viable Source | Probability   | Consequence | Risk           |
|---|----------------------------------|---------------|---|-------------|----------------|
| Radon   | Solid Geology                    | No            | No Source   |             | No Risk        |
| Mine Gas  | Mine workings                    | Yes           | Unlikely – proximal monitoring confirms neither mining nor made ground are producing significant volumes of gas | Severe      | Moderate / Low |
| Hazardous / ground gas: methane, carbon dioxide | Made ground etc                  | Yes           |   | Severe      | Moderate / Low |

Table 5-6: Ground and Hazardous Gas Conceptual Model

## 6.0 Summary & Conclusions

The objectives of this letter report were

- Provide an updated hazardous and ground gas risk assessment for the study site based on a detailed assessment of existing onsite and proximal data with recourse to current UK guidance.
- Provide an updated Radon assessment with recourse to recently revised UK Radon risk mapping.
- Undertake a contamination assessment for areas of proposed soft landscaping.

A review of the site history, environmental setting and previous adjacent investigations have not identified a viable source of hazardous gas on site. The revised UKHSA mapping has indicated the study site is in a <1% radon affected area, therefore no significant radon risk has been identified.

Proximal gas monitoring in boreholes installed in made ground, clay and mudstone (with evidence of workings) has shown only low-level concentrations of carbon dioxide and methane, carbon monoxide and hydrogen sulphide levels were below limits of detection. No significantly elevated flow rates were recorded and GSVs have been calculated as CS1.

On the basis of the above information, LKC consider the site does not require gas protection measures, despite a vented void already present within the barn.

Soil sampling of shallow made ground has identified no visual/olfactory or laboratory observed contamination within any of the samples tested. A simple growing 300mm medium will be required to facilitate plant growth in all areas of soft landscaping.

Imported soils are likely to be required to construct gardens and soft landscaping and should be sampled and tested at an appropriate frequency by volume and compared to residential with homegrown produce threshold to confirm suitability, for a greenfield source this would typical be 1 per 50m<sup>3</sup> or a minimum of three samples. A typical sampling frequency, for a brownfield site, according to YALPAG, would be 1 sample per 50m<sup>3</sup> or a minimum of 6no. samples. However, considering the small size of the site and its limited development history, and limited volume of materials involved in the project, 3no. samples is deemed appropriate and should fall within the required volumes.

Should materials be excavated and moved around the site, a material management plan (MMP) will be required. Which would need to be in place prior to material being excavated.

I trust the contents of this letter meet with your requirements.

**Kris Rodway**  
**Principal Geo-environmental Consultant.**

Enclosed:

Appendix A – Drawings

Appendix B – Existing Factual Information

Appendix C – LKC Profile Logs

Appendix D – Contamination Testing Results & Generic Soil Assessment Criteria

Appendix E – UKHSA Radon Report

Appendix F – References



**Appendix A –**

**Drawings**



Extract From: © Google Maps  
Drawing Ref: Appletree Cottage, Morley



- KEY**
-  Site Boundary
  -  Hand Dug Trial Pit (HD)

Sampling locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client:  
**Leanne Megson and Will Brown**

Site:  
**Appletree Cottage, Morley**

Title:  
**Site Investigation Location Plan  
(Satellite Image)**

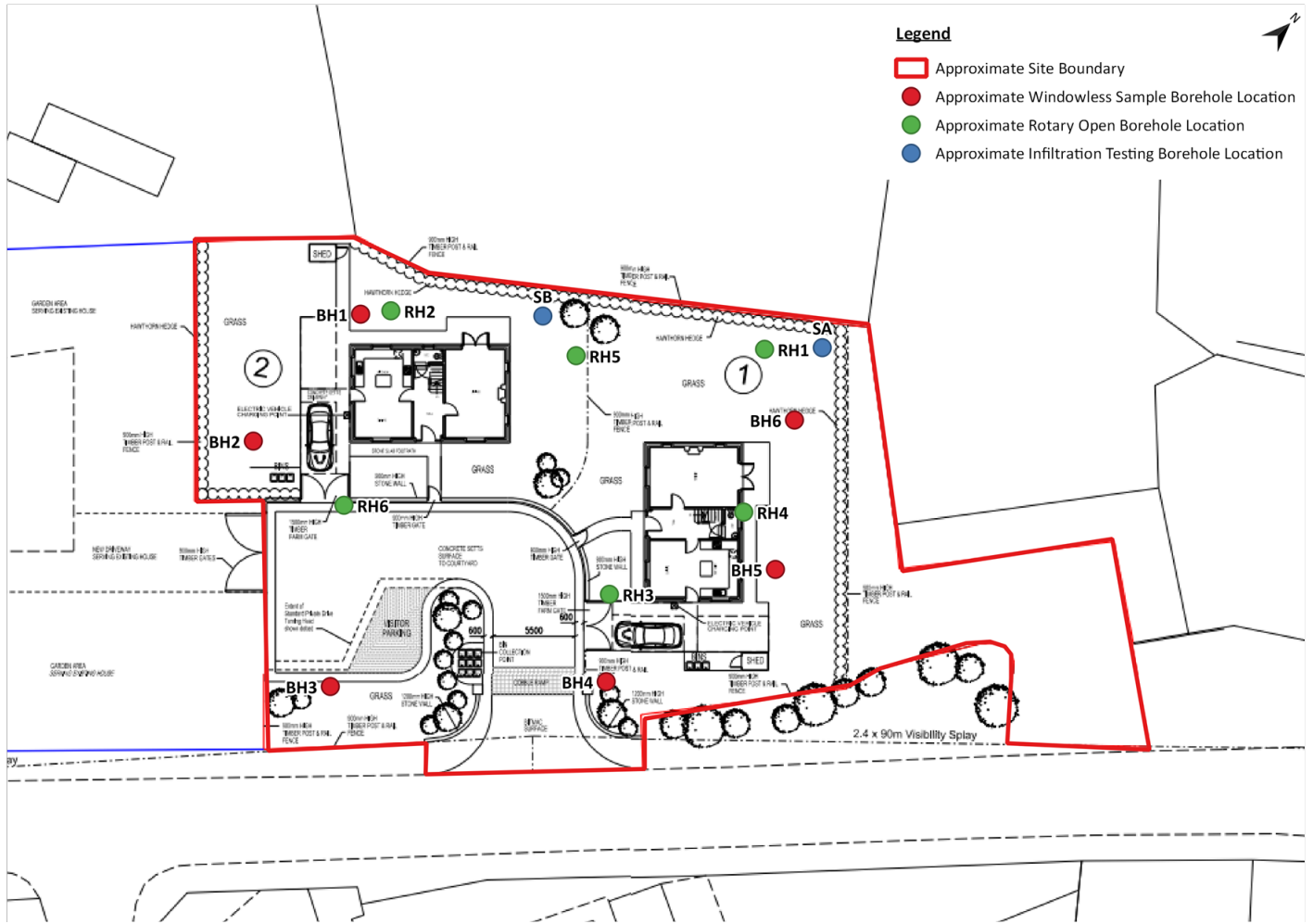
|             |                        |          |           |
|-------------|------------------------|----------|-----------|
| Job No:     | Scale (See Scale Bar): | Figure:  | Revision: |
| LKC 23 1535 | See Scale Bar          | <b>3</b> |           |
| Drawn By:   | Checked By:            | Drawn:   |           |
| AC          | CD                     | Nov 2023 |           |

## **Appendix B –**

### **Existing Factual Information**

**GEOINVESTIGATE Ltd.**

|                    |  |                          |
|--------------------|--|--------------------------|
| OUR REF: G20285    | YOUR REF:  | SITE PLAN (NOT TO SCALE) |
| DATE: October 2020 | LOCATION: Three Acres, Gildersome Lane, Gildersome, LS27 7BN |                          |





# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**BH No.1 Sheet No. 1 of 1**
**Location:** Three Acres, Gildersome Lane, Gildersome LS27 7BN

**DATE:** 15/09/20

| Depth (m) | Description of Strata  | Thick-ness | Legend | Gas Well | Sample | Test Type Result     | SPT N Value (Depth)               | Depth to Water | Depth (m) |
|-----------|--|------------|--------|----------|--------|----------------------|-----------------------------------|----------------|-----------|
| 0.60      | MADE GROUND. Dense brown and dark grey sandy gravel. Gravel is fine to coarse of brick, sandstone, ash, concrete and slag.           | 600        |        |          | O      | Cv kN/m <sup>2</sup> |                                   |                | 0.20      |
|           |  |            |        |          |        |                      |                                   |                | 0.50      |
| 0.90      | MADE GROUND. Firm dark grey gravelly clay. Gravel is fine to coarse of sandstone, brick and coal.                                    | 300        |        |          | O      |                      | 1.00m - 1.45m<br>1/5/5/5/5        |                | 0.75      |
| 2.40      | Firm light brown mottled grey silty gravelly CLAY. Gravel is fine to coarse of and occasional coal.<br><br>Becomes stiff from 1.50m. | 1500       |        |          | O S    | 52                   | N = 20                            |                | 1.00      |
|           |  |            |        |          | O      | 90                   |                                   |                | 1.25      |
|           |  |            |        |          | O S    | 110                  | 2.00                              |                |           |
|           |  |            |        |          |        |                      | 2.25                              |                |           |
| 3.00      | Very weak, very weathered light brown and grey MUDSTONE with some minor IRONSTONE inclusions.  | 600        |        |          | O      |                      | 3.00m - 3.45m<br>8/10/10/11/11/12 |                | 2.50      |
|           |  |            |        |          | O S    |                      |                                   |                | 2.75      |
|           | Borehole terminated at 3.00m   |            |        |          |        |                      |                                   |                | 3.00      |

**Remarks:**

Casing to 1.00m  
 Dynamic windowless sampling by Terrier Rig to 3.00m  
 Borehole remained open and dry on completion  
 Gas well installed to 3.00m with bung and cover.

**Key:**

|  |               |  |                  |
|--|---------------|--|------------------|
|  | Slotted Pipe  |  | Disturbed sample |
|  | Plain Pipe    |  | Cv Shear vane    |
|  | Bentonite     |  | W Water sample   |
|  | Gravel Filter |  |                  |

|            |
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| <b>BH1</b> |
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# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**BH No.2 Sheet No. 1 of 1**
**Location:** Three Acres, Gildersome Lane, Gildersome LS27 7BN

**DATE:** 15/09/20

| Depth (m) | Description of Strata   | Thickness | Legend | Gas Well | Sample | Test Type Result     | SPT N Value (Depth)      | Depth to Water | Depth (m) |
|-----------|---|-----------|--------|----------|--------|----------------------|--------------------------|----------------|-----------|
| 0.80      | MADE GROUND. Dense dark grey and red sandy gravel. Gravel is fine to coarse of brick, sandstone, concrete and slag. | 800       |        |          | O      | Cv kN/m <sup>2</sup> |                          |                | 0.20      |
|           |   |           |        |          | O      |                      |                          |                | 0.50      |
|           |   |           |        |          |        |                      | 1.00m - 1.45m            |                | 0.75      |
| 1.00      | MADE GROUND. Firm dark grey gravelly CLAY. Gravel is fine to coarse of sandstone and coal.                          | 200       |        |          | O S    | 68                   | 2/2/2/3/3/2<br>N = 10    |                | 1.00      |
|           | Firm light brown mottled grey silty gravelly CLAY. Gravel is fine to coarse of and occasional coal.                 |           |        |          | O      | 88                   |                          |                | 1.25      |
|           | Becomes stiff from 1.70m  | 1300      |        |          |        |                      | 2.00m - 2.45m            |                | 1.50      |
|           |   |           |        |          | O S    | 95                   | 5/5/5/6/6/6<br>N = 23    |                | 1.75      |
|           |   |           |        |          |        |                      |                          |                | 2.00      |
|           |   |           |        |          |        |                      |                          |                | 2.25      |
| 2.30      |   |           |        |          | O      |                      |                          |                | 2.50      |
|           | Very weak, very weathered light brown and grey MUDSTONE with some minor IRONSTONE inclusions.                       | 700       |        |          |        |                      | 3.00m - 3.45m            |                | 2.75      |
|           |   |           |        |          | O S    |                      | 7/9/9/10/12/15<br>N = 46 |                | 3.00      |
| 3.00      | Borehole terminated at 3.00m  |           |        |          |        |                      |                          |                |           |

**Remarks:**

Casing to 1.00m  
 Dynamic windowless sampling by Terrier Rig to 3.00m  
 Borehole remained open and dry on completion

**Key:**

|  |               |  |                  |
|--|---------------|--|------------------|
|  | Slotted Pipe  |  | Disturbed sample |
|  | Plain Pipe    |  | Cv Shear vane    |
|  | Bentonite     |  | W Water sample   |
|  | Gravel Filter |  |                  |

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| BH2 |
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# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**BH No.3 Sheet No. 1 of 1**
**Location:** Three Acres, Gildersome Lane, Gildersome LS27 7BN

**DATE:** 15/11/19

| Depth (m) | Description of Strata   | Thickness | Legend | Gas Well | Sample   | Test Type Result     | SPT N Value (Depth)                        | Depth to Water | Depth (m)                            |
|-----------|---|-----------|--------|----------|----------|----------------------|--|----------------|--------------------------------------|
| 0.40      | MADE GROUND. Dense dark greyish brown clayey sandy gravel. Gravel is fine to coarse of brick, sandstone and plastic.  | 400       |        |          | O        | Cv kN/m <sup>2</sup> |  |                | 0.20                                 |
| 1.20      | MADE GROUND. Firm to stiff light brown mottled light and dark grey silty gravelly CLAY. Gravel is fine to coarse of brick, concrete, sandstone and occasional coal. | 800       |        |          | O<br>O S |                      | 1.00m - 1.45m<br>2/2/4/4/6/6<br>N = 20     |                | 0.50<br>0.75<br>1.00                 |
| 2.50      | Very weak very weathered dark brown and grey MUDSTONE with some minor IRONSTONE inclusions.   | 1300      |        |          | O<br>O S |                      | 2.00m - 2.45m<br>8/9/10/10/10/11<br>N = 41 |                | 1.25<br>1.50<br>1.75<br>2.00<br>2.25 |
|           | Borehole terminated at 3.00m  |           |        |          |          |                      | 2.50m - 2.95m<br>N = 30>30mm               |                | 2.50                                 |

**Remarks:**

Casing to 1.00m  
 Dynamic windowless sampling by Terrier Rig to 2.50m  
 Borehole remained open and dry on completion  
 Gas well installed to 2.20m with bung and cover.

**Key:**

|  |               |  |                             |
|--|---------------|--|-----------------------------|
|  | Slotted Pipe  |  | Disturbed sample            |
|  | Plain Pipe    |  | Cv Shear vane               |
|  | Bentonite     |  | W Water sample              |
|  | Gravel Filter |  | S Standard Penetration Test |

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| <b>BH3</b> |
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# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**BH No.4 Sheet No. 1 of 1**
**Location:** Three Acres, Gildersome Lane, Gildersome LS27 7BN

**DATE:** 15/11/19

| Depth (m) | Description of Strata   | Thickness | Legend | Gas Well | Sample | Test Type Result     | SPT N Value (Depth)                    | Depth to Water | Depth (m) |
|-----------|---|-----------|--------|----------|--------|----------------------|--|----------------|-----------|
| 0.60      | MADE GROUND. Dense brown and blackish grey sandy gravel. Gravel is fine to coarse of brick, sandstone, concrete and slag.                     | 600       |        |          | O      | Cv kN/m <sup>2</sup> |  |                | 0.20      |
| 1.00      | MADE GROUND. Firm dark grey gravelly clay. Gravel is fine to coarse of sandstone and coal.  | 400       |        |          | O      |                      |  |                | 0.50      |
| 1.00      | MADE GROUND. Firm dark grey gravelly clay. Gravel is fine to coarse of sandstone and coal.  | 400       |        |          | O S    | 62                   | 1.00m - 1.45m<br>1/1/1/1/2/2<br>N = 6  |                | 0.75      |
| 2.40      | Firm light brown mottled grey silty gravelly CLAY. Gravel is fine to coarse of sandstone and occasional coal.<br><br>Becomes stiff from 1.60m | 1400      |        |          | O      | 85                   |  |                | 1.25      |
| 2.40      | Firm light brown mottled grey silty gravelly CLAY. Gravel is fine to coarse of sandstone and occasional coal.<br><br>Becomes stiff from 1.60m | 1400      |        |          | O S    | 98                   | 2.00m - 2.45m<br>2/3/2/3/4/4<br>N = 13 |                | 1.50      |
| 3.10      | Very weak, very weathered light brown and grey MUDSTONE with some minor IRONSTONE inclusions.   | 700       |        |          | O      |                      |  |                | 1.75      |
| 3.10      | Very weak, very weathered light brown and grey MUDSTONE with some minor IRONSTONE inclusions.   | 700       |        |          | O S    |                      | 3.00m - 3.45m<br>1/0/0/0/0/0<br>N = 0  |                | 2.00      |
| 3.10      | Sampling borehole terminated at 3.10m<br><br>VOID to 10.80m noted when carrying out SPT test from 3.10m depth                                 |           |        |          |        |                      |  |                | 2.25      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 2.50      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 2.75      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 3.00      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 3.25      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 3.50      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 3.75      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 4.00      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 4.25      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 4.50      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 4.75      |
|           | VOID to 10.80m noted when carrying out SPT test from 3.10m depth  |           |        |          |        |                      |  |                | 5.00      |

**Remarks:**

Casing to 1.00m  
 Dynamic windowless sampling by Terrier Rig to 3.10m  
 Borehole remained open and dry on completion  
 Gas well installed to 10.80m with bung and cover.

**Key:**

|  |               |  |                  |
|--|---------------|--|------------------|
|  | Slotted Pipe  |  | Disturbed sample |
|  | Plain Pipe    |  | Cv Shear vane    |
|  | Bentonite     |  | W Water sample   |
|  | Gravel Filter |  |                  |

|            |
|------------|
| <b>BH4</b> |
|------------|

# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**BH No.5 Sheet No. 1 of 1**
**Location:** Three Acres, Gildersome Lane, Gildersome LS27 7BN

**DATE:** 17/09/20

| Depth (m) | Description of Strata   | Thick-ness | Legend | Gas Well | Sample | Test Type Result | SPT N Value (Depth)         | Depth to Water                           | Depth (m) |
|-----------|---|------------|--------|----------|--------|------------------|-----------------------------|--|-----------|
| 0.90      | TURF / MADE GROUND. Dense light brown and blackish grey sandy gravel. Gravel is fine to coarse of brick, sandstone and concrete.                  | 900        |        |          |        | O                | Cv kN/m <sup>2</sup>        |  | 0.20      |
|           |   |            |        |          |        |                  |                             |  | 0.50      |
|           |   |            |        |          |        |                  |                             |  | 0.75      |
| 1.10      | MADE GROUND. Firm dark grey mottled brown sandy gravelly clay. Gravel is fine to coarse of brick, sandstone and wood.                             | 200        |        |          |        | O S              | 62                          | 1.00m - 1.45m<br>2/2/2/2/3/3<br>N = 10   | 1.00      |
| 1.90      | Firm light brown mottled grey gravelly CLAY. Gravel is fine to coarse of sandstone.<br><br>Becomes stiff from 1.80m.                              | 800        |        |          |        | O                | 65                          | 2.00m - 2.45m<br>5/5/6/6/8/8<br>N = 28   | 1.25      |
|           |   |            |        |          |        |                  |                             |  | 1.50      |
|           |   |            |        |          |        |                  |                             |  | 1.75      |
| 4.00      | Very weak very weathered brown and dark grey MUDSTONE with some minor IRONSTONE inclusions.<br><br>Becomes weak and slightly weathered from 3.30m | 2100       |        |          |        | O S              | 92                          | 3.00m - 3.45m<br>6/9/10/8/9/10<br>N = 37 | 2.00      |
|           |   |            |        |          |        |                  |                             |  | 2.25      |
|           |   |            |        |          |        |                  |                             |  | 2.50      |
|           |   |            |        |          |        |                  |                             |  | 2.75      |
|           |   |            |        |          |        |                  |                             |  | 3.00      |
| 4.00      | Borehole terminated at 4.00m  |            |        |          |        | O S              | 10/10/10/11/12/14<br>N = 47 |  | 3.25      |
|           |   |            |        |          |        |                  |                             |  | 3.50      |
|           |   |            |        |          |        |                  |                             |  | 3.75      |

**Remarks:**

Casing to 1.00m  
 Dynamic windowless sampling by Terrier Rig to 4.00m  
 Borehole remained open and dry on completion

**Key:**

|  |               |  |                  |
|--|---------------|--|------------------|
|  | Slotted Pipe  |  | Disturbed sample |
|  | Plain Pipe    |  | Cv Shear vane    |
|  | Bentonite     |  | W Water sample   |
|  | Gravel Filter |  |                  |

**BH5**

# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**BH No.6 Sheet No. 1 of 1**
**Location:** Three Acres, Gildersome Lane, Gildersome LS27 7BN

**DATE:** 17/09/20

| Depth (m) | Description of Strata   | Thick-ness | Legend | Gas Well | Sample | Test Type Result     | SPT N Value (Depth)                          | Depth to Water | Depth (m)                    |
|-----------|---|------------|--------|----------|--------|----------------------|--|----------------|------------------------------|
| 0.40      | MADE GROUND. Dense red and blackish grey sandy gravel. Gravel is fine to coarse of brick, sandstone, concrete and coal. | 400        |        |          | O      | Cv kN/m <sup>2</sup> |  |                | 0.20                         |
| 0.60      | MADE GROUND. Firm blackish grey sandy gravelly clay. Gravel is fine to coarse of sandstone, coal and wood.              | 200        |        |          | O      |                      |  |                | 0.50                         |
| 1.70      | Stiff light brown mottled grey very gravelly CLAY. Gravel is fine to coarse of sandstone. Cobbles noted.                | 1100       |        |          | O      | 98                   |  |                | 0.75                         |
| 2.00      | Very weak very weathered light brown and grey MUDSTONE.   | 300        |        |          | O S    |                      | 2.00m - 2.45m<br>10/10/11/12/14/14<br>N = 50 |                | 1.00<br>1.25<br>1.50<br>1.75 |
|           | Borehole terminated at 2.00m  |            |        |          |        |                      |  |                |                              |

**Remarks:**

 Casing to 1.00m  
 Dynamic windowless sampling by Terrier Rig to 2.00m  
 Borehole remained open and dry on completion

**Key:**

|  |               |  |                  |
|--|---------------|--|------------------|
|  | Slotted Pipe  |  | Disturbed sample |
|  | Plain Pipe    |  | Cv Shear vane    |
|  | Bentonite     |  | W Water sample   |
|  | Gravel Filter |  |                  |

BH6

# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**BH Sa**
**Sheet No. 1 of 1**
**Location:** Three Acres, Gildersome Lane, Gildersome LS27 7BN

**DATE:** 15/09/20

| Depth (m) | Description of Strata   | Thick-ness | Legend | Gas Well | Sample | Test Type Result     | SPT N Value (Depth) | Depth to Water | Depth (m) |
|-----------|---|------------|--------|----------|--------|----------------------|---------------------|----------------|-----------|
| 0.50      | MADE GROUND. Dense brown and blackish grey very sandy gravel. Gravel is fine to coarse of brick, sandstone and ash. | 500        |        |          | O      | Cv kN/m <sup>2</sup> |                     |                | 0.25      |
|           |   |            |        |          |        |                      |                     |                | 0.50      |
| 0.70      | MADE GROUND. Firm dark grey silty sandy gravelly clay. Gravel is fine to coarse of sandstone and coal.              | 200        |        |          |        |                      |                     |                | 0.75      |
| 1.80      | Firm light brown and orange mottled grey gravelly CLAY. Gravel is fine to coarse of sandstone.                      | 1100       |        |          |        | 55                   |                     |                | 1.00      |
|           | Becomes stiff from 1.40m  |            |        |          |        | 92                   |                     |                | 1.25      |
|           |   |            |        |          |        |                      |                     |                | 1.50      |
| 2.00      | Very weak very weathered light brown and grey MUDSTONE.   | 200        |        |          |        |                      |                     |                | 1.75      |
|           | Borehole terminated at 2.00m  |            |        |          |        |                      |                     |                | 2.00      |
|           | Infiltration Test carried out with 1m of borehole casing in situ  |            |        |          |        |                      |                     |                |           |

**Remarks:**

Casing to 1.00m  
 Dynamic windowless sampling by Terrier Rig to 2.00m  
 Borehole remained open and dry on completion

**Key:**

|  |               |  |                  |
|--|---------------|--|------------------|
|  | Slotted Pipe  |  | Disturbed sample |
|  | Plain Pipe    |  | Cv Shear vane    |
|  | Bentonite     |  | W Water sample   |
|  | Gravel Filter |  |                  |

**BH Sa**

# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**BH Sb**
**Sheet No. 1 of 1**
**Location:** Three Acres, Gildersome Lane, Gildersome LS27 7BN

**DATE:** 15/09/20

| Depth (m) | Description of Strata   | Thick-ness | Legend | Gas Well | Sample              | Test Type Result     | SPT N Value (Depth) | Depth to Water | Depth (m)                                |
|-----------|---|------------|--------|----------|---------------------|----------------------|---------------------|----------------|--|
| 1.10      | MADE GROUND. Dense red and dark grey sandy gravel. Gravel is fine to coarse of sandstone, brick, concrete and slag.<br><br>Wet from 0.90m | 1100       |        |          | O<br><br>O<br><br>O | Cv kN/m <sup>2</sup> |                     |                | 0.25<br><br>0.50<br><br>0.75<br><br>1.00 |
| 2.00      | Firm light brown mottled grey silty gravelly CLAY. Gravel is fine to coarse of sandstone.   | 900        |        |          |                     |                      |                     |                | 1.25<br><br>1.50<br><br>1.75<br><br>2.00 |
|           | Borehole terminated at 2.00m<br><br>Infiltration Test carried out with 1m of borehole casing in situ                                      |            |        |          |                     |                      |                     |                |  |

**Remarks:**

Casing to 1.00m  
 Dynamic windowless sampling by Terrier Rig to 2.00m  
 Borehole remained open and dry on completion

**Key:**

|  |               |  |                  |
|--|---------------|--|------------------|
|  | Slotted Pipe  |  | Disturbed sample |
|  | Plain Pipe    |  | Shear vane       |
|  | Bentonite     |  | Water sample     |
|  | Gravel Filter |  |                  |

**BH Sb**



# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**RH No.1 Sheet No. 1 of 2**
**Location:** Three Acres, Gildersome Lane, Gildersome, LS27 7BN

**DATE:** 21/09/20

| Depth (m) | Description of Strata                                    | Thick-ness | Legend | Gas Well | Sample | Test Type Result | Flush                  | Depth to Water | Depth (m)                       |
|-----------|--|------------|--------|----------|--------|------------------|------------------------|----------------|---------------------------------|
| 1.90      | Light brown DRIFT  | 1900       |        |          |        |                  |                        |                |                                 |
| 7.60      | Brownish grey MUDSTONE<br>Becoming light grey from 2.50m | 5700       |        |          |        |                  | Flush lost at<br>7.60m | 7.50           | 2.50<br><br>5.00                |
| 9.40      | Possible COLLAPSED WORKINGS                              | 1800       |        |          |        |                  |                        |                |                                 |
| 16.5      | SANDSTONE with MUDSTONE inclusions                       | 7100       |        |          |        |                  |                        |                | 10.00<br><br>12.50<br><br>15.00 |
| 21.6      | MUDSTONE with occasional SANDSTONE inclusions            | 5100       |        |          |        |                  |                        |                | 17.50<br><br>20.00              |
| 30.0      | SANDSTONE with MUDSTONE inclusions                       | 8400       |        |          |        |                  |                        |                | 22.50<br><br>25.00              |

**Remarks:** Casing to 1.00m  
 Microdrill rotary open hole borehole to 30.00m  
 No cores recovered from borehole  
 No gas detected from borehole on completion  
 Flush lost at 7.60m. No voids encountered.

**RH1**



# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**RH No.2 Sheet No. 1 of 2**
**Location:** Three Acres, Gildersome Lane, Gildersome, LS27 7BN

**DATE:** 21/09/20

| Depth (m) | Description of Strata                                  | Thick-ness | Legend | Gas Well | Sample | Test Type Result | Flush               | Depth to Water | Depth (m)               |
|-----------|--|------------|--------|----------|--------|------------------|---------------------|----------------|-------------------------|
| 2.50      | Brown and grey DRIFT                                   | 2500       |        |          |        |                  |                     |                | 2.50                    |
| 8.40      | Light brown MUDSTONE<br>Becoming light grey from 3.50m | 5900       |        |          |        |                  | Flush lost at 8.40m |                | 5.00<br>7.50            |
| 9.50      | Possible COLLAPSED WORKINGS                            | 1100       |        |          |        |                  |                     |                | 10.00                   |
| 18.0      | SANDSTONE<br><br>MUDSTONE inclusions from 13.50m       | 8500       |        |          |        |                  |                     |                | 12.50<br>15.00<br>17.50 |
| 30.0      | MUDSTONE with SANDSTONE inclusions                     | 12000      |        |          |        |                  |                     |                | 20.00<br>22.50<br>25.00 |

**Remarks:** Casing to 1.00m  
 Microdrill rotary open hole borehole to 30.00m  
 No cores recovered from borehole  
 No gas detected from borehole on completion  
 Flush lost at 8.40m. No voids encountered.

**RH2**



# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**RH No.3 Sheet No. 1 of 2**
**Location:** Three Acres, Gildersome Lane, Gildersome, LS27 7BN

**DATE:** 22/09/20

| Depth (m) | Description of Strata              | Thick-ness | Legend | Gas Well | Sample | Test Type Result | Flush               | Depth to Water                   | Depth (m)    |
|-----------|------------------------------------|------------|--------|----------|--------|------------------|---------------------|----------------------------------|--------------|
| 2.20      | Brown DRIFT                        | 2200       |        |          |        |                  | Flush lost at 1.80m |                                  |              |
| 6.90      | MUDSTONE                           | 4700       |        |          |        |                  |                     |                                  | 2.50<br>5.00 |
| 8.10      | Possible COLLAPSED WORKINGS        | 1200       |        |          |        |                  |                     | 7.50                             |              |
| 12.4      | SANDSTONE with MUDSTONE inclusions | 4300       |        |          |        |                  |                     | 10.00                            |              |
| 22.8      | MUDSTONE                           | 10400      |        |          |        |                  |                     | 12.50<br>15.00<br>17.50<br>20.00 |              |
| 30.0      | SANDSTONE with MUDSTONE inclusions | 7200       |        |          |        |                  |                     | 22.50<br>25.00                   |              |

**Remarks:** Casing to 1.00m  
 Microdrill rotary open hole borehole to 30.00m  
 No cores recovered from borehole  
 No gas detected from borehole on completion  
 Flush lost at 1.80m. No voids encountered.

|            |
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| <b>RH3</b> |
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# GEOINVESTIGATE Ltd.

**Your Ref.**

**Our Ref.** G20285

**RH No.3 Sheet No. 1 of 2**

**Location:** Three Acres, Gildersome Lane, Gildersome, LS27 7BN

**DATE:** 22/09/20

| Depth (m) | Description of Strata              | Thick-ness | Legend | Gas Well | Sample | Test Type Result | Flush | Depth to Water | Depth (m) |
|-----------|------------------------------------|------------|--------|----------|--------|------------------|-------|----------------|-----------|
| 30.0      | SANDSTONE with MUDSTONE inclusions | 7200       |        |          |        |                  |       |                | 30.00     |
|           | Rotary hole terminated at 30.00m   |            |        |          |        |                  |       |                |           |

**Remarks:** Casing to 1.00m  
 Microdrill rotary open hole borehole to 30.00m  
 No cores recovered from borehole  
 No gas detected from borehole on completion  
 Flush lost at 1.80m. No voids encountered.

**RH3**

# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**RH No.4 Sheet No. 1 of 2**
**Location:** Three Acres, Gildersome Lane, Gildersome, LS27 7BN

**DATE:** 22/09/20

| Depth (m) | Description of Strata  | Thick-ness | Legend | Gas Well | Sample | Test Type Result | Flush | Depth to Water | Depth (m)                                  |
|-----------|--|------------|--------|----------|--------|------------------|-------|----------------|--|
| 4.20      | Light brown DRIFT  | 4200       |        |          |        |                  |       |                | 2.50                                       |
| 12.9      | Light grey MUDSTONE with SANDSTONE inclusions<br><br>Very weak between 7.20m and 8.40m | 8700       |        |          |        |                  |       |                | 5.00<br><br>7.50<br><br>10.00<br><br>12.50 |
| 19.6      | Light grey MUDSTONE  | 6700       |        |          |        |                  |       |                | 15.00<br><br>17.50                         |
| 30.0      | Light grey SANDSTONE with MUDSTONE inclusions  | 10400      |        |          |        |                  |       |                | 20.00<br><br>22.50<br><br>25.00            |

**Remarks:** Casing to 1.50m  
 Microdrill rotary open hole borehole to 30.00m  
 No cores recovered from borehole  
 No gas detected from borehole on completion  
 Full flush returned. No voids encountered.

|     |
|-----|
| RH4 |
|-----|

# GEOINVESTIGATE Ltd.

**Your Ref.**

**Our Ref.** G20285

**RH No.4 Sheet No. 2 of 2**

**Location:** Three Acres, Gildersome Lane, Gildersome, LS27 7BN

**DATE:** 22/09/20

| Depth (m) | Description of Strata                         | Thick-ness | Legend | Gas Well | Sample | Test Type Result | Flush | Depth to Water | Depth (m) |
|-----------|---|------------|--------|----------|--------|------------------|-------|----------------|-----------|
| 30.0      | Light grey SANDSTONE with MUDSTONE inclusions | 10400      |        |          |        |                  |       |                | 30.00     |
|           | Rotary hole terminated at 30.00m              |            |        |          |        |                  |       |                |           |

**Remarks:** Casing to 1.50m  
 Microdrill rotary open hole borehole to 30.00m  
 No cores recovered from borehole  
 No gas detected from borehole on completion  
 Full flush returned. No voids encountered.

**RH4**



# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**RH No.5 Sheet No. 1 of 2**
**Location:** Three Acres, Gildersome Lane, Gildersome, LS27 7BN

**DATE:** 22/09/20

| Depth (m) | Description of Strata                          | Thick-ness | Legend | Gas Well | Sample | Test Type Result | Flush                | Depth to Water | Depth (m)                                 |
|-----------|--|------------|--------|----------|--------|------------------|----------------------|----------------|---|
| 3.20      | Brown DRIFT                                    | 3200       |        |          |        |                  |                      |                | 2.50                                      |
| 7.10      | Light brown MUDSTONE with SANDSTONE inclusions | 3900       |        |          |        |                  | Lost return at 7.10m |                | 5.00                                      |
| 9.10      | VOID, possible workings                        | 2000       |        |          |        |                  |                      |                | 7.50                                      |
| 22.4      | MUDSTONE with SANDSTONE inclusions             | 13300      |        |          |        |                  |                      |                | 10.00<br>12.50<br>15.00<br>17.50<br>20.00 |
| 30.0      | SANDSTONE with minor MUDSTONE inclusions       | 7600       |        |          |        |                  |                      |                | 22.50<br>25.00                            |

**Remarks:** Casing to 1.00m  
 Microdrill rotary open hole borehole to 30.00m  
 No cores recovered from borehole  
 No gas detected from borehole on completion  
 Flush lost at 7.10m. 2.00m void encountered.

**RH5**

# GEOINVESTIGATE Ltd.

**Your Ref.**
**Our Ref.** G20285

**RH No.5 Sheet No. 2 of 2**
**Location:** Three Acres, Gildersome Lane, Gildersome, LS27 7BN

**DATE:** 22/09/20

| Depth (m) | Description of Strata                    | Thick-ness | Legend | Gas Well | Sample | Test Type Result | Flush | Depth to Water | Depth (m) |
|-----------|--|------------|--------|----------|--------|------------------|-------|----------------|-----------|
| 30.0      | SANDSTONE with minor MUDSTONE inclusions | 7600       |        |          |        |                  |       |                | 30.00     |
|           | Rotary hole terminated at 30.00m         |            |        |          |        |                  |       |                |           |

**Remarks:** Casing to 1.00m  
 Microdrill rotary open hole borehole to 30.00m  
 No cores recovered from borehole  
 No gas detected from borehole on completion  
 Flush lost at 7.10m. 2.00m void encountered.

**RH5**

Job Number G20285  
 Client Roberts  
 Site Three Acres, Gildersome LS27 7BN  
 Instrument GFM 406 + 410

Key  
 W/L Water Logged  
 BDL Below Detectable Levels  
 NB No Bung  
 WD/I Well destroyed / inaccessible

| Monitoring Personal |                | AW                | Date                      | 25/09/2020      | Weather       | windy/sunny            | Temperature    | 12                 | Starting Pressure | 1005 falling                            | Hydrogen Sulphide | Carbon Monoxide |
|---------------------|----------------|-------------------|---------------------------|-----------------|---------------|------------------------|----------------|--------------------|-------------------|---|-------------------|-----------------|
| Monitoring Point    | Well condition | Flow range (l/hr) | Atmospheric Pressure (mb) | Methane % (v/v) | Methane % LEL | Carbon dioxide % (v/v) | Oxygen % (v/v) | Water Level (mbgl) | Depth of Well (m) | Volume of gas in well (m <sup>3</sup> ) | (ppm)             | (ppm)           |
| BH1                 |                | 0                 | 1005                      | 0.0             | 0             | 1.7                    | 19.4           |                    |                   |   |                   |                 |
| BH3                 |                | 0                 | 1005                      | 0.0             | 0             | 1.0                    | 19.4           |                    |                   |   |                   |                 |
| BH4                 |                | 0                 | 1005                      | 0.0             | 0             | 1.2                    | 19.4           |                    |                   |   |                   |                 |

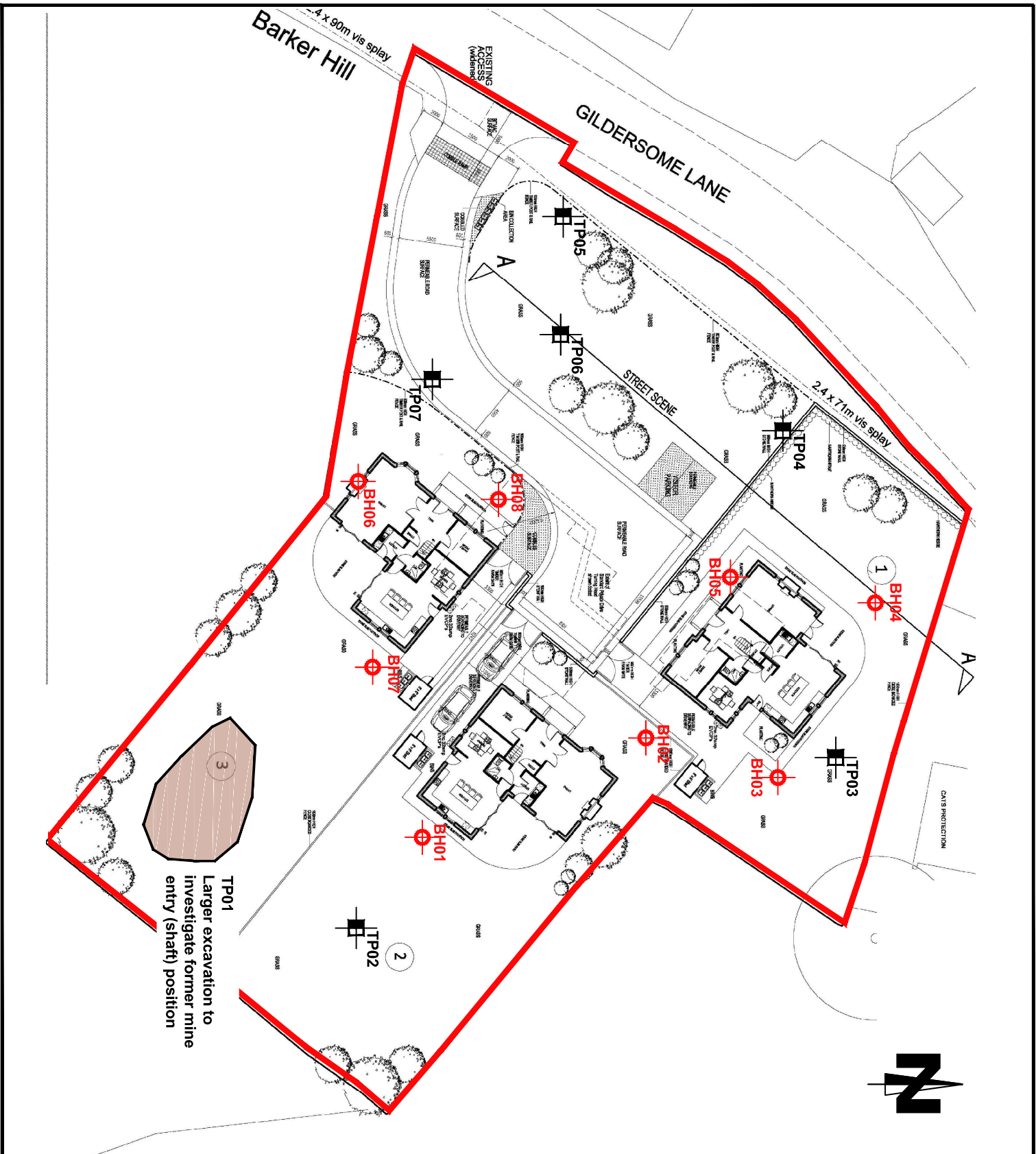
| Monitoring Personal |                | BG                | Date                      | 06/10/2020      | Weather       | raining                | Temperature    | 8                  | Starting Pressure | 973 falling                             | Hydrogen Sulphide | Carbon Monoxide |
|---------------------|----------------|-------------------|---------------------------|-----------------|---------------|------------------------|----------------|--------------------|-------------------|---|-------------------|-----------------|
| Monitoring Point    | Well condition | Flow range (l/hr) | Atmospheric Pressure (mb) | Methane % (v/v) | Methane % LEL | Carbon dioxide % (v/v) | Oxygen % (v/v) | Water Level (mbgl) | Depth of Well (m) | Volume of gas in well (m <sup>3</sup> ) | (ppm)             | (ppm)           |
| BH1                 |                | 0                 | 973                       | 0.0             | 0             | 1.1                    | 19.7           |                    |                   |   |                   |                 |
| BH3                 |                | 0                 | 973                       | 0.0             | 0             | 0.3                    | 20.2           |                    |                   |   |                   |                 |
| BH4                 |                | 0                 | 973                       | 0.0             | 0             | 0.0                    | 20.6           |                    |                   |   |                   |                 |

| Monitoring Personal |                | AW                | Date                      | 19/10/2020      | Weather       | cloudy                 | Temperature    | 12                 | Starting Pressure | 1012 steady                             | Hydrogen Sulphide | Carbon Monoxide |
|---------------------|----------------|-------------------|---------------------------|-----------------|---------------|------------------------|----------------|--------------------|-------------------|---|-------------------|-----------------|
| Monitoring Point    | Well condition | Flow range (l/hr) | Atmospheric Pressure (mb) | Methane % (v/v) | Methane % LEL | Carbon dioxide % (v/v) | Oxygen % (v/v) | Water Level (mbgl) | Depth of Well (m) | Volume of gas in well (m <sup>3</sup> ) | (ppm)             | (ppm)           |
| BH1                 |                | 0                 | 1012                      | 0.0             | 0             | 1.3                    | 19.7           |                    |                   |   |                   |                 |
| BH3                 |                | 0                 | 1012                      | 0.0             | 0             | 0.6                    | 20.2           |                    |                   |   |                   |                 |
| BH4                 |                | 0                 | 1012                      | 0.0             | 0             | 0.3                    | 20.1           |                    |                   |   |                   |                 |

| Monitoring Personal | AW             | Date              | 30/10/2020                | Weather         | raining       | Temperature            | 14             | Starting Pressure  | 1010 rising       | Hydrogen Sulphide (ppm)                 | Carbon Monoxide (ppm) |  |
|---------------------|----------------|-------------------|---------------------------|-----------------|---------------|------------------------|----------------|--------------------|-------------------|---|-----------------------|--|
| Monitoring Point    | Well condition | Flow range (l/hr) | Atmospheric Pressure (mb) | Methane % (v/v) | Methane % LEL | Carbon dioxide % (v/v) | Oxygen % (v/v) | Water Level (mbgl) | Depth of Well (m) | Volume of gas in well (m <sup>3</sup> ) |                       |  |
| BH1                 |                | 0                 | 1010                      | 0.0             | 0             | 0.8                    | 19.4           |                    |                   |   |                       |  |
| BH3                 |                | 0                 | 1010                      | 0.0             | 0             | 0.3                    | 20.0           |                    |                   |   |                       |  |
| BH4                 |                | 0                 | 1010                      | 0.0             | 0             | 2.2                    | 15.8           |                    |                   |   |                       |  |

| Monitoring Personal | SH             | Date              | 13/11/2020                | Weather         | sunny         | Temperature            | 7              | Starting Pressure  | 1007 rising       | Hydrogen Sulphide (ppm)                 | Carbon Monoxide (ppm) |  |
|---------------------|----------------|-------------------|---------------------------|-----------------|---------------|------------------------|----------------|--------------------|-------------------|---|-----------------------|--|
| Monitoring Point    | Well condition | Flow range (l/hr) | Atmospheric Pressure (mb) | Methane % (v/v) | Methane % LEL | Carbon dioxide % (v/v) | Oxygen % (v/v) | Water Level (mbgl) | Depth of Well (m) | Volume of gas in well (m <sup>3</sup> ) |                       |  |
| BH1                 |                | 0                 | 1007                      | 0.0             | 0             | 1.8                    | 18.9           |                    |                   |   |                       |  |
| BH3                 |                | 0                 | 1007                      | 0.0             | 0             | 1.0                    | 19.7           |                    |                   |   |                       |  |
| BH4                 |                | 0                 | 1007                      | 0.0             | 0             | 0.3                    | 20.1           |                    |                   |   |                       |  |

| Monitoring Personal | CD             | Date              | 21/01/2021                | Weather         | raining       | Temperature            | 4              | Starting Pressure  | 958 falling       | Hydrogen Sulphide (ppm)                 | Carbon Monoxide (ppm) |  |
|---------------------|----------------|-------------------|---------------------------|-----------------|---------------|------------------------|----------------|--------------------|-------------------|---|-----------------------|--|
| Monitoring Point    | Well condition | Flow range (l/hr) | Atmospheric Pressure (mb) | Methane % (v/v) | Methane % LEL | Carbon dioxide % (v/v) | Oxygen % (v/v) | Water Level (mbgl) | Depth of Well (m) | Volume of gas in well (m <sup>3</sup> ) |                       |  |
| BH1                 |                | 0                 | 958                       | 0.0             | 0             | 0.6                    | 19.9           |                    |                   |   |                       |  |
| BH3                 |                | 0                 | 958                       | 0.0             | 0             | 0.2                    | 20.0           |                    |                   |   |                       |  |
| BH4                 |                | 0                 | 958                       | 0.0             | 0             | 0.2                    | 20.2           |                    |                   |   |                       |  |



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The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.  
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| LEGEND |   |
|--------|---|
|        | APPROXIMATE SITE BOUNDARY                 |
|        | MECHANICALLY EXCAVATED TRIAL PIT POSITION |
|        | WINDOWLESS SAMPLING BOREHOLE LOCATION     |

| rev. | date | amendments | drawn checked |
|------|------|------------|---------------|
|      |      |            |               |

Client: **STEPHEN SMITH CONSTRUCTION**

Project Title: Proposed Residential Development  
 Hillycroft  
 Gildersome Lane, LS27 7BL

Drawing Title: Borehole and Trial Pit Location Plan

Scale of A3: Date: Drawn by: Approved by:  
 NIS @ A3 02.03.23 P.D P.B  
 Job Ref: 23-087 Dwg no: Rev:



Arc Environmental Limited  
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## BOREHOLE LOG

|  |                  |                  |                 |                             |  |
|--|------------------|------------------|-----------------|-----------------------------|--|
| Project<br><b>Hillicroft</b>                   |                  |                  |                 | <b>BOREHOLE No<br/>BH01</b> |  |
| Job No<br>23-087                               | Date<br>24-02-23 | Ground Level (m) | Co-Ordinates () |                             |  |
| Contractor<br><b>Arc Environmental Limited</b> |                  |                  |                 | Sheet<br>1 of 1             |  |

| SAMPLES & TESTS |         |             | Water | STRATA                |        |   |             | Geology               | Instrument/<br>Backfill |
|-----------------|---------|-------------|-------|-----------------------|--------|---|-------------|-----------------------|-------------------------|
| Depth           | Type No | Test Result |       | Reduced Level         | Legend | Depth (Thickness)   | DESCRIPTION |                       |                         |
| 0.10-0.30       | J/D     |             |       | [Cross-hatch pattern] | (0.30) | Grass overlying dark brown topsoil (MADE GROUND)  |             | [Black/White pattern] |                         |
| 0.40-0.60       | J/D     |             |       | [Cross-hatch pattern] | (0.50) | Dark grey colliery spoil fill (MADE GROUND)   |             | [Black/White pattern] |                         |
| 0.80-1.00       | B       |             |       | [Horizontal lines]    | 0.80   | Firm light brown mottled grey CLAY (RESIDUAL SOIL)  |             | [Dotted pattern]      |                         |
| 1.00-1.45       | SPT     | N=9         |       | [Horizontal lines]    | (0.80) |   |             | [Dotted pattern]      |                         |
| 1.40-1.60       | B       |             |       | [Horizontal lines]    | 1.60   |   |             | [Dotted pattern]      |                         |
| 1.80-2.00       | B       |             |       | [Horizontal lines]    | (0.70) | Stiff orangish brown CLAY (RESIDUAL SOIL)   |             | [Dotted pattern]      |                         |
| 2.00-2.45       | SPT     | N=23        |       | [Horizontal lines]    | 2.30   |   |             | [Dotted pattern]      |                         |
| 2.60-2.80       | B       |             |       | [Horizontal lines]    | (0.82) | Moderately weak and stronger orangish brown weathered MUDSTONE with occasional coal fragments |             | [Dotted pattern]      |                         |
| 3.00-3.12       | SPT     | 77 Blows    |       | [Horizontal lines]    | 3.12   |   |             | [Dotted pattern]      |                         |

AGS3 UK BH LOGS 23-087 HILLYCROFT.GPJ AGS3 ALL.GDT 3/3/23

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

|  |   |   |                        |
|--|---|---|------------------------|
| All dimensions in metres<br>Scale 1:25 | Client<br><b>Stephen Smith Construction</b> | Method/<br>Plant Used<br><b>Windowless Sampling</b> | Logged By<br><b>DO</b> |
|--|---|---|------------------------|



## BOREHOLE LOG

|  |                         |                  |                 |                            |  |
|--|-------------------------|------------------|-----------------|----------------------------|--|
| Project<br><b>Hillycroft</b>                   |                         |                  |                 | BOREHOLE No<br><b>BH02</b> |  |
| Job No<br><b>23-087</b>                        | Date<br><b>24-02-23</b> | Ground Level (m) | Co-Ordinates () |                            |  |
| Contractor<br><b>Arc Environmental Limited</b> |                         |                  |                 | Sheet<br><b>1 of 1</b>     |  |

| SAMPLES & TESTS |         |             | Water | STRATA        |        |   |             | Geology | Instrument/<br>Backfill |
|-----------------|---------|-------------|-------|---------------|--------|---|-------------|---------|-------------------------|
| Depth           | Type No | Test Result |       | Reduced Level | Legend | Depth (Thickness)   | DESCRIPTION |         |                         |
| 0.10-0.30       | J/D     |             |       |               | (0.30) | Grass overlying dark brown topsoil (MADE GROUND)  |             |         |                         |
| 0.80-1.00       | J/D     |             |       |               | (1.00) | Dark grey colliery spoil fill (MADE GROUND)   |             |         |                         |
| 1.00-1.45       | SPT     | N=4         |       |               | 1.30   |   |             |         |                         |
| 1.40-1.60       | B       |             |       |               | (0.70) | Soft becoming stiff light brown mottled grey CLAY (RESIDUAL SOIL)   |             |         |                         |
| 2.00-2.45       | SPT     | N=24        |       |               | 2.00   |   |             |         |                         |
| 2.40-2.60       | B       |             |       |               | (0.70) | Stiff orangish brown CLAY (RESIDUAL SOIL)   |             |         |                         |
| 2.80-3.00       | B       |             |       |               | (0.37) | Moderately weak and stronger orangish brown weathered MUDSTONE with occasional coal fragments (PENNINE LOWER COAL MEASURES FORMATION) |             |         |                         |
| 3.00-3.07       | SPT     | 75 blows    |       |               | 3.07   |   |             |         |                         |

AGS3 UK BH LOGS 23-087 HILLYCROFT.GPJ AGS3 ALL.GDT 3/3/23

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

|  |   |   |                        |
|--|---|---|------------------------|
| All dimensions in metres<br>Scale 1:25 | Client<br><b>Stephen Smith Construction</b> | Method/<br>Plant Used<br><b>Windowless Sampling</b> | Logged By<br><b>DO</b> |
|--|---|---|------------------------|



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## BOREHOLE LOG

|  |                         |                  |                 |                            |  |
|--|-------------------------|------------------|-----------------|----------------------------|--|
| Project<br><b>Hillycroft</b>                   |                         |                  |                 | BOREHOLE No<br><b>BH03</b> |  |
| Job No<br><b>23-087</b>                        | Date<br><b>24-02-23</b> | Ground Level (m) | Co-Ordinates () |                            |  |
| Contractor<br><b>Arc Environmental Limited</b> |                         |                  |                 | Sheet<br><b>1 of 1</b>     |  |

| SAMPLES & TESTS |         |                     | Water | STRATA        |                |   |             | Geology | Instrument/<br>Backfill |
|-----------------|---------|---------------------|-------|---------------|----------------|---|-------------|---------|-------------------------|
| Depth           | Type No | Test Result         |       | Reduced Level | Legend         | Depth (Thickness)   | DESCRIPTION |         |                         |
| 0.10-0.30       | J/D     | 88kN/m <sup>2</sup> |       |               | (0.30)<br>0.30 | Grass overlying dark brown topsoil (MADE GROUND)                                |             |         |                         |
| 0.60-0.80       | J/D     |                     |       |               | (0.80)         | Stiff (high strength) medium to dark brown sandy clay with bricks (MADE GROUND) |             |         |                         |
| 1.00            | V       | 61<br>Blows         |       |               | 1.10           |   |             |         |                         |
| 1.20-1.40       | B       |                     |       |               | (0.50)<br>1.60 | Stiff (high strength) medium brown mottled grey CLAY (RESIDUAL SOIL)            |             |         |                         |
| 1.80-2.00       | B       |                     |       |               | (0.83)<br>2.43 | Weak orangish brown weathered MUDSTONE (PENNINE LOWER COAL MEASURES FORMATION)  |             |         |                         |
| 2.00-2.43       | SPT     |                     |       |               |                |   |             |         |                         |

AGS3 UK BH LOGS 23-087 HILLYCROFT.GPJ AGS3 ALL.GDT 3/3/23

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

|  |   |   |                        |
|--|---|---|------------------------|
| All dimensions in metres<br>Scale 1:25 | Client<br><b>Stephen Smith Construction</b> | Method/<br>Plant Used<br><b>Windowless Sampling</b> | Logged By<br><b>DO</b> |
|--|---|---|------------------------|





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## BOREHOLE LOG

|  |                  |                  |                 |                             |  |
|--|------------------|------------------|-----------------|-----------------------------|--|
| Project<br><b>Hillicroft</b>                   |                  |                  |                 | <b>BOREHOLE No<br/>BH04</b> |  |
| Job No<br>23-087                               | Date<br>24-02-23 | Ground Level (m) | Co-Ordinates () |                             |  |
| Contractor<br><b>Arc Environmental Limited</b> |                  |                  |                 | Sheet<br>1 of 1             |  |

| SAMPLES & TESTS |         |             | Water | STRATA                    |        |   |             | Geology               | Instrument/<br>Backfill |
|-----------------|---------|-------------|-------|---------------------------|--------|---|-------------|-----------------------|-------------------------|
| Depth           | Type No | Test Result |       | Reduced Level             | Legend | Depth (Thickness)   | DESCRIPTION |                       |                         |
| 0.10-0.30       | J/D     |             |       | [Cross-hatch pattern]     | (0.30) | Grass overlying dark brown topsoil (MADE GROUND)                                |             | [Black/White pattern] |                         |
| 0.60-0.80       | J/D     |             |       | [Cross-hatch pattern]     | (0.90) | Stiff (high strength) medium to dark brown sandy clay with bricks (MADE GROUND) |             | [Black/White pattern] |                         |
| 1.00-1.45       | SPT     | N=8         |       | [Cross-hatch pattern]     | 1.20   |   |             | [Black/White pattern] |                         |
| 1.40-1.60       | B       |             |       | [Horizontal line pattern] | (0.50) | Soft to firm light brown mottled grey CLAY (RESIDUAL SOIL)                      |             | [Black/White pattern] |                         |
| 1.80-2.00       | B       |             |       | [Horizontal line pattern] | (0.50) | Stiff to very stiff medium brown CLAY (RESIDUAL SOIL)                           |             | [Black/White pattern] |                         |
| 2.00-2.45       | SPT     | N=30        |       | [Horizontal line pattern] | 2.20   |   |             | [Black/White pattern] |                         |
| 2.40-2.60       | B       |             |       | [Horizontal line pattern] | (1.10) | Weak orangish brown weathered MUDSTONE (PENNINE LOWER COAL MEASURES FORMATION)  |             | [Black/White pattern] |                         |
| 3.00-3.30       | SPT     | 75 Blows    |       | [Horizontal line pattern] | 3.30   |   |             | [Black/White pattern] |                         |

AGS3 UK BH LOGS 23-087 HILLYCROFT.GPJ AGS3 ALL.GDT 3/3/23

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

|  |   |   |                        |
|--|---|---|------------------------|
| All dimensions in metres<br>Scale 1:25 | Client<br><b>Stephen Smith Construction</b> | Method/<br>Plant Used<br><b>Windowless Sampling</b> | Logged By<br><b>DO</b> |
|--|---|---|------------------------|



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 Telephone: 0191 378 6380

## BOREHOLE LOG

|  |                  |                  |                 |                             |  |
|--|------------------|------------------|-----------------|-----------------------------|--|
| Project<br><b>Hillycroft</b>                   |                  |                  |                 | <b>BOREHOLE No<br/>BH05</b> |  |
| Job No<br>23-087                               | Date<br>24-02-23 | Ground Level (m) | Co-Ordinates () |                             |  |
| Contractor<br><b>Arc Environmental Limited</b> |                  |                  |                 | Sheet<br>1 of 1             |  |

| SAMPLES & TESTS |         |             | Water | STRATA                    |   |  |             | Geology            | Instrument/<br>Backfill |
|-----------------|---------|-------------|-------|---------------------------|---|--|-------------|--------------------|-------------------------|
| Depth           | Type No | Test Result |       | Reduced Level             | Legend  | Depth (Thickness)  | DESCRIPTION |                    |                         |
| 0.10-0.30       | J/D     |             |       | [Cross-hatch pattern]     | (0.30)  | Grass overlying dark brown topsoil (MADE GROUND)                               |             | [Stippled pattern] |                         |
| 0.40-0.60       | J/D     |             |       |                           | (0.60)  | Light brown sandy clay (MADE GROUND)   |             |                    |                         |
| 1.00-1.45       | SPT     | N=9         |       |                           | (0.60)  | Firm dark brown / black colliery spoil (MADE GROUND)                           |             |                    |                         |
| 1.30-1.50       | J/D     |             |       | (0.60)                    |   |  |             |                    |                         |
| 1.80-2.00       | B       |             |       | (0.50)                    | Firm becoming stiff medium to dark brown clay with mudstone and coal (reworked) (MADE GROUND) |  |             |                    |                         |
| 2.00-2.45       | SPT     | N=28        |       | (0.50)                    |   |  |             |                    |                         |
| 2.40-2.60       | B       |             |       | [Horizontal line pattern] | (1.32)  | Weak orangish brown weathered MUDSTONE (PENNINE LOWER COAL MEASURES FORMATION) |             |                    |                         |
| 3.00-3.32       | SPT     | 75 Blows    |       |                           | (1.32)  |  |             |                    |                         |
|                 |         |             |       |                           | 3.32  |  |             |                    |                         |

AGS3 UK BH LOGS 23-087 HILLYCROFT.GPJ AGS3 ALL.GDT 3/3/23

| Boring Progress and Water Observations |      |       |  |                |           | Chiselling                                       |    |       | Water Added         |    | GENERAL REMARKS                                 |
|--|------|-------|--|----------------|-----------|--|----|-------|---------------------|----|---|
| Date                                   | Time | Depth | Casing Depth                             | Casing Dia. mm | Water Dpt | From   | To | Hours | From                | To |   |
|  |      |       |  |                |           |  |    |       |                     |    | Borehole remained dry during exploratory period |
| All dimensions in metres<br>Scale 1:25 |      |       | Client <b>Stephen Smith Construction</b> |                |           | Method/<br>Plant Used <b>Windowless Sampling</b> |    |       | Logged By <b>DO</b> |    |   |



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 Durham DH7 8PN  
 Telephone: 0191 378 6380

## BOREHOLE LOG

|  |                  |                  |                 |                             |  |
|--|------------------|------------------|-----------------|-----------------------------|--|
| Project<br><b>Hillycroft</b>                   |                  |                  |                 | <b>BOREHOLE No<br/>BH06</b> |  |
| Job No<br>23-087                               | Date<br>24-02-23 | Ground Level (m) | Co-Ordinates () |                             |  |
| Contractor<br><b>Arc Environmental Limited</b> |                  |                  |                 | Sheet<br>1 of 1             |  |

| SAMPLES & TESTS |         |                      | Water | STRATA        |                |  |             | Geology | Instrument/<br>Backfill |
|-----------------|---------|----------------------|-------|---------------|----------------|--|-------------|---------|-------------------------|
| Depth           | Type No | Test Result          |       | Reduced Level | Legend         | Depth (Thickness)  | DESCRIPTION |         |                         |
| 0.20-0.40       | J/D     |                      |       |               | (0.40)         | Dark grey colliery spoil fill (MADE GROUND)                                    |             |         |                         |
| 0.40-0.60       | J/D     |                      |       |               | (0.20)<br>0.60 | Light brown mottled grey CLAY (RESIDUAL SOIL)                                  |             |         |                         |
| 0.80-1.00       | B       |                      |       |               | (1.10)         | Stiff (high strength) medium brown mottled grey CLAY (RESIDUAL SOIL)           |             |         |                         |
| 1.00            | V       | 102kN/m <sup>2</sup> |       |               | (1.10)         |  |             |         |                         |
| 1.40-1.60       | B       |                      |       |               | 1.70           |  |             |         |                         |
| 1.80-2.00       | B       |                      |       |               | (0.65)         | Weak orangish brown weathered MUDSTONE (PENNINE LOWER COAL MEASURES FORMATION) |             |         |                         |
| 2.00-2.35       | SPT     | 69 Blows             |       |               | 2.35           |  |             |         |                         |

AGS3 UK BH LOGS 23-087 HILLYCROFT.GPJ AGS3 ALL.GDT 3/3/23

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

|  |   |   |                        |
|--|---|---|------------------------|
| All dimensions in metres<br>Scale 1:25 | Client<br><b>Stephen Smith Construction</b> | Method/<br>Plant Used<br><b>Windowless Sampling</b> | Logged By<br><b>DO</b> |
|--|---|---|------------------------|



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## BOREHOLE LOG

|  |                  |                  |                  |                             |  |
|--|------------------|------------------|------------------|-----------------------------|--|
| Project<br><b>Hillicroft</b>                   |                  |                  |                  | <b>BOREHOLE No<br/>BH07</b> |  |
| Job No<br>23-087                               | Date<br>24-02-23 | Ground Level (m) | Co-Ordinates ( ) |                             |  |
| Contractor<br><b>Arc Environmental Limited</b> |                  |                  |                  | Sheet<br>1 of 1             |  |

| SAMPLES & TESTS |         |             | Water | STRATA        |                |  |             | Geology | Instrument/<br>Backfill |
|-----------------|---------|-------------|-------|---------------|----------------|--|-------------|---------|-------------------------|
| Depth           | Type No | Test Result |       | Reduced Level | Legend         | Depth (Thickness)  | DESCRIPTION |         |                         |
| 0.20-0.40       | J/D     |             |       |               | (0.40)<br>0.40 | Dark grey colliery spoil fill (MADE GROUND)                                    |             |         |                         |
| 0.60-0.80       | J/D     |             |       |               | (1.10)         | Stiff light brown mottled grey CLAY (RESIDUAL SOIL)                            |             |         |                         |
| 1.00-1.45       | SPT     | N=19        |       |               | 1.50           |  |             |         |                         |
| 1.30-1.50       | B       |             |       |               | 1.50           |  |             |         |                         |
| 1.80-2.00       | B       |             |       |               | (0.71)         | Weak orangish brown weathered MUDSTONE (PENNINE LOWER COAL MEASURES FORMATION) |             |         |                         |
| 2.00-2.21       | SPT     | 65 Blows    |       |               | 2.21           |  |             |         |                         |

AGS3 UK BH LOGS 23-087 HILLYCROFT.GPJ AGS3 ALL.GDT 3/3/23

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

|  |   |   |                        |
|--|---|---|------------------------|
| All dimensions in metres<br>Scale 1:25 | Client<br><b>Stephen Smith Construction</b> | Method/<br>Plant Used<br><b>Windowless Sampling</b> | Logged By<br><b>DO</b> |
|--|---|---|------------------------|