

Mugen
Geo Ltd.

PHASE 1 & PHASE 2
SITE INVESTIGATION &
GEO-ENVIRONMENTAL APPRAISAL

LAND
AT
ROWLEY HILL
FENAY BRIDGE
HUDDERSFIELD
HD8 0JF

Document Status: FINAL
Revision: v1

For
Select Developments Limited
Rowley Hill
Fenay Bridge
Huddersfield
HD8 0JF

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Job N° MGEO 2512 HD8 0JF

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Executive Summary and Conceptual Site Model

Site Setting	Client	Select Developments Limited
	Site	Land at Rowley Hill Fenay Bridge Huddersfield HD8 0JF
	Site Location	419041E 414812N
	Current Land Use & Development Proposal	The site was located at Rowley Hill in Lepton a village situated approximately 4 miles east of Huddersfield centre. The site was accessed from Common End Lane with access to a level area of cleared ground in the south with the ground level rising in elevation to the north. Existing residential development was present to the north, south and west of the site. It is understood it is planned to construct a new residential development.
Conceptual Site Model Potential Pollutant Linkages	Surrounding Area	The site was situated within a largely residential setting.
	Geology	The British Geological Survey (BGS) 1:50,000 scale map solid & drift Digital Geological Map of Great Britain indicates the site is underlain by the Kirkburton Sandstone, a sandstone forming part of the Pennine Lower Coal Measures Formation. The Black Bed Coal seam is recorded to underlie the site at shallow depth. These strata will weather to both cohesive and granular strata depending on the site aspect and local conditions.
	Hydrogeology	The aquifers within the bedrock deposits are designated as 'Secondary A'. These are described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and a source of base flow to rivers.
	Possible pollutant linkages on undeveloped site determined from a desk study and site walkover	
	Preliminary Sources	The previous small buildings in the north of the site are considered potential sources of contamination that could impact the site. The land uses noted on surrounding land are considered unlikely to impact the site given the site setting however, did include coal mining and a Fireworks Factory.
	Preliminary Pathways	<ul style="list-style-type: none"> • Ingestion, inhalation or direct contact • Leaching through unsaturated zone • Direct contact with free phase or dissolved phase • Fugitive dust • Migration through Soils or groundwater to indoor air
	Potential Receptors	<ul style="list-style-type: none"> • Site Workers • End users of the site • Neighbours • Groundwater and possible abstractors or aquatic ecosystems • Building Products
	Site Investigation Findings	<p>Geo-environmental – The findings of the generic risk assessment are that no significant sources of contamination were identified as part of the site investigation. The ground investigation confirmed the localised areas with made ground comprised predominantly reworked natural strata from surface.</p> <p>Ground Gas Risk - The risks associated with the ground gases methane (CH₄) and carbon dioxide (CO₂) have been assessed with reference to BS 8485:2015 and guidelines from CIRIA 665 and the NHBC. It was concluded that the site should</p>

		be regarded as “Characteristic Situation 1” (CS1) and no gas protection measures are considered necessary.
	Uncertainties & Limitations	The site access was restricted by the former utility service runs. The report findings should be reconsidered as part of any development changes.

This is only a summary.

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Appendix B – Environmental Dataset

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Appendix E – Borehole & Trial Pit Logs

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Appendix G – Gas Monitoring Report

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Appendix I –Standard Procedures and Terms & Conditions

Note: This report has been formatted to be read as a PDF.

1 INTRODUCTION

Mugen Geo Ltd (Mugen Geo) were commissioned by Select Developments Limited to undertake a combined Phase 1 and Phase 2 investigation of 'Land at Rowley Hill Fenay Bridge Huddersfield HD8 0JF' (the site).

1.1 Scope and objective of the report

This report has been prepared in support of a planning application for a new residential development at the site.

This report has been developed in accordance with the YALPAG Technical Guidance for Developers Landowners & Consultants Version 12.2 – July 2023 (Ref 12), Land Contamination Risk Management (Ref. 1), and other best practice guidance cited at the end of this report.

The study has not included checks on services on or adjacent to the site, and no structural, ecological or asbestos surveys have been carried out.

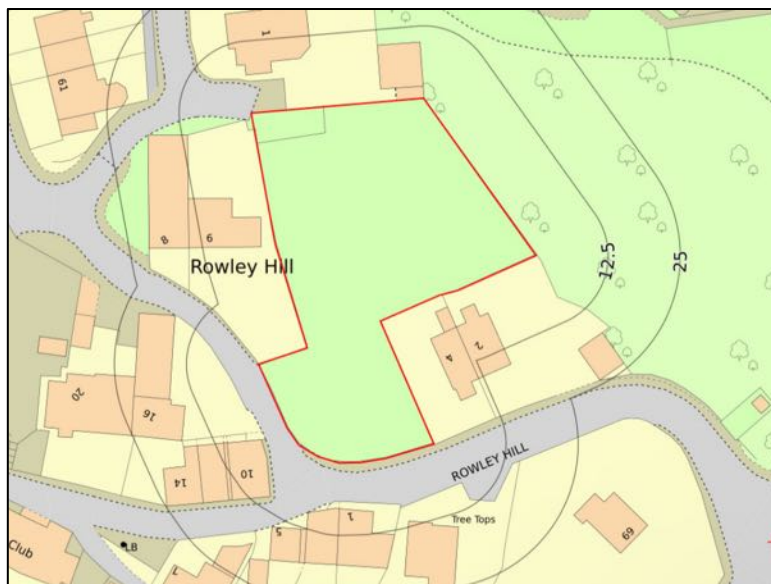


Figure 1 – Extract image of Site Location Plan

1.2 Site Description

The site was an irregular shaped parcel of land as shown in figure 1 and the location plan included in appendix A. The site was located in the village of Lepton located approximately 4 miles east of Huddersfield centre.

The site was accessed from Common End Lane with a gated access to an area of rough ground in the south. Existing residential development was present to the north, south and west.



Figure 2 –Extract satellite image with site outlined in red

The ground level rose gently in elevation to the north with the topographic low in the south of the site near to the existing access.

There were several mature trees on the eastern site boundary and a level area across the centre and rising to the northern site boundary.

A drain run was present along the central part of the site discharging to the south-west based upon the position of existing access chambers.

No evidence of Japanese Knotweed or other invasive species was identified during the site walkover, however, a detailed inspection of the fauna was not undertaken.

The site is shown on the indicative plans included in appendix A and figures in this section.

Site details are summarised in Table 1.2 below:

Detail	Remarks
Location	Land at Rowley Hill Fenay Bridge Huddersfield HD8 0JF
NGR	419041E 414812N
Area	0.19ha
Known services	Underground sewers, drainage, telecoms, electricity, gas suspected

Table 1.2 – Site Summary

1.3 Limitations

This report has been prepared for the sole use and reliance of the Client named above and cannot be relied upon by any other parties without the express written authorisation of Mugen Geo Ltd. Any unauthorized third party relies on this report at their own risk and the authors owe them no duty of care.

The report should be read in its entirety, including all associated drawings and appendices. Mugen Geo Ltd cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context. The report presents observations and factual data obtained during our site investigation, and provides an assessment of geo-environmental issues with respect to information provided by the Client and specific to the proposed development. Further advice should be sought from Mugen Geo Ltd prior to significant revision of the development proposals.

The geo-environmental investigation was undertaken on behalf of The Client (referenced above). The investigation was designed based upon information supplied by the client & on the assumption that the site is to be developed for residential use with private gardens.

The findings and opinions based upon the assessment conveyed in this report is based on information obtained from sources which Mugen Geo Ltd believe are reliable. All reasonable endeavours have been made to source the information from reputable organisations, however, Mugen Geo Ltd accepts no responsibility for inaccuracies in the data supplied or for opinions based on any such inaccurate data. No attempt has been made to independently verify any data collected by others or from other sources.

Whilst the prepared report may express an opinion on the possible configuration of strata, contaminants or gases between or beyond exploratory hole positions or on the possible presence of features based on visual, verbal or published evidence, this is for guidance only, and no liability can be accepted for its accuracy.

Comments on groundwater and ground gas conditions are based on observations made at the time of the investigation. It should be noted, however, that

groundwater and ground gas levels may vary from those reported due to seasonal or other effects.

Consideration should be given to the possibility that exploratory holes excavated as part of this investigation, and indeed any previous ground work by others, may be encountered beneath or within the influence of the proposed development. Mugen Geo Ltd cannot be held responsible for failure of excavations or structural failures caused by the location of foundations of any form of structure within the influence of exploratory holes.

Existing manhole covers were not lifted and drainage runs not be inspected during the course of this ground investigation.

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

Mugen Geo Ltd reserves the right to amend their conclusions and recommendations in the light of further information that may become available.

2 GEO-ENVIRONMENTAL SETTING

2.1 Geology

The British Geological Survey (BGS) 1:50,000 scale map solid & drift Digital Geological Map of Great Britain indicates the site is underlain by the Kirkburton Sandstone, a sandstone forming part of the Pennine Lower Coal Measures Formation. . These strata will weather to both cohesive and granular strata depending on the site aspect and local conditions.

Map records indicate the site is underlain by the Black Bed Coal seam at shallow depth. The 80 Yard coal seam is recorded to be 0.20 – 1.80m thick.

2.1.1 BGS Borehole Viewer

The BGS has made available borehole records taken from the National Geoscience Data Centre and may be used for commercial purposes providing their source is identified.

An inspection of the available borehole records did not identify records within the vicinity of the site that provide additional detail.

2.2 Radon

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. No Radon protective measures are necessary.

2.3 Historic Map Records

The historic development of the site and surrounding land has been summarised with reference to available map records. Historically, maps were updated at regular intervals, providing a record of site uses and changes in use over time, however, they only provide a 'snapshot' of land use at the time of the survey and activities that may have taken place between surveys is not known and in some cases sensitive information (such as military sites) would not be recorded.

Date	Information Source	Land Use of Site	Land Use of Surroundings
1854	County Series 1:10,560 scale	The site is undeveloped land.	Development and infrastructure is marked to the west and south of the site on surrounding land. Rowley Quarry (Sandstone) is marked on land to the north of the site.

Date	Information Source	Land Use of Site	Land Use of Surroundings
1888-1892	County Series 1:2,500 scale 1:10,560 scale	Small buildings are marked in the south of the site.	Residential type development and infrastructure noted on surrounding land to the north east south west of the site. A Spring is marked immediately north west of the site and a Well marked immediately to the east of the site. A Fireworks Manufactory was marked on land approximately 100m to the north west of the site with several small structures marked as Magazines. An Airshaft was marked approximately 200m south west of the site. An Airshaft was marked approximately 200m north east of the site.
1904-1906	County Series 1:2,500 scale 1:10,560 scale	No significant changes noted.	No significant changes noted.
1916	County Series 1:2,500 scale	No significant changes noted.	No significant changes noted.
1931-1938	County Series 1:10,560 scale	No significant changes noted.	A line of buildings and small structures marked on land approximately 40m to the north and west of the site assumed to be associated with the Fireworks Manufactory.
1948	County Series 1:2,500 1:1,250 scale	No significant changes noted.	No significant changes noted.
1951-1956	County Series 1:10,560 scale	No significant changes noted.	No significant changes noted.
1961	County Series 1:2,500 1:1,250 scale	A building is marked in the north of the site. Buildings previously marked in the south of the site are no longer seen.	A large Works is marked immediately north of the site with a complex of buildings and structures. Several magazine type structures remain further to the north.
1965-1968	County Series 1:2,500 1:10,560 scale	No significant changes noted.	No significant changes noted.
1971-1979	National Grid 1:1,250 1:10,000 scale	No significant changes noted.	Sometime prior to 1975 a School was marked on part of the former Fireworks Factory approximately 60m north east of the site.
1985-1993	National Grid 1:1,250 1:10,000 scale	Minor changes in building footprint marked in the north of the site.	No significant changes noted. The Lion Works is marked approximately 20m north of the site.
1990-1993	National Grid 1:2,500 Scale	No significant changes noted.	No significant changes noted.
2001-2003	National Grid 1:10,000 Scale	No significant changes noted.	No significant changes noted.
2015	National Grid 1:10,000 Scale	No significant changes noted.	No significant changes noted.

Date	Information Source	Land Use of Site	Land Use of Surroundings
2025	National Grid 1:10,000 Scale	No significant changes noted.	No significant changes noted.

The previous buildings in the north and south of the site are considered potential sources of contamination that could impact the site. The land uses noted on surrounding land including the Fireworks Manufactory Works and structures are considered to have potential to impact the site given the site setting.

2.3.1 Environmental Permits, Incidents & Registers

There were no historic IPC Authorisations within 500m of the study site.

There were no records of Part A(1) and IPPC Authorised Activities within 500m of the study site.

There were no Water Industry Referral (potentially harmful discharges to sewer) or Red List Discharge Consents record within 500m of the site.

There were no records of List 1 or List 2 Dangerous Substances Inventory Sites within 250m of the study site.

There were no Part A(2) Activities and Enforcements within 250m of the study site..

There were no records of Category 3 or 4 Radioactive Substance Licences within 500m of the study site

There were no Licensed Discharge Consents recorded within 250m to the site.

There were no significant Environment Agency recorded pollution incidents within 250m of the site.

There were no records of any sites determined as contaminated land under section 78R of the Environmental Protection Act 1990.

Environment Agency and Local Authority Data did not identify any other significant authorisations or licenses relevant to the site or within 250m of the site.

2.4 Landfill Sites

There were no Environment Agency records of either active or historic landfills within 250m of the site.

No Local Authority Landfills were recorded within 250m from the site. There were no Waste Exemptions within 250m from the site.

3 SITE INVESTIGATION

3.1 General

The ground investigation was designed by Mugen Geo Ltd with consideration of the preliminary conceptual site model and the available access at the time.

The principal objectives of the study were to assess the underlying ground conditions. Window sampling was undertaken to recover environmental samples and install gas monitoring wells for site characterisation. Trial pitting was undertaken to additionally assess the ground profile and to provide an indication whether a soakaway system will work.

3.2 Field Works

The ground investigation was undertaken in phases with the window sampling undertaken on the 18th December 2026. The trial pits were excavated on the 31st January 2026 and the soakaway test undertaken on 17th April 2026. The weather during the ground investigations was generally cold and sunny with occasional showers.

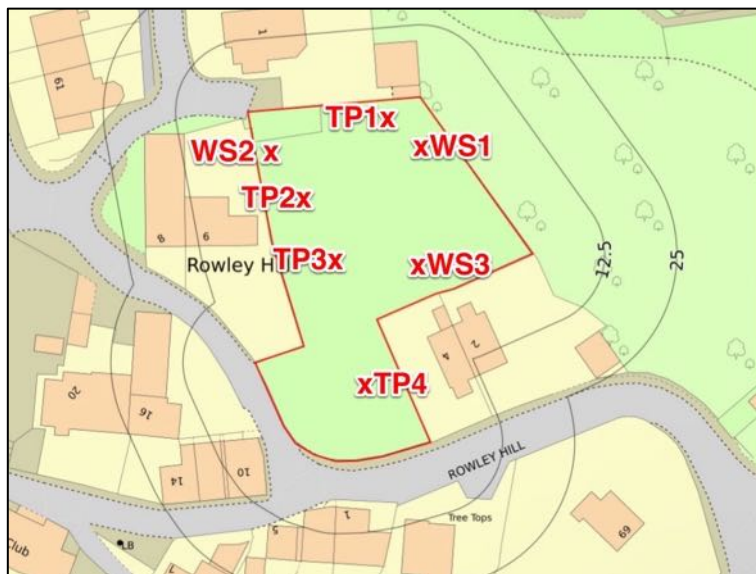


Figure 3 – Borehole & trial pit location plan

3.2.1 Window Sampling

Window sampling was undertaken to provide good site coverage, recover environmental samples and install gas monitoring wells. The window sampling

boreholes were logged by an Engineering Geologist in accordance with BS 5930 (Ref. 3) and Eurocode 7 (Ref. 4) requirements. Method Statements and a Health & Safety Plan for the work were prepared prior to mobilisation to site.

A total of No. 7 geo-environmental samples were taken from the borehole positions during the site works in accordance with BS 10175:2011, Section 8.3 (ref.9). Samples were stored in cool boxes (<4°C).

At WS1, made ground was recorded from ground level and comprised a brown very slightly organic slightly gravelly silty clay to approximately 0.4m below ground level (bgl). From 0.4m made ground comprised largely reworked natural strata recovered as a brown yellow and black slightly gravelly silty clay to approximately 2.4m bgl. An extremely weak brown and grey thinly laminated fine grained sandstone was recorded to 2.5m bgl where the borehole was terminated on hard stratum. A gas and groundwater monitoring well was installed upon completion.

At WS2, made ground was recorded from ground level and comprised a brown very slightly organic slightly gravelly silty clay to approximately 0.3m bgl. From 0.3m made ground comprised largely reworked natural strata recovered as a brown yellow and black slightly gravelly silty clay to approximately 1.35m bgl. An extremely weak brown and grey thinly laminated fine grained sandstone was recorded to 1.4m bgl where the borehole was terminated on hard stratum. A gas and groundwater monitoring well was installed upon completion.

At WS3, made ground was recorded from ground level and comprised a brown very slightly organic slightly gravelly silty clay to approximately 0.3m bgl. From 0.3m made ground comprised largely reworked natural strata recovered as a brown yellow and black slightly gravelly silty clay to approximately 1.40m bgl. An extremely weak brown and grey thinly laminated fine grained sandstone was recorded to 1.50m bgl where the borehole was terminated on hard stratum. A gas and groundwater monitoring well was installed upon completion.

Borehole logs are provided in appendix E, and the results of the chemical analysis results are provided in appendix F.

3.3 Trial Pitting

The trial pits were excavated to provide coverage to confirm the absence of a significant thickness of made ground within the central part of the site.

At TP1, made ground was recorded from ground level and comprised a brown very slightly organic slightly gravelly silty clay to approximately 0.4m bgl. From 0.4m made ground comprised largely reworked natural strata recovered as a brown yellow and black slightly gravelly silty clay to approximately 0.9m bgl. An extremely weak brown and grey thinly laminated fine grained sandstone was recorded to 1.4m bgl where the trial pit was terminated on hard stratum. The trial pit was backfilled with arisings upon completion.

At TP2, made ground was recorded from ground level and comprised a brown very slightly organic slightly gravelly silty clay to approximately 0.2m bgl. From 0.2m natural strata of a firm orangish brown slightly gravelly silty clay was recovered to approximately 0.5m bgl grading to an extremely weak brown and grey thinly laminated fine grained sandstone to 0.6m bgl where the trial pit was terminated on hard stratum. The trial pit was backfilled with arisings upon completion.

At TP3, made ground was recorded from ground level and comprised a brown very slightly organic slightly gravelly silty clay to approximately 0.2m bgl. From 0.2m natural strata of a firm orangish brown slightly gravelly silty clay was recovered to approximately 0.7m bgl grading to an extremely weak brown and grey thinly laminated fine grained sandstone to 1.0m bgl where the trial pit was terminated on hard stratum. The trial pit was backfilled with arisings upon completion.

Further excavation was undertaken in the south of the site on the 17th April 2026 with an additional pit excavated to undertake a soakaway test.

At TP4, made ground was recorded from ground level and comprised a brown very slightly organic slightly gravelly silty clay to approximately 0.4m bgl. From 0.4m natural strata of a firm orangish brown slightly gravelly silty clay was recovered to approximately 1.2m bgl grading to an extremely weak brown and grey thinly laminated fine grained sandstone to 1.5m bgl where the trial pit was terminated on hard stratum. Upon completion of the soakaway test the trial pit was backfilled with arisings upon completion.

3.3.1 Soakaway Test

Soakaways have been the traditional way to dispose of stormwater from buildings and paved areas remote from a public sewer or watercourse. In recent years, soakaways have been used within urban, fully sewered areas to limit the impact on discharge of new upstream building works and to avoid costs of sewer upgrading outside a development. They must discharge their stored water sufficiently quickly to provide the necessary capacity to receive run-off from a subsequent storm. The time taken for discharge depends upon the soakaway shape and size, and the surrounding soil's infiltration characteristics. They can be constructed in many different forms and from a range of materials but can be considered unsuitable in a number of situations.

Trial pit TP4 was excavated using a JCB 3CX with a back hoe to confirm the ground conditions underlying the site and undertake a soakaway test. The trial pit position was located near to where the soakaway system would likely be located as part of the planned development.

The trial pit was excavated to approximately 1.5m bgl and terminated within the extremely weak brown and grey thinly laminated fine grained sandstone noted

above. The trial pit surface dimensions were 0.6m wide x 1.6m long for trial pit TP1. The pit was filled to approximately 1.0m bgl. After an initial drop in water level of approximately 10mm there was no further drop in water level and after 2 hours there was no significant movement in water level and the test was terminated.

A selection of photos showing the trial pit and test and general site condition is included as part of appendix B.

The soakaway test as conducted was considered sufficient to confirm that a soakaway system is unlikely to provide the indicated infiltration rate required for the accommodation of surface water drainage for surface run-off from the site. It is noted that the existing residential properties on land to the south are at a lower elevation relative to the site. Soakaways should be positioned at least 5m away from the foundations of any permanent structures. Given the site setting and development proposal it is assumed that some form of attenuation scheme is likely to be more suitable.

3.3.2 Rotary Drilling

Three rotary open-hole boreholes were drilled to 10m depth at the site at the locations identified as BH1 to BH3 in the plan presented as figure 4 below and included as part of appendix C.

The rotary drilling was licensed under a Coal Authority permit to 'Enter or Disturb Coal Authority Mining Interests' (ref. 31231). The intrusive works were undertaken by experienced and knowledgeable drillers from Cape Site Services using full water flush drilling methods. The weather during the ground investigations was dry and sunny.

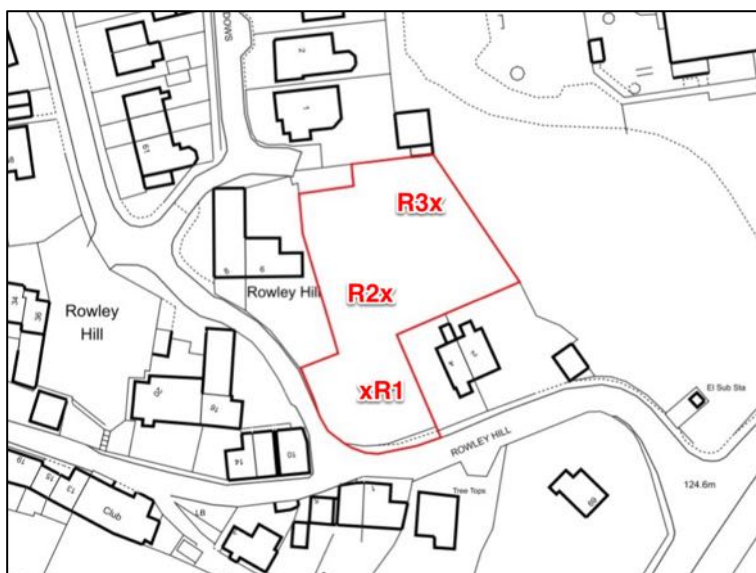


Figure 4 – Rotary borehole location plan

The ground conditions encountered during the investigation were generally in accordance with published records.

At borehole BH1, soils were recorded to approximately 1m bgl over sandstone to approximately 2.9m bgl. From 2.9m a mudstone was recorded to 6.8m bgl. A coal seam was recorded from 6.8m to 6.9m bgl over mudstone to 8.4m bgl over sandstone to 10m bgl where the borehole was terminated.

At borehole BH2, soils were recorded to approximately 0.9m bgl over sandstone to approximately 2.3m bgl. From 2.3m a mudstone was recorded to 6.7m bgl. A coal seam was recorded from 6.7m to 6.8m bgl over mudstone to 8.3m bgl over sandstone to 10m bgl where the borehole was terminated.

At borehole BH3, made ground was recorded to approximately 0.8m bgl over natural soils to approximately 1.9m bgl over interbedded sandstone and mudstone to approximately 3.5m bgl. From 3.5m bgl a mudstone was recorded to 4.6m bgl. A 'dirty' coal seam was recorded from 4.6m to 4.8m bgl over mudstone to 6.9m bgl over sandstone to 10m bgl where the borehole was terminated.

The rotary borehole logs and the drillers logs are included as part of appendix C.

3.4 Interpretation

Based upon the rotary drilling results there is considered to be a low risk of instability at the site due to no workings recorded at depth. A 100-200mm thick coal seam was recorded at all positions at depths between 4.6-4.8m in the lower part of the site and 6.8m in the north of the site.

3.4.1 Soil Gas Emissions (CH₄, CO₂, O₂)

The three monitoring wells were installed during the drilling operations to assist gas monitoring. Site visits were undertaken by ground gas specialists Geoengineer monitoring between the 22nd December 2025 and 26th February 2026. These visits consisted of extended bulk ground gas sampling during a period of dropping barometric pressure over 20 minutes and dipping of the boreholes.

Screening results are provided as appendix F. Refer to section 6.1.2 and the recommendations in section 8 for further discussion of ground gases.

4 LABORATORY TESTING & MONITORING

4.1 Laboratory Testing

Environmental Laboratory testing was scheduled on samples of the made ground and natural soils taken from the window sample positions. Envirolab Limited undertook the testing to a schedule drawn up by Mugen Geo Ltd.

Selected samples were scheduled for a basic suite of determinants detailed in the analytical results for soil samples are provided within appendix F.

All testing was undertaken on a standard 10 day turnaround time.

5 CONTAMINATION ANALYSIS

5.1 Analytical Strategy

The site investigation comprised random sampling locations. Soil samples were recovered from across the relevant depth range (generally less than 1m) for the conceptual model. The sampling was designed to consider surface soil and root zone to characterise the potentially significant exposure pathways.

The analytical suite comprised generic determinands of heavy metals, inorganics and hydrocarbons for contaminants associated with former historic uses. These were selected with reference to the DoE Industry Profiles.

5.1.1 Results of Chemical Analysis - Soils

Seven samples of the recovered soils were analysed by i2 Analytical. The test results are provided in appendix F. The results have been screened in relation to Tier 1 contaminated land risk assessment criteria which are currently in use by the industry for 'residential with plant uptake' at 1% Soil Organic Matter (SOM). The results of the screening are summarised in the following tables.

Determinand	Units	Screening criteria	Assessment Criteria	No of Samples tested	Min	Max	No. of Exceedences
Arsenic	mg/kg	37	LQM/CIEH S4ULs (2015)	4	18	23	0
Cadmium	mg/kg	11	SGV	4	<0.1	<0.1	0
Chromium	mg/kg	910	LQM/CIEH S4ULs (2015)	4	14	18	0
Lead	mg/kg	200	C4SL	4	66	93	0
Mercury	mg/kg	40	LQM/CIEH S4ULs (2015)	4	<0.17	<0.17	0
Nickel	mg/kg	180	LQM/CIEH S4ULs (2015)	4	14	17	0
Copper	mg/kg	2400	LQM/CIEH S4ULs (2015)	4	36	44	0
Zinc	mg/kg	3750	LQM/CIEH S4ULs (2015)	4	87	114	0
Selenium	mg/kg	250	LQM/CIEH S4ULs (2015)	4	2	2	0

Table 61.1 Soil laboratory Analysis Results – metals & metalloids

Determinand	Units	Screening criteria	Assessment Criteria	No of Samples tested	Min	Max	No. of Exceedences
Acenaphthene	mg/kg	210	LQM/CIEH S4ULs (2015)	4	<0.01	0.01	0
Acenaphthylene	mg/kg	170	LQM/CIEH S4ULs (2015)	4	<0.01	C	0
Anthracene	mg/kg	2400	LQM/CIEH S4ULs (2015)	4	<0.02	0.03	0
Benzo(a)anthracene	mg/kg	7.2	LQM/CIEH S4ULs (2015)	4	0.07	0.20	0
Benzo(a)pyrene	mg/kg	5	LQM/CIEH S4ULs (2015)	4	0.07	0.21	0
Benzo(b)fluoranthene	mg/kg	2.6	LQM/CIEH S4ULs (2015)	4	0.17	0.29	0
Benzo(ghi)perylene	mg/kg	320	LQM/CIEH S4ULs (2015)	4	<0.05	0.16	0
Benzo(k)fluoranthene	mg/kg	77	LQM/CIEH S4ULs (2015)	4	<0.07	<0.07	0
Chrysene	mg/kg	15	LQM/CIEH S4ULs (2015)	4	0.08	0.24	0
Dibenz(ah)anthracene	mg/kg	0.24	LQM/CIEH S4ULs (2015)	4	<0.04	<0.04	0
Fluoranthene	mg/kg	280	LQM/CIEH S4ULs (2015)	4	0.13	0.41	0
Fluorene	mg/kg	170	LQM/CIEH S4ULs (2015)	4	<0.01	<0.01	0
Indeno (123cd)pyrene	mg/kg	27	LQM/CIEH S4ULs (2015)	4	0.05	0.17	0
Naphthalene	mg/kg	2.3	LQM/CIEH S4ULs (2015)	4	<0.03	<0.03	0
Phenanthrene	mg/kg	95	LQM/CIEH S4ULs (2015)	4	0.08	0.21	0
Pyrene	mg/kg	620	LQM/CIEH S4ULs (2015)	4	0.11	0.35	0

Table 61.2 Soil laboratory Analysis Results – hydrocarbons

Table 61.3 Soil screening values – hydrocarbons residential with plant uptake

Concentrations of heavy metals were all below their relevant screening values within the shallow soils. Concentrations of selected hydrocarbons were all below their relevant screening values within the shallow soils. No Asbestos fibres were detected in selected samples.

5.1.2 Results of Ground Gas Monitoring

GeoEngineer were commissioned to undertake an extended bulk ground gas sampling and provide an assessment of the site. The report incorporating the gas monitoring data is included in its entirety as appendix G and should be referred to for a detailed assessment.

Guidance on assessing the risk posed by hazardous ground gases is given within CIRIA Report C665 'Assessing risks posed by hazardous ground gases to buildings'. The risk to the site has been assessed for a residential end use.

Quantitative Risk Assessment Based on the documentation presented in BS8485:2015+A:2019, which is the 'Code of practice for the characterisation and remediation from soil-gas in affected developments" the hazardous gas flow rate was calculated.

The maximum carbon dioxide and methane concentration was used for the gas concentration and the maximum gas flow across all boreholes and monitoring events was taken for the borehole flow rate, thus simulating a worst-case scenario, and increasing the degree of conservatism adopted.

6 GEO-ENVIRONMENTAL RISK ASSESSMENT AND REVISED CONCEPTUAL SITE MODEL

6.1 Introduction

With respect to historic land contamination, Planning Policy Guidance: Planning and Pollution Control (PPS 23) (Ref.7) states that ground contamination is a material planning consideration. Local planning authorities must take account of such issues in determining applications for planning permission. In addition, building work is regulated under the Building Regulations 1991. Schedule 1 (Ref. 8) requires 'precautions shall be taken to avoid danger to health and safety caused by substances found on, or in the ground covered by the building'.

Environmental Risk has been addressed by adopting a site-specific qualitative approach to identify the risk of environmental harm. The guiding principle of this approach is an attempt to establish connecting links between a hazardous source, via an exposure pathway to a potential receptor. This is in accordance with the Department of Environment, Transport and Regions (DETR) guidance on Contaminated Land (Ref.6) and the Construction Industry Research and Information Association (Ref. 7).

By considering where a viable pathway exists, which connects a source with a receptor, this assessment will identify where pollutant linkages may exist. A pollutant linkage is the term used by the DETR in their standard procedure on risk assessment. If there is no pollutant linkage, then there is no risk. The risk assessment conceptual exposure model used is for the standard CLEA UK residential with plant uptake.

Contaminated land risk assessment is based on development of a conceptual model for the site. This is representation of the relationship between contaminant sources, pathways and receptors developed on the basis of hazard identification.

6.2 Identified Sources

Concentrations of heavy metals were all below their relevant screening values within the shallow soils. Concentrations of all hydrocarbons were below their relevant screening values. No Asbestos fibres were recorded in selected samples.

Groundwater was not encountered in significant volumes during the site investigation. Taken in context of the intrusive investigations and the site setting it is considered reasonable to conclude that significant on-going entry of substances from the site itself is not occurring.

6.3 Qualitative Risk Assessment and Conceptual Site Model

A qualitative risk assessment has been undertaken for these potential source-pathway-receptor linkages. This is based on consideration of both:

- The likelihood of an event (probability – takes into account both the presence of the hazard and receptor and the integrity of the pathway);
- The severity of the potential consequence (takes into account both the potential severity of the hazard and the sensitivity of the receptor).

The risk assessment has been based on redevelopment of the site with a proposed residential use with private gardens.

6.3.1 Findings of the Qualitative Risk Assessment

The findings of the generic risk assessment are that no significant sources of contamination were identified as part of the site investigation. No soils remediation is considered necessary for the proposed development.

The ground investigation confirmed the areas with made ground comprised predominantly reworked natural strata from surface.

Taken in context of the intrusive investigations and the site setting it is considered reasonable to conclude that significant on-going entry of substances from the site itself is not occurring.

During development of the site, all workers should remain vigilant to the possible risk of encountering areas of potentially contaminated material. Should potentially contaminated material be encountered, site management should be informed. Further testing may then be required to assess the risk to health and safety of the site workers and the environment.

6.3.1.1 Ground Gas Risk

The risks associated with the ground gases methane (CH₄) and carbon dioxide (CO₂) have been assessed with reference to BS 8485:2015 (Ref. 14) and guidelines from CIRIA 665 and the NHBC.

It was concluded that the site should be regarded as Characteristic Situation 1 (British Standard Class). For Characteristic Situation 1 no gas protection is necessary with reference to the requirements of the BS8485:2015+A1:2019.

7 RECOMMENDATIONS

7.1 Introduction

It is proposed to redevelop the site with a residential development. It is considered sufficient to note that the further works should be undertaken in a way that does not create new pathways for future site users.

7.2 Foundation Considerations

The site should be suitable for standard strip foundations. Made ground is not generally considered a suitable founding material and foundations should be taken through it into underlying natural strata of adequate bearing capacity.

It is recommended that foundations are suitably reinforced to reduce the potential for differential settlement. All excavations for foundations should be inspected by a suitably qualified engineer to confirm the uniformity and competence of the formation.

The allowable bearing capacity is a function of the foundation configuration, depth and the ability of the structure to tolerate such movements and should therefore be validated during detailed design. Based upon the encountered ground conditions, provided suitable land drainage is in place an allowable bearing capacity of at least 100kN/m² for settlements of < 25mm at 1m bgl can be assumed. If a greater allowable bearing capacity is required, then foundations will be required to be excavated to greater depth, founding in the less weathered bedrock.

Houses located near existing or proposed new trees must have their foundations sited below the root growth zone. The NHBC Standards Chapter 4.2 "Building Near Trees" gives guidance on foundation criteria, depths and construction that should be followed. All services will also have to be similarly protected.

Where service trenches cross the site, foundations should be placed below a line drawn up at 45° from the base of any service excavations.

7.3 Further Work

Further characterisation of stockpiled materials is likely to be required if off-site disposal is proposed.

7.3.1 Waste Management

Any material excavated on site may be classified as waste and it is the responsibility of the holder of the material to form their own view on whether or not it is waste. This includes determining when waste that has been treated in some way can cease to be classified as waste for a particular purpose.

One of the ways this can be achieved is set out in the Development Industry Code of Practice (CoP) (CL:AIRE, 2008).

The handling, re-use or disposal of waste is regulated by the Environment Agency. The Agency will take into account the use of the CoP in deciding whether to regulate materials as waste. If materials are dealt with in accordance with the CoP, the Agency considers that those materials are unlikely to be waste at the point when they are to be used for the purpose of land development. This may be because the materials were never discarded in the first place, or because they have been submitted to a recovery operation and have been completely recovered so they have ceased to be waste.

At this stage none of the Made Ground has been tested against Waste Acceptance Criteria (WAC) as it is unclear if any material were removed from site for disposal. 'WAC' testing would be required for any material disposed of off-site.

7.4 Uncertainties & Limitations

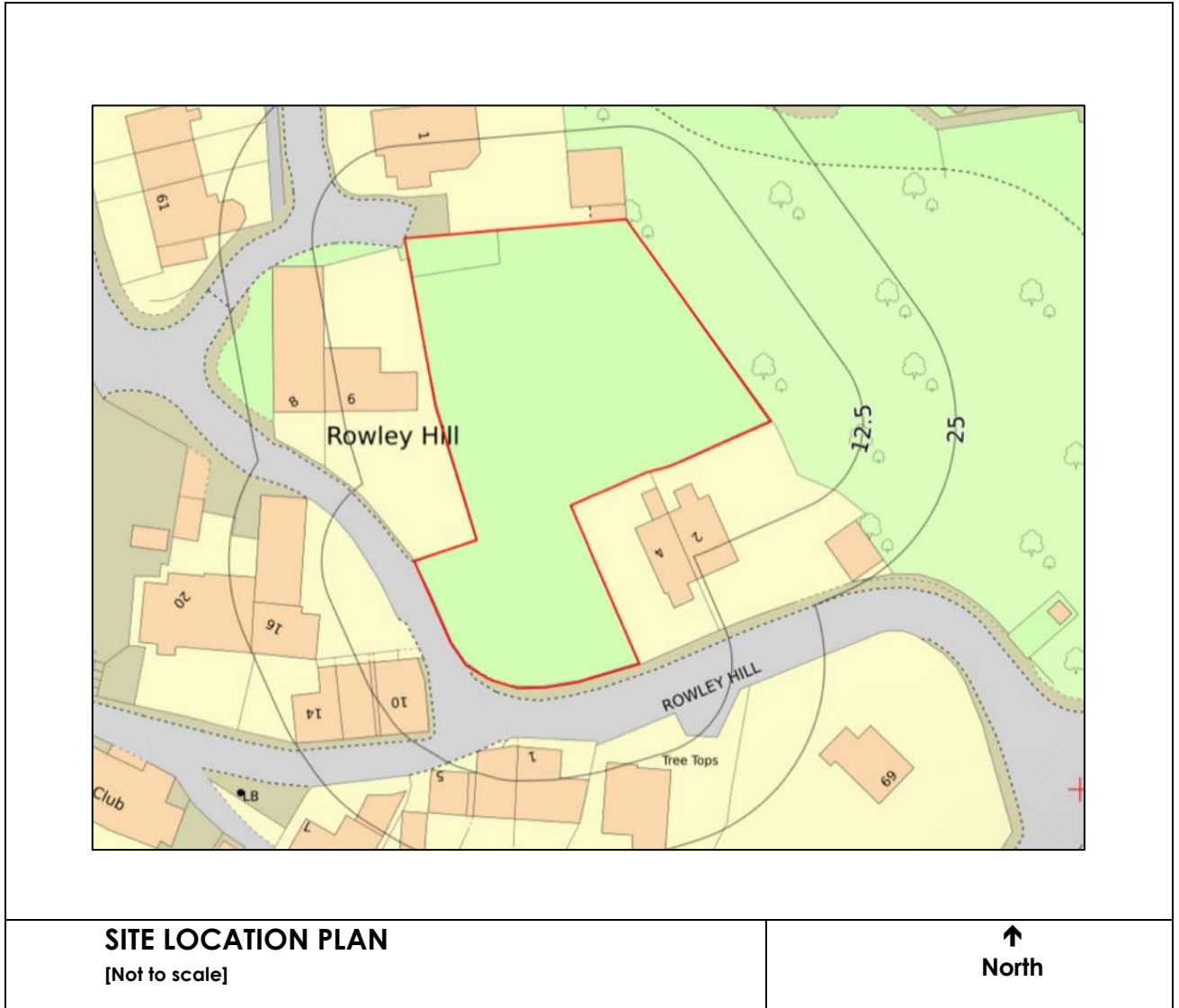
The site access was restricted by the site condition at the time of investigation. This report has presented options with respect to development that are considered technically feasible and in line with current good practice. Consequently, we would expect to obtain regulatory approval for whichever option is adopted, although this cannot be guaranteed. Copies of this report should be forwarded to the relevant regulatory authorities (NHBC & Local Authority) for their comment/approval.

Mugen Geo Ltd believes however, that the current investigation accurately models the site and that the suggested development strategy is adequate for the conditions already encountered at the site.

8 REFERENCES

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APPENDIX A
SITE LOCATION PLANS



APPENDIX B
ENVIRONMENTAL DATASET

APPENDIX C

SITE PHOTOS

General site photos



General view looking north from southern site boundary



General view to the north east from near the site centre



General view to the north west across the north of the site



General view to the south from near the site centre



General view to the south from the north of the site



General view to the east across the centre of the site



TP1 pit



TP1 spoil



TP201 spoil



TP3 pit



TP4 pit



TP4 spoil

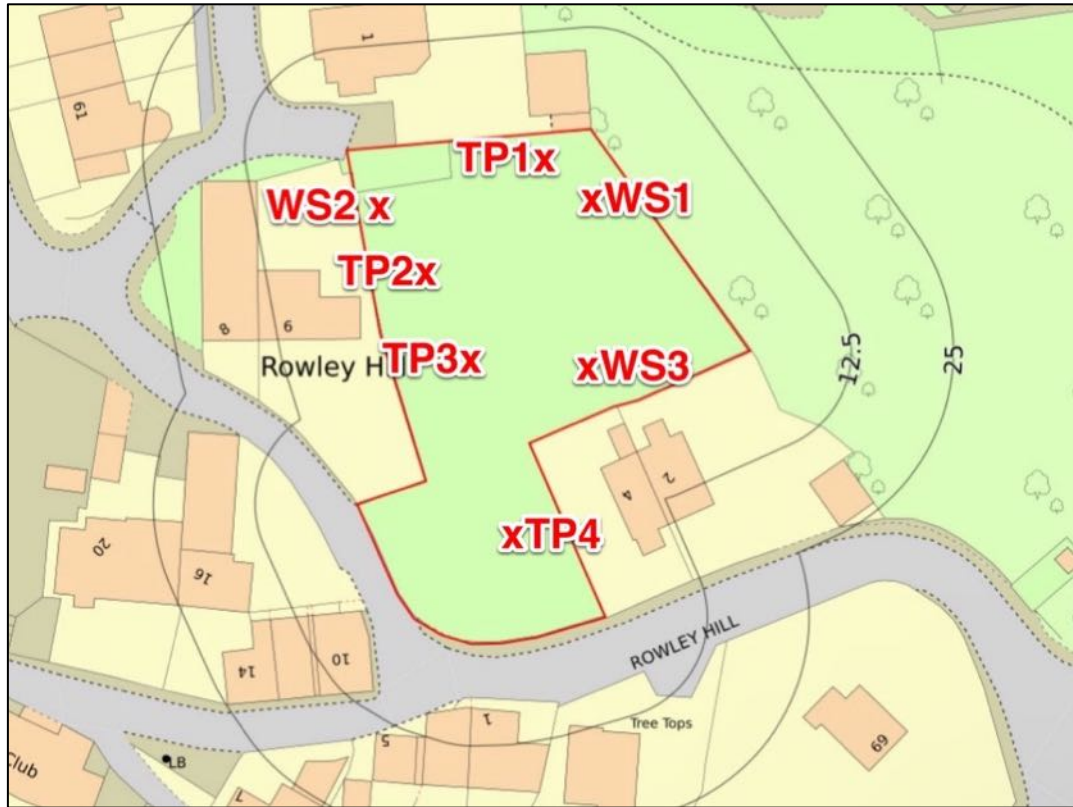


TP4 filling operation for soakaway test



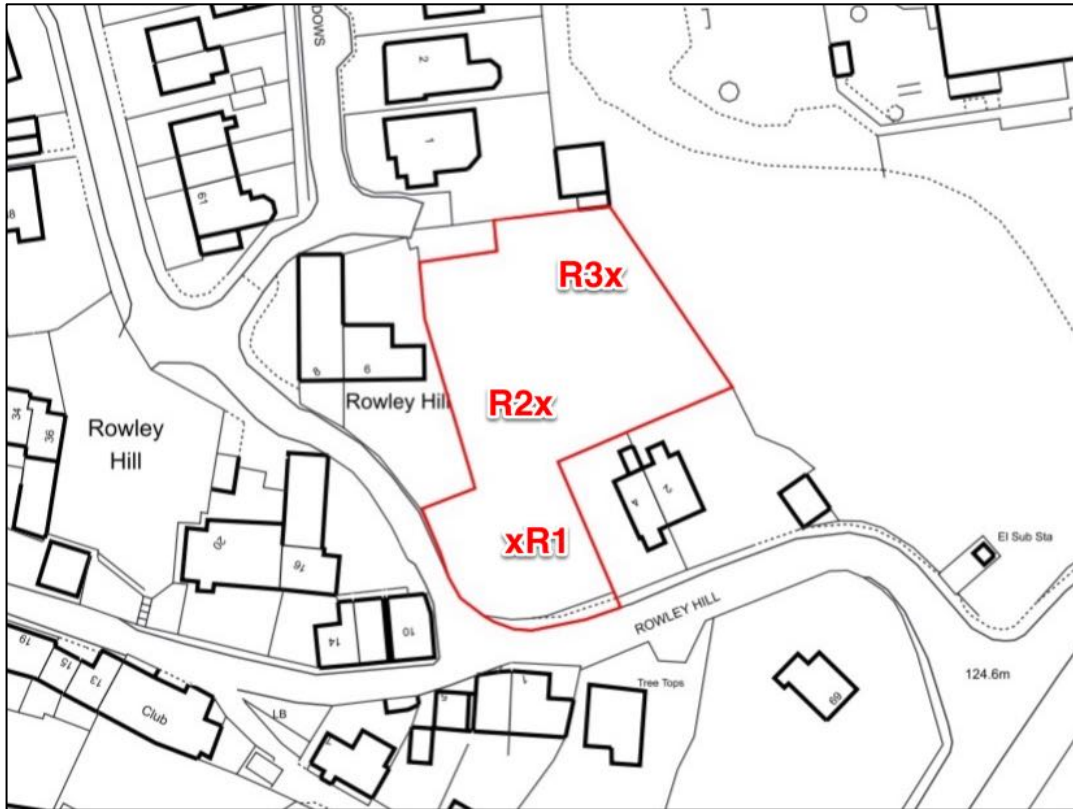
TP4 soakaway test after 1 hr

APPENDIX D
SAMPLING LOCATIONS



SAMPLING LOCATION PLAN – WINDOW SAMPLING & TRIAL PITS
[Not to scale]

↑
NORTH



SAMPLING LOCATION PLAN – TRIAL PITS 201-204
[Not to scale]

↑
NORTH

APPENDIX E
BOREHOLE LOGS



Mugen
Geo Ltd.

Site
Land at Rowly Hill Fenay Bridge Huddersfield HD8 0JF

Number
WS1

Machine : Archway Competitor Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)	Client Select Developments	Job Number 2512 HD8 0JF
	Location 419049 E 414835 N	Dates 18/12/2025	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
1.00-1.45	SPT(C) N=14		4,4/3,3,4,4		(0.40) 0.40	MADE GROUND: Brown very slightly organic slightly gravelly silty CLAY. Gravel was subangular to subrounded f of sandstone and coal.			
2.00-2.45	SPT(C) N=12		2,2/3,3,3,3		(2.00)	MADE GROUND: Brown yellow and black slightly gravelly silty CLAY. Gravel was subangular to subrounded fine to coarse of sandstone siltstone and coal.			
2.50-2.50	SPT(C) 50*/0		50/		2.40 (0.10) 2.50	Extremely weak brown and grey thinly laminated fine grained SANDSTONE. Complete at 2.50m			

Remarks Borehole terminated on solid strata at 2.5m bgl. Dry upon completion. Ground gas monitoring well installed upon completion.	Scale (approx) 1:25	Logged By SJP
	Figure No. 2512 HD8 0JF.WS1	



Mugen
Geo Ltd.

Site
Land at Rowly Hill Fenay Bridge Huddersfield HD8 0JF

Number
WS2

Machine : Archway Competitor Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD)	Client Select Developments	Job Number 2512 HD8 0JF
	Location 419031 E 414823 N	Dates 18/12/2025	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
1.00-1.40	SPT(C) 50/250		6,5/4,5,8,33		(0.30)	MADE GROUND: Brown very slightly organic slightly gravelly silty CLAY. Gravel was subangular to subrounded f of sandstone and coal.			
					0.30	MADE GROUND: Brown yellow and black slightly gravelly silty CLAY. Gravel was subangular to subrounded fine to coarse of sandstone siltstone and coal.			
					(1.05)				
					1.35 1.40	Extremely weak orangish brown and grey thinly laminated fine grained SANDSTONE.			
						Complete at 1.40m			

Remarks Borehole terminated on solid strata at 1.4m bgl. Dry upon completion. Ground gas monitoring well installed.	Scale (approx)	Logged By
	1:25	SJP
	Figure No. 2512 HD8 0JF.WS2	



Mugen
Geo Ltd.

Site
Land at Rowly Hill Fenay Bridge Huddersfield HD8 0JF

Number
WS3

Machine : Archway Competitor Method : Drive-in Windowless Sampler	Dimensions Location 419048 E 414823 N	Ground Level (mOD) Dates 18/12/2025	Client Select Developments	Job Number 2512 HD8 0JF
			Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
1.00-1.45	SPT(C) N=25		4,3/4,5,8,8		(0.30) 0.30	MADE GROUND: Brown very slightly organic slightly gravelly silty CLAY. Gravel was subangular to subrounded f of sandstone and coal.			
1.50-1.50	SPT(C) 50*0		50/		(1.10) 1.40 (0.10) 1.50	Extremely weak brown and grey thinly laminated fine grained SANDSTONE. Complete at 1.50m			

Remarks Borehole terminated on solid strata at 1.5m bgl. Dry upon completion. Ground gas monitoring well installed.	Scale (approx) 1:25	Logged By SJP
	Figure No. 2512 HD8 0JF.WS3	



Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD)	Client Select Developments	Job Number 2512 HD8 0JF
	Location (Handheld GPS) 419045 E 414838 N	Dates 31/01/2026	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	ES				(0.40)	MADE GROUND: Brown very slightly organic slightly gravelly silty CLAY. Gravel was subangular to subrounded of sandstone coal and brick.		
					0.40	MADE GROUND: Grey brown and black slightly gravelly silty CLAY. Gravel was subangular to subrounded fine to coarse of mudstone sandstone siltstone and coal.		
					(0.50)			
					0.90	Extremely weak brown and grey thinly laminated fine grained SANDSTONE.		
					1.50	Complete at 1.50m		

Plan .	Remarks Trial pit terminated at 1.5m bgl within solid strata. Dry upon completion.		
	<table border="1"> <tr> <td>Scale (approx) 1:25</td> <td>Logged By SJP</td> <td>Figure No. 2512 HD8 0JF.TP1</td> </tr> </table>	Scale (approx) 1:25	Logged By SJP
Scale (approx) 1:25	Logged By SJP	Figure No. 2512 HD8 0JF.TP1	



Site
Land at Rowly Hill Fenay Bridge Huddersfield HD8 0JF

Trial Pit Number
TP2

Machine : JCB 3CX Method : Trial Pit	Dimensions		Ground Level (mOD)	Client Select Developments	Job Number 2512 HD8 0JF
	Location (Handheld GPS) 419041 E 414824 N		Dates 31/01/2026	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	ES				(0.20)	MADE GROUND: Brown very slightly organic slightly gravelly silty CLAY. Gravel was subangular to subrounded of sandstone coal and brick.		
					0.20			
					(0.30)	Firm orangish brown slightly gravelly silty CLAY. Gravel was subangular to subrounded fine to coarse of sandstone.		
					0.50 (0.10) 0.60	Extremely weak brown and grey thinly laminated fine grained SANDSTONE.		
						Complete at 1.00m		

Plan .	Remarks Trial pit terminated at 0.6m bgl within solid strata. Dry upon completion. Unidentified pipe identified within the pit at approximately 0.25m bgl.		
	<table border="1"> <tr> <td>Scale (approx) 1:25</td> <td>Logged By SJP</td> <td>Figure No. 2512 HD8 0JF.TP2</td> </tr> </table>	Scale (approx) 1:25	Logged By SJP
Scale (approx) 1:25	Logged By SJP	Figure No. 2512 HD8 0JF.TP2	




Site
Land at Rowly Hill Fenay Bridge Huddersfield HD8 0JF

Trial Pit Number
TP3

Machine : JCB 3CX Method : Trial Pit	Dimensions	Ground Level (mOD)	Client Select Developments	Job Number 2512 HD8 0JF
	Location (Handheld GPS) 419028 E 414821 N	Dates 31/01/2026	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30	ES				0.20	MADE GROUND: Brown very slightly organic slightly gravelly silty CLAY. Gravel was subangular to subrounded of sandstone coal and brick.		
					0.50	Firm orangish brown slightly gravelly silty CLAY. Gravel was subangular to subrounded fine to coarse of sandstone.		
					0.70	Extremely weak brown and grey thinly laminated fine grained SANDSTONE.		
					1.00	Complete at 1.00m		

Plan .	Remarks Trial pit terminated at 1.0m bgl within solid strata. Dry upon completion.		
	<table border="1"> <tr> <td>Scale (approx) 1:25</td> <td>Logged By SJP</td> <td>Figure No. 2512 HD8 0JF.TP3</td> </tr> </table>	Scale (approx) 1:25	Logged By SJP
Scale (approx) 1:25	Logged By SJP	Figure No. 2512 HD8 0JF.TP3	

Client: Mugen Geo	Site: Land at Rowley Hill, Fenway Bridge, Huddersfield. HD8 0JF		Cape Site Services unit 2, rear of Castle Buildings Carlton Road, Barnsley, S71 3HX	
Date: 22/04/2026	Method: water flush	Permit No: 31231		
Driller: Ian Wiles			Driller Assistant: Richard Hawkins, Simon Fish	
			Page No: 1	

Measurements In Meters

BH No:	FROM	TO	THICKNESS	DESCRIPTION
1				
	0	1	1	Sand gravel some clay brown orange
	1	2.9	1.9	Sandstone brown orange silty some water loss
	2.9	4.4	1.5	Mudstone dark grey silty
	4.4	6	1.6	Mudstone light grey
	6	6.8	0.8	Mudstone dark grey
	6.8	6.9	0.1	Coal
	6.9	8.4	1.5	Mudstone grey
	8.4	10	1.6	Sandstone brown grey
				Small water loss to bottom
2				
	0	0.9	0.9	Sand gravel some clay brown orange
	0.9	3.2	2.3	Sandstone brown orange silty
	3.2	4.2	1	Mudstone dark grey silty
	4.2	6.2	2	Mudstone light grey
	6.2	6.7	0.5	Mudstone dark grey
	6.7	6.8	0.1	Coal
	6.8	8.3	1.5	Mudstone grey
	8.3	10	1.7	Sandstone brown grey
				Not much water loss
3				
	0	0.8	0.8	Made ground
	0.8	1.9	1.1	Clay orange brown
	1.9	3.5	1.6	Sandstone mudstone mix brown grey
	3.5	4.6	1.1	Mudstone grey soft some brown silty
	4.6	4.8	0.2	Coal dirty
	4.8	6.9	2.1	Mudstone grey some brown staining some water loss
	7.7	10	2.3	Sandstone brown some grey some water loss

APPENDIX F
CHEMICAL ANALYTICAL DATA

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 26/01547
Issue Number: 1

Date: 18 February, 2026

Client: Mugen Geo
Machpelah House
Machpelah
Hebden Bridge
West Yorkshire
UK
HX7 8AU

Project Manager: Stuart Proudlock
Project Name: Land at Rowley Hill Fenay Bridge Huddersfield HD8 0JF
Project Ref: 2602 HD8 0JF
Order No: N/A
Date Samples Received: 09/02/26
Date Instructions Received: 11/02/26
Date Analysis Completed: 18/02/26

Approved by:



Gemma Berrisford
Deputy Client Services Supervisor

Envirolab Job Number: 26/01547

Client Project Name: Land at Rowley Hill Fenay Bridge
Huddersfield HD8 0JF

Client Project Ref: 2602 HD8 0JF

Lab Sample ID	26/01547/1	26/01547/2	26/01547/3	26/01547/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP3	TP4						
Depth to Top	0.20	0.30	0.20	0.30						
Depth To Bottom										
Date Sampled	06-Feb-26	06-Feb-26	06-Feb-26	06-Feb-26						
Sample Type	SOIL	SOIL	SOIL	SOIL						
Sample Matrix Code	4AE	4AE	4AE	4AE						
% Stones >10mm _A	8.7	16.2	7.8	4.0						
Arsenic _D ^{M#}	22	23	18	22				mg/kg	1	A-T-024s
Barium _D [#]	121	113	133	183				mg/kg	3	A-T-024s
Beryllium _D	1.0	1.0	1.0	1.2				mg/kg	0.5	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0	<1.0				mg/kg	1	A-T-027s
Cadmium _D	<1.0	<1.0	<1.0	<1.0				mg/kg	1	A-T-024s
Copper _D ^{M#}	38	36	36	44				mg/kg	1	A-T-024s
Chromium _D ^{M#}	16	14	16	18				mg/kg	1	A-T-024s
Lead _D ^{M#}	72	66	76	93				mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17				mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	15	14	15	17				mg/kg	1	A-T-024s
Selenium _D ^{M#}	2	2	2	2				mg/kg	1	A-T-024s
Vanadium _D ^{M#}	24	23	23	25				mg/kg	1	A-T-024s
Zinc _D ^{M#}	90	87	96	114				mg/kg	1	A-T-024s

Envirolab Job Number: 26/01547

Client Project Name: Land at Rowley Hill Fenay Bridge
Huddersfield HD8 0JF

Client Project Ref: 2602 HD8 0JF

Lab Sample ID	26/01547/1	26/01547/2	26/01547/3	26/01547/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP3	TP4						
Depth to Top	0.20	0.30	0.20	0.30						
Depth To Bottom										
Date Sampled	06-Feb-26	06-Feb-26	06-Feb-26	06-Feb-26						
Sample Type	SOIL	SOIL	SOIL	SOIL						
Sample Matrix Code	4AE	4AE	4AE	4AE						
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	-	NAD	NAD						A-T-045
Asbestos Matrix (visual) _D	-	-	-	-						A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-						A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	-	N/A	N/A						A-T-045

Envirolab Job Number: 26/01547

Client Project Name: Land at Rowley Hill Fenay Bridge
Huddersfield HD8 0JF

Client Project Ref: 2602 HD8 0JF

Lab Sample ID	26/01547/1	26/01547/2	26/01547/3	26/01547/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP3	TP4						
Depth to Top	0.20	0.30	0.20	0.30						
Depth To Bottom										
Date Sampled	06-Feb-26	06-Feb-26	06-Feb-26	06-Feb-26						
Sample Type	SOIL	SOIL	SOIL	SOIL						
Sample Matrix Code	4AE	4AE	4AE	4AE						
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	<0.01	0.01	<0.01				mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	<0.01				mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	0.03	<0.02				mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.11	0.07	0.20	0.07				mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.11	0.07	0.21	0.07				mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.17	0.12	0.29	0.11				mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.08	<0.05	0.16	<0.05				mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	<0.07				mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	0.15	0.09	0.24	0.08				mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04				mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	0.24	0.16	0.41	0.13				mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	<0.01	<0.01				mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.09	0.05	0.17	0.06				mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	<0.03				mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	0.15	0.11	0.21	0.08				mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	0.21	0.14	0.35	0.11				mg/kg	0.07	A-T-019s
Total PAH-16MS_A^{M#}	1.31	0.81	2.28	0.71				mg/kg	0.01	A-T-019s

Report Notes

General

- This report shall not be reproduced, except in full, without written approval from Envirolab.
- The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
- The results reported herein relate only to the material supplied to the laboratory.
- The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
- Analytical results reflect the quality of the sample at the time of analysis only.
- Opinions and Interpretations expressed are outside our scope of accreditation.
- A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
- If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
- Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

Key

Superscript “#”	Accredited to ISO 17025
Superscript “M”	Accredited to MCertS
Superscript “U”	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript “A”	Analysis performed on as-received Sample
Subscript “D”	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript “D” on Asbestos	Analysis performed on a dried aliquot of sample provided.
Subscript “A”	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
Trace	Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh.
N/A	Not applicable

Asbestos

Identification: Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis

“Trace Asbestos Identified” will be reported if there is not enough present to verify the type.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs

Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.

Soil Chemical Analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any “D” subscripts.

TPH by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.

Results “with Clean up” indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:

EPH CWG results have humics mathematically subtracted through instrument calculation.

Where these humic substances have been identified in any IDs from “TPH CWG with clean up” please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Mugen Geo, Machpelah House, Machpelah, Hebden Bridge, West Yorkshire, UK, **Project No:** 26/01547
HX7 8AU **Date Received:** 11/02/2026 (am)

Project: Land at Rowley Hill Fenay Bridge Huddersfield HD8 0JF **Cool Box Temperatures (°C):** 7.6
Clients Project No: 2602 HD8 0JF

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	26/01547/1	26/01547/2	26/01547/3	26/01547/4
Client Sample No				
Client Sample ID/Depth	TP1 0.20m	TP2 0.30m	TP3 0.20m	TP4 0.30m
Date Sampled	06/02/26	06/02/26	06/02/26	06/02/26
A-T-019s	17/02/2026	17/02/2026	17/02/2026	17/02/2026
A-T-024s	18/02/2026	18/02/2026	18/02/2026	18/02/2026
A-T-027s	18/02/2026	18/02/2026	18/02/2026	18/02/2026
A-T-044	17/02/2026	17/02/2026	17/02/2026	17/02/2026
A-T-045	16/02/2026		16/02/2026	16/02/2026

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

APPENDIX G
GROUND GAS RISK ASSESSMENT



GeoEnginSeer

FREELANCE DILETTANTE GEOLOGIST

Rowley Hill,
Huddersfield,
HD8 0JF

Final Report and SQRA for Ground Gas Monitoring

Dates:

06.03.26

Project Title	Land off Rowley Hill, Fenay Bridge, Huddersfield HD8 0JF
Dates	22.12.25, 16.1.26, 25.2.26
Client	MugenGeo
Weather	Mostly 0oC to 10oC cloudy, light wind, 7-20 kmph, light-heavy rain
Development Type	Commercial Units
Land Type	Fenced Open Land on all sides, Residential properties, Roads.
Plot Numbers	Whole site
Visits By	Ben Crowther
GESL Report Number:	
GESL Job Ref:	1925

Report By		Checked/Approved By	
Signature		Signature	
Name:	Paul Carter – Jones	Name:	Ben Crowther



Company Contact Details

Mr Stuart Proudlocks, Mugen Geo.
Machpelah House
Hebden Bridge
West Yorkshire
HX7 8AU

PRINCIPALS OF TARGETTED SAMPLING

These gas sampling events were conducted by GeoEnginSeerLtd, a specialist Company dealing with the risk in the field of ground gas: Geologist Ben Crowther conducted 3 visits to this site. The targeted borehole sampling was conducted at a time when the barometric pressure drop was either steeply over 4-8 hours (20+ millibars) or steadily over 24+ hours (5+ millibars) ideally to reach a level below 1008mb. This is to establish if there is indeed a worst-case scenario for gas emanating from the ground into the installed boreholes. Extract of the Barometric Records at the time of sampling are included for the sampling at this location and are presented in the Appendix, along with location plans and calibration certificates. Ideal situation is 3.5+Mb or 7Mb per 3.5hour as a driver to allow gas to appear.

The tests were conducted using the following methodology and have been extracted and refined from the CL:AIRE methodologies as described in Technical Documents No. TD16, TD17, and TD18 found [here](#). Additional advice on the importance of gas and atmospheric pressure can be found as published by Ground Gas Solutions: Andrew Brunton; October 2024 'Atmospheric pressure and a simplified approach to ground gas monitoring in the UK'

Each sampling event comprised of a sampling of each borehole with a clear and sweep of the perimeter and through the centre of the site as a background reading. The boreholes were maintained well during the sampling events at the site. The boreholes are then sampled for over approximately 30 minutes with three rounds of minimum 2 minute sampling and flow samples taken between gas reading values, while keeping the tap of the borehole bung closed between events. Water levels and depths are then also checked All were dry.

The reason for this methodology is to observe actual barometric pressure trends and be at the site at the appropriate time to capture the worst-case barometric drop. This is a modified targetted version of the standard industry practice of day time visits, 6 over 6 months checks usually done for testing gas on potentially gas impacted construction sites.

The Barometric data used by GeoEnginSeerLtd to predict when a low that is great enough to produce the worst-case scenario over a 1-3month period is the Norwegian MET office data app that is the most calibratable to use to the on the ground corroborative recordings. Below is another system that is interrogatable for historic data. Although GeoEnginSeerLtd does not believe this is the most accurate recording of data on the ground. Experience has demonstrated that the Meteorologisk Institutt App has proved to be the most accurate of apps used to predict barometric pressure drop, which is then checked with onsite measurements using the calibrated GFM436 and Tiger PID.

With this site three visits were conducted due to the two good barometric drop situations encountered. Then a 'worst-case' (TB17+GGs Research) event occurred, and the site was visited for a third occasion, 3 hours earlier 1005 mb were recorded in Leeds, and 1000mb were recorded on site. A Worst-Case extreme drop in barometric pressure is over 5mb in 3 hours, which was achieved here, or 3.5mb per hour is a more ideal situation.

Site Plan: Approximate borehole locations marked in red. Courtesy of AppleMaps 2026.



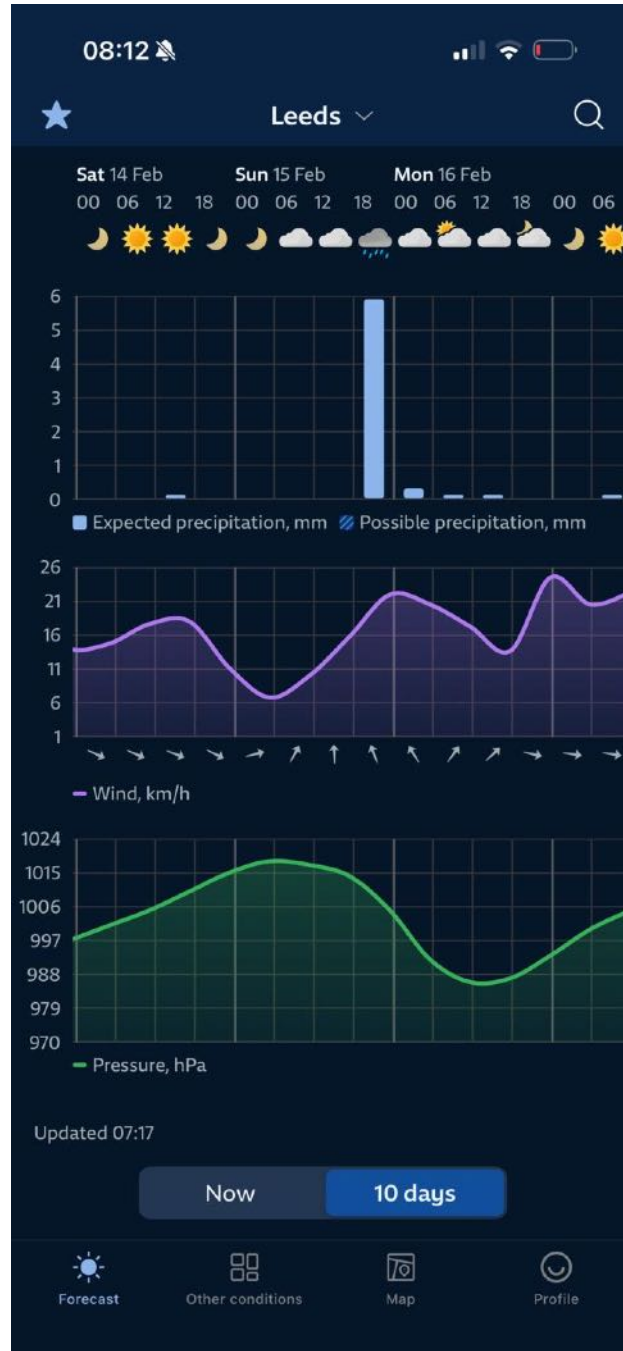
Site overview Winter 2025:



Taken on site.

Barometric Pressure curves prior to sampling for all visits:

GeoEnginSeerLtd uses Metrologisk Institute data to predict low pressure events and then real time on the ground barometric checks.



Sampling on Wednesday 16th January, and again 25th February 2027 worst case scenario: 00:15hrs.

PHOTOGRAPHIC RECORDS

Site presence evidence:

Example testing:



Conclusion:

Following a set of three visits by GeoEnginSeerLtd this semi quantatative risk assessment has formed a conclusion for this site.

It is the opinion of GeoEnginSeerLtd that the site is of Low Gas Risk and after calculation of the British Standard 8485:2015+A1:2019 Gas Characteristic Situation 1 using worst case gas levels for carbon dioxide. This conclusion is relevant for the proposed residential structures.

A further consideration of the zero levels of methane and very low levels of VOC detected that there is a VERY LOW risk of gas contamainaiton at this site, and therefore there is a VERY LOW risk of harm to human health for any future occupants of the proposed commercial type A privately owned buildings.

A CS1 Situtation exists at this site BS8485:2015+A1:2019.

This site will not require a planned gas protection measures solution commonly applied in the UK to render the properties safe for the life of the proposed development.

If you have any questions regarding the above, please do not hesitate to contact me.

Yours sincerely

14th October 2025



Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA-QT, SGPV
For and on behalf of GeoEnginSeer Ltd.

Commorrhagh, 10 School Street Castleford West Yorkshire WF10 2FD:

07817 108 921

GeoEnginSeer@gmail.com

www.GeoEnginSeerLtd.co.uk



Calibration Certificate for GeoEnginSeerLtd gas measurement Instruments.

GFM436 with external gas flow measurement pod.

Second GFM436 on hire from Shaw City while primary device is being serviced: (all visits)

TEST DATE AND CONDITIONS	
Date	17/05/2024
Atmospheric Pressure	990 mB
Ambient Temperature	22.0 °C
Barometric Serial No.	5089

GAS DATA LTD	
Unit D	
Earlplace Business Park	
Fletchamstead Highway	
Coventry	
CV4 9XL	
Tel 02476303311	Fax 02476307711

Customer	GeoEnginSeer Ltd
Certificate Number	125201
Order Number	330262

Serial Number	13915
Software Version	G436-00.0029/0010

Recalibration Due Date
17/05/25

Instrument Checks			
Keyboard	✓	Display Contrast	✓
Pump Flow In	500 Accept > 200 cc/min	Pump Flow @ -20dbB	350 Accept > 200 cc/min
Clock Set / Running	✓	Labels Fitted	✓

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %
	60.2	60	39.6	40	20.9	20.9
	Accept ±0.0		Accept ±0.0		Accept ±0.5	
	5.0	5	5.1	5	6.0	6
	Accept ±0.2		Accept ±0.2		Accept ±0.2	
Zero Reading 100% N ₂	0.0	0	0.0	0	0.0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.2	

Optional Gas Checks						
Applied Gas & Range	Concentration Tested @ (ppm)	Instrument Readings (ppm)				
Gas Type	Range (ppm)	Zero Reading	Instrument Gas Reading			
H ₂ S	5000	2000	0	Accept ±0.0	1500	Accept ±0.0%
CO	2000	1000	0	Accept ±0.0	1000	Accept ±0.0%
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±0.0%

Cross Gas Effects							
Applied Gas (ppm)	Instrument Readings (ppm)						
Gas Type	Concentration	Toxic 1:	H ₂ S	Toxic 2:	CO	Toxic 3:	HEX
H ₂ S	2500	1500	0	0			
CO	1000	80	1000	0			
Hexane	2.0%	0	0	1.99			

Pressure Checks		
Atmospheric Pressure (AP) (mB)		
Current Atmospheric Pressure (mB)	Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports	989	Accept ±2.0
AP Port (Internal)	+800 mB	799
	+1200 mB	1200
		Accept ±5.0

Flow Checks				
Applied Reading (l/h)	Borehole Flow		Differential Pressure	
	Instrument Reading (l/h)	Acceptance	Applied Pressure (Pa)	Instrument Reading (Pa)
-30	-29.8	Accept ±0.0	-276	-272
-2	-1.1	Accept ±1.0	-13	-13
0	0.0	Accept ±0.0	0	0
2	3.0	Accept ±0.5	16	16
30	30.2	Accept ±3.0	392	391
60	60.1	Accept ±5.0	1244	1245
90	91.1	Accept ±5.0	2490	2598

Temperature Checks	
Applied Temperature °C	Instrument Temperature Reading °C
-20	-18.0
0	0.0
30	30.0
60	60.0
100	100.0

Technician	Jack Ryland
------------	-------------

Date Tested:	17/05/2024
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The instrument identified by the serial number stated above has been tested by Gas Data pursuant to calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd (Internal BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018) compliant workshop procedures were followed to apply known calibration on test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018.

TEST DATE AND CONDITIONS		GAS DATA LTD	
Date	17/05/24	Unit D	
Atmospheric Pressure	990 mB	Earlplace Business Park	
Ambient Temperature	22.0 °C	Fletchamstead Highway	
Barometric Serial No.	5089	Coventry	
		CV4 9XL	
		Tel 02476303311	Fax 02476307711

GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SI Number	Instrument Type	Instrument Serial Number	SW Version
330262	GFM436	13915	G436-00.0029
Calibration Technician		Date	
Jack Ryland		17/05/24	
Inspection Technician		Date	
Jack Ryland		17/05/24	

Function	INSTRUMENT CHECKS	FILE (PL PART) or (CC) (ppm) (mB)	INSTRUMENT PACKING	Box of
Basic	Over Air Flow	✓	Instrumnt	✓
	Keyboard Test (All Keys)	✓	Leakier Gas	✓
	Backlight	✓	Leakier Gas	✓
	Clock Set / Running	✓	AC Battery Charger (UK)	✓
	Connect test	✓	AC Battery Charger (USA)	✓
	Pump Flow Test (In & Out)	✓	AC Battery Charger (USA)	✓
	Overair Leak Test (In & Out)	✓	AC Battery Charger (USA)	✓
	Battery Charge Test	✓	Gas Sample Bag (New ones)	✓
	Storage Data test	✓	Hand Car Case	✓
	Zero Reading	✓	Zero Gas	✓
Checked	Zero Reading	✓	Zero Gas	✓
	Temp. CO ₂ LEL Hexane HD	✓	Alka Key	✓
	Temp. CO ₂	✓	Impregnate Pad	✓
	Temp. O ₂	✓	New Ammonia	✓
	Temp. H ₂ S	✓	USA Cable	✓
	Temp. CO	✓	USA Manometer	✓
	Temp. H ₂	✓	SN V1 Software	✓
	Temp. H ₂ O ₂ Gas	✓	External Filter Pad	✓
	Temp. Atmospheric pressure	✓	Inverted Flow Test	✓
	Temp. Atmospheric pressure	✓	Field Units	✓
Diagnose	Temp. Atmospheric pressure	✓	Batter Issues	✓
	Temp. Atmospheric pressure	✓	Simple tube	✓
	Temp. Atmospheric pressure	✓		
	Temp. Atmospheric pressure	✓		
	Temp. Atmospheric pressure	✓		
	Temp. Atmospheric pressure	✓		
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Verification and Ground Gas Specialist Operative Ben Crowther:



GeoEnginSeer Ltd
Geological Services
Gas Protection Verification
Site Supervision
Ground Gas Sampling

Geological Services: Verification Specialist: Freelance Geologist

Ben Crowther trading as GeoEnginSeer Ltd; Independent Geological Services.

CSCS MAP: 06010225 exp 09/2022

Telephone: 07817 108921

Email: geoenginseer@gmail.com Website: www.GeoEnginSeerLtd.com

Qualifications: B.Sc, M.Sc, PGCE, FGS, CIEH, PCA QT (CSSW) SGVP (CL:AIRE)

NVQL3 Assessor of: Verification of Gas Protection Measures (NVQL4)

Confined Spaces L1, IPAF Harness Training, Cradle Safety.

PCA Qualified Technician in structural waterproofing. October 2020

Experience Summary:

15 years local authority regulation

14 years site investigation, site supervision, construction quality assurance and verification

Previous Secretary of, and founder member of the British Verification Council

Attendee of CIRIA Research Group 'Remedial Measures for Proprietary Gas Protection Measures'

Assessor for: NVQL4 Verification of Gas Protection Systems

CL:AIRE GPVS Assessor, SGVP certificate holder No.004

Climber, Fell Runner, Wild Swimmer, Ex Royal Marine Diver.

Recent CPD Summary:

GGs 2 Day A-Z of Ground Gas August 2017

CIRIA Verification Training Event October 2017

PCA Structural Waterproofing Conference 2018, 2019

CIRIA Technical Meeting for Retrospective Fitting of Gas Resistant Membranes 2019

Brownfield Summit Attendance 2018, 2019, 2020, 2021, 2022

DoWCoP CL:AIRE Training March 2021

PCA CSSW Qualified Technician Training 2021, working towards CSSW qualification.

Appeared on: Gassing On! with Neil Salvidge.

HS2 Align Training for Tunnel Shaft H&S Green Tunnels and Shaft Work: C1 and C2,

2022 Cradle safety and IPAF harness use trained: Operator Licence: OP/2157339

Signature:



APPENDIX H
COAL AUTHORITY CLOSURE FORM



Permit Closure Summary Form

Permit Ref.	31231	Project / Site Location	Land at, Rowley Hill, Fenay Bridge, Huddersfield, West Yorkshire, HD8 0JF
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Please supply all relevant documents, including this completed form within 3 months of the permitted works being completed.

Where relevant the report should include; borehole logs and details of mine or mine entry treatment works carried out (incl. engineering drawings, grout takes etc.) and a scaled site layout plan (correlated to O.S N' Grid) showing all relevant mine entry positions, coal seams, voids and broken ground proved by the works.

Summary of works

Start date

22/04/2026

Finish date

22/04/2026

Have any variations occurred? No Yes If so was the Authority notified? No Yes

Please describe;

Did if any of the following incidents occur?

- Spontaneous combustion Water emission Gas emission (elevated or above action levels)
 Geotechnical instability Legal issues incl. damage or potential claims None

If yes, please detail each item;

Were any of the following encountered? Please give a brief summary of the works undertaken.

Intact coal only Broken ground Backfilled ground Voids

Description;

Coal seam recorded 0.1m to 0.2m thick between 4.8m in south of the site and 6.8m in the north at higher elevation.

Will further works be necessary that require a Permit? No Yes

If yes, please describe, including any recommendations;

Name: STUART PROUDLOCK	Email: mugengeo@gmail.com
Company: MUGEN GEO	Tel: 07812007697

APPENDIX I
GENERAL TERMS AND CONDITIONS
&
STANDARD PROCEDURES

General Terms & Conditions Mugen Geo Phase II Investigations

This report describes a ground investigation to be undertaken on behalf of The Client and owner of the site) referenced above. The investigation proposed is been designed based upon information supplied by the client & on the assumption that the site is to be developed for residential use.

The objectives of the investigation are to obtain information relating to the ground conditions at the site in order to comply with a planning condition relating to the site. This report will be produced on behalf of The Client and no responsibility is accepted to any Third Party for all or any part.

The final report should not be relied upon or transferred to any other parties without the express written authorisation of Mugen Geo Ltd. If any unauthorised Third Party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

Whilst the prepared report may express an opinion on the possible configuration of strata, contaminants or gases between or beyond exploratory hole positions or on the possible presence of features based on either visual, verbal or published evidence, this is for guidance only, and no liability can be accepted for its accuracy.

The comments on groundwater and ground gas conditions will be based on observations made at the time of the investigation. It should be noted, however, that groundwater and ground gas levels may vary from those reported due to seasonal or other effects.

Consideration should be given to the possibility that exploratory holes excavated as part of this investigation, and indeed any previous ground i work by others, may be encountered beneath or within the influence of individual foundations. Mugen Geo Ltd cannot be held responsible for failure of excavations or structural failures caused by the location of foundations of any form of structure within the influence of exploratory holes.

Existing manhole covers will not be lifted and drainage runs will not be inspected during the course of this ground investigation.

Standard Procedure Notes for Phase 2 Reports:

The desk study and ground investigation have been carried out in accordance with the principles of BS EN 1997-1: 2004 "Eurocode 7 - Geotechnical Design - Part 1: General Rules", BS EN 1997-2: 2007 "Eurocode 7 - Geotechnical Design - Part 2: Ground Investigation and Testing", BS5930: 1999 and BS10175: 2001, and the terms of the client's brief.

It must be understood that any ground investigation only samples a small percentage of the ground. As a result changes in ground conditions and soil properties can occur between any two exploratory points, for example local features such as soft ground, pockets of contamination and faults. Unrecorded bell pits and shafts can also exist between exploratory points. The proposed ground investigation is designed to minimize such risks. Conclusions and recommendations are based on the information presented in this report, but unforeseen features may exist. Therefore, the actual ground conditions should be noted during construction and further advice sought if they differ significantly from those predicted.

Further investigation can be carried out to further reduce uncertainty and risk but ultimately these risks cannot be eliminated. In commissioning further research or investigation the costs, and the assumed benefit of doing so, must be considered.

Where buildings are present on a site, structural and asbestos surveys have not been carried out, unless specifically stated. An unexploded ordnance survey has not been carried out. In relevant situations it would be prudent to commission such surveys.

Where information has been obtained from Third Parties, no liability can be accepted for the accuracy or completeness of this information. Where anecdotal evidence or speculations are presented, they must be treated as such and cannot be relied upon.