PHASE II GROUND INVESTIGATION AND UPDATED RISK ASSESSMENT REPORT

AT

LOWER CHATTS FARM, OAKENSHAW

FOR

HPC PROPERTIES LTD

Report Reference: 5871-26

GeoEnviro Solutions Ltd
4A Haggwood Stone Quarry
Woodhead Road
Honley
West Yorkshire
HD9 6PW

www: geoenvirosolutions.com

QUALITY ASSURANCE

	Name	Position	Date
Prepared by:	Jacob Fenton	Geoenvironmental Engineer	September 2026
Reviewed by:	Rob Lewis	Director	September 2026
Approved by:	Rob Lewis	Director	September 2026

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LIST OF ACRONYMS

Acronym	Meaning
BGS	British Geological Survey
BH	Borehole
CDM	Construction Design and Management
CL:AIRE	Contaminated Land: Applications In Real Environments
CLR	Contaminated Land Report
COSHH	Control Of Substances Hazardous to Health
CSM	Conceptual Site Model
DCP	Dynamic Cone Penetrometer
DEFRA	Department for Environment Foods and Rural Affairs
DoE	Department of Environment
DP	Dynamic Probe
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	Generic Acceptance Criteria
HA	Hand Auger
HP	Hand Pit
LPA	Local Planning Authority
LQM	Land Quality Management
mbgl	Metres Below Ground Level
MP	Mackintosh Probe
NGR	National Grid Reference
NPPF	National Planning Policy Framework
OS	Ordnance Survey
SGV	Soil Guideline Value
SPOSH	Significant Possibility of Significant Harm
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SSV	Soil Screening Value
TP	Trial Pit
TT	Trial Trench
WS	Windowless Sample / Window Sample
WSV	Water Screening Value

1. INTRODUCTION

1.1 BACKGROUND AND INSTRUCTION

GeoEnviro Solutions Ltd (GES) were instructed by HPC Properties Ltd (the Client) to conduct a Phase II geoenvironmental ground investigation at Lower Chatts Farm, Oakenshaw.

This report is written in accordance with the guidance set out in Land Contamination Risk Management (LCRM), Guiding Principles for Land Contamination (GPLC) 1 – 3, the National Planning Policy Framework (NPPF), BS10175:2022+A2:2017 and YALPAG Technical Guidance for Developers, Landowners & Consultants (v11.2 – June 2020).

The ground investigation was undertaken around the area of a proposed barn conversion to identify any potential risks to future users.

1.2 PROPOSED DEVELOPMENT

We understand current plans for the development of the site include:

Conversion of the existing barn structure into a residential property, retaining existing hard surfaced parking infrastructure and alteration of existing soft landscaping.

An outline development drawing for the site as drawn by Cadvis 3d, referenced A(90)-01, and dated December 2025, can be reviewed within **Appendix 1**.

The risk assessment undertaken in this report is therefore based on the proposed development as outlined here. Any variation from this may require a re-assessment and the Conceptual Site Model updating accordingly.

1.3 OBJECTIVES

The objectives of this Phase II report are to:

- To gain an understanding of any concerns of the regulatory authorities (Local Authority Planning, Building Control and Environmental Health departments and the Environment Agency) regarding local land filling, flooding, mining, quarrying and other concerns.
- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater, and ecological receptors based on the findings of the preliminary CSM.
- Assess by quantitative means the potential nature and extent of contamination from those uses and the environmental risk and liabilities which may affect the site redevelopment.
- Refine the prevalent source-pathway-receptor linkages present on site by means of a Tier 2 contamination risk assessment which incorporates the formulation of an Updated Conceptual Site Model.
- To identify the ground conditions and provide details of their engineering properties in order to facilitate foundation design for the proposed development.

1.4 SCOPE

The ground investigation undertaken was specified by GES as a result of recommendations made in a previously undertaken Phase I desktop report.

Prior to commencing the site works the proposed scope of investigation was as follows:

- Four window sampling boreholes to a nominal depth of up to 5.00 mbgl or refusal.
- Environmental and geotechnical sampling, and in situ geotechnical testing (SPTs).
- Collection and subsequent environmental laboratory testing of samples.
- Collection and subsequent geotechnical laboratory testing of samples.
- The installation of three combined gas and groundwater monitoring standpipes to a nominal depth of 5.00 mbgl.
- Subsequent gas and groundwater monitoring on six occasions over a three-month period, commencing approximately one week after the completion of the ground investigation.
- Interpretation and risk assessment of the data in respect of potential contamination and subsequent updating of the preliminary CSM.
- Interpretation of the geotechnical data to provide details of their engineering properties in order to facilitate foundation design for the proposed development.

However, the proposed scope may be subject to change dependent upon site conditions, access, restrictions and obstructions.

1.5 PREVIOUS INVESTIGATIONS

A Phase I Desktop Study (Report reference C5994/26/E/9289) was carried out by Rogers Geotechnical Services Ltd in May 2026. The study's Preliminary Qualitative Risk Assessment identified Moderate risk ratings for the majority of contaminant linkages considered, pending further testing, together with a Moderate risk rating specifically in relation to mine gas, reflecting the site's history of coal mining. Further intrusive investigation, including gas and groundwater monitoring, was recommended as a result of this study.

2. PHYSICAL SETTING

2.1 SITE INFORMATION

Location

The site is located at land off Cliff Hollins Lane, Oakenshaw, at approximate National Grid Reference NGR: 417953:428195 (centre of the site).

Topography

The site and surrounding area generally slopes gently towards the northwest, as recorded during the site walkover undertaken as part of the Phase I Desktop Study.

Access

The site was accessible via a gate in the southeastern portion of the site.

Site Description

A site reconnaissance was carried out on the 8th of June 2026. All details from the site reconnaissance are included in the site description below.

The site is an irregular shaped piece of land with an approximate area of 0.14 Ha, as recorded within the Phase I Desktop Study (Report reference C5994/26/E/9289).

At the time of the investigation the site was occupied by the existing barn to be converted with associated parking infrastructure and soft landscaping borders. Several stables and miscellaneous storage structures are also present in the areas around the barn.

An approximate distribution of the surface covering is given below in Table 2.1.

Table 2.1: Site Surface Covering

Type of Surface Cover	Distribution (%)
Soft Ground (grassed and landscaped areas)	20
Hardstanding	20
Roadways	0
Buildings	60
Water (ponds, streams)	0

2.2 GEOLOGY

The British Geological Survey shows the site to be underlain by the geological succession outlined below in Table 2.2.

Table 2.2: Published Geology

Geology	Description /strata
Artificial	None Recorded
Superficial	None Recorded
Bedrock	Clifton Rock Sandstone

There are no known artificial or superficial deposits recorded underlying the site.

The bedrock geology beneath the site is shown to be the Clifton Rock Sandstone Formation a named subunit of ther Pennine Lower Coal measures formation which is generally described as

'fine-grained cross-bedded or ripple cross-laminated sandstone and includes a thin coal' (BGS Lexicon description).

2.3 HYDROGEOLOGY

The Environment Agency designate aquifers in accordance with the Water Framework Directive. These designations reflect not only the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetlands ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey.

Groundwater Vulnerability

The Phase I Desktop Study records the site to be located within an area where the bedrock aquifer is considered by the Environment Agency to have a Low vulnerability to mobile pollutants, with a Low soil leaching potential and no groundwater Source Protection Zone or licensed abstractions recorded within 250 m, as summarised in Table 2.3 below.

Table 2.3: Groundwater Vulnerability Definitions

Definition	Description
High Vulnerability	Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
Medium Vulnerability	Intermediate between high and low vulnerability.
Low Vulnerability	Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Superficial Deposits

There is no superficial aquifer designation for the site.

Bedrock

The Environment Agency aquifer classification scheme indicates that the bedrock aquifer designation for the site is classed as Secondary A aquifer which are generally described as *'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.'*

The groundwater vulnerability in the vicinity of the site is classified as Low.

2.4 HYDROLOGY

The nearest surface watercourse to the site is High Royds Beck located approximately 100 m to the northwest.

The site lies within the Spen Beck from Source to River Calder catchment, which the EA recorded to have a moderate chemical and fail ecological classification in 2019.

The Phase I Desktop Study confirms that the site is not situated within an Environment Agency Flood Zone 2 or Flood Zone 3, that no flood defences are recorded within 250 m of the site, and that there is only limited potential for groundwater flooding to occur.

2.5 SENSITIVE LAND USE

The Phase I Desktop Study identifies the following planning and ecological designations relevant to the site: the site lies within the South and West Yorkshire Green Belt (Kirklees) and within a designated Nitrate Vulnerable Zone (Spen Beck, from source to the River Calder - Surface Water). A designated Ancient Woodland (Chatts Wood) is recorded approximately 163 m to the southeast of the site. These designations are primarily of relevance to the planning and drainage strategy for the site rather than to ground contamination risk and are noted here for completeness.

The Phase I study also identifies the site as being at Low risk from unexploded ordnance (UXO), based on a review of Zetica online mapping data.

2.6 CONTAMINANT SOURCES

The following possible on-site sources have been identified from the Phase I Desktop Study (Report reference C5994/26/E/9289) and subsequent ground investigation:

- Historical construction and associated Made Ground, potentially containing brick, concrete, timber, ash and metals (whole site).
- Mining activity: the Shertcliffe Coal seam (0.4 - 0.8 m thick) is recorded to outcrop at, or near, the surface at the eastern site boundary, and underground coal mining has taken place within 2 seams of coal reported at depths of between approximately 43 m and 109 m (worked 1861-1894), with a Coal Authority mine plan indicating workings within the Black Bed Coal seam at approximately 77 m depth beneath the site.
- Potential for shallow, unrecorded coal workings, bell pits or mine entries; whilst none are recorded on-site, the Consultants Coal Mining Report identifies 5no. mine entries (4no. shafts and 1no. adit) within the wider search area, considered to lie outside the zone of influence of the site (see Section 9.1).

Offsite Sources

The following possible off-site sources have been identified from the Phase I Desktop Study:

- Road Pit / Chatts Colliery (historical coal and ironstone mining and quarrying), recorded approximately 100 m to the south; associated shafts and a tramway were present on historical mapping between 1890 and 1967.
- An unspecified quarry, recorded approximately 218 m to the southwest (recorded as active between 1905 and 1948).
- Historical refuse heaps, recorded between approximately 46 m and 81 m from the site boundary (1892-1967); permitted waste exemption sites recorded approximately 52-64 m to the south/southeast; and an electricity substation recorded approximately 179 m to the west.

3. FIELDWORKS

3.1 GROUND INVESTIGATION

All ground investigation works were carried out on the 8th of June 2026 under the supervision of a Geoenvironmental Engineer from GES.

The ground investigation has been carried out in accordance with BS5930: 2015+A1:2020 and the UK Specification for Ground Investigation Second Edition 2012.

All strata descriptions were undertaken in accordance with BS5930: 2015+A1:2020; EN ISO 14688-1&2:2018; and EN ISO 14689:2018.

The ground investigation undertaken was in line with the scope as described in Section 1.4.

Combined groundwater and ground gas monitoring installations were installed in WS01 to WS03.

The positions of the exploratory holes in relation to the existing site layout can be reviewed on drawing number GES 5871-26 / 01 within **Appendix 1**.

3.2 RESTRICTIONS

No restrictions were encountered during this ground investigation.

4. GEOLOGY AND GROUND CONDITIONS

The following ground conditions were encountered during the ground investigation.

4.1 GENERAL

A generalised summary of the ground conditions encountered, depths to base, and thickness recorded from the exploratory hole records is presented below in Table 4.1, below.

Table 4.1: Summary of Ground Conditions

Geology / Strata	Depth (mbgl)				Thickness (m)		Locations encountered
	Top		Base		Min	Max	
	Min	Max	Min	Max			
Topsoil	0.00	-	0.20	0.30	0.2	0.3	WS02, WS03, WS04
Made Ground	0.00	-	0.70	-	0.7	-	WS01
Sandstone (Clifton Rock Formation)	0.30	0.70	1.60 (Not Proved)	1.90 (Proved)	1.20	Not Proved (>1.30)	WS01, WS02
Mudstone (Pennine Lower Coal Measures Formation)	0.20	1.90	Not Proved	Not Proved	Not Proved (>0.50)	Not Proved (>3.20)	WS01, WS03, WS04

Detailed strata descriptions are presented on the exploratory point logs presented in Appendix 2 and photographs of the exploratory points are also presented within Appendix 2.

4.2 TOPSOIL

Topsoil was encountered in three of the four exploratory holes (WS02, WS03 and WS04), to a maximum depth of 0.30 mbgl and a maximum recorded thickness of 0.30 m, generally comprising grass over brown sandy TOPSOIL. Detailed descriptions of the topsoil are provided on the exploratory hole logs presented in Appendix 2.

4.3 MADE GROUND

Made Ground was encountered within WS01 only, to a depth of 0.70 mbgl (thickness 0.70 m). The Made Ground has been further sub-divided based on the exploratory hole records, as detailed in the following sub-sections. Detailed descriptions of the Made Ground are provided on the exploratory hole logs presented in Appendix 2.

Hardstanding

No hardstanding was encountered or observed during this ground investigation.

Granular Made Ground

Granular Made Ground was encountered within WS01 between 0.00 and 0.70 mbgl, generally comprising dark brown sandy fine subrounded to angular GRAVEL of red brick

and slate, with a discrete band of angular red brick cobbles recorded between 0.40 and 0.50 mbgl.

4.4 SUPERFICIAL DEPOSITS

No superficial deposits were encountered during this ground investigation, consistent with the published geological mapping for the site (see Section 2.2).

4.5 BEDROCK

The Clifton Rock Sandstone Formation was encountered in two of the four exploratory holes (WS01 and WS02) at depths of between 0.30 and 0.70 mbgl. The sandstone was proved to its base at WS01 (1.90 mbgl), where it was found to be underlain by Mudstone (see below), but was not proved to its base at WS02 within the depth investigated (1.60 mbgl). The sandstone was generally extremely weak and highly to completely weathered. Classification testing of a sample recovered from within this unit at WS01 (1.00 mbgl) indicates that it is locally weathered to a CLAY of low plasticity (CL; Liquid Limit 28%, Plasticity Index 11%, 100% passing the 425 µm sieve), rather than retaining a sand-like fabric; at WS02, the sandstone was recovered as a dense to very dense clayey SAND, the fines fraction of which (tested at 1.60 mbgl) also classifies as CL (Liquid Limit 28%, Plasticity Index 11%). Detailed descriptions are provided on the exploratory hole logs presented in Appendix 2, and classification test results in Appendix 3.

4.6 MUDSTONE

Mudstone considered to represent the Pennine Lower Coal Measures Formation was encountered in three of the four exploratory holes (WS01, WS03 and WS04) at depths of between 0.20 and 1.90 mbgl, and was not proved to its base within the depths investigated (up to 3.50 mbgl). The mudstone was generally extremely weak and completely to highly weathered, recovered as a stiff to very stiff CLAY at WS03 and WS04, becoming highly fractured with depth at WS01. Classification testing confirms this material to be a CLAY of low to high plasticity: at WS03, plasticity increases with depth, from CI (Clay of Intermediate plasticity; Liquid Limit 42%, Plasticity Index 19%) at 2.00 mbgl to CH (Clay of High plasticity; Liquid Limit 51%, Plasticity Index 24%) at 3.00 mbgl; at WS04, the mudstone classifies as CL (Clay of Low plasticity; Liquid Limit 32-33%, Plasticity Index 12-13%) at both 1.00 mbgl and 3.50 mbgl, becoming slightly gravelly towards the base of the hole. All tested samples plot above the 'A' line on the Plasticity Chart (Appendix 3), confirming a clay (rather than silt) classification throughout. Detailed descriptions are provided on the exploratory hole logs presented in Appendix 2, and classification test results in Appendix 3.

4.7 GROUNDWATER

Groundwater was not recorded as a strike within any of the exploratory holes during the ground investigation works undertaken on 8th June 2026, as confirmed within the remarks recorded on each exploratory hole log (Appendix 2). This is not unusual for window sampling techniques in low-permeability strata. Standing water was, however, subsequently recorded within the standpipe installed in WS01, WS02 and WS03 during the post-installation gas and groundwater monitoring programme (see Table 4.2 and Section 4.7).

Table 4.2: Summary of Groundwater Strikes

Groundwater	Strike depth (mbgl)		Rest Level (mbgl)		Locations encountered
	Min	Max	Min	Max	
Seepage	Not Encountered	Not Encountered	Not Encountered	Not Encountered	Not encountered as a strike in any exploratory hole (window sampling); see Table 4.3 for water levels recorded during the subsequent monitoring programme.
Strike	Not Encountered	Not Encountered	Not Encountered	Not Encountered	Not encountered as a strike in any exploratory hole (window sampling); see Table 4.3 for water levels recorded during the subsequent monitoring programme.
Standing Water Level	Not Encountered	Not Encountered	Not Encountered	Not Encountered	Not encountered as a strike in any exploratory hole (window sampling); see Table 4.3 for water levels recorded during the subsequent monitoring programme.

4.8 GROUNDWATER MONITORING

A combined gas and groundwater monitoring regime was carried out at the site to establish the groundwater levels beneath the site, which included monitoring on six occasions between 24th June 2026 and 7th September 2026. Table 4.3 below presents the water levels recorded during the monitoring regime, alongside the nominal depth of each standpipe.

Table 4.3: Groundwater Monitoring Results

Monitoring Visit / Date	WS01 - Water Level (mbgl)	WS02 - Water Level (mbgl)	WS03 - Water Level (mbgl)	Comments
Visit 1 - 24/06/2026	Not recorded	Not recorded	Not recorded	Water levels not measured during this visit
Visit 2 - 08/07/2026	Not recorded	Not recorded	Not recorded	Water levels not measured during this visit
Visit 3 - 22/07/2026	Dry	Dry	1.64	-
Visit 4 - 10/08/2026	Dry	Dry	1.64	-

Visit 5 - 24/08/2026	Dry	Dry	0.52	-
Visit 6 - 07/09/2026	Dry	Dry	0.45	-
Nominal depth of standpipe (mbgl)	2.24 - 2.28	1.74 - 1.90	3.32 - 3.37	Approximate; based on depth to base of standpipe recorded during monitoring visits

No groundwater samples were collected for chemical analysis as part of this investigation: standpipes WS01 and WS02 remained dry throughout the monitoring programme, and the volume of water recorded within WS03 was not considered sufficient to obtain a representative sample.

4.9 OBSTRUCTIONS

No obstructions were encountered during this ground investigation.

4.10 CONTAMINATION

No visual or olfactory evidence of contamination was encountered or observed during this ground investigation, in particular no obvious visual or olfactory evidence of mobile contamination was observed during the ground investigation.

5. INSITU TESTING

5.1 STANDARD PENETRATION TESTS

Standard penetration testing was undertaken in all four exploratory boreholes (WS01 to WS04), and is summarised below:

- SPT 'N' values of between 24 and 48 were encountered within the weathered Sandstone (Clifton Rock Formation) at WS01 and WS02.
- SPT 'N' values of between 14 and 35 were encountered within the weathered Mudstone (Pennine Lower Coal Measures Formation) at WS01, WS03 and WS04, with practical refusal (N ≥ 50 for 300 mm penetration) recorded at WS01 (2.00 mbgl) and WS03 (3.00 mbgl). An immediate refusal response (0 mm penetration for the recorded blow count) was obtained at WS04 (3.50 mbgl), at which depth the borehole was terminated.

SPT 'N' values generally increase with depth within both the weathered Sandstone and Mudstone, consistent with a reducing degree of weathering with depth.

6. LABORATORY TESTING – GEOTECHNICAL

The following programme of laboratory testing has been undertaken on samples obtained during this investigation:

- Moisture content determinations BS EN ISO 17892-1:2014+A1:2022
- Liquid and Plastic Limits (Atterberg Limits), 4no. by 4-point method and 2no. by 1-point method BS EN ISO 17892-12:2018+A2:2022

The test results are summarised in Table 6.1, below:

Table 6.1: Summary of Geotechnical Test Results.

Hole No.	Depth (mbgl)	Moisture Content, w (%)	% Passing 425 µm	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	BS5930 Classification
WS01	1.00	9.4	100	28	17	11	CL
WS02	1.60	6.0	37	28	17	11	CL
WS03	2.00	23.6	99	42	23	19	CI
WS03	3.00	12.2	100	51	27	24	CH
WS04	1.00	11.3	98	32	20	12	CL
WS04	3.50	26.8	47	33	20	13	CL

The test results are presented in Appendix 3.

The appropriate geotechnical properties are summarised in Table 6.2, below:

Table 6.2: Summary of Geotechnical Properties.

Property	Range of values	Comments
Volume change potential (NHBC)	Low to Medium	Based on Modified Plasticity Index (PI x % passing 425 µm / 100), calculated from Table 6.1: Low (4% to 19%) at WS01, WS02, WS03 (2.00 mbgl) and WS04; Medium (24%) locally within the Mudstone at WS03 (3.00 mbgl).

7. LABORATORY TESTING – SULPHATES

The following programme of chemical laboratory testing has been undertaken on samples obtained during this investigation:

Three samples of the underlying deposits (WS01 at 0.30 mbgl, WS02 at 0.10 mbgl and WS03 at 0.80 mbgl) were submitted for assessment of water-soluble sulphate and pH value. Total (acid-soluble) sulphate and total sulphur were not included within the analytical suite for this investigation.

Water-soluble sulphate concentrations of 12.1 mg/l to 1,840 mg/l (0.012 to 1.84 g/l) were recorded, with pH values consistently recorded at 7.7 across all three samples.

The two shallower samples (WS01 and WS02) returned water-soluble sulphate concentrations consistent with BRE Special Digest 1 (SD1) Design Sulphate Class DS-1, for which concrete may typically be designed to an AC-1s classification. However, the deeper sample at WS03 (0.80 mbgl) returned a markedly elevated water-soluble sulphate concentration of 1,840 mg/l (1.84 g/l), which on a preliminary basis would fall within a substantially higher BRE SD1 Design Sulphate Class (in the region of DS-4), requiring a correspondingly more resistant concrete classification (e.g. AC-3) in that area.

8. LABORATORY TESTING – CONTAMINATION

8.1 SOIL AND GROUNDWATER TESTING

All samples were sent to a UKAS accredited chemical testing laboratory, and MCERTS were used where available. The analytical strategy focussed on a general suite of potential contaminants and the analytical suites are summarised in Table 8.1, below.

Table 8.1: Summary of Chemical Testing Suite

Testing	Comment	No. of soil samples analysed	No. of water samples analysed
General metals suite including Arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, phenol, selenium, zinc, pH, and water soluble sulphate	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	3	0
Speciated PAH and TPH CWG	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	3	0
Asbestos Screen	General analysis of soils beneath the site to achieve general site coverage, and targeting former uses on site and off site within influencing distance	3	0

All chemical testing results are presented in Appendix 4.

9. GEOTECHNICAL RECOMMENDATIONS

9.1 MINING RISK

The Phase I Desktop Study (Rogers Geotechnical Services Ltd, ref C5994/26/E/9289) confirms that the site is located within a recorded coal mining affected area, as defined by the Coal Authority. Published geological mapping indicates the Shertcliffe Coal seam (0.4 - 0.8 m thick) to outcrop at, or near, the surface at the eastern boundary of the site, resting above the Clifton Rock sandstone. On the basis that this seam is anticipated to progress off-site towards the east, and given that no evidence of coal, dayholes, bell pits or ground disturbance was noted during the site walkover, this shallow coal risk was assessed within the Phase I study as Low.

In regard to deeper mining, the Phase I study confirms that underground coal mining has taken place within 2 seams of coal reported at depths of between approximately 43 m and 109 m (Consultants Coal Mining Report), worked between 1861 and 1894; a Coal Authority mine plan (ID 21913397, Series 5069) indicates workings within the Black Bed Coal seam at approximately 77 m depth beneath the site. Given that these workings are present in excess of 70 m below ground level, it was considered within the Phase I study that sufficient cover is present such that the risk of instability to surface structures from mining at depth is Low.

5no. mine entries (2no. shafts recorded to have been filled to an unknown specification in 1938, and a further 2no. shafts and 1no. adit with no treatment details recorded) are identified within the Consultants Coal Mining Report search area. These are considered to be located at a sufficient distance from the site that it falls outside the zone of influence of a potential collapse, in accordance with CIRIA SP32 guidance, and the associated risk was assessed within the Phase I study as Low.

The ground investigation, comprising four exploratory holes advanced to depths of between 1.60 and 3.50 mbgl, did not encounter any coal, mine workings, dayholes, bell pits or other evidence of shallow mining activity. The strata proved comprised Made Ground, Topsoil, and weathered Sandstone and Mudstone within the Pennine Lower Coal Measures Formation (see Section 4), which is consistent with the anticipated ground conditions and the Low shallow mining risk rating identified within the Phase I study.

The Phase I study assigned a Moderate risk rating to mine gas, reflecting the presence of recorded coal workings at depth beneath the site and the potential for shallow, off-site mining activity to represent a credible ground gas source, and recommended that a detailed gas risk assessment be undertaken following intrusive investigation. This has subsequently been addressed by way of the gas and groundwater monitoring programme described in Section 8 of this report: across 6no. monitoring visits, Methane was not detected (0.0%) and Carbon Dioxide concentrations remained low (a maximum of 2.7%), yielding a Worst-Credible Gas Screening Value of 0.0108 l/hr, corresponding to Characteristic Situation 1 (CS1) and a 'Very Low' gas risk classification in accordance with CIRIA C665 (see Sections 8.5 and 12.4). On the basis of this monitoring data, it is considered that the Moderate mine gas risk identified within the Phase I desk study has been satisfactorily addressed, and no gas protection measures are considered necessary.

Notwithstanding the above, should any evidence of coal, dayholes, bell pits, mine entries or other unrecorded ground disturbance be encountered during groundworks, works should stop immediately in that area and advice should be sought from a suitably qualified engineer.

9.2 QUARRYING RISK

The Phase I Desktop Study (Report reference C5994/26/E/9289) identifies an 'Unspecified Quarry' recorded approximately 218 m to the southwest of the site (recorded as active

between 1905 and 1948); no evidence of quarrying, pitting or non-coal mineral extraction is recorded on, or beneath, the site itself within the historical mapping or published geological data reviewed. The principal historical extractive activity affecting the site relates to coal mining (Road Pit / Chatts Colliery), which is addressed above under Mining Risk.

The Phase I study also notes that localised, small-scale historical (or potentially ongoing) underground iron-ore mining may have occurred within the local area, at a level unlikely to give rise to difficult ground conditions relevant to the proposed development. The ground investigation did not encounter any evidence of quarrying, backfilled excavations or non-coal mineral extraction within the four exploratory holes advanced (to depths of up to 3.50 mbgl).

On this basis, no significant risk to the proposed development is anticipated from historical quarrying or non-coal mining activity. As with the mining risk discussed above, should evidence of an infilled quarry, pit or unrecorded excavation be encountered during groundworks, works should cease and the advice of a suitably qualified consultant should be sought immediately.

9.3 FOUNDATIONS

The Made Ground encountered at WS01 (to 0.70 mbgl) and the Topsoil encountered at WS02 to WS04 (to between 0.10 and 0.30 mbgl) are not considered suitable for the direct support of foundations, due to their variable composition and the risk of unacceptable total and differential settlement occurring under even moderately light surface loading.

Beneath these near-surface soils, the site is underlain by weathered Sandstone (Clifton Rock Formation, proved at WS01 and WS02) and weathered Mudstone (Pennine Lower Coal Measures Formation, proved at WS01, WS03 and WS04). Classification testing (see Table 6.1 and Appendix 3) confirms that both units are locally recovered as CLAY of low to high plasticity (CL to CH), and it is considered that foundations for the proposed development are likely to be viable within these strata.

On the basis of the exploratory hole records, it is recommended that foundations be taken to a minimum depth of 1.0 m below existing ground level across the site, to found within the natural weathered Sandstone- or Mudstone-derived clay, beyond the influence of Made Ground, Topsoil and seasonal ground movement (see also volume change potential, below).

Undrained shear strength (cu) has been estimated from the Standard Penetration Test ‘N’ values using Stroud’s correlation (cu = f1 x N, with f1 = 4.5, considered appropriate to clays of the plasticity range recorded at this site), and indicative net allowable bearing pressures have been derived using Skempton’s bearing capacity method, adopting a factor of safety of 3.0 against general shear failure. The lowest SPT ‘N’ value recorded at the recommended 1.0 m founding depth (N = 14, recorded within the Mudstone at both WS03 and WS04) has been adopted for this preliminary assessment and is therefore considered conservative for the remainder of the site, where higher ‘N’ values (up to N = 38) were recorded at comparable depths within the Sandstone.

On this basis, it is considered that strip and spread foundations founded at 1.0 m depth within the underlying weathered Sandstone / Mudstone-derived clay could be designed assuming the indicative allowable increase in stress given below in Table 9.1.

Table 9.1: Allowable Increase in Stress

Foundation Type	Strip Foundations (m)			Spread Foundations (m)		
Foundation Width	*0.6*	*0.9*	*1.2*	*0.6*	*0.9*	*1.2*
Depth	1.0			1.0		
Allowable increase KN/m^2	130	125	170	160	150	*145*

The allowable increases in stress given above assume a factor of safety of 3.0 against general shear failure, based on an estimated undrained shear strength of 63 kPa (derived from the lowest recorded SPT 'N' value of 14, as described above) at a nominal foundation depth of 1.0 mbgl.

Settlements at the above loading intensities should remain within tolerable limits for the type of structure proposed provided that the underlying soils are carefully inspected immediately after final trimming has taken place.

Should any soft, weak, made ground or highly fractured / disturbed mudstone be encountered at formation level (for example, the highly fractured, highly weathered Mudstone locally recorded at WS01 below 1.90 mbgl), this should be locally removed and replaced with lean-mix concrete or compacted granular soil. It should be appreciated that where higher bearing capacities are required, these could be achieved by placing the foundation at greater depth within the clay, or by adopting an alternative foundation solution such as piling.

Given the variable depth to, and local variability within, the weathered Sandstone and Mudstone recorded across the site (see Table 4.1), foundations should be assessed on an individual basis and, where a marked change in bearing stratum occurs across a single structure, foundations should be deepened locally to bear onto a consistent stratum, to mitigate the potential for differential settlement.

In addition, if the excavations are required to stand open for any period of time, then a blinding layer of lean-mix concrete should be placed in the excavation bases. This expedient will reduce loosening of the sub-grade due to the ingress of surface water.

With respect to the volume change potential of the tested soils, careful consideration of the guidance provided in Chapter 4.2 of the NHBC standards[1] is recommended. It may be noted that where foundations lie outside of the zone of influence of the trees at the site, the minimum foundation depths given in Table 5[2] of the standards should be employed in conjunction with the recommendations above. Foundations lying inside the zone of influence of existing trees should be constructed at depths determined from the guidance in Chapter 4.2.

9.4 EXCAVATIONS

Groundwater was not encountered during the investigation however it was noted in subsequent monitoring. However, it should be appreciated that groundwater levels are subject to seasonal variation or changes on local drainage conditions.

Groundwater is unlikely to represent a particular problem to the construction of the development; however, may become a problem if encountered with excavations during inclement weather. Furthermore, it should be recognized that slight seepages and minor water

[1] NHBC Standards, Chapter 4.2, *Building near trees.*
[2] NHBC Standards, Chapter 4.2, *Building near trees,* Table 5 – *Minimum foundation depths outside zone of influence.*

entries may combine in any long trench excavations to create a significant volume of water which may cause local problems during the construction phase. Any minor groundwater seepages or significant standing water within excavations made upon this site may be removed by using a simple form of de-watering. Such a system could include the excavation of sumps from which the water could be pumped. Advice on Groundwater Control is given in CIRIA Report No 515 – Groundwater Control Design and Practice.

The stability of the excavation faces cannot be guaranteed thus temporary support to the excavation faces may become necessary unless the foundations are constructed using trench-fill techniques. In this method the foundation trenches should be excavated, inspected and backfilled with concrete as a continuous operation. Under no circumstances should operatives be allowed to enter unsupported excavations.

Subject to space constraints, excavations could be battered back to a suitable angle of repose (typically 1:1 for a 1.00 m deep excavation). Alternatively, if there is a requirement to protect nearby structures or services, appropriate supports may be required. Advice on excavation support is given in CIRIA Report No 97 – Trenching Practice.

Where trench support/shoring is utilised an appropriately qualified and experienced engineer should design the support system. The shoring/support will require regular inspection in accordance with published guidelines to ensure that the support/shoring is adequate for the ground conditions present.

10. CONTAMINATION

10.1 SOIL TESTING

A total of three samples (WS01 at 0.30 mbgl, WS02 at 0.10 mbgl and WS03 at 0.80 mbgl, all recovered on 8th June 2026) were analysed by Chemtech Ltd in their UKAS and MCERTS accredited laboratory-testing facility in accordance with laboratory protocol.

The testing completed comprised of a focused suite of heavy metals, speciated Total Petroleum Hydrocarbons (TPH CWG Aromatic/aliphatic split) and speciated Polycyclic Aromatic Hydrocarbons (PAH) including the more carcinogenic benzo(a)pyrene (BaP) and naphthalene, asbestos, soil organic matter (SOM) content, VOCs, SVOCs, MTBE & BTEX, cyanide, pH and sulphates.

The results of this laboratory testing have been compared to the LQM/CIEH Suitable 4 Use Levels (S4ULs) and, where no S4UL is available, other published generic assessment criteria, as described below. The proposed development of the site is intended to comprise of a residential property with garden and therefore screening has been made against a land use of 'Residential with Homegrown Produce'.

A set of Screening Values are provided in Appendix 5.

10.2 SELECTION OF SCREENING CRITERIA

The on-site receptors for the study site are considered to be:

- Construction workers (during redevelopment of the site only).
- Future maintenance workers (following redevelopment).
- Future end users and site visitors (following redevelopment); and
- Trespassers (during redevelopment).

Risks to construction workers during the redevelopment process will be mitigated by adhering to appropriate health and safety legislation, and the wearing of appropriate personal protective equipment (PPE). During redevelopment, the site will be securely fenced to prevent trespassers from accessing the site, and good site management practices will be implemented to mitigate exposure to off-site receptors.

The potential pathways for contaminants within the soil to human health receptors following redevelopment are considered to be:

- Direct ingestion of soil and soil derived dust.
- Dermal contact with soil outside and soil derived dust inside.
- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside.

The potential pathways for contaminants within the soil to off-site human health receptors following redevelopment are considered to be:

- Direct ingestion of soil and soil derived dust.
- Dermal contact with soil outside and soil derived dust inside.
- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside if contamination within soil is able to migrate across the site boundary within.

In the first instance, the results of this laboratory testing have been compared to generic assessment criteria (GAC) for the residential with homegrown produce land use scenario. These incorporate the following pathways:

- Direct ingestion of soil and soil derived dust.
- Dermal contact with soil outside and soil derived dust inside.
- Inhalation of soil derived dust inside and outside; and
- Inhalation of soil derived vapours inside and outside.

Contaminants have been screened against revised LQM/CIEH S4UL criteria[3] where available. These GAC have been designed for use under planning, using Health Criteria Values based on minimal risk, and updated exposure parameters. The S4UL are intended to replace the previous LQM/CIEH GAC. The S4UL are based on the assumption of a sandy loam soil and are published for 1%, 2.5% and 6% soil organic matter (SOM). All soil samples were analysed for SOM, which ranged from 0.50% (WS03 @ 0.80 mbgl) to 8.45% (WS01 @ 0.30 mbgl), with 6.43% recorded at WS02 @ 0.10 mbgl. The 6% SOM criteria have therefore been adopted, which is conservative for WS01 and WS02 where the measured SOM exceeds 6%. Although the SOM at WS03 is below 6%, all organic determinands in this sample were below the laboratory limit of detection, so the choice of SOM criteria does not affect the screening outcome at WS03.

Where no S4UL are available, the EIC/ AGS/ CL:AIRE/ GAC[4] have been used. The toxicological criteria within these are also based on minimal risk. It is recognised that these criteria have not recently been updated, and in particular, do not incorporate the slightly higher inhalation rates that have been used within the S4UL. However, given that they incorporate additional pathways, they are considered suitable for an initial screen. The EIC/ AGS/ CL:AIRE/ GAC are also based on a sandy loam soil and the 1% SOM criteria have been used in the first instance.

There is neither an S4UL nor an EIC/ AGS/ CL:AIRE/ GAC available for lead. In the absence of a GAC based on minimal risk, the C4SL for lead has been used. It is recognised that this is based on a “low level of toxicological concern” rather than on a minimal risk level. However, it is considered appropriate for use under planning, especially for a site where there will effectively be no pathways for inorganic metals following redevelopment.

All the GAC are based on a sandy loam soil. This is considered appropriate for use for initial screening.

All of the GAC assume unsaturated soils. However, the use of the GAC is considered to be conservative, because they assume a certain air-filled porosity and water-filled porosity.

The GAC also assume that no free phase product is present and are not intended for use in this instance. No free product was observed within soils during the ground investigation.

[3] Nathanail et al. (2015) The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, 2015. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3495
[4] CL:AIRE (2010) The EIC/AGS/CL:AIRE Generic Assessment Criteria for Human Health Risk Assessment

10.3 SOIL TESTING RESULTS AND SCREENING

All metals, PAHs, and TPH CWG analytes are presented in the following tables with units in mg/kg unless otherwise stated. Other potential contaminants of concern are only shown where there is at least one result exceeding the limit of detection.

The results of the chemical laboratory testing are provided in Appendix 4.

Tables 10.1 – 10.3 below and overleaf summarize the soil testing results.

Metalloids

Table 10.1: Metalloids Soil Exceedances

Determinant	Min	Max	GAC	Number of exceedances	Location of exceedances
Arsenic	7.2	16.8	37*	0	-
Cadmium	<1.1	1.5	11	0	-
Chromium total	21.4	111	910*	0	-
Chromium (VI)	<0.040	<0.040	6*	0	-
Copper	21.3	33.8	2400*	0	-
Lead	12.1	31.8	200[c]	0	-
Mercury	<0.6	<0.6	40*[a]	0	-
Nickel	13.9	21.5	180*[b]	0	-
Selenium	<3.0	<3.0	250*	0	-
Zinc	79.4	120	3700*	0	-
Total Phenols	<0.50	<0.50	1500*	0	-
Total Cyanide	<1.0	<1.0	34*	0	-

*LQM/CIEH GAC for 'Residential with Homegrown Produce' use scenario based on a sandy loam soil and 6% SOM.

a) Based on the inorganic mercury GAC as the conceptual site model does not suggest that other forms of mercury are likely to be present on site.

b) LQM issued an update to the nickel S4ULs in August 2015, and this has been taken into account.

c) No S4UL is available for lead; the Category 4 Screening Level (C4SL) for the 'Residential with Homegrown Produce' land use has been adopted, as described above.

Organics

Table. 10.2: PAH Soil Exceedances

Determinant	Min	Max	GAC	Number of exceedances	Location of exceedances
Naphthalene	<0.016	0.226	13*	0	-
Acenaphthylene	<0.015	0.279	920*	0	-
Acenaphthene	<0.013	0.986	1100*	0	-
Fluorene	<0.013	0.447	860*	0	-
Phenanthrene	<0.014	6.04	440*	0	-
Anthracene	<0.017	2.19	11000*	0	-

Determinant	Min	Max	GAC	Number of exceedances	Location of exceedances
Fluoranthene	<0.017	18.9	890*	0	-
Pyrene	<0.016	17.9	2000*	0	-
Benzo(a)anthracene	<0.012	8.05	13*	0	-
Chrysene	<0.028	7.24	27*	0	-
Benzo(b)fluoranthene	<0.020	12.5	3.7*	1	WS01 @ 0.30 mbgl
Benzo(k)fluoranthene	<0.025	4.79	100*	0	-
Benzo(a)pyrene	<0.019	10.4	3*	1	WS01 @ 0.30 mbgl
Indeno(1,2,3-cd)pyrene	<0.019	10.2	41*	0	-
Dibenz(a,h)anthracene	<0.017	1.6	0.3*	2	WS01 @ 0.30 mbgl and WS02 @ 0.10 mbgl
Benzo(ghi)perylene	<0.019	8.12	350*	0	-

*LQM/CIEH GAC for 'Residential with Homegrown Produce' use scenario based on a sandy loam soil and 6% SOM.

Table 10.3: TPH CWG Aliphatic/Aromatic Soil Exceedances

Determinant	Min	Max	GAC	Number of exceedances	Location of exceedances
Aromatic >C5 - C7	<0.010	<0.010	300	0	-
Aromatic >C7 - C8	<0.010	<0.010	660*	0	-
Aromatic >C8 - C10	<0.010	<0.010	190*	0	-
Aromatic >C10 - C12	<5.0	<5.0	380*	0	-
Aromatic >C12 - C16	<5.5	7.6	660*	0	-
Aromatic >C16 - C21	<4.5	36.6	930*	0	-
Aromatic >C21 - C35	<11.0	796	1700*	0	-
Aromatic >C35 – C44	<5.2	1010	1700*	0	-
Aliphatic >C5 – C6	<0.10	<0.10	160*	0	-
Aliphatic >C6 - C8	<0.10	<0.10	530*	0	-
Aliphatic >C8 - C10	<0.10	<0.10	150*	0	-
Aliphatic >C10 - C12	<2.5	4.0	760*	0	-
Aliphatic >C12 - C16	<4.3	<4.3	4300*	0	-
Aliphatic >C16 – C35	<7.7	278.6	110,000*	0	-
Aliphatic >C35-C44	<2.6	262	110,000*	0	-

* LQM/CIEH GAC scenario for 'Residential with Homegrown Produce' based on a sandy loam soil and 6% SOM. It is noted that the LQM/CIEH S4UL guidance recommends an additive

approach for the TPH fraction, so that a hazard index approach is used. A hazard index (HI) has been calculated by summing the ratios of the maximum concentration of each fraction to its S4UL. This gives an HI of approximately 1.1 at WS01 @ 0.30 mbgl, principally from the Aromatic >C21–C35 (0.47) and Aromatic >C35–C44 (0.59) fractions, and approximately 0.7 at WS02 @ 0.10 mbgl. The marginal exceedance of unity at WS01 is co-located with the PAH exceedances in the near-surface Made Ground at this location and is considered together with those results in the Recommendations.

Others

The asbestos screening did not identify the presence of Asbestos in any of the samples analysed.

10.4 GAS MONITORING RESULTS

All three installed monitoring standpipes (WS01, WS02 and WS03) were monitored during each of the six monitoring visits, providing full coverage of the site across the monitoring period.

Gas monitoring was carried out on six separate occasions between 24th June 2026 and 7th September 2026 using a gas monitor (GA5000). Readings were taken from all three installed window sampler boreholes (WS01 to WS03) on each occasion.

The standpipes were tested for the presence of methane, oxygen, carbon dioxide, carbon monoxide and hydrogen sulphide. The flow rates of the gas and barometric pressure were also recorded.

Ground conditions were recorded as dry throughout the monitoring period, with the wind recorded as being calm to light and precipitation recorded as none to slight. Barometric pressure ranged from 987 mbar to 1,006 mbar during the monitoring period, and readings were generally taken during steady to rising pressure conditions. According to Met Office advice in the UK, low barometric pressure is considered to be anything below 1009 mbar; as such, some rounds of monitoring were undertaken during relatively low and falling pressure, which is considered to represent a worst-case scenario for gas migration.

Oxygen

Oxygen concentrations ranged from a minimum of 15.9% (WS01, 22nd July 2026) to a maximum of 19.2% (WS02, 7th September 2026).

Methane

Methane was not detected (0.0%) in any of the three standpipes during any of the six rounds of monitoring.

Carbon Dioxide

Carbon Dioxide concentrations ranged from a minimum of 0.1% (WS03, 24th June 2026) to a maximum of 2.7% (WS01, 24th August 2026).

The maximum peak concentration of Carbon Dioxide obtained was 2.7% from WS01 during the monitoring visit of 24th August 2026.

Flows Rates

Flow rates were recorded during each round of monitoring from all installations, ranging from a minimum of 0.2 l/hr to a maximum of 0.4 l/hr.

Barometric pressure ranged from a low of 987 mB during the monitoring visit of 7th September 2026 to a high of 1,006 mB attained during the monitoring visit of 24th June 2026. In the case

of any negative flows, it should be assumed that any negative flows can become positive and therefore any negative flows should be taken as positive.

Gas Screening Values

The recorded concentrations of Methane and Carbon Dioxide have been used to calculate a Gas Screening Value (GSV) for the gassing regime at this site.

This value has been subsequently compared against CIRIA values supplied within CIRIA Document C665: Assessing risks posed by hazardous ground gases to buildings (2007), using Situation B for Methane and Carbon Dioxide.

C665 recommends that a maximum worst case theoretical GSV is calculated by multiplying the maximum recorded gas concentration by the maximum recorded flow, irrespective of where the standpipe is, or the date of the visit. However, it is widely accepted that this is not considered representative of the actual site conditions, as too many variables are taken into consideration. As such two alternative approaches have been utilised, both of which are considered equal valid.

- Worst-Credible: Multiply the highest recorded gas concentration by the highest recorded flow for any given standpipe, irrespective of the timing of the two data points.
- Worst-Possible: Multiply each gas concentration against the flow rate at each individual monitoring event.

As such GES has adopted the Worst-Credible approach above.

The values used represent the worst-case CO2 and CH4 concentrations across all installations. The maximum flow rate was 0.4 l/hr and this was taken from all locations and/or monitoring visits.

Table 10.4 below summarises the gas monitoring data calculations.

Table 10.4: Calculated GSV's

Peak Flow Rate (l/hr)	Worst Case CO_2	CO_2 GSV	Worst Case CH_4	CH_4 GSV
0.4	2.7%	0.0108l/hr	0%	0l/hr

(Worst case CO_2 and CH_4 concentration / 100) x worst case flow rate = GSV

This GSV is a conservative estimate based on the maximum concentrations and flow rate.

Based on the maximum calculated GSV of 0.0108 l/hr as derived for Carbon Dioxide, along with the maximum concentrations for Methane of 0.0% and Carbon Dioxide of 2.7%, the site can be characterised by Table 8.5 of CIRIA C665 for classification Characteristic Situation 1 (CS1) and as 'very low risk'.

Carbon Monoxide

Carbon Monoxide concentrations ranged from a minimum of 0 ppm to a maximum of 2 ppm.

The maximum peak concentration of Carbon Monoxide obtained was 2 ppm, recorded at WS02 on several monitoring visits.

Information provided by the World Health Organisation (WHO) provides air quality guidelines for Europe 2000, which provides time weighted average exposures that have been determined in such a way that the carboxyhaemoglobin (COHb) level of 2.5% is not exceeded. These are as follows:

- 87ppm for 15 minutes
- 52ppm for 30 minutes

- 26ppm for one hour
- 9ppm for eight hours

In addition, recommended WHO European guidelines for indoor air quality is as follow:

- 6ppm for twenty four hours so as not to exceed 2% COHb for chronic exposure.

Based on the above, the risks from carbon monoxide are considered to be very low, with the maximum recorded concentration (2 ppm) remaining well below the WHO 8-hour guideline value of 9 ppm.

Therefore, based on the above results, protection is not considered necessary against Carbon Monoxide.

Hydrogen Sulphide

Hydrogen Sulphide concentrations ranged from a minimum of 0 ppm to a maximum of 1 ppm.

The maximum peak concentration of Hydrogen Sulphide obtained was 1 ppm, recorded at WS03 during the monitoring visits of 24th June 2026 and 8th July 2026.

Information taken directly from the HSE (Health & Safety Executive) Online provides the following:

- 0.0047 ppm is the recognition threshold of human smell, the concentration at which 50% of humans can detect the characteristic odour of hydrogen sulphide.
- 10-20 ppm is the borderline concentration for eye irritation.
- 50-100 ppm leads to eye damage.
- At 150-250 ppm the olfactory nerve is paralyzed after a few inhalations, and the sense of smell disappears, often together with awareness of danger.
- 320-530 ppm leads to pulmonary edema with the possibility of death.
- 530-1000 ppm causes strong stimulation of the central nervous system and rapid breathing, leading to loss of breathing.
- Concentrations over 1000 ppm cause immediate collapse with loss of breathing, even after inhalation of a single breath.

Based on the above, the risks from hydrogen sulphide are considered to be very low. Whilst the recorded maximum (1 ppm) is above the human olfactory detection threshold (0.0047 ppm), it remains substantially below the concentrations associated with any adverse health effects (10-20 ppm and above).

Therefore, based on the above results, protection is not considered necessary against Hydrogen Sulphide.

11. UPDATED CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

The Conceptual Site Model has been re-formulated based upon the results from the ground investigation in accordance with BS10175:2015. It aims to provide information regarding the sources of contamination and the pathways in which contamination can migrate to a vulnerable receptor, all of which need to be present for there to be a risk. This is in relation to the proposed end use being classified as 'residential with homegrown produce'. The following linkages have been identified and are presented in Table 11.1, below.

Table 11.1: Updated Conceptual Site Model.

Contaminant Source	Pathways	Receptor	Pollutant Linkage	Probability of Risk	Classification of Consequence	Level of Risk	Justification
On-site: Made Ground soils on site possibly containing elevated metals, other organics such as TPH, PAH, phenols, VOC and SVOCs.	Ingestion, dermal contact, inhalation of dusts/vapours	Future end users and site visitors	Considered potentially active Considered inactive	Low Likelihood	Medium	Low ●	A low risk rating has been assessed. Minor exceedances of the adopted GAC were identified for three PAH determinants (benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene) within the near-surface Made Ground at WS01 (0.30 mbgl), with a single marginal exceedance of dibenzo(a,h)anthracene also recorded at WS02 (0.10 mbgl). No exceedances were identified for any other determinant tested (metals, remaining PAHs, or individual TPH CWG fractions), although the combined TPH hazard index at WS01 marginally exceeds unity (HI approximately 1.1), driven by the heavy aromatic fractions. Given the low magnitude and localised nature of these exceedances, the risk to future end users is considered low and manageable via the watching brief and discovery strategy set out in Section 12.

Contaminant Source	Pathways	Receptor	Pollutant Linkage	Probability of Risk	Classification of Consequence	Level of Risk	Justification
		Construction Workers	Considered potentially active Considered inactive	Low Likelihood	Medium	Low ●	A low risk rating has been assessed. As above, minor PAH exceedances were identified within the near-surface Made Ground at WS01, which construction workers may come into direct contact with during groundworks. This risk is considered manageable through adherence to appropriate health and safety procedures and PPE during construction.
	Leaching through soils and migration via groundwater or soil pore moisture	Controlled Waters	Considered potentially active Considered inactive	Low Likelihood	Mild	Low / moderate ●	A low, risk rating has been assessed due to the presence of no contaminative sources on site and the presence of a Secondary (A) Aquifer within the superficial deposits and the presence of two Principal Aquifers in the bedrock underlying the site.
	Permeation of water pipes	Construction materials, future end users and site visitors	Considered potentially active Considered inactive	Low Likelihood	Medium	Low ●	Returned samples indicated low hydrocarbon concentrations from tested soils. Provision of water supply pipes and connectors formed from proprietary “barrier pipe” materials (e.g., polyethylene-aluminium-polyethylene) may be required by the water supply company.
	Uptake	Plant and Wildlife	Considered potentially active Considered inactive	Low Likelihood	Medium	Low ●	A low, risk rating has been assessed due to tested samples showing phytotoxic contaminants below elevated concentrations often below the limit of detection returned. Contact is likely limited between future occupiers/visitors and contaminants due to the Residential end use.

Contaminant Source	Pathways	Receptor	Pollutant Linkage	Probability of Risk	Classification of Consequence	Level of Risk	Justification
On-site: Asbestos at/near ground surface in Made Ground soils.	Inhalation of fibres in airborne dust	Future end users and site visitors	Considered potentially active Considered inactive	Low Likelihood	Medium	Low ●	A low, risk rating has been assessed due to the asbestos screening returning a negative result for the presence of fibrous material from all samples analysed.
		Construction Workers	Considered potentially active Considered inactive	Low Likelihood	Medium	Very Low ●	A low, risk rating has been assessed due to the asbestos screening returning a negative result for the presence of fibrous material from all samples analysed.
On-site: Ground Gases (CH_4, CO_2) from on-site Made Ground.	Gas migration and build up within buildings (explosion/ asphyxiation risk)	Future end users and building structures.	Considered potentially active Considered inactive	Low Likelihood	Minor	Very Low ●	A very low risk rating has been assessed given the maximum calculated GSV of 0.0108 l/hr (Characteristic Situation 1).
Offsite: Ground Gases (CH_4, CO_2, H_2S) from off-site historical landfilling activities.	Gas migration and build up within buildings (explosion/ asphyxiation risk)	Future end users and building structures.	Considered potentially active Considered inactive	Low Likelihood	Minor	Very Low ●	The monitoring undertaken suggests the risk from ground gas is very low.

12. RECOMMENDATIONS

The results of the chemical testing undertaken across the site indicate that significant contamination is not present. Minor exceedances of the adopted GAC were identified for three PAH determinants within the near-surface Made Ground at WS01 (and, for one determinant, at WS02), together with a marginal exceedance of the TPH hazard index (HI approximately 1.1) at WS01 driven by the heavy aromatic fractions; however, given the low magnitude and localised nature of these results, they are not considered to represent a significant risk to the proposed residential end use, subject to the watching brief set out below. Moreover these would likely be removed by a site strip normally undertaken when commencing work on site and present in the driveway area which is considered to have broken the pathway to receptor.

12.1 CONSULTEES

It is highly recommended that this report be forwarded to the relevant Local Authority Environmental Health and Planning Departments to seek their comments and subsequent approval, otherwise further works may be required.

12.2 WATCHING BRIEF AND DISCOVERY STRATEGY

A watching brief should be maintained by the Main Contractor at all times during the groundworks stage. Should any unforeseen contamination, such as oils or soils/groundwater with an unusual colour or odour, be encountered during groundworks then the following procedure should be implemented:

- Work to cease in that area to prevent exposure to ground workers and potential contaminants being spread around.
- Notify GES, to attend site and sample material.
- Notify the Environmental Health Department / Contaminated Land Officer(s) of the Local Planning Authority.

If the nature and extent of the contamination is unmanageable under the procedure set out above, then a suitable management, mitigation or remediation procedure will be agreed with the CLO. However, this is considered unlikely at this particular site.

12.3 PREVIOUSLY UNIDENTIFIED CONTAMINANTS

Any suspected contaminated soil/fill found during construction works shall be placed in temporary stockpiles on hardstanding or high density Visqueen and be suitability covered to minimize the potential for dust/odour nuisance and prevent surface water runoff. Samples of arisings material will be taken to determine whether this material is suitable for re-use on site.

Once the laboratory analysis of the material is available an assessment should be undertaken to determine whether it can be retained on-site as part of the Material Management Plan or whether it should be disposed off-site.

Depending on the nature of any such impact it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in-situ.

12.4 GROUND GAS PROTECTION MEASURES

Based on the maximum calculated GSV of 0.0108 l/hr, the site can be characterised by Table 8.6 of CIRIA C665 for building type A, Characteristic Situation CS1 and as ‘Very Low’ risk.

As such no site-specific gas protection measures are required.

Professional advice should be sought from a suitably qualified structural engineer as to the appropriateness of any gas protection scheme to the intended construction. All gas protection measures should be designed by a competent person, and they should refer to BS 8485 and BRE 414.

The Phase I Desktop Study (Rogers Geotechnical Services Ltd, ref C5994/26/E/9289) confirms, with reference to UK Health Security Agency (UKHSA) Radon data, that the site lies within a Radon Affected Area where between 1% and 3% of properties are at or above the radon Action Level. In accordance with BR211 guidance, no radon protective measures are necessary in the construction of new dwellings or extensions at this site.

12.5 ASBESTOS

Although screening has revealed no asbestos to be present within the samples analysed from exploratory holes undertaken, it cannot be guaranteed that asbestos is not present within the soils across the remainder of the site.

Consequently, GES would recommend that a watching brief be adopted with regards to the site for the potential of finding any Asbestos Containing Materials (ACMs). If any ACMs are identified these need to be dealt with accordingly in relation to the Hazardous Waste Regulations 2005.

12.6 SERVICES

If new services will be installed as part of the redevelopment of the site, we would recommend the local water supply company be contacted to determine their specification for the type of pipework which should be used on this site.

All services and in particular potable water supply pipework should comprise of material that is resistant to attack and degradation to chemical attack.

Further information can be found within the published guidance for the '*Selection of Water Supply Pipes to be used in Brownfield Sites'*, issued in January 2011 by the UK Water Industry Research (UKWIR), this supersedes the Water Regulations Advisory Scheme (WRAS) Information and Guidance Note – '*Laying Pipes in Contaminated Land'* which has been withdrawn.

12.7 SURFACE WATER

It should be noted that the Environment Agency does not recommend that soakaways be placed within Made Ground, potentially contaminative land or in ground previously identified as contaminated.

12.8 BOREHOLE DECOMISSIONING

Prior to the development of the site, it is recommended that all the boreholes installed at the site by GES are decommissioned in line with EA Guidance document 'Good Practice for Decommissioning Redundant Boreholes and Wells' (October 2012).

13. RELIANCE AND LIMITATIONS

This report has been prepared using published information and information provided by the Client and their professional advisers which has been made available to GES at the time of writing only. GES accepts no liability for any changes resulting from new information which has become available since this time.

This report is provided for the sole use of the client and their professional advisors and is confidential to them unless agreed otherwise in writing. This report may only be used and relied on once the work has been paid for in full. GES owes no duty of care and has no liability to any third party who is not authorised by GES to use this report. Any unauthorised third parties using information contained in this report do so at their own risk.

We are content that as a result of the ground investigation works and subsequent soil testing undertaken, as outlined within this report, we have characterised the ground conditions and consequently the potential for contamination to exist on site. These works and ensuing assessment have been detailed in this report.

This assessment has been carried out to determine the potential risks posed to future end users, along with other key receptors, resulting from potential contamination at the site, based on the proposed development. Should any revisions in the development proposals result in a change any assessment parameters detailed in this report, a re-assessment of the risk should be carried out.

Whilst this report may reference observations made regarding the presence of features/ issues such as invasive species, ACM, site drainage and evidence of structural abnormalities, this report does not constitute specialist surveys on these matters. Should further specialist surveys be carried out in this regard, the findings of these should be reported to GES so that we may determine if this has any impact on the findings of this report.

The assessment and interpretation of the factual data obtained as part of this ground investigation has been undertaken in accordance with standard consulting practise and with current national and international guidance.

This report presents the observations made during the ground investigation and the factual data obtained. The conclusions and recommendations in this report are limited to those which can be made based on the findings of the survey and information provided by third parties. GES assumes all third party data to be true and correct. No responsibility can be accepted by GES for inaccuracies in the information provided by any other party.

This report is written in the context of an agreed scope of works and should not be used in a different context. Furthermore, new information, improved practises, and changes in legislation may require the reinterpretation of the report in whole or in part after its original issue. GES reserve the right to alter their conclusions and recommendations in the light of further information that may become available.

Ground conditions can be variable and change rapidly, especially in areas of Made Ground, however it is assumed that the ground conditions encountered and observed are typical and representative of the site as a whole. Most specifically with regard to this limited investigation, the ground conditions have been determined from a limited number of exploratory holes formed across the site, therefore only a small percentage of the total area of the site has been investigated. Interpolation between exploratory holes has enabled a general picture of the subsurface conditions to be produced. Conclusions drawn from the ground investigation should be read in this context. GES cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.

In addition, subsurface conditions including contaminant concentrations and groundwater levels may vary spatially with time. This factor should be given due consideration in the event that the information contained within this report is used after any significant period of time has elapsed.

APPENDIX 1

DRAWINGS AND PLANS

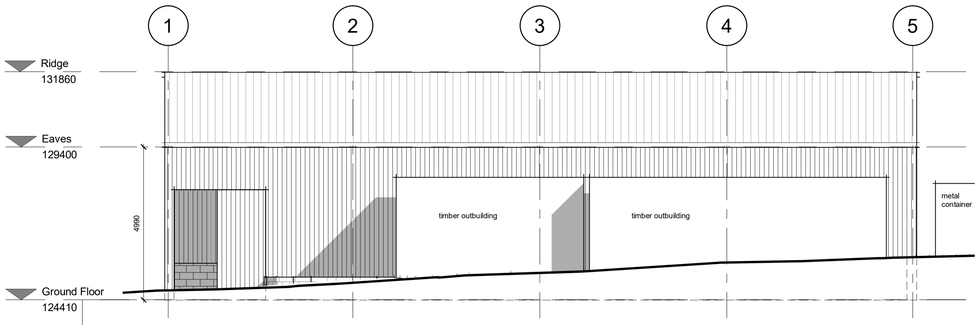
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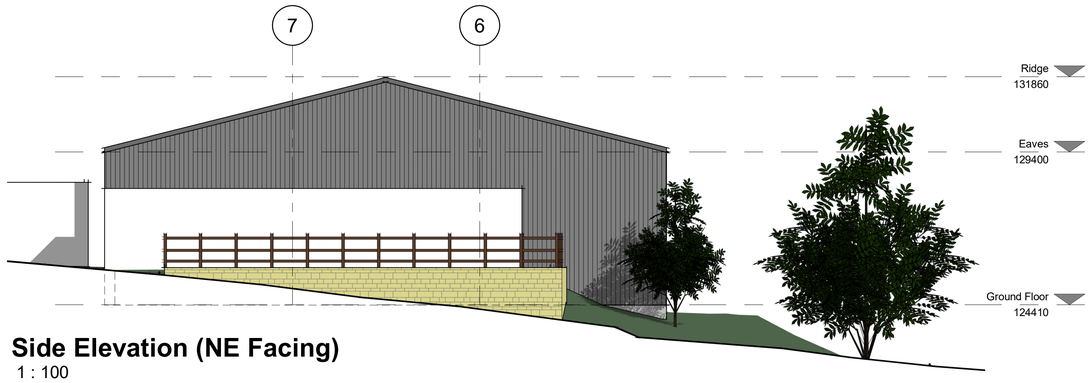
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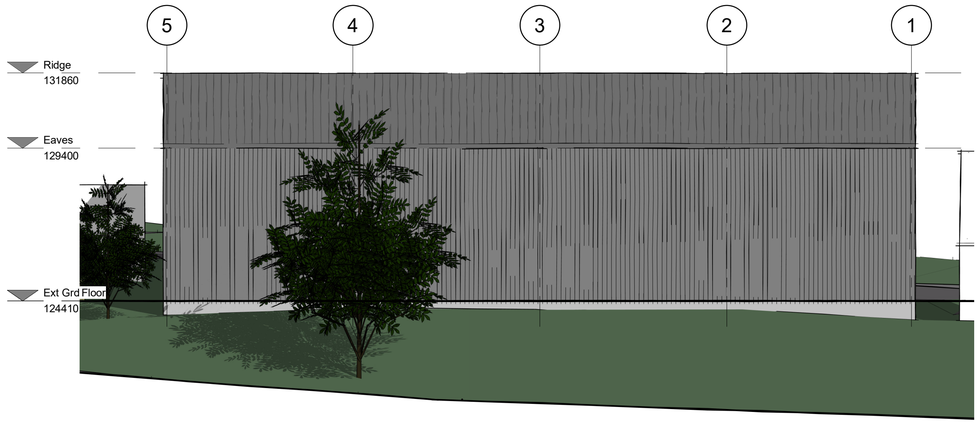
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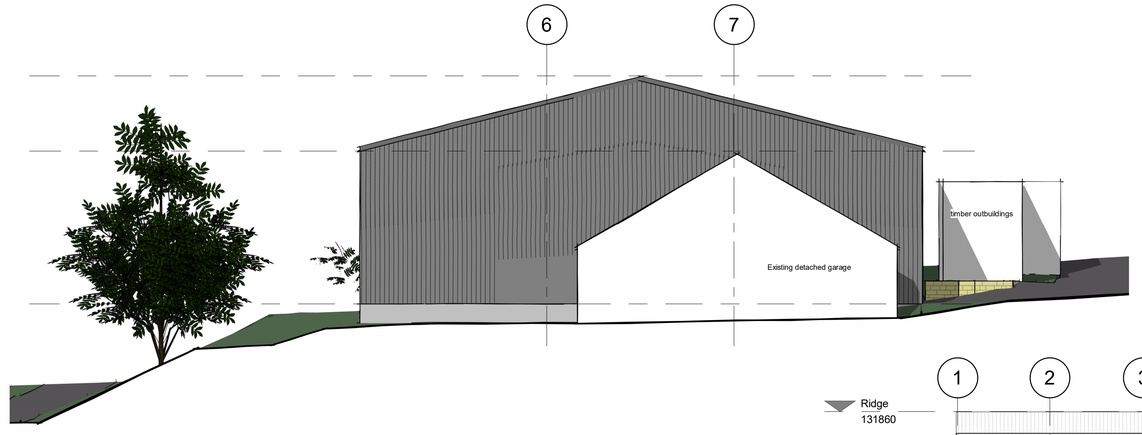
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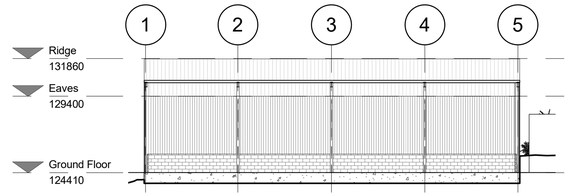
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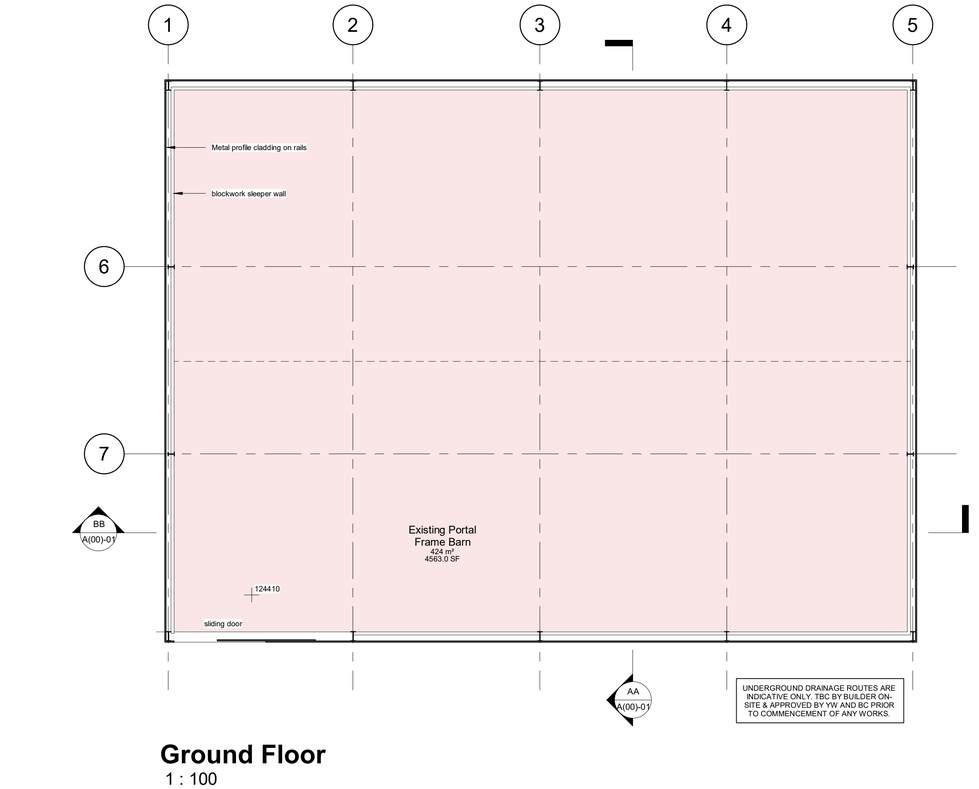
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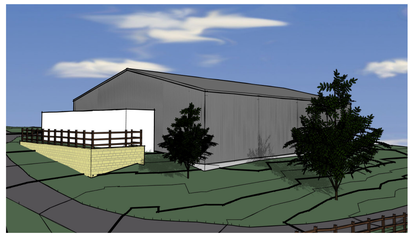
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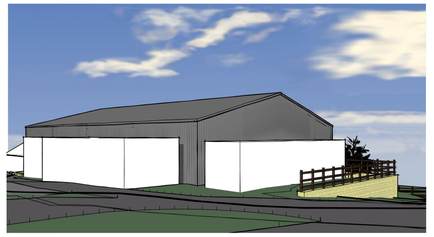
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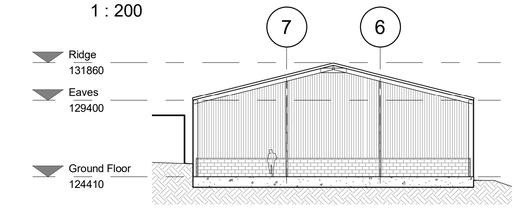
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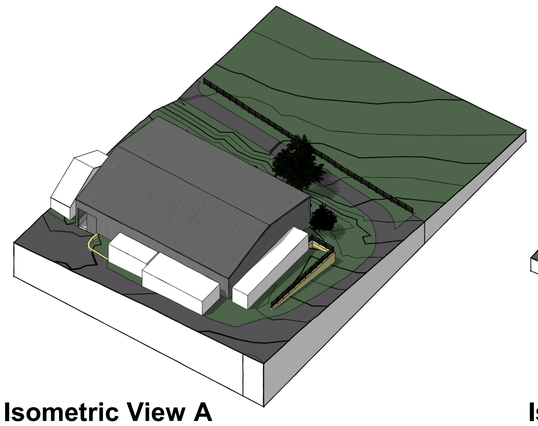
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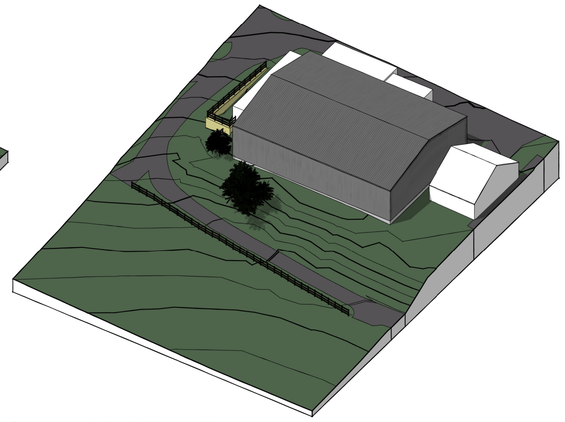
Front Perspective



Section AA
1 : 200



Isometric View A



Isometric View B

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NOTES

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As indicated	PSI	CJ
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status	PLANNING	
job no	dwg no	rev
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project

Proposed Barn Conversion at
Lower Chatts Farm,Cliff Hollins Lane,
Oakenshaw, Bradford BD12 7ET

client

Mr & Mrs Jacobs

title

Plans & Elevations - As Existing

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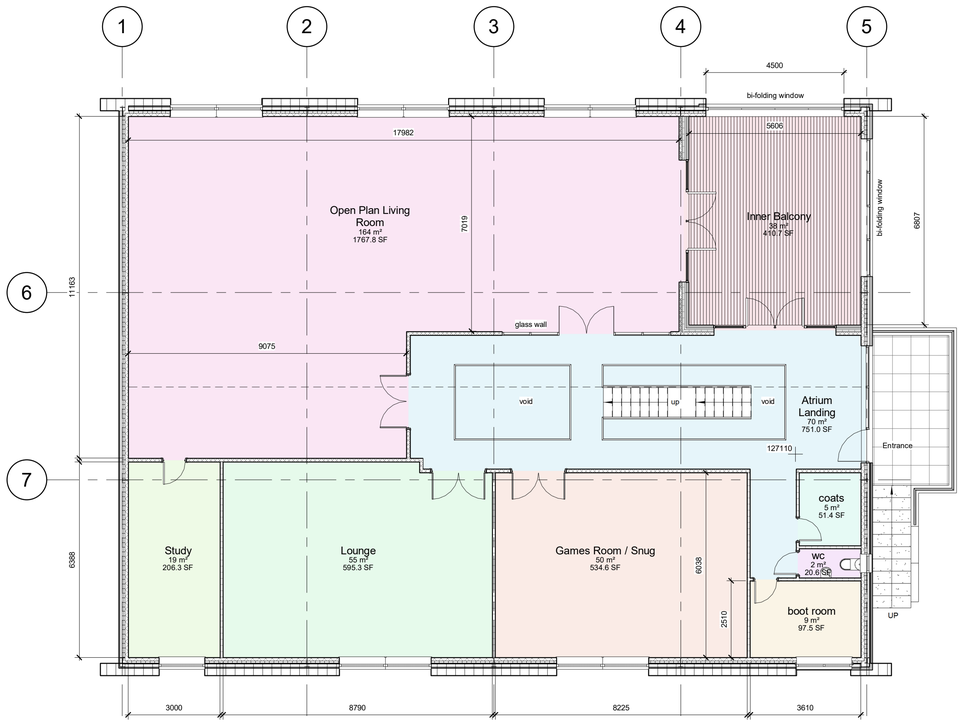
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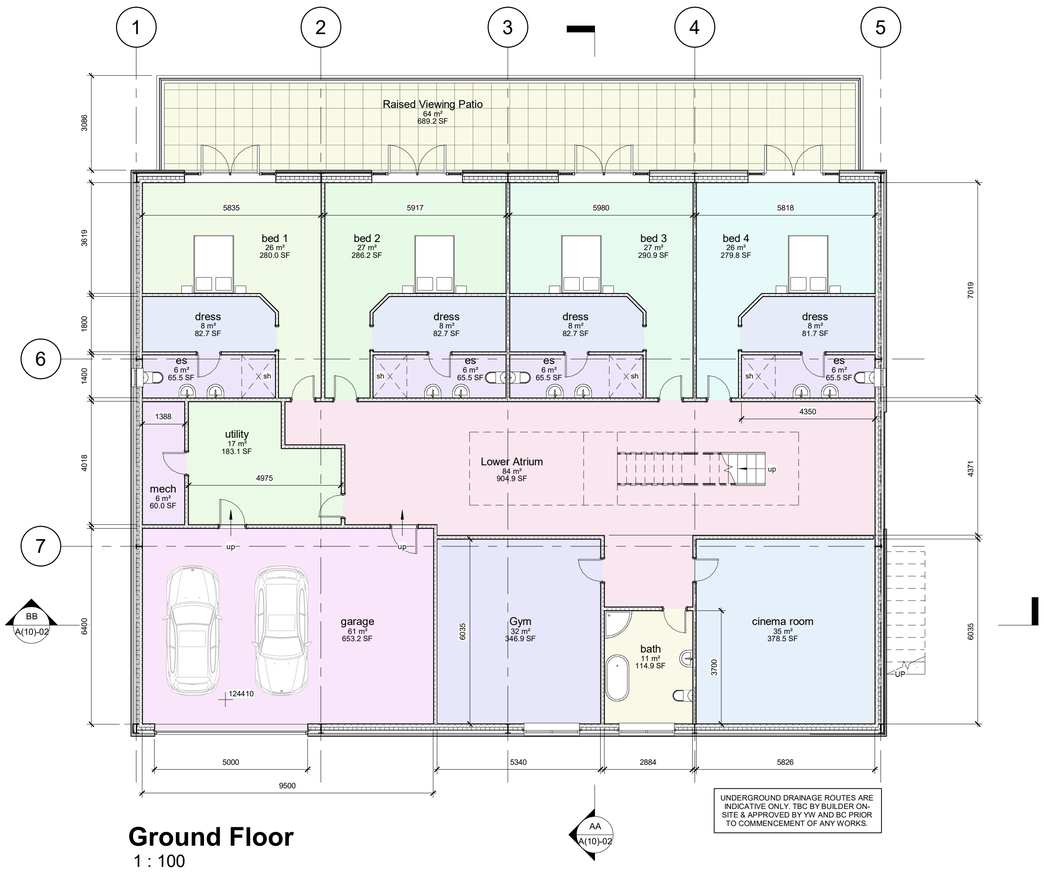
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First Floor
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Ground Floor
1 : 100



Artists Impression A



Artists Impression B



Artists Impression C

GENERAL

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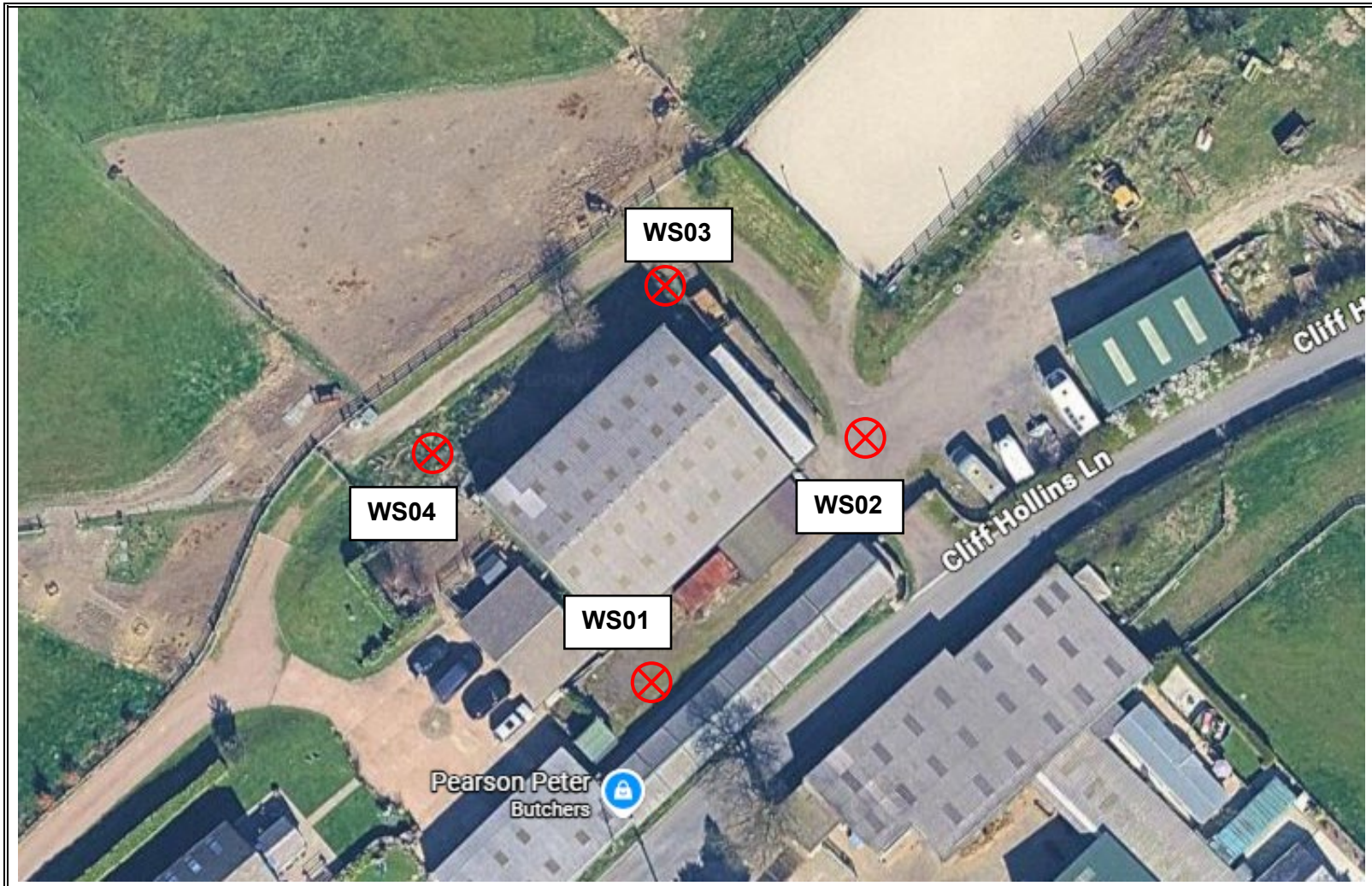
Tel: 01484 937123
Email: info@cadvis3d.co.uk
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project
Proposed Barn Conversion at
Lower Chatts Farm,Cliff Hollins Lane,
Oakenshaw,
Bradford, BD12 7ET

client
Mr & Mrs Jacobs

title
Floor Plans & Artists Impressions
As Proposed

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Window Sample

Borehole Location

GeoEnviro Solutions Ltd
4A Haggwood Stone Quarry,
Woodhead Road, Honley,
HD9 6PW
Tel: 01484 986010
Email: info@geoenvirosolutions.com
Web: www.geoenvirosolutions.com

PROJECT NAME Lower Chatts Farm, Oakenshaw **PROJECT NUMBER** 5871-26	**DRAWING NO.** 5871-6/01	**SCALE** N.T.S
TITLE Borehole Location Plan	**DATE** September 2026	**DRAWN BY** JF

APPENDIX 2

EXPLORATORY HOLE LOGS

Dynamic (Windowless) Sampler

WS01

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS				1:50

Project Name	Project No.	Start Date	End Date
Lower Chatts Farm	5871-26	2026-06-08	2026-06-08

Client
Cadvis 3D

Consultant
GeoEnviro

Contractor
GeoEnviro

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.30	ES 1			(0.40) 0.40		MADE GROUND: Dark brown sandy fine subrounded to angular GRAVEL of red brick and slate
						(0.10) 0.50		MADE GROUND: Angular cobbles of RED BRICK
						(0.20) 0.70		MADE GROUND: Dark brown sandy fine subrounded to angular GRAVEL of red brick and slate
		1.00 1.00-1.45 1.00-1.80	SPT D 2 B 3	N=24 (5,4/4,7,7,6)		(1.20) 1.90		Extremely weak highly weathered yellow grey SANDSTONE [Clifton Rock Formation]
		2.00 2.00-2.45	SPT D 4	N=50 for 300mm (5,9/10,16,13,11)		(0.50) 2.40		Extremely weak highly fractured highly weathered yellow grey MUDSTONE [Pennine Lower Coal Measures Formation]
								End of Borehole at 2.40m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

Remarks
1. A hand pit was excavated to 1.0 mbgl to check for services. 2. No visual or olfactory evidence of hydrocarbon contamination was noted. 3. Groundwater was not encountered. 4. The borehole was backfilled with bentonite and gravel .

Method, Plant, Stability, Dimensions
0.00 - 2.00m WLS Archway Dart

Logger
JF

Dynamic (Windowless) Sampler

WS02

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS				1:50

Project Name	Project No.	Start Date	End Date
Lower Chatts Farm	5871-26	2026-06-08	2026-06-08

Client
Cadvis 3D

Consultant
GeoEnviro

Contractor
GeoEnviro

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.10	ES 1			(0.30) 0.30		TOPSOIL: grass over brown sandy TOPSOIL
		1.00 1.00-1.45	SPT D 2	N=38 (7,7/11,10,7,10)		(1.30)		Extremely weak, completely weathered yellow grey SANDSTONE recovered as dense to very dense clayey SAND [Clifton Rock Formation]
		1.60 1.60-1.45	SPT D 3	N=48 (5,7/6,15,16,11)		1.60		*End of Borehole at 1.60m*

Remarks
1. A hand pit was excavated to 1.0 mbgl to check for services. 2. No visual or olfactory evidence of hydrocarbon contamination was noted. 3. Groundwater was not encountered. 4. The borehole was backfilled with bentonite and gravel .

Method, Plant, Stability, Dimensions
0.00 - 1.60m WLS Archway Dart

Logger
JF

Dynamic (Windowless) Sampler

WS03

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS				1:50

Project Name	Project No.	Start Date	End Date
Lower Chatts Farm	5871-26	2026-06-08	2026-06-08

Client
Cadvis 3D

Consultant
GeoEnviro

Contractor
GeoEnviro

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.20) 0.20		TOPSOIL: grass over brown sandy TOPSOIL
								Extremely weak completely weathered grey brown MUDSTONE recovered as stiff to very stiff CLAY [Pennine Lower Coal Measures Formation]
		0.80	ES 1					
		1.00 1.00-1.45	SPT D 2	N=14 (2,2/2,4,3,5)				
						(2.80)		
		2.00 2.00-2.45	SPT D 3	N=17 (2,3/3,4,4,6)				
		3.00 3.00-3.45	SPT D 4	N=51 for 300mm (4,6/6,11,22,12)		3.00		*End of Borehole at 3.00m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

Remarks
1. A hand pit was excavated to 1.0 mbgl to check for services. 2. No visual or olfactory evidence of hydrocarbon contamination was noted. 3. Groundwater was not encountered. 4. The borehole was backfilled with bentonite and gravel .

Method, Plant, Stability, Dimensions
0.00 - 3.00m WLS Archway Dart

Logger
JF

Dynamic (Windowless) Sampler

WS04

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS				1:50

Project Name	Project No.	Start Date	End Date
Lower Chatts Farm	5871-26	2026-06-08	2026-06-08

Client
Cadvis 3D

Consultant
GeoEnviro

Contractor
GeoEnviro

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.30) 0.30		TOPSOIL: grass over brown sandy TOPSOIL
								Extremely weak completely weathered grey brown MUDSTONE recovered as stiff to very stiff CLAY [Pennine Lower Coal Measures Formation]
		1.00 1.00-1.45	SPT D 1	N=14 (2,4/3,4,3,4)				
		2.00 2.00-2.45	SPT D 2	N=22 (3,4/5,5,6,6)		(3.20)		
		3.00 3.00-3.45	SPT D 3	N=35 (3,4/5,10,9,11)				
		3.50 3.50-3.70	SPT D 4	N=0 (6,20/0,0,0,0 for 0mm)		3.50		*End of Borehole at 3.50m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

Remarks
1. A hand pit was excavated to 1.0 mbgl to check for services. 2. No visual or olfactory evidence of hydrocarbon contamination was noted. 3. Groundwater was not encountered. 4. The borehole was backfilled with bentonite and gravel .

Method, Plant, Stability, Dimensions
0.00 - 3.50m WLS Archway Dart

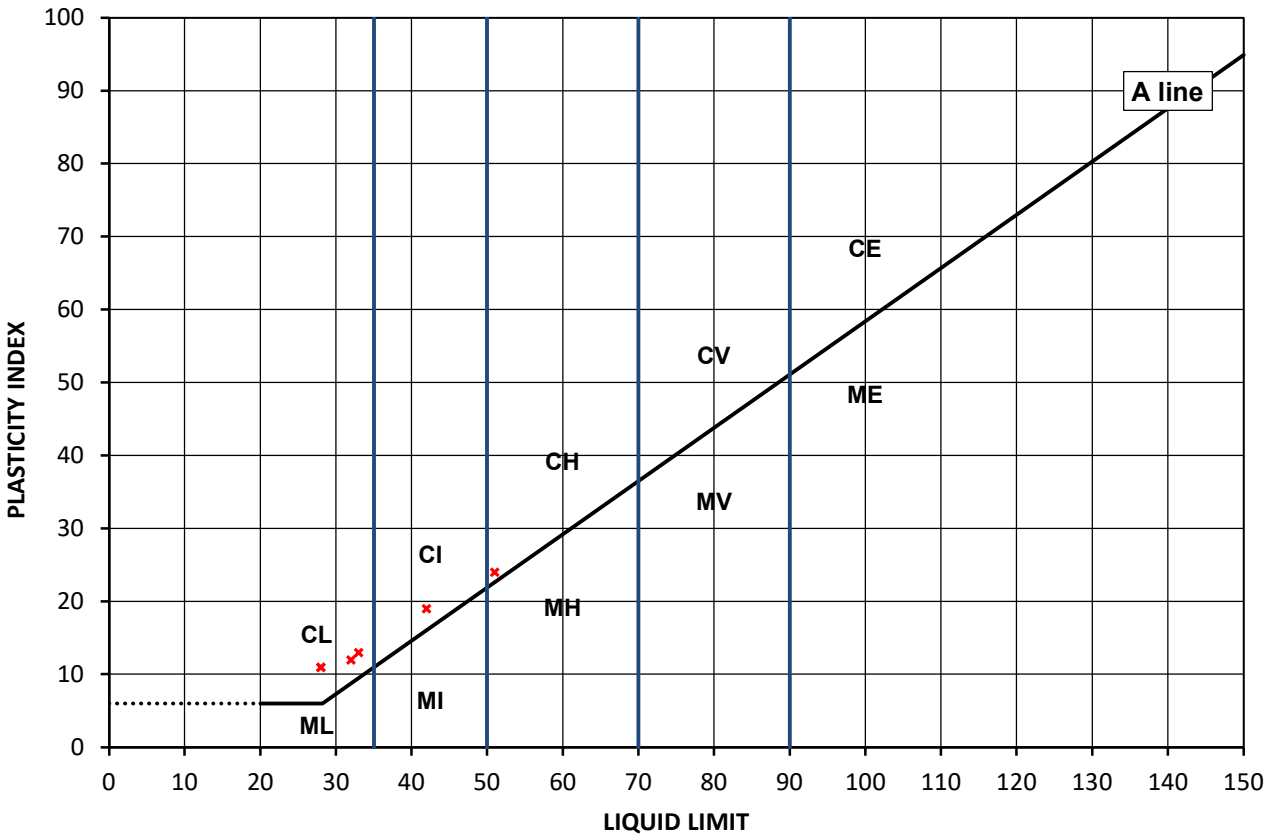
Logger
JF

APPENDIX 3

GEOTECHNICAL TESTING RESULTS

Plasticity (A-line) Chart

Project No.	Project Name
J365286	Oakshaw



Legend, based on BS 5930:2015 +A1: 2020 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Notes	Date Printed	Approved By	Table
Classifications vary between countries and codes of practice. Laboratory tests to ISO 17892-12 include 4pt and 1 pt tests, see individual results for more details. 'A' line derivation above PI of 6, PI = 0.73(LL-20)	27/07/2026	Mark Athorne	1 sheet 1

GFQ-008-74
Issue 02 - Nov 23

Summary of Classification Test Results

Project No.
J365286

Project Name
Oakshaw

Hole No.	Sample				Soil Description	Density		*w*	Passing 425µm	LL	If 1 Point Test			PL	PI	Particle density	Remarks
	Ref	Top	Base	Type		bulk	dry				Pen 1	Pen 2	CF				
						Mg/m^3		%	%	%				%	%	Mg/m^3	
WS01		1.00		D	Grey brown slightly sandy CLAY			9.4	100-n	28-4pt-i				17	11		
WS02		1.60		D	Grey brown slightly sandy CLAY			6.0	37-w	28 -1pt	21	21	0.984	17	11		
WS03		2.00		D	Grey brown slightly sandy CLAY			23.6	99-hp	42-4pt-i				23	19		
WS03		3.00		D	Grey brown slightly sandy CLAY			12.2	100-hp	51-4pt-i				27	24		
WS04		1.00		D	Grey brown slightly sandy CLAY			11.3	98-hp	32-4pt-i				20	12		
WS04		3.50		D	Grey brown slightly sandy slightly gravelly CLAY			26.8	47-w	33 -1pt	21	21	0.984	20	13		

Key

Density tests:
Linear measurement unless :
wd - water displacement
wi - immersion in water

w - water content

Atterberg:
4pt cone unless :
cas - Casagrande method
1pt - single point test
CF - Correlation Factor
Liquid limit test: i - increasing moisture content, d - decreasing moisture content
Atterberg sample prep: n - Natural, HP - Hand Picked, w - Washed

Particle density:
sp - fluid pycnometer

Test Standards:
Bulk Density Tests - BS EN ISO 17892-2:2014
Water Content - BS EN ISO 17892-1:2014+A1:2022
Liquid & Plastic Limits - BS EN ISO 17892-12:2018+A2:2022
Particle Density - BS EN ISO 17892-3:2015

Date Printed:
27/07/2026

ISO INDX

APPENDIX 4

CHEMICAL TESTING RESULTS

ANALYTICAL TEST REPORT

Report Number	26-06822, issue number 1
Contract name:	Lower Chatts Farm, Oakshaw
Client reference:	5871-26
Clients name:	GeoEnviro Solutions Ltd
Clients address:	GeoEnviro Solutions Ltd Unit 7 Springvale Works Brookfoot Lane Brighouse HD6 2RA
Samples received:	11/06/2026
Analysis started:	12/06/2026
Analysis completed:	22/06/2026
Report issued:	22/06/2026

Key

U UKAS accredited test
M MCERTS & UKAS accredited test
(B) Analysis performed at Southampton Site
I/S Insufficient sample to carry out test
U/S Sample not suitable for testing
NAD No Asbestos Detected
Full key available on Information page

Approved by:

Georgia Hunter
Senior Reporting Administrator

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
% Moisture reported as MCERTS drying at 30ºC

Lab ref	Sample ID	Depth (m)	Sample description	Material removed	% Removed	% Moisture
111704	WS01	0.30	Brown Clayey Sand with Stones and Gravel.	-	-	11.8
111705	WS02	0.10	Brown Clayey Sand with Stones and Gravel.	-	-	14.7
111706	WS03	0.80	Beige Clay.	-	-	13.4

SOILS

Lab Number					111704	111705	111706
Client Reference					1	1	1
Sample ID					WS01	WS02	WS03
Depth (m)					0.30	0.10	0.80
Sampling Date					08/06/2026	08/06/2026	08/06/2026
Test	**Method**	**Accred**	**LoD**	**Units**			
Asbestos							
Asbestos Identification	SUBCON	SU	0	-	NAD	NAD	NAD
Metals							
Arsenic	CE264	M	2.3	mg/kg	7.2	16.8	9.3
Cadmium	CE264	M	1.1	mg/kg	1.5	< 1.1	< 1.1
Chromium	CE264	U	1.3	mg/kg	111	42.7	21.4
Copper	CE264	M	1.2	mg/kg	30.4	33.8	21.3
Lead	CE264	U	2.4	mg/kg	26.6	31.8	12.1
Mercury	CE264	M	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Nickel	CE264	M	1.6	mg/kg	13.9	14.2	21.5
Selenium	CE264	M	3	mg/kg	< 3.0	< 3.0	< 3.0
Zinc	CE264	M	2.4	mg/kg	96.3	120	79.4
Colourimetric							
Water Soluble Chromium VI	CE263	N	0.04	mg/kg	< 0.040	< 0.040	< 0.040
Water Soluble Sulphate	CE261	U	1.8	mg/l	47.5	12.1	1840
Total Monohydric Phenols	CE078	N	0.5	mg/kg	< 0.50	< 0.50	< 0.50
Total Cyanide	CE077	N	1	mg/kg	< 1.0	< 1.0	< 1.0
Combustion							
Moisture Content	CE001	N	0.1	%	11.8	14.7	13.4
Soil Organic Matter	CE192	N	0.1	%	8.45	6.43	0.50
Polyaromatic hydrocarbons							
Naphthalene	CE087	M	0.016	mg/kg	0.226	0.079	< 0.016
Acenaphthylene	CE087	M	0.015	mg/kg	0.279	0.052	< 0.015
Acenaphthene	CE087	M	0.013	mg/kg	0.986	0.154	< 0.013
Fluorene	CE087	U	0.013	mg/kg	0.447	0.117	< 0.013
Phenanthrene	CE087	M	0.014	mg/kg	6.04	1.40	< 0.014
Anthracene	CE087	U	0.017	mg/kg	2.19	0.532	< 0.017
Fluoranthene	CE087	M	0.017	mg/kg	18.9	4.47	< 0.017
Pyrene	CE087	M	0.016	mg/kg	17.9	4.57	< 0.016
Benzo(a)anthracene	CE087	U	0.012	mg/kg	8.05	1.97	< 0.012

SOILS

Lab Number					111704	111705	111706
Client Reference					1	1	1
Sample ID					WS01	WS02	WS03
Depth (m)					0.30	0.10	0.80
Sampling Date					08/06/2026	08/06/2026	08/06/2026
Test	**Method**	**Accred**	**LoD**	**Units**			
Chrysene	CE087	M	0.028	mg/kg	7.24	1.59	< 0.028
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	12.5	2.80	< 0.020
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	4.79	1.03	< 0.025
Benzo(a)pyrene	CE087	U	0.019	mg/kg	10.4	2.39	< 0.019
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	10.2	2.18	< 0.019
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	1.60	0.357	< 0.017
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	8.12	1.73	< 0.019
Total PAH(16)	CE087	N	0.28	mg/kg	110	25.4	< 0.280
BTEX							
Benzene	CE267	U	0.001	mg/kg	< 0.001	< 0.001	< 0.001
Toluene	CE267	U	0.001	mg/kg	< 0.001	< 0.001	< 0.001
Ethylbenzene	CE267	U	0.001	mg/kg	< 0.001	< 0.001	< 0.001
Xylenes	CE267	N	0.004	mg/kg	< 0.004	< 0.004	< 0.004
MTBE	CE267	N	0.002	mg/kg	< 0.002	< 0.002	< 0.002
m,p-Xylene	CE267	U	0.002	mg/kg	< 0.002	< 0.002	< 0.002
oXylenes	CE267	U	0.002	mg/kg	< 0.002	< 0.002	< 0.002
Total Petroleum Hydrocarbons							
>C5-C6 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C6-C8 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C8-C10 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C5-C7 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
>C7-C8 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
>C8-C10 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
>C10-C12 Aliphatic (EH_CU_1D_AL)	CE286	N	2.5	mg/kg	4.0	< 2.5	< 2.5
>C12-C16 Aliphatic (EH_CU_1D_AL)	CE286	N	4.3	mg/kg	< 4.3	< 4.3	< 4.3
>C16-C21 Aliphatic (EH_CU_1D_AL)	CE286	N	2.5	mg/kg	8.6	< 2.5	< 2.5
>C21-C35 Aliphatic (EH_CU_1D_AL)	CE286	N	5.2	mg/kg	270	150	< 5.2
>C35-C44 Aliphatic (EH_CU_1D_AL)	CE286	N	2.6	mg/kg	262	122	< 2.6
>C10-C12 Aromatic (EH_CU_1D_AR)	CE286	N	5	mg/kg	< 5.0	< 5.0	< 5.0
>C12-C16 Aromatic (EH_CU_1D_AR)	CE286	N	5.5	mg/kg	7.6	< 5.5	< 5.5

SOILS

Lab Number					111704	111705	111706
Client Reference					1	1	1
Sample ID					WS01	WS02	WS03
Depth (m)					0.30	0.10	0.80
Sampling Date					08/06/2026	08/06/2026	08/06/2026
Test	**Method**	**Accred**	**LoD**	**Units**			
>C16-C21 Aromatic (EH_CU_1D_AR)	CE286	N	4.5	mg/kg	36.6	14.5	< 4.5
>C21-C35 Aromatic (EH_CU_1D_AR)	CE286	N	11	mg/kg	796	500	< 11.0
>C35-C44 Aromatic (EH_CU_1D_AR)	CE286	N	5.2	mg/kg	1010	611	< 5.2
>C5-C44 Total (EH_CU+HS_1D_Total)	CE286	N	21.4	mg/kg	2400	1400	< 21.4
Wet Chem							
pH	CE004	M	0.1	pH units	7.7	7.7	7.7

METHOD DETAILS

METHOD	TESTNAME	METHOD SUMMARY	ANALYSIS BASIS
CE267	VPH in Soil	HS-GCFID	As submitted sample
SUBCON	Asbestos Soil	HSG248	Air Dried Sample
CE264	Metals by ICP in Soil	ICPOES	Air dried sample
CE267	BTEX in Soils	Analysis by HSGCFID	As submitted sample
CE263	ChromiumVI by Discrete Analyser in Soil	Gallery	Air dried sample
CE261	Anions by Discrete Analyser in Soils	Gallery	Air dried sample
CE087	PAH in Soil	DCM Extraction and GCMS	As submitted sample
CE078	Phenols in Soil	Continuous Flow Analyser	As submitted sample
CE077	Cyanides in Soils	Continuous Flow Analyser	As submitted sample
CE192	TOC In Soil	PRIMACS Combustion Analyser	Air dried sample
CE286	TPHCWG in Soil	Acetone:Hexane Extraction, SPE and GCFID	As submitted sample

DEVIATING SAMPLE INFORMATION

Comments

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

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

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

Key

a	Sampling date not provided
b	Sampling time not provided (waters only)
c	Sample not received in appropriate containers
d	Storage Temperature
e	Headspace present in sample container
f	Sample exceeded sampling to receipt
g	Sample exceeded holding time(s)

Lab ref	Sample ID	Depth (m)	Deviating	Tests (Reason for deviation)
111704	WS01	0.30	N	
111705	WS02	0.10	N	
111706	WS03	0.80	N	

REPORT INFORMATION

Report No.:26-06822, issue number 1

Key	
U	ISO17025 Accredited Result
M	ISO17025 and MCERTS Accredited Result
N	Do not currently hold accreditation
^	MCERTS accreditation not applicable for sample matrix
*	ISO17025 accreditation not applicable for sample matrix
S	Subcontracted
I/S	Insufficient Sample
U/S	Unsuitable sample
N/T	Not tested
<	Means "less than"
>	Means "greater than"

LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

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

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

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

The results relate only to the sample received.

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Moisture Content Calculated on a Wet Weight basis (at 30°C)

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

Where sampling was undertaken by Chemtech Environmental Limited it is outside the UKAS accreditation scope.

Methods, procedures and performance data are available on request.

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

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

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

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

'Client Reference', 'Sample ID', 'Sample Location', 'Sample Type', 'Depth', 'Sample Date' and 'Sample Time' information is provided by the customer

Sample Retention and Disposal

All soil samples will be retained for a period of 4 weeks from the point of receipt

All water samples will be retained for a period of 2 weeks from the point of Reporting

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

Unless specifically identified (noted as "(B)" in analyte name) all internal analysis performed at Durham site

APPENDIX 5

CHEMICAL SCREENING CRITERIA

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
Metals/metalloids																			
Arsenic	37			40			43			640			79			170			LQM (2014)
Beryllium	1.7			1.7			35			12			2.2			63			LQM (2014)
Boron	290			11000			45			240000			21000			46000			LQM (2014)
Cadmium	11			85			1.9			190			120			532			LQM (2014)
Chromium III	910			910			18000			8600			1500			33000			LQM (2014)
Chromium VI	6			6			1.8			33			7.7			220			LQM (2014)
Copper	2400			7100			520			68000			12000			44000			LQM (2014)
Lead	200			310			80			2330			630			1300			C4SL
Mercury (elemental)	1.2			1.2			21			58 (25.8)			16			30 (25.8)			LQM (2014)
Mercury (Inorganic)	40			56			19			1100			120			240			LQM (2014)
Methylmercury	11			15			6			320			40			68			LQM (2014)
Nickel	180			180			230			980			230			3400			LQM (2014)
Selenium	250			430			88			12000			1100			1800			LQM (2014)
Vanadium	410			1200			91			9000			2000			5000			LQM (2014)
Zinc	3700			40000			620			730000			81000			170000			LQM (2014)
Other																			
Total Sulphate	2,400			2,400			2,400			2,400			2,400			2,400			BRE (2005)
Water Soluble Sulphate (g/l)	0.5			0.5			0.5			0.5			0.5			0.5			BRE (2005)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
PAHs																			
Acenaphthene	210	510	1100	3000 (57)	4700(141)	6000 (336)	34	85	200	84000 (57)	97000 (141)	100000	15000	15000	15000	29000	30000	30000	LQM (2014)
Acenaphthylene	170	420	920	2900 (86.1)	4600 (212)	6000 (506)	28	69	160	8300 (86.1)	97000 (212)	100000	15000	15000	15000	29000	30000	30000	LQM (2014)
Anthracene	2400	5400	11000	31000 (1.17)	35000	37000	380	950	2200	520000	540000	540000	74000	74000	74000	150000	150000	150000	LQM (2014)
Benzo(a)anthracene	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	LQM (2014)
Benzo(a)pyrene	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	LQM (2014)
Benzo(b)fluoranthene	2.6	3.3	3.7	3.9	4	4	0.99	2.1	3.9	44	44	45	7.1	7.1	7.1	13	15	16	LQM (2014)
Benzo(g,h,i)perylene	320	340	350	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	LQM (2014)
Benzo(k)fluoranthene	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	LQM (2014)
Chrysene	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	LQM (2014)
Dibenz(a,h)anthracene	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.61	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	LQM (2014)
Fluoranthene	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	63	6300	6400	LQM (2014)
Fluorene	170	400	860	2800 (30.9)	3800 (76.5)	4500 (183)	27	67	160	63000 (30.9)	68000	71000	9900	9900	9900	20000	20000	20000	LQM (2014)
Indeno(1,2,3-cd)pyrene	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
Naphthalene	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190 (76.4)	460 (183)	1100 (432)	4900	4900	4900	1200 (76.4)	1900 (183)	3000	LQM (2014)
Phenanthrene	95	220	440	1300 (36)	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	LQM (2014)
Pyrene	620	1200	2000	3700	3800	3800	110	270	620	54000	54000	54000	7400	7400	7400	15000	15000	15000	LQM (2014)
Coal Tar (BaP as surrogate marker)	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	LQM (2014)
BTEX and TPH																			
Benzene	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	LQM (2014)
Toluene	130	290	660	880 vap (869)	1900	3900	22	51	120	56000 vap (869)	110000 vap (1920)	180000 vap (4360)	56000	56000	56000	87000 vap (869)	95000 vap (1920)	100000 vap (4360)	LQM (2014)
Ethylbenzene	47	110	260	83	190	440	16	39	91	5700 vap (518)	13000 vap (1220)	27000 vap (2840)	24000	24000	25000	17000 vap (518)	22000 vap (1220)	27000 vap (2840)	LQM (2014)
Xylene - o	60	140	330	88	210	480	28	67	160	6600 (478)	15000 (1120)	33000 (2620)	41000	42000	43000	17000 (478)	24000 (1120)	33000 (2620)	LQM (2014)
Xylene - m	59	140	320	82	190	450	31	74	170	6200 (625)	14000 (1470)	31000 (3460)	41000	42000	43000	17000 (625)	24000 (1470)	32000 (3460)	LQM (2014)
Xylene - p	56	130	310	79	180	430	29	69	160	5900 (576)	14000 (1350)	30000 (3170)	41000	42000	43000	17000 (576)	23000 (1350)	31000 (3170)	LQM (2014)
Aliphatic EC 5-6	42	78	160	42	78	160	730	1700	3900	3200 (304)	5900 (558)	12000 (1150)	570000 (304)	590000	600000	95000 (304)	130000 (558)	180000 (1150)	LQM (2014)
Aliphatic EC >6-8	100	230	530	100	230	530	2300	5600	13000	7800 (144)	17000 (322)	40000 (736)	600000	610000	620000	150000 (144)	220000 (322)	320000 (736)	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
Aliphatic EC >8-10	27	65	150	27	65	150	320	770	1700	2000 (78)	4800 (190)	11000 (451)	13000	13000	13000	14000 (78)	18000 (190)	21000 (451)	LQM (2014)
Aliphatic EC >10-12	130 (48)	330 (118)	760 (283)	130 (48)	330 (118)	760 (283)	2200	4400	7300	9700 (48)	23000 (118)	47000 (283)	13000	13000	13000	21000 (48)	23000 (118)	24000(283)	LQM (2014)
Aliphatic EC >12-16	1100 (24)	2400 (59)	4300 (142)	1100 (24)	2400 (59)	4300 (142)	11000	13000	13000	59000 (24)	82000 (59)	90000 (142)	13000	13000	13000	25000 (24)	25000 (59)	26000 (142)	LQM (2014)
Aliphatic EC >16-35	65000 (8.48)	92000 (21)	110000	65000 (8.48)	92000 (21)	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	LQM (2014)
Aliphatic EC >35-44	65000 (8.48)	92000 (21)	110000	65000 (8.48)	92000 (21)	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	LQM (2014)
Aromatic EC 5-7	70	140	300	370	690	1400	13	27	57	26000 (1220)	46000 (2260)	86000 (4710)	56000	56000	56000	76000 (1220)	84000 (2260)	92000 (4710)	LQM (2014)
Aromatic EC >7-8	130	290	660	860	1800	3900	22	51	120	56000 (869)	110000 (1920)	180000 (4360)	56000	56000	56000	87000 (869)	95000 (1920)	100000 (4360)	LQM (2014)
Aromatic EC >8-10	34	83	190	47	110	270	8.6	21	51	3500 (613)	8100 (1500)	17000 (3580)	5000	5000	5000	7200 (613)	8500 (1500)	9300 (3580)	LQM (2014)
Aromatic EC >10-12	74	180	380	250	590	1200	13	31	74	16000 (364)	28000 (899)	34000 (2150)	5000	5000	5000	9200 (364)	9700 (899)	10000	LQM (2014)
Aromatic EC >12-16	140	330	660	1800	2300 (419)	2500	23	27	130	36000 (169)	37000	38000	5100	5100	5000	10000	10000	10000	LQM (2014)
Aromatic EC >16-21	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	LQM (2014)
Aromatic EC >21-35	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
Aromatic EC >35-44	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
Aromatic EC >44-75	1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	LQM (2014)
VOCs																			
1,2-dichloroethane (1,2-DCA)	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	LQM (2014)
1,1,1-trichloroethane	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000 (1425)	76000 (2915)	100000 (6392)	LQM (2014)
1,1,2,2,tetrachloroethane	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	LQM (2014)
tetrachloroethene	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	45	95	1400	1400	1400	810 (424)	1100 (951)	1500	LQM (2014)
tetrachloromethane (Carbon tetrachloride)	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	LQM (2014)
Trichloroethene	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	LQM (2014)
Trichloromethane (chloroform)	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	LQM (2014)
Chloroethene (Vinyl chloride)	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	LQM (2014)
2,4,6 Trinitrotoluene (TNT)	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	1%	2.50%	6%	
RDX	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000 (18.7)	51000	53000	LQM (2014)
HMX	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000 (0.35)	23000 (0.39)	24000 (0.48)	LQM (2014)
Aldrin	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	LQM (2014)
Dieldrin	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	LQM (2014)
Atrazine	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	LQM (2014)
Dichlovos	0.032	0.066	0.014	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	LQM (2014)
Alpha-Endosulfan	7.4	18	41	160 (0.003)	280 (0.007)	410 (0.016)	1.2	2.9	6.8	5600 (0.003)	7400 (0.007)	8400 (0.016)	1200	1200	1200	2400	2400	2500	LQM (2014)
alpha-Hexachlorocyclohexane	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	LQM (2014)
beta-hexachlorocyclohexanes	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	LQM (2014)
gamma-hexachlorocyclohexanes	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	LQM (2014)
Chlorobenzene	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	1300 (675)	2000 (1520)	2900	LQM (2014)
1,2-Dichlorobenzene	23	55	130	24	57	130	94	230	540	2000 (571)	4800 (1370)	11000 (3240)	90000	95000	98000	24000 (571)	36000 (1370)	51000 (3240)	LQM (2014)
1,3-Dichlorobenzene	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
1,4-Dichlorobenzene	61	150	350	61	150	350	15	37	88	4400 (224)	10000 (540)	25000 (1280)	17000	17000	17000	36000 (224)	36000 (540)	36000 (1280)	LQM (2014)
VOCs Continued																			
1,2,3-Trichlorobenzene	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770 (134)	1100 (330)	1600 (789)	LQM (2014)
1,2,4-Trichlorobenzene	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700 (318)	2600 (786)	4000 (1880)	LQM (2014)
1,3,5-Trichlorobenzene	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380 (36.7)	580 (90.8)	860 (217)	LQM (2014)
1,2,3,4-Tetrachlorobenzene	15	36	78	24	56	120	4.4	11	26	1700 (122)	3080 (304)	4400 (728)	830	830	830	1500 (122)	1600	1600	LQM (2014)
1,2,3,5-Tetrachlorobenzene	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49 (39.4)	120 (98.1)	240 (235)	78	79	79	110 (39)	120	130	LQM (2014)
1,2,4,5-Tetrachlorobenzene	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42 (19.7)	72 (49.1)	96	13	13	13	25	26	26	LQM (2014)
Pentachlorobenzene	5.8	12	22	19	30	38	1.2	3.1	7	640 (43)	770 (107)	830	100	100	100	190	190	190	LQM (2014)
Hexachlorobenzene	1.8 (0.2)	3.3 (0.5)	4.9	4.1 (0.2)	5.7 (0.5)	6.7 (1.2)	0.47	1.1	2.5	110 (0.2)	120	120	16	16	16	30	30	30	LQM (2014)
Phenol	280	550	1100	750	1300	2300	66	140	280	760 $_{dir}$ (31000)	1500 $_{dir}$ (35000)	3200 $_{dir}$ (37000)	760 $_{dir}$ (31000)	1500 $_{dir}$ (35000)	3200 $_{dir}$ (37000)	760 $_{dir}$ (31000)	1500 $_{dir}$ (35000)	3200 $_{dir}$ (37000)	LQM (2014)

Parameter	Residential with homegrown produce (mg/kg, unless otherwise stated)			Residential without homegrown produce (mg/kg, unless otherwise stated)			Allotment (mg/kg, unless otherwise stated)			Commercial / Industrial (mg/kg, unless otherwise stated)			Public Open Space near Residential (mg/kg, unless otherwise stated)			Public Open Space - Park (mg/kg, unless otherwise stated)			Source
SOM	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	**1%**	**2.50%**	**6%**	
Chlorophenols (excluding pentachlorophenol)	0.87 (g)	2	4.5	94	150	210	0.13 (g)	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	LQM (2014)
Pentachlorophenol	0.22	0.52	1.2	27 (16.4)	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	LQM (2014)
Carbon Disulphide	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	LQM (2014)
Hexachlorobutadiene	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	LQM (2014)

(g) derived based on 2,3,4,6-tetrachlorophenol; dir - based on a threshold protective of direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustration only); (vap) calculated for vapour phase only. SOM – Soil Organic Matter; (4.5) solubility.

APPENDIX 6

GAS MONITORING RESULTS

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: HPC Properties Ltd
Site: Lower Chatts Farm
Date: 24/06/2026

Project No: 5871-26
Visit No: 1 **of** 6
Operator: JF **Project Manager:** JF

GEOENVIRO SOLUTIONS LIMITED

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA					Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
WS01	0.0	0.0	0.0	0.0	1.1	1.1	1	1	0	0	16.7	16.7	NR	NR	0.2	0.2	0	90	0	0.0022						
WS02	0.0	0.0	0.0	0.0	0.7	0.7	2	2	0	0	18.4	18.4	NR	NR	0.4	0.4	0	75	0	0.0028						
WS03	0.0	0.0	0.0	0.0	0.1	0.1	1	1	1	1	18.3	18.3	NR	NR	0.2	0.2	0	90	0	0.0002						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
																			0	0						
Max	0.0	0.0	0.0	0.0	1.1	1.1	2	2	1	1	18.4	18.4	ND	ND	0.4	0.4	0.2	90	0.0000	0.0028	DRY	NR	NR	NR		
Min	0.0	0.0	0.0	0.0	0.1	0.1	1	1	0	0	16.7	16.7	0.0	0.0	0.2	0.2	0.0	75	0.0000	0.0000	0.00	0.00	0.00	0.00		

Worst-possible GSVs	
0	0.0044

ND - Not detected
NR - Not recorded
NA - Non applicable

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:	X	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm	X	Light		Moderate		Strong		
Cloud cover:		None	X	Slight		Cloudy		Overcast		
Precipitation:	X	None		Slight		Moderate		Heavy		
Time monitoring performed:			02:38	Start			00:00	End		
Barometric pressure (mbar):			1004	Start			1006	End		
Pressure trend (Daily):				Falling		Steady	X	Rising		
Source:										
Air Temperature (Deg. C):			30	Before			31	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: HPC Properties Ltd
Site: Lower Chatts Farm
Date:

Project No: 5871-26
Visit No: 2 **of** 6
Operator: 08/07/2026
Project Manager: JF

GEOENVIRO SOLUTIONS LIMITED

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA					Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
WS01	0.0	0.0	0.0	0.0	2.5	2.5	1	1	0	0	16.4	16.4	NR	NR	0.3	0.3	0	90	0	0.0075						
WS02	0.0	0.0	0.0	0.0	0.7	0.7	1	1	0	0	18.5	18.5	NR	NR	0.4	0.4	0	75	0	0.0028						
WS03	0.0	0.0	0.0	0.0	1.4	1.4	2	2	1	1	17.1	17.1	NR	NR	0.4	0.4	0	90	0	0.0056						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
Max	0.0	0.0	0.0	0.0	2.5	2.5	2	2	1	1	18.5	18.5	ND	ND	0.4	0.4	0.1	90	0.0000	0.0075	DRY	NR	NR	NR		
Min	0.0	0.0	0.0	0.0	0.7	0.7	1	1	0	0	16.4	16.4	0.0	0.0	0.3	0.3	-0.1	75	0.0000	0.0000	0.00	0.00	0.00	0.00		

Worst-possible GSVs	
0	0.01

ND - Not detected
NR - Not recorded
NA - Non applicable

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:	X	Dry		Moist		Wet		Snow		Frozen
Wind:	X	Calm		Light		Moderate		Strong		
Cloud cover:	X	None		Slight		Cloudy		Overcast		
Precipitation:	X	None		Slight		Moderate		Heavy		
Time monitoring performed:				Start				End		
Barometric pressure (mbar):			1003	Start			1004	End		
Pressure trend (Daily):				Falling		Steady		Rising		
Source:										
Air Temperature (Deg. C):				Before				After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: HPC Properties Ltd
Site: Lower Chatts Farm
Date: 22/07/2026

Project No: 5871-26
Visit No: 3 **of** 6
Operator:
Project Manager: JF

GEOENVIRO SOLUTIONS LIMITED

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA					Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
WS01	0.0	0.0	0.0	0.0	2.4	2.4	1	1	0	0	15.9	15.9	NR	NR	0.3	0.3	0	60	0	0.0072	Dry	2.24				
WS02	0.0	0.0	0.0	0.0	0.7	0.7	2	2	0	0	18.9	18.9	NR	NR	0.3	0.3	0	60	0	0.0021	Dry	1.90				
WS03	0.0	0.0	0.0	0.0	0.7	0.7	0	0	0	0	17.3	17.3	NR	NR	0.2	0.2	0	60	0	0.0014	1.64	3.37				
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
Max	0.0	0.0	0.0	0.0	2.4	2.4	2	2	0	0	18.9	18.9	ND	ND	0.3	0.3	-0.2	60	0.0000	0.0072	1.64	3.37	NR	NR		
Min	0.0	0.0	0.0	0.0	0.7	0.7	0	0	0	0	15.9	15.9	0.0	0.0	0.2	0.2	-0.3	60	0.0000	0.0000	DRY	1.90	0.00	0.00		

Worst-possible GSVs	
0	0.0072

ND - Not detected
NR - Not recorded
NA - Non applicable

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:		Dry		Moist		Wet		Snow		Frozen
Wind:		Calm		Light		Moderate		Strong		
Cloud cover:		None		Slight		Cloudy		Overcast		
Precipitation:		None		Slight		Moderate		Heavy		
Time monitoring performed:				Start				End		
Barometric pressure (mbar):				Start				End		
Pressure trend (Daily):				Falling		Steady		Rising		
Source:										
Air Temperature (Deg. C):				Before				After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client:
Site: Lower Chatts Farm
Date: 10/08/2026

Project No:
Visit No: 4 **of** 6
Operator:
Project Manager: JF

GEOENVIRO SOLUTIONS LIMITED

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA					Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
WS01	0.0	0.0	0.0	0.0	2.0	2.0	1	1	0	0	16.1	16.1	NR	NR			-1	60	0	0	Dry	2.24				
WS02	0.0	0.0	0.0	0.0	0.8	0.8	1	1	0	0	18.2	18.2	NR	NR			0	60	0	0	Dry	1.90				
WS03	0.0	0.0	0.0	0.0	0.7	0.7	0	0	0	0	18.1	18.1	NR	NR			-3	60	0	0	1.64	3.37				
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
Max	0.0	0.0	0.0	0.0	2.0	2.0	1	1	0	0	18.2	18.2	ND	ND	ND	ND	-0.4	60	0.0000	0.0000	1.64	3.37	NR	NR		
Min	0.0	0.0	0.0	0.0	0.7	0.7	0	0	0	0	16.1	16.1	0.0	0.0	0.0	0.0	-3.0	60	0.0000	0.0000	DRY	1.90	0.00	0.00		

Worst-possible GSVs	
0	0.002

ND - Not detected
NR - Not recorded
NA - Non applicable

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:	x	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm	x	Light		Moderate		Strong		
Cloud cover:	x	None		Slight		Cloudy		Overcast		
Precipitation:	x	None		Slight		Moderate		Heavy		
Time monitoring performed:				Start				End		
Barometric pressure (mbar):			995	Start			995	End		
Pressure trend (Daily):			x	Falling		Steady		Rising		
Source:										
Air Temperature (Deg. C):			17	Before			17	After		

HPC Properties Ltd

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: HPC Properties Ltd
Site: Lower Chatts Farm
Date: 24/08/2026

Project No: 5871-26
Visit No: 5 **of** 6
Operator: BJ **Project Manager:** JF

GEOENVIRO SOLUTIONS LIMITED

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA					Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
WS01	0.0	0.0	0.0	0.0	2.7	2.7	1	1	0	0	17.1	17.1	NR	NR	0.3	0.3	-1	60	0	0.0081	DRY	2.28				
WS02	0.0	0.0	0.0	0.0	0.8	0.8	1	1	0	0	18.8	18.8	NR	NR	0.3	0.3	0	60	0	0.0024	DRY	1.74				
WS03	0.0	0.0	0.0	0.0	0.9	0.9	2	2	0	0	17.6	17.6	NR	NR	0.3	0.3	-3	60	0	0.0027	0.52	3.32				
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
Max	0.0	0.0	0.0	0.0	2.7	2.7	2	2	0	0	18.8	18.8	ND	ND	0.3	0.3	-0.4	60	0.0000	0.0081	0.52	3.32	NR	NR		
Min	0.0	0.0	0.0	0.0	0.8	0.8	1	1	0	0	17.1	17.1	0.0	0.0	0.3	0.3	-3.0	60	0.0000	0.0000	DRY	1.74	0.00	0.00		

Worst-possible GSVs	
0	0.0081

ND - Not detected
NR - Not recorded
NA - Non applicable

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:	X	Dry		Moist		Wet		Snow		Frozen
Wind:	X	Calm		Light		Moderate		Strong		
Cloud cover:		None	X	Slight		Cloudy		Overcast		
Precipitation:	X	None		Slight		Moderate		Heavy		
Time monitoring performed:			####	Start			00:00	End		
Barometric pressure (mbar):				Start				End		
Pressure trend (Daily):				Falling		Steady		Rising		
Source:										
Air Temperature (Deg. C):				Before				After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS

Client: HPC Properties Ltd
Site: Lower Chatts Farm
Date: 07/09/2026

Project No: 5871-26
Visit No: 6 **of** 6
Operator:
Project Manager: RL

GEOENVIRO SOLUTIONS LIMITED

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		WELL AND WATER DATA					Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady										
WS01	0.0	0.0	0.0	0.0	2.6	2.6	0	1	0	0	17.6	17.6							0	0	DRY	2.28				
WS02	0.0	0.0	0.0	0.0	0.9	0.9	2	2	0	0	19.2	19.2							0	0	DRY	1.74				
WS03	0.0	0.0	0.0	0.0	0.8	0.8	1	1	0	0	18.6	18.6							0	0	0.45	3.32				
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
0																			0	0						
Max	0.0	0.0	0.0	0.0	2.6	2.6	2	2	0	0	19.2	19.2	ND	ND	ND	ND	ND	NA	0.0000	0.0000	0.45	3.32	NR	NR		
Min	0.0	0.0	0.0	0.0	0.8	0.8	0	1	0	0	17.6	17.6	0.0	0.0	0.0	0.0	0.0	0	0.0000	0.0000	DRY	1.74	0.00	0.00		

Worst-possible GSVs	
0	0.0026

ND - Not detected
NR - Not recorded
NA - Non applicable

MG - Made ground
NAT - Natural
C - Cohesive
G - Granular

NB: Where no flow (ND) recorded, GSVs are calculated using equiment limit of detection (0.1l/hr). Where negative flows recorded, these are converted to positive values for calculation of GSVs.

METEOROLOGICAL AND SITE INFORMATION:

(Select correct box with X or enter data, as applicable)

State of ground:	x	Dry		Moist		Wet		Snow		Frozen
Wind:		Calm	x	Light		Moderate		Strong		
Cloud cover:		None	x	Slight		Cloudy		Overcast		
Precipitation:	x	None		Slight		Moderate		Heavy		
Time monitoring performed:			10:00	Start			10:45	End		
Barometric pressure (mbar):			987	Start			987	End		
Pressure trend (Daily):				Falling	x	Steady		Rising		
Source:										
Air Temperature (Deg. C):			17	Before			18	After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GA5000
Gas Range: **CH_4** 0 - 100% **CO_2** 0 - 100% **O_2** 0 - 25%
Gas Flow range: +/-
Differential Pressure: +/- 500mbar
Date of last calibration:
Date of next calibration:

Ground Gas and Groundwater Monitoring Record Sheet

Summary of all gas monitoring events

JOB DETAILS

Client: HPC Properties Ltd
Site: Lower Chatts Farm
Period: 24/06/2026 to 07/09/2026

Project No: 5871-26
Project Manager: JF
No. Events 6

Monitoring Point	GAS CONCENTRATIONS												VOLATILES		FLOW DATA				Worst-credible GSVs		Comments
	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady					
WS01	0	0	0	0	2.6	2.6	1	1	0	0	17.6	17.6	0	0	0.3	0.3	0.1	90	0	0.0075	
WS02	0	0	0	0	0.9	0.9	2	2	0	0	19.2	19.2	0	0	0.4	0.4	0.19	75	0	0.0028	
WS03	0	0	0	0	1.4	1.4	2	2	1	1	18.6	18.6	0	0	0.4	0.4	-0.02	90	0	0.0056	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Max	**0**	**0**	**0**	**0**	**2.6**	**2.6**	**2**	**2**	**1**	**1**	**19.2**	**19.2**	**0**	**0**	**0.4**	**0.4**	**0.19**	**90**	**0**	**0.0075**	
Min	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-0.02**	**0**	**0**	**0**	
																			Worst-possible GSVs		
																			0	**0.0104**	

Summary of all gas monitoring events

JOB DETAILS

Client: HPC Properties Ltd
Site: Lower Chatts Farm
Period: 24/06/2026 to 07/09/2026

Project No: 5871-26
Project Manager: JF

Monitoring Point	Product Thickness (mm)	Water Level (mbgl)		Water Level (m AOD)		Water Level Range (m)	Response Zone	Response Zone Strata
	Max	Min	Max	Min	Max			
WS01	#REF!	0.00	0.00	0.00	0.00	0	0.00	
WS02	#REF!	0.00	0.00	0.00	0.00	0	0.00	
WS03	#REF!	0.45	1.64	0.00	0.00	1.19	1.19	
0		0.00	0.00	0.00	0.00	0	0.00	
0		0.00	0.00	0.00	0.00	0	0.00	

APPENDIX 7

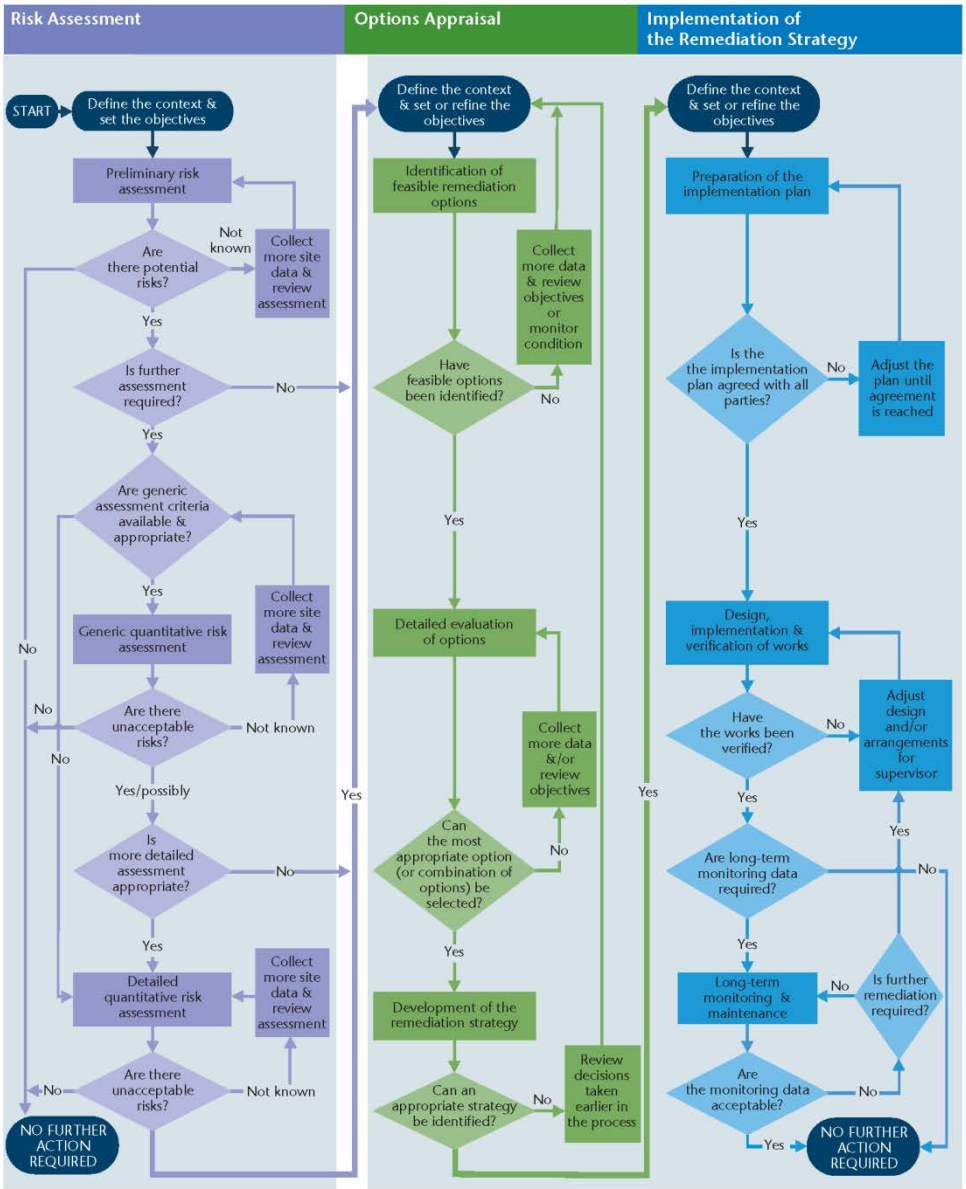
RISK ASSESSMENT MATRIX

APPENDIX H – HUMAN HEALTH ASSESSMENT CRITERIA

Context

Contaminated Land is defined under law through Part IIA of the Environmental Protection Act 1990, implemented through Section 57 of the Environment Act 1995 and associated guidance ("Part IIA"). These specify that a "suitable for use" approach is to be applied in the assessment of potentially contaminated land, implemented through a phased programme of site investigation and risk assessment appropriate to the site under consideration.

The assessment of potential risks posed by contaminated land is based upon the assessment of plausible contaminant source - pathway - receptor linkages ("pollutant linkages") for the current and/or proposed future use of the site. The process for the assessment of contaminated land adopted in this report is in line with guidance issued by DEFRA and Environment Agency (EA) 2004: "Model Procedures for the Management of Contaminated Land (CLR11)". The overall process for the management of land contamination is shown Figure 1 of CLR11 and reproduced below:



Note: The process may apply to one or more pollutant linkages each of which may follow a different route. For some linkages, it may be possible to stop at an early stage – others will progress all the way through the process. The level of complexity of each stage may also vary and in some cases may be very simple.

The risk assessment and subsequent investigation, remediation and verification must address all potential sources of pollutants that may be present on the site (the "hazards"), all receptors that may be harmed by these (e.g. human health, controlled waters, ecological receptors) and the pathways by which the contamination may be transported from the

contaminant source(s) to the receptor(s). This is defined within the conceptual model for the site, which represents the characteristics of the site in a form that shows the possible pollutant linkages. As further information becomes available (for example, through site investigation), so the conceptual model will be refined.

Remedial action can be specified at any phase within this assessment process to break the identified pollutant linkage In determining whether or not to undertake further assessment or to undertake remediation, the potential cost-savings arising from a more thorough assessment of the pollutant linkages and more tightly defined remedial strategy must be considered against the direct costs involved in the work and the time that this will take to execute and gain regulatory approval.

A different approach to the statistical appraisal of data is required depending on whether the assessment is being undertaken to assess land as Contaminated Land in accordance with the regulations or whether the assessment is to assess whether the site is suitable for new development in accordance with the Planning regime. The statistical approach to assessment is discussed further in CL:AIRE:2009 “Guidance on Comparing Data with a Critical Concentration”.

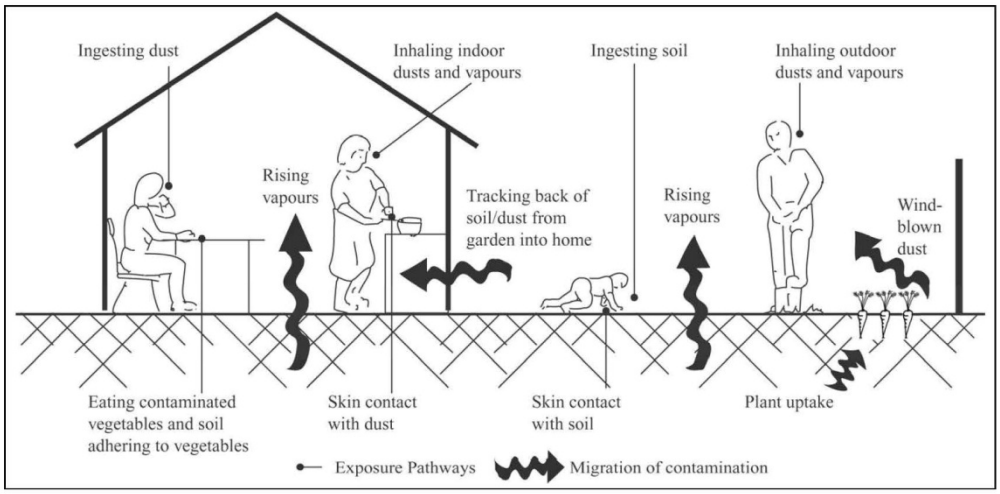
Some form of Detailed Quantitative Risk Assessment (DQRA) will be essential for those cases where appropriate GAC values cannot be established for the contaminant linkages under consideration.

Generic Assessment Criteria for Human Health Risk Assessment

In March 2002, the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) published the Contaminated Land Exposure Assessment (CLEA) Model and a series of related reports and guidance. These were designed to provide a scientifically based framework for the assessment of chronic risks to human health from contaminated land. The initial documents (CLR7 – 10) were withdrawn and replaced with revised guidance issued by the Environment Agency including:

- "Using Soil Guideline Values"; SC050021/SGV Introductions, EA,2009;
- "Human Health toxicology assessment of contaminants in soil"; SC050021/SR2, EA, 2009;
- "Update technical background to the CLEA model"; SC050021/SR3, EA, 2009;
- CLEA Software (Version) Handbook; SC050021/SR4; EA, 2008;
- Compilation of Data for priority Organic Contaminants for Derivation of Soil Guideline Values; Science Report SC050021/SR7, 2008; and,
- Guidance on Comparing Data with a Critical Concentration; CL:AIRE, 2009.

The CLEA model and associated guidance was developed to calculate an estimated tolerable daily intake (TDI) of contaminants for site users given a set of 'typical' human health exposure pathways which are detailed in "SR3: Updated technical background to the CLEA model" (Science Report SC050021/SR3, EA, 2009) and reproduced below.



- **Ingestion**
  - Outdoor soil;
  - Indoor dust;
  - Home grown produce;
  - Soil attached to home grown produce.
- **Dermal Contact**
  - Outdoor soil;
  - Indoor dust.
- **Inhalation**
  - Outdoor dust;
  - Indoor dust;
  - Outdoor vapour;
  - Indoor vapour.

It should be noted that the CLEA model does not include an exhaustive list of potential exposure pathways, e.g. certain compounds can pass through plastic water pipes into drinking water supply.

The potential significance of each of the exposure pathways is dependent upon the type of land use and the nature of the contaminant being considered. The CLEA model considers principal 'default' land use scenarios and makes a series of assumptions with regards to building type (where applicable), identification of the critical human receptor group, exposure frequency and duration. The definitions of the principal land use types given in SR3 (EA, 2009) are:

- **Residential land use;**
  A typical residential property consisting of a two story terraced house built on a ground-bearing slab of 0.15m thickness with a private garden consisting of lawn, flowerbeds, and a small fruit and vegetable patch. The occupants are assumed to be parents with young children, who make regular use of the garden. The critical receptor is a 0 – 6 year old female.

  Active exposure pathway are: ingestion of outdoor soil, ingestion of indoor dust, ingestion of home grown produce and soil adhering to home grown produce; direct dermal contact with outdoor soil and indoor dust; inhalation of outdoor dust and vapour and indoor dust and vapour.

- **Allotments**
  A plot of open space commonly made available by the Local Authority to tenants to grow fruit and vegetables for their own consumption. There are usually several plots to a site and the overall site area may cover more than one hectare. The tenants are assumed to be the parents or grandparents and that young children make occasional accompanied visits to the plots. The critical receptor is a 0 – 6 year old female and there is no building present on Site.

  Active exposure pathways are ingestion of outdoor soil, ingestion of home grown produce and soil adhering to home grown produce; direct dermal contact with outdoor soil; inhalation of outdoor vapour.

- **Commercial and industrial land use.**
  A typical commercial or light industrial property consisting of a three-story office building (pre-1970) with a ground bearing floor slab at which employees spend most time indoors and are involved in office based or related light physical work. The critical receptor is a working female adult aged 16 – 65 years.

  Active exposure pathway are ingestion of outdoor soil, ingestion of indoor dust; direct dermal contact with outdoor soil and indoor dust; inhalation of outdoor dust and vapour and inhalation of indoor dust and vapour.

Soil Guideline Values

Based on the assumption of each land use type, the EA and DEFRA developed and published Soil Guideline Value (SGV) using the CLEA model for a number of principal contaminants and 'default' end-use scenarios of residential, allotments and commercial/industrial use. The primary purpose of the SGVs are as trigger value for the tolerable daily intake (TDI), below which it can be assumed that the soil does not pose an unacceptable risk to the identified receptor. Where soils contamination is present above this level further assessment may be required. SGVs were developed for the following contaminants:

- Heavy metals and other inorganic compounds: arsenic, cadmium, chromium, cyanide, lead (now withdrawn), mercury, nickel and selenium;
- Benzene, ethylbenzene, toluene and xylenes;
- Phenol;
- Dioxins and dioxin-like polychlorinated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs) – 11 substances

LQM/CIEH Generic Assessment Criteria of Human Health Risk Assessment

In addition, in 2009 CIEH through LQM and EIC published generic assessment criteria (GACs) for 82 substances including metals, petroleum hydrocarbons, PAHs and explosive substances for a variety of soil types and the three 'default' land uses – (residential, allotments and commercial end-uses) as described in SR3 (EA, 2009). These have been superseded as described below.

Category 4 Screening Values

In 2013 "SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination" (CL:AIRE 2013) was issued which detailed findings of a research project undertaken by CL:AIRE to set out the framework by which potential Category 4 Screening Levels (pC4SL) may be derived. This was supplemented in 2014 by "SP1010: Development of Category 4 Screening Levels for the Assessment of Land Affected by Contamination – Policy Companion Document" (DEFRA, 2014). SP1010 proposed several updated toxicology information relating to contaminant behaviour updated assumptions relating to the modelling of human exposure to soil contaminants, derivation of separate C4SLs for residential with the consumption of home grown produce, residential without the consumption of home grown produce, and two new land uses: public open spaces near residential housing (POS resi) and public parks (POS park).

- **Public Open Space: Residential**

  For public open space in close proximity to residential housing and the central green area around which houses are located, as on many housing estates from the 1930s to 1970s. It is also applicable for smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soil with planting. It is considered to be a generally grassed area up to 0.5ha with up to 50% bare soil. The land use is an important resource for children and the area is near the homes. The critical receptor is a female child age >3 - <9 years old (CLEA age class 4 – 9) as younger children are unlikely to play outdoors unsupervised.

  Active exposure pathways are: ingestion of outdoor soil, ingestion of indoor dust; direct dermal contact with outdoor soil and indoor soil derived dust; inhalation of outdoor and indoor dust and inhalation of outdoor vapour.

- **Public Open Space: Park**

  A public park is defined as an area of open space provided for recreational use and usually owned and maintained by the Local Authority. It is anticipated the park could be used for a wide range of activities, including the following:
  - Family visits and picnics;
  - Children's play area;
  - Sporting activities such as football on an informal basis (i.e. no a dedicated sports pitch); and
  - Dog walking.

  The park is modelled as an area >0.5 ha of predominantly grasses open space with no more than 25% of exposed soil.

  The critical receptor is a female child with CLEA age classes 1 – 6.

  Active exposure pathway are: ingestion of outdoor soil; direct dermal contact with outdoor soil; inhalation of outdoor dust and inhalation of outdoor vapour.

Furthermore the C4SLs are based on a different toxicological benchmark, the 'low level of toxicological concern' (LLTC). This difference in approach was adopted because the C4SLs were primarily intended for use under Part2A of the EPA 1990 to quickly screen out Category 4 sites where there is "*no risk or that the level of risk posed is low*". SGVs and LQM GACs are

based on the more conservative 'minimal or tolerable level of risk' as defined in SR2 (EA, 2009) and were derived for assessment of contamination for the Planning process.

Lead

The SGV for lead was withdrawn in 2011 and is not used in this report. The C4SL for lead provides a technically robust and conservative assessment tool using significantly updated toxicological modelling than the withdrawn SGV and derived in line with current science of lead toxicology.

LQM/CIEH Suitable 4 Use Levels (S4ULs)

The publication of the C4SLs resulted in considerable and inconclusive debate about the applicability of the lower level of protection of the C4SL, which are underlain by the LLTC, outside of the Part 2A context for which they were derived. In 2014 LQM/CIEH presented a Suitable 4 Use Levels (S4ULs), which incorporate the updated assumption exposure derived for the production of the C4SLs but within the context of deriving screening criteria above which further assessment of the risks or remedial action may be needed. The S4ULs replace the 82 substances, species and fractions and congeners contained in the previous LQM/CIEH GACs issued in 2009. Additionally, following changes and new land uses proposed in the C4SL research project, S4ULs have also been derived for the majority of substances for which the EA derived SGVs in 2009.

The GAC values adopted in this report are summarised in Table 1, below.