



Phase 2 Intrusive Site Investigation Report

LOCATION	Bell Cabin, Low Lane, Dewsbury WF12 8LG
ISSUE DATE	October 2023
FOR	Mr P. Audsley
CLIENT REF.	
OUR REF.	G23326

Prepared by

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1. Introduction

In accordance with your instruction, Geoinvestigate Limited has carried out an intrusive site investigation at Bell Cabin, Low Lane, Dewsbury WF12 8LG.

A Phase 1 Desk Study has previously been completed by Geoinvestigate Limited (G23326a, September 2023), concluded that the onsite mine shaft and associated mine workings and features were the principal potential sources of contamination to the site.

The purpose of this Phase 2 investigation was to establish the true nature of the ground conditions at the site with regard to the potential for contamination and hazardous gas sources on site. No geotechnical assessment with regard to foundations or stability is provided as part of this report.

It is proposed to develop the site with residential housing with soft landscaping as gardens and hardstanding access road and hardstanding. The boundary of the current study area and the proposed developmental layout are presented on the site plan included within Appendix 1 of this report.

2. Scope of Phase 2 Investigation

2.1 Scope of Works

Given the above, the following investigation was carried out to assess the potential risks to the proposed development:

- Six (6) boreholes (BH1 to BH6) were undertaken at the site to depths between 1.70m and 4.00m below ground level (bgl) with associated soil sampling. The boreholes were commenced using windowless sampling techniques with a Dando Terrier 2002 mini drilling rig.
- Four (4) hand excavated trial pits (TPA to TPD) to provide additional information on ground conditions and collect samples from areas of proposed soft landscaping and/or gardens and where access with the drill rig was not possible.
- The installation of three (3) gas monitoring wells in boreholes BH1, BH2 and BH3 with allowance for up to six (6) gas monitoring visits over a period of up to three (3) months (if appropriate), including readings below 1000mb and where possible following a sharp drop in atmospheric pressure.
- Contamination analyses of seven (7) samples of near-surface made ground recovered from depths between ground level and 1.00m bgl to investigate the potential presence and concentrations of various potential contaminants (including metals/metalloids, asbestos, polycyclic aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPHs). Additionally, Leachate testing (to check for mobility of contaminants) were also completed. Chemical analysis is based on the attending engineer's descriptions of the ground conditions.
- Provision of a factual and interpretative report including site plan, trial pit & borehole logs, contamination soil analysis results, together with advice on the contamination and gas and the coal mining situation at the site.

The trial pit and borehole positions are shown on the plan provided in Appendix 1.

The excavations were sampled and logged at site by a geoenvironmental engineer and the ground conditions encountered are described on the borehole logs also provided in Appendix 1.

The results of the contamination testing are included in Appendix 2.

2.2 Sampling Rationale

The borehole positions were chosen to give an indication of the ground conditions generally throughout the site, both in terms of geotechnical appraisal and assessment of soil contamination. The soils encountered in the boreholes are considered to be broadly representative of soils throughout the site. The hand excavated trial pit positions were chosen to target external areas or potential garden space at the site.

3. Phase 2 Investigation Findings

3.1 Encountered Ground Conditions

3.1.1 Windowless Sample Boreholes

The ground conditions were relatively uniform across the site and comprised made ground underlain by natural strata comprising clayey sandy gravel. Given the sloping nature of the site the depth of the made ground varied from 0.70m to 1.45m depth. The made ground comprised ostensibly silty sandy gravel, with some clayey strata also. Gravel constituents included mudstone, shale, sandstone, brick and occasional ash and glass.

Below the fill the natural strata comprised generally loose clayey sandy gravelly / clayey sandy gravel of sandstone, with some possible weathered rock recovered in BH3. The boreholes were terminated at depths between 1.70m and 4.00m.

The boreholes remained open and dry on completion. No roots were recovered from the boreholes, save for BH3 where samples extended to 0.60m.

3.1.2 Hand Excavated Trial Pits

TPA to TPD encountered similar conditions to the boreholes, with initial made ground, underlain by loose and compact natural clay sands and gravels commenced to a depth of 0.80m (TPC). The excavations were terminated at depths between 0.03m and 0.80m bgl.

The trial pits remained stable and dry on completion.

4. Contamination Testing

As mentioned in Section 1, it is considered that coal mining at the site might provide the most viable source of contamination to the site.

Potential contaminants could potentially occur throughout the full thickness of the made ground which were recovered from the boreholes and trial pits to a maximum depth of 1.40m. Soils close to surface would be the most relevant regarding human health risk assessment though analysis of deeper soils would also be appropriate to ensure no risk to local ground and surface waters exists through potential contaminant leaching and mobilisation. Other than the presence of occasional ash glass and brick fragments, the made ground and occasional topsoil showed little obvious visual or olfactory evidence of

potential contamination or contaminative materials. However due to the site history, potential contamination risk existed at the site.

Based on the findings of the site works, seven (7) samples of made ground between ground level and 1.00m recovered from across the site were tested for a range of substances. These included common contaminants such as arsenic, lead and cadmium which are normally included in a general human health contamination suite together with analysis for Speciated PAHs (7 samples), petroleum hydrocarbons, Asbestos (4 samples), TPH CWG (2 samples), BTEX (2 samples) and Leachates (2 samples).

The results of the contamination testing are included in Appendix 2 of this report (Chemtech Environmental Ltd. Report 126522 and have been used in the contamination risk assessment, set out in the following sections.

5. Risk Assessment

5.1 Method

Geoinvestigate Ltd. uses a combination of assessment criterion provided by the Environment Agency, DEFRA and by the Chartered Institute of Environmental Health in order to assess the presence of potentially harmful chemicals within soils and water. These include DEFRA category 4 screening levels (C4SLs), Environment Agency Environmental Quality Standards (EQSs), Site Specific Assessment Criteria (SSAC) generated using CLEA software version 1.06 site specific risk assessment modelling, and Land Quality Management / Chartered Institute of Environmental Health (LQM/CIEH) Safe for Use Limits (S4ULs).

As the site is to be developed as a residential dwelling, it falls within the residential end-use category. As it is possible that persons living on the site may cultivate vegetables / fruit for consumption, consideration to this end is also deemed necessary.

No site-specific assessment criteria (SSAC) have been created for the site as no unusual circumstances (i.e., occupation periods etc.) are considered to be present/likely at the site that would render the generic residential assessment criteria unsuitable.

The results of the contamination testing that has been carried out have been compared to the soil quality values from the above sources. Where they fall below these limit values, they have been deemed safe for a residential end use. Any results found to be above the intervention values, have been subject to an assessment of the available pathways and receptors would have been carried out to determine whether further investigation or remediation might have been necessary.

An appraisal of the chemical results and relevant limits is set out in the Contamination Risk Assessment that follows.

5.2 Contamination Risk to Identified Receptors

5.2.1 Contamination Risk to Human Health

Made ground was encountered to a maximum depth of 1.45m, this was underlain by natural granular deposits.

Save for the presence of occasional concrete, brick and the anticipated coal a shale fragments (with one excavation noting occasional plastic also). The soils encountered at the site exhibited little noteworthy visual or olfactory evidence of possible contamination. A former fire pit was sampled also.

As discussed earlier in the report, levels of determinands have been compared to the soil assessment criteria for residential end-use, as published by the Environment Agency, DEFRA and LQM/CIEH.

The results of the analyses of seven (7) samples of soil recovered from the site from a depth ground level to 1.00m returned concentrations of a range of substances falling for the most part below respective assessment criteria adopted from the sources named above with some exceptions discussed later. Further discussion is presented in the following sections. A summary of the returned soil concentrations together with the adopted assessment criteria is presented in Table 1 on the following page.

A mean Total Organic Carbon Content (TOC) of 6.40% and mean Soil Organic Matter Content (SOM) of 11.03% (estimated from the TOC) were returned from the soil analyses. Therefore, the LQM/CIEH GAC for PAHs and Hydrocarbons were chosen using the highest Soil Organic Matter (SOM) option of 6.0%, which is considered the most representative (and conservative) value for the samples returned.

Table 1: Chemical Determinands in Soils

Determinand	Range of Returned concentrations (mg/kg)	S4UL (LQM/CIEH)* (mg/kg)	C4SL (DEFRA)* (mg/kg)
Asbestos	None detected (all 7)	Any presence unacceptable	
Arsenic	15-40	37	37
Boron	0.7-3.9	290	
Cadmium	<2	11	26
Chromium VI	<0.04-0.11	6	21
Chromium III	25-203	910	
Copper	44-71	2,400	
Lead	36-251		200
Mercury (elemental)	<2	1.2	
Nickel	13-42	180	
Selenium	<3	250	
Zinc	88-284	2,700	
pH	5.3-7.9	See Report Section 7.3 "Concrete Design"	
Water Soluble SO ₄	21-205		
Phenol	<0.05	1,100	
Total PAH	0.94-279		
PAH Naphthalene	0.03-0.25	13	
PAH Acenaphthylene	<0.02-0.55	920	
PAH Acenaphthene	<0.02-0.57	1,100	
PAH Fluorene	<0.02-0.51	860	
PAH Phenanthrene	0.08-8.91	440	
PAH Anthracene	<0.02-2.86	11,000	
PAH Fluoranthene	0.14-45.56	890	
PAH Pyrene	0.13-51.36	2,000	
PAH Benzo[a]anthracene	0.08-21.59	13	
PAH Chrysene	0.08-18.21	27	
PAH Benzo(b)fluoranthene	0.09-36.41	3.7	
PAH Benzo(k)fluoranthene	0.06-14.85	100	
PAH Benzo(a)pyrene	0.09-29.72	3.0	5
PAH Dibenzo(a,h)anthracene	<0.02-0.51	0.30	
PAH Indeno(123-cd)pyrene	0.08-22.46	41	
PAH Benzo(ghi)perylene	0.07-21.12	350	
TPH Aromatic C5-C7	<0.01	300	0.87 (benzene)
TPH Aromatic C7-C8	<0.01	660	
TPH Aromatic C8-C10	<0.01	190	
TPH Aromatic C10-C12	<10	380	
TPH Aromatic C12-C16	<10	660	
TPH Aromatic C16-C21	<1-167.33	930	
TPH Aromatic C21-C35	<1-944.04	1,700	
TPH Aromatic C35-C44	<1-1132.86	1,700	
TPH Aliphatic C5-C6	<0.1	160	
TPH Aliphatic C6-C8	<0.1	530	
TPH Aliphatic C8-C10	<0.1	150	
TPH Aliphatic C10-C12	<6	760 (283**)	
TPH Aliphatic C12-C16	<6	4,300 (142**)	
TPH Aliphatic C16-C35	<15-76.49	110,000	
TPH Aliphatic C35-C44	<10-160.21	110,000	
Benzene	<0.01	0.37	
Toluene	<0.01	660	
Ethylbenzene	<0.01	260	
m & p-Xylene	<0.02	310	
o-Xylene	<0.01	330	

*For residential use with allowance for cultivation of fruit/veg and at 6% organic matter where relevant.

**Figures in parentheses represent estimated soil saturation limits above which there may be some potential for free phase contamination to exist.

Exceedances of assessment criteria are shown in **BOLD**

As can be seen from the results in Table 1 and the detailed results presented in Chemtech Environmental Ltd. report 97136 (Appendix 3) the returned results are generally below the adopted target values, however there are significantly elevated arsenic, lead, PAH levels for Benzo[a]anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenzo(a,h)anthracene in four (4) of the samples:

- Arsenic – BH4 (0.10) & BH5 (0.20)
- Lead – BH4 (0.20)
- PAH Benzo[a]anthracene – TPC (0.02-0.05)
- PAH Benzo(a)pyrene – BH2 (1.00) & TPC (0.02-0.05)
- PAH Benzo(b)fluoranthene - BH2 (1.00) & TPC (0.02-0.05)
- PAH Dibenzo(a,h)anthracene - BH2 (1.00) & TPC (0.02-0.05)

5.2.2 Contamination Risk to the Controlled Waters

Given the possible sources of historical contamination and nature of material, leachate was analysed from two (2) samples obtained from BH3 (0.30m) and BH5 (0.20m). This screening returned generally negligible concentrations and concentrations below detectable limits and/or safe levels for domestic water supply or the protection of aquatic life levels as published by the Environment Agency which were used as the assessment criteria. The results of the testing and the assessment criteria are shown Table 2 below.

Table 2: Chemical Determinands in Leachate

	Returned Concentrations (µg/l)	UK Standard for Surface Waters intended for Drinking Water Abstraction* (DW) and/or protection of Aquatic Life in surface waters* (Aq) (µg/l)
<i>Inorganic Chemicals</i>		
Arsenic	17.24-2.31	50 (DW, range: 50-100) (No Aq standard)
Boron	28-33	1000 (DW & Aq)
Cadmium	<0.1	5 (DW & Aq)
Chromium	<0.5-1.6	50 (DW) / 5-250 (Aq, range: 5-250)
Copper	5.2-16.1	50 (DW) / 5-112 (Aq, range: 5-112)
Lead	<0.6- 72.3	50 (DW) / 4-250 (Aq, range: 4-250)
Mercury (elemental Hg)	<0.05-0.076	1 (DW & Aq)
Nickel	1.1-4.6	20** (DW) / 50-200 (Aq, range: 50-200)
Selenium	<1.2	10 (DW) (No Aq standard)
Zinc	<3.5-23	3000 (DW, range: 3000-5000) / 30-2000 (Aq, range: 30-2000)
pH	8.0-8.2	Range 5.5 to 10 (UK drinking water standards)
Cyanide	<5	50 (DW) / 5 (Aq)
Phenols	<10	50** (DW) / 300 (Aq)
PAHs (total)	3.3	0.2 (DW, range: 0.2-1.0) (No Aq standard)
Acenaphthene	0.4-0.5	No applicable UK standard
Acenaphthylene	0.4-0.5	No applicable UK standard
Anthracene	<0.1	0.4 (surface water quality, max. allowable)
Chrysene	<0.1	No applicable UK standard
Dibenzo(a,h)anthracene	<0.1	No applicable UK standard
Fluoranthene	0.3-0.4	1 (surface water quality, max. allowable)
Fluorene	0.4-0.7	No applicable UK standard
Naphthalene	<0.1-0.6	10 (Aq, UK inland waters)
Phenanthrene	0.9-1.1	No applicable UK standard
Pyrene	0.3	No applicable UK standard

*sourced from Environment Agency database at <http://evidence.environment-agency.gov.uk/ChemicalStandards/home.aspx>.

If more than one option is available (dependant on other water properties or environmental setting) applicability is discussed later.

**Standard for water supply as no standard available for surface water abstraction for drinking water.

Exceedances of assessment Criteria shown in **BOLD** type

As can be seen from Table 2 and the detailed results presented in Chemtech Environmental Ltd report 126522 (Appendix 2), levels of potential contaminants in analysed leachates generally returned negligible concentrations however there is elevated lead concentration within the topsoil from BH5 (0.20m) which exceeded the threshold level.

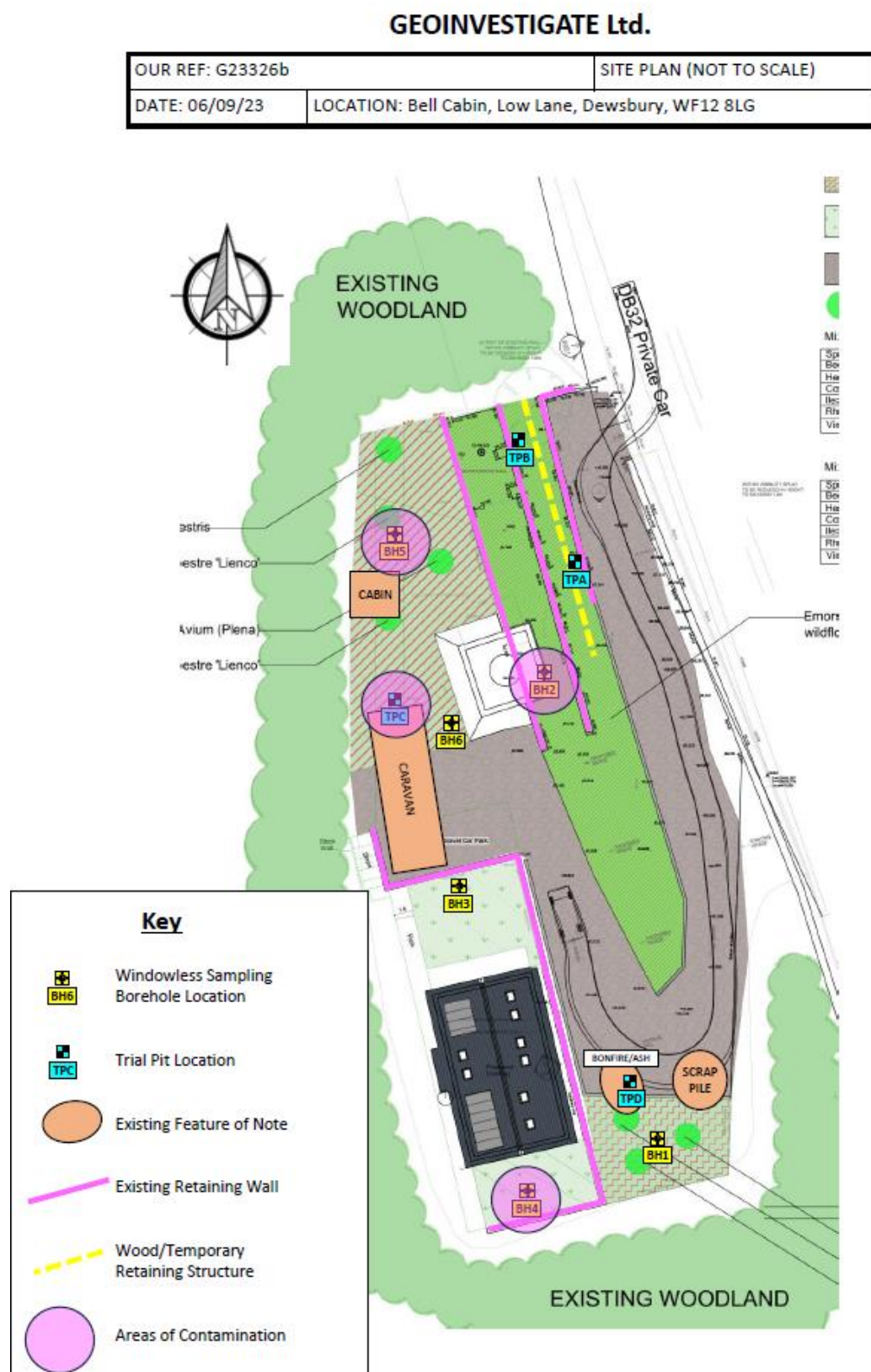
Leachate testing within BH5 returned slightly elevated lead concentrations and both boreholes returned elevated copper concentrations, which exceed the lowest threshold of the assessment criteria options (of several possible choices). These lowest options relate to freshwater with very low calcium carbonate content ($<50\text{mg l}^{-1}$) which is unlikely in water of pH 8.0 to 8.2 as measured for these leachates (Low CaCO_3 content would be expected to more likely in more acidic waters than this). Though no data has been collected regarding the calcium carbonate content of local waters and underlying groundwater and the low concentration and consequently very minor nature of the exceedances suggest that these results not represent any noteworthy risk to underground or surface waters. Furthermore, no surface water receptors were noted within influencing distance of the site.

5.3 Review of Results

Analysis of the ground conditions at the site and an assessment of the potential pathways have confirmed that soils on the site (excluding topsoil from BH3, TPB and TPD) is suitable for the proposed residential end use. The areas with exceedances are shown in Figure 1 on the following page.

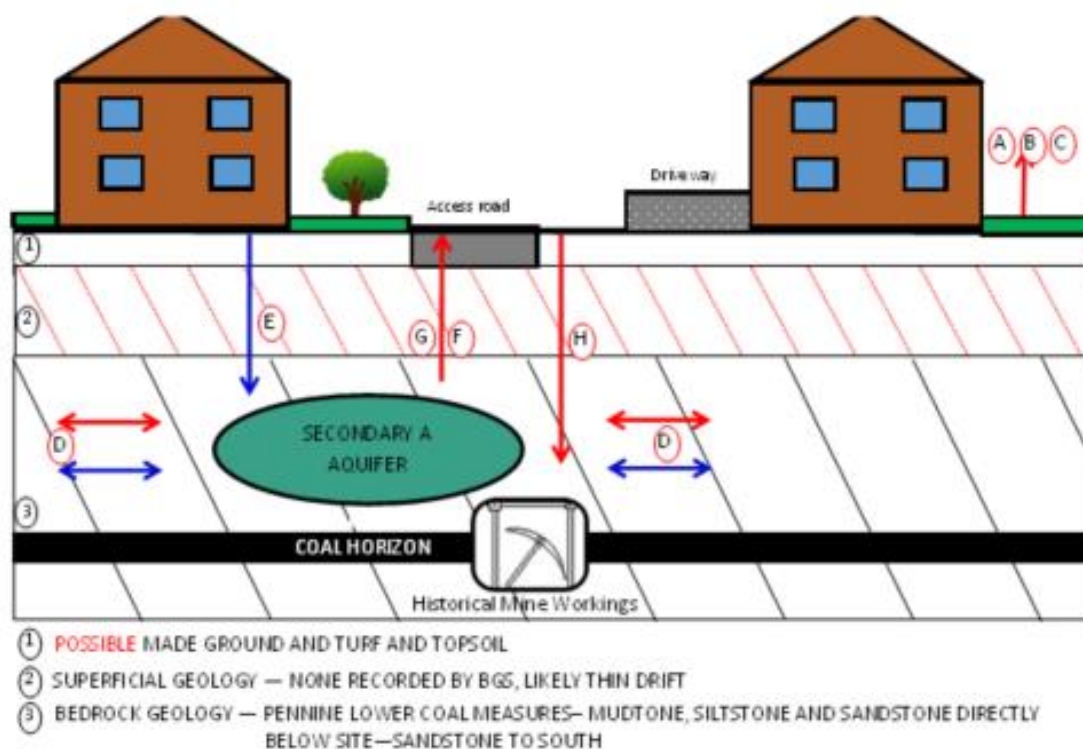
The highlighted areas that are located within the proposed soft landscaping and planting areas to be utilised as the garden areas for the development, should be removed as part of the site strip and should be either removed from site or contained beneath hardstanding.

Due to the discovery of contaminated soils and absence of site won subsoil and topsoil, the Local Planning Authority (LPA) will require a remediation strategy document for review prior to commencement of these remedial works and will also require a validation report on completion of the work to confirm that the site has been left in a suitable condition. This will include analysis of any new soils brought into the site (e.g. topsoil for finishing gardens) to confirm that it is suitable for use. Where this is required, soils should be sampled at the supplier's premises to confirm their quality before purchase and transport.

Figure 1: Locations of contamination exceedances.

5.3.1 CGHM

The conceptual ground hazard model (CGHM) presented on the following page shows the potential hazards and pollutant linkages which have been considered at the site and those which may still be complete, or would be complete, if the site were to be developed as a residential unit in its current condition.

Figure 1: CGHM – Conceptual cross section of site including a Source, Pathway and Receptor Model**IDENTIFIED HAZARDS Including Potential CONTAMINATION SOURCES**

- Construction and demolition of existing buildings on site and storage of unknown material and/or substances on site
- Contamination from traffic on nearby Gildersome Lane and/or A58
- Potential presence of unrecorded underground coal and non-coal mine workings beneath the site.
- Potential hazardous gases sourced from shallow unrecorded mine workings and/or made ground on site.

IDENTIFIED RECEPTORS and ASSOCIATED PATHWAY

- A—** End Users through Direct Contact / Inhalation / Ingestion. Buildings and hard standing will encompass some of the site, removing any pathway to end users through direct contact in these areas.
- B—** Plants and Trees through uptake, possible given the intended use of the site.
- C—** End Users through cultivation and consumption of vegetables / fruit. Possible given the intended end use of the site.
- D—** Neighbouring Sites through lateral migration (in soil and water, including surface water run off).
- E—** Ground water through leaching of sub-soil.
- F—** Buildings and services through direct contact. Buildings and hard standing will encompass some of the site, removing any pathway to end users through direct contact in these areas.
- Linkages A—F still remains, as elevated contaminants are present across the site. Remediation required.**
- G—** End users and buildings through ground gas migration. Buildings and hard standing will encompass some of the site, removing any pathway to end users through direct contact in these areas.
- Linkage G considered broken—no sources present and two rounds of monitoring place the site in 'Green' of NHBC Traffic Light System.**
- H—** Ground surface instability due to the presence of unrecorded, underground, coal and non-coal mine workings beneath the site.
- Linkage H is considered broken as no shallow workings are considered unlikely.**

6 Hazardous Gas

6.1 Gas Regime

Given the depth of made ground at the site and presence of an infilled mineshaft at the site, an allowance was made in the investigation for a ground gas monitoring exercise to be undertaken at the site. Gas monitoring wells were installed in boreholes BH1, BH2 and BH3.

The results of two (2) initial gas monitoring visit at the site are presented in Table 4 below. A further set of up to four measurements may be required to complete the gas risk assessment at the site.

Table 4 Summary of Gas Monitoring Data

Borehole	Number of Visits	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Flow Rate (l/hr)	Atmospheric Pressure (mb)
BH1	2	<0.01	0.6-0.7	18.7	<0.1	985 (falling)
BH2		<0.01	0.2-1.2	18.3-19.1		to
BH3		<0.01	0.3	19.0-19.1		1000 (rising)

The gas monitoring visit carried out to date at atmospheric pressures of 985mb to 1000mb returned:

- Low levels of CO₂.
- Negligible levels of CH₄.
- Near-normal oxygen levels.
- Consistently negligible H₂S and CO below detectable limits (<1ppm).
- Negligible flow rates, below detectable limits (<0.1 l/hr) were recorded on each monitoring occasion.

Given the above, there is considered to be a low risk of ground gas migration in the final development, and no monitoring is considered necessary.

6.2 Radon Gas

In terms of radon gas, the site lies within a radon affected area where between 3-5% of the properties are above the action level. Therefore, basic radon protection is likely to be required for the proposed development. It is recommended that a radon address search report is ordered.

7. Conclusions

7.1 Contamination

The data presented in Tables 1 and 2 and the associated discussion show most of analysed samples have returned levels of contaminants generally within acceptable concentrations, with the notable exception of the results of the testing of the soils from BH2, BH4, BH5 and TPC. Samples from multiple depths returned elevated concentrations of four species of PAH, arsenic and lead. The samples were noted to contain brick and coal, with occasional ash. These elevated levels of contaminants would not be acceptable in a residential setting.

Therefore, it is concluded that remedial works will be required at the site in the garden curtilage before it can be deemed suitable for residential use.

These works would be expected to comprise the removal and suitable disposal of the affected soils and installation of a capping horizon of certified clean soils of circa 600mm installed to finished ground levels. Alternatively, the strata may be contained beneath hardstanding, such as driveways or paths.

Note that the Local Planning Authority (LPA) may require a Remediation Strategy document for review prior to commencement of the remedial works and will also require a Validation Report on completion of the work to confirm that the site has been left in a suitable condition.

This will include analysis of any new soils brought into the site (e.g. topsoil for finishing gardens) to confirm that it is suitable for use. Where this is required, soils should be sampled at the supplier's premises to confirm their quality before purchase and transport.

7.2 Hazardous Gas

Gas monitoring is ongoing at the site with three of a potential six monitoring visits having been undertaken to date. The monitoring undertaken to date has returned no elevated carbon dioxide or methane and no depleted oxygen levels.

Based the data gathered to date, the property is likely to fall into "Green" of the NHBC Traffic Light System for low rise housing and therefore, gas protection measures are likely not considered necessary for the proposed building.

Note that these conclusions are provisional and that the gas monitoring exercise is not yet completed, with only two of a possible six sets of readings gathered to date. Final recommendations regarding gas protection will be issued in due course in a Gas Monitoring Addendum Report following completion of the gas monitoring exercise.

It is anticipated that the remedial geotechnical works, with regard to the mineshaft capping, will incorporate appropriate gas venting measures for the shaft, to ensure that no additional gas risk is placed on the new development.

Basic Radon Protective Measures are required for the new development.

7.3 Concrete Design

The results of chemical analyses of the fill returned Water Soluble Sulphate levels of between 21mg/l¹ and 205mg/l¹ and pH levels of between 5.3 and 7.9. Additionally, the site is inferred to classify as brownfield soils with mobile water.

On this basis concrete in contact with the ground may be designed to ACEC Class DS-2 AC-2 of "BRE Special Digest 1 – Concrete in aggressive ground".

END OF REPORT

The findings and contents of this (intrusive) Site Investigation Report pertain solely to the study area(s) outlined herein and are based solely on the findings of the excavations undertaken as part of the current exercise unless otherwise stated. The findings and/or recommendations of this report do not take into account any ground conditions that may be present but have hitherto not been encountered and as such further investigation and/or a reconsideration of the findings of this report should be undertaken if such conditions are subsequently encountered or an alternative development plan or land use is subsequently proposed.

This report considers various environmental and/or geological risks posed to the site and/or proposed development and offers advice accordingly as guidance only. The findings of this report will remain valid provided no change of ground or groundwater conditions, either natural or anthropogenic, take place and no warranty is offered or implied.

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Appendix 1

Site Plan and Borehole Logs

OUR REF: G23326b		SITE PLAN (NOT TO SCALE)
DATE: 06/09/23	LOCATION: Bell Cabin, Low Lane, Dewsbury, WF12 8LG	



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BH No.1 Sheet No. 1 of 1**Location:** Bell Cabin, Low Lane, Dewsbury WF12 8LG**DATE:** 06/09/23

Depth (m)	Description of Strata	Thickness	Legend	Gas Well	Sample	Test Type Result	SPT N Value (Depth)	Depth to Water	Depth (m)
0.80	MADE GROUND: Loose dark brown to pale brown slightly clayey sandy gravel. Gravel is fine to coarse of sandstone and occasional coal brick concrete and plastic.	800			O	Cv kN/m ²			0.25
					O				0.50
									0.75
	Loose to medeum dense orangish pale brown clayey very sandy GRAVEL. Gravel is fine to coarse of sandstone - possible completely weathered rock.	2200			O				1.00
									1.25
					O				1.50
									1.75
					O				2.00
									2.25
					O				2.50
									2.75
3.00					O				3.00
	Borehole terminated at 3.00m.								

Remarks:

Casing to 1.00m

Dynamic windowless sampling by Terrier Rig to 3.00m

Borehole remained dry on completion

Gas well installed to 2.80m with gas bung and cover

Key:
 Slotted Pipe
 Plain Pipe
 Bentonite
 Gravel Filter

 Disturbed sample
 Cv Shear vane
 W Water sample
 S Standard Penetration Test
 C Cone Penetration Test
BH1

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BH No.2 Sheet No. 1 of 1**Location:** Bell Cabin, Low Lane, Dewsbury WF12 8LG**DATE:** 06/09/23

Depth (m)	Description of Strata	Thickness	Legend	Gas Well	Sample	Test Type Result	SPT N Value (Depth)	Depth to Water	Depth (m)
0.90	TURF/MADE GROUND: Loose brownish grey sandy gravel. Gravel is fine to coarse of sandstone coal and occasional brick glass and mudstone.	900			O	Cv kN/m ²			0.20
1.40	MADE GROUND: Loose dark brownish black clayey gravelly sandy silt. Gravel is fine to coarse of sandstone coal and brick.	500			O				0.50
3.00	Loose pale brown very clayey sandy GRAVEL. Gravel is fine to coarse of sandstone.	1600			O				0.75
4.00	Loose orangeish brown slightly silty sandy clayey GRAVEL. Gravel is fine to coarse of sandstone and occasional cobbles.	1000			O				1.00
					O				1.25
					O				1.50
					O				1.75
					O				2.00
					O				2.25
					O				2.50
					O				2.75
					O				3.00
					O				3.25
					O				3.50
					O				3.75
					O				4.00
	Borehole terminated at 4.00m.								

Remarks:

Casing to 1.00m

Dynamic windowless sampling by Terrier Rig to 4.00m

Borehole remained dry on completion

Gas well installed to 3.00m with gas bung and cover

Key:
 Slotted Pipe
 Plain Pipe
 Bentonite
 Gravel Filter

O Disturbed sample
 Cv Shear vane
 W Water sample
 S Standard Penetration Test
 C Cone Penetration Test

BH2

GEOINVESTIGATE Ltd.

Your Ref.

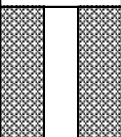
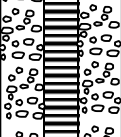
Our Ref.

G23326

BH No.3 Sheet No. 1 of 1

Location: Bell Cabin, Low Lane, Dewsbury WF12 8LG

DATE: 06/09/23

Depth (m)	Description of Strata	Thickness	Legend	Gas Well	Sample	Test Type Result	SPT N Value (Depth)	Depth to Water	Depth (m)
1.00	TURF/MADE GROUND: Loose dark grey slightly clayey silty gravel. Gravel is fine to coarse of sandstone shale coal and mudstone. Roots to 0.60m	1000			O	Cv kN/m ²			0.20
					O				0.50
					O				0.75
					O				1.00
	Loose to medium dense orange slightly clayey sandy GRAVEL. Gravel is fine to coarse of sandstone. Possible completely weathered rock.	2000			O				1.25
					O				1.50
					O				1.75
					O				2.00
					O				2.25
					O				2.50
					O				2.75
3.00					O				3.00
	Borehole terminated at 3.00m.								

Remarks:

Casing to 1.00m

Dynamic windowless sampling by Terrier Rig to 3.00m

Borehole remained dry on completion

Gas well installed to 2.50m with gas bung and cover

Key:
 Slotted Pipe
 Plain Pipe
 Bentonite
 Gravel Filter

O Disturbed sample
 Cv Shear vane
 W Water sample
 S Standard Penetration Test
 C Cone Penetration Test

BH3

GEOINVESTIGATE Ltd.

Your Ref.

Our Ref.

G23326

BH No.4 Sheet No. 1 of 1

Location: Bell Cabin, Low Lane, Dewsbury WF12 8LG

DATE: 06/09/23

Depth (m)	Description of Strata	Thickness	Legend	Gas Well	Sample	Test Type Result	SPT N Value (Depth)	Depth to Water	Depth (m)
0.20	TOPSOIL: Loose dark brown to black sandy gravelly silt. Gravel is fine to coarse of sandstone and occasional coal.	200			O	Cv kN/m ²			0.25
0.70	MADE GROUND: Loose brown to pale brown very silty clayey sandy gravel. Gravel is fine to coarse of sandstone and thin coal.	500			O				0.50
1.55	Loose to medium dense orange slightly clayey sandy GRAVEL. Gravel is fine to coarse of sandstone. Possibly weathered rock.	850			O				0.75
1.70	Weak pale brown weathered SANDSTONE	150			O				1.00
	Borehole terminated at 1.70m. Due to refusal								1.25
									1.50
									1.70

Remarks:

Casing to 1.00m

Dynamic windowless sampling by Terrier Rig to 1.70m

Borehole remained dry on completion

Key:

 Slotted Pipe
 Plain Pipe
 Bentonite
 Gravel Filter

O Disturbed sample
 Cv Shear vane
 W Water sample
 S Standard Penetration Test
 C Cone Penetration Test

BH4

GEOINVESTIGATE Ltd.**Your Ref.****Our Ref.**

G23326

BH No.5 Sheet No. 1 of 1**Location:** Bell Cabin, Low Lane, Dewsbury WF12 8LG**DATE:** 06/09/23

Depth (m)	Description of Strata	Thickness	Legend	Gas Well	Sample	Test Type Result	SPT N Value (Depth)	Depth to Water	Depth (m)
0.50	TURF/MADE GROUND: Loose dark brown slightly sandy very gravelly CLAY. Gravel is fine to coarse of sandstone coal shale and brick.	500			O	Cv kN/m ²			0.20
0.70	MADE GROUND: Loose clayey sandy gravel. Gravel is fine to coarse of mudstone	200			O				0.50
	Loose orangeish brown sandy very clayey gravel. Gravel is fine to coarse of sandstone	1300			O				0.75
					O				1.00
					O				1.25
					O				1.50
					O				1.75
2.00					O				2.00
	Borehole terminated at 2.00m.								

Remarks:**Key:**
 Slotted Pipe
 Plain Pipe
 Bentonite
 Gravel Filter

 Disturbed sample
 Cv Shear vane
 W Water sample
 S Standard Penetration Test
 C Cone Penetration Test

Dynamic windowless sampling by Terrier Rig to 2.00m
 Borehole remained dry on completion

BH5

GEOINVESTIGATE Ltd.**Your Ref.****Our Ref.**

G23326

BH No.6 Sheet No. 1 of 1**Location:** Bell Cabin, Low Lane, Dewsbury WF12 8LG**DATE:** 06/09/23

Depth (m)	Description of Strata	Thickness	Legend	Gas Well	Sample	Test Type Result	SPT N Value (Depth)	Depth to Water	Depth (m)
0.55	TURF/MADE GROUND: Loose dark brown slightly clayey gravelly sand. Gravel is fine to coarse of soft thin coal and mudstone.	550			O	Cv kN/m ²			0.20
					O				0.50
					O				0.75
					O				1.00
					O				1.25
					O				1.50
					O				1.75
2.00		1450			O				2.00
	Borehole terminated at 2.00m.								

Remarks:

Casing to 1.00m

Dynamic windowless sampling by Terrier Rig to 2.00m

Borehole remained dry on completion

Key:

Slotted Pipe

Plain Pipe

Bentonite

Gravel Filter

O Disturbed sample

Cv Shear vane

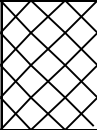
W Water sample

S Standard Penetration Test

C Cone Penetration Test

BH6

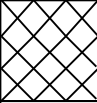
GEOINVESTIGATE Ltd.**Your Ref.****Our Ref.** G23326**TP A****Sheet No. 1 of 1****Location:** Bell Cabin, Low Lane, Dewsbury WF12 8LG**DATE:** 28/03/23

Depth (m)	Description of Strata	Thick- ness	Legend	Sample	Test Type Result	Root Information	Depth to Water	Depth (m)
0.45	TURF/MADE GROUND: Compact greyish brown clayey sandy gravel. Gravel is fine to coarse of sandstone mudstone coal brick and occasional concrete. Roots noted	450		O				0.20 0.45
	Trial pit terminated at 0.45m.							

Remarks: Hand excavated to 0.45m
Trial pit remained stable and dry on completion

Key: O Disturbed sample
Cv Shear vane
W Water sample

GEOINVESTIGATE Ltd.**Your Ref.****Our Ref.** G23326**TP B****Sheet No. 1 of 1****Location:** Bell Cabin, Low Lane, Dewsbury WF12 8LG**DATE:** 28/03/23

Depth (m)	Description of Strata	Thick- ness	Legend	Sample	Test Type Result	Root Information	Depth to Water	Depth (m)
0.35	MADE GROUND: Compact slightly silty sandy clayey gravel. Gravel is fine to coarse of sandstone shale slate bricks and occasional glass.	350		O	Cv kN/m ²			0.20 0.35
	Trial pit terminated at 0.35m.							

Remarks: Hand excavated to 0.35m
Trial pit remained stable and dry on completion

Key: O Disturbed sample
Cv Shear vane
W Water sample

GEOINVESTIGATE Ltd.**Your Ref.****Our Ref.** G23326**TP C****Sheet No. 1 of 1****Location:** Bell Cabin, Low Lane, Dewsbury WF12 8LG**DATE:** 28/03/23

Depth (m)	Description of Strata	Thickness	Legend	Sample	Test Type Result	Root Information	Depth to Water	Depth (m)
0.05	TURF/MADE GROUND: Loose dark greyish black sandy gravel. Gravel is fine to coarse of sandstone and limestone. Possible road plainings underlain by geotextile	50		O	Cv kN/m ²			0.05
0.80	MADE GROUND: Stiff grey slightly sandy gravelly clay. Gravel is fine to coarse of sandstone and thin coal.	750		O				0.80
	Trial pit terminated at 0.80m.							

Remarks: Hand excavated to 0.80m
Trial pit remained stable and dry on completion

Key: O Disturbed sample
Cv Shear vane
W Water sample

GEOINVESTIGATE Ltd.

Your Ref.

Our Ref. G23326

TP D

Sheet No. 1 of 1

Location: Bell Cabin, Low Lane, Dewsbury WF12 8LG

DATE: 28/03/23

Depth (m)	Description of Strata	Thickness	Legend	Sample	Test Type Result	Root Information	Depth to Water	Depth (m)
0.30	MADE GROUND: Soft greyish brown sandy gravelly clay. Gravel is fine to coarse of sandstone coal and occasional glass and ash	30	XXXX		Cv kN/m ²			0.03
	Trial pit terminated at 0.03m.							

Remarks: Hand excavated to 0.03m

Trial pit remained stable and dry on completion

Key: O Disturbed sample

Cv Shear vane

W Water sample

Appendix 2

Chemtech Analytical Test Report



ANALYTICAL TEST REPORT

Contract no: 126522

Contract name: Bell Cabin, Low Lnae, Earlsheaton, Dewsbury, WF12 8LG

Client reference: G23326

Clients name: Geo Investigate

Clients address: Units 3a & 4 Terry Dicken Industrial Estate
Ellerbeck Way, Stokesley
North Yorkshire
TS9 7AE

Samples received: 08 September 2023

Analysis started: 08 September 2023

Analysis completed: 19 September 2023

Report issued: 19 September 2023

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
\$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing
NAD	No Asbestos Detected

Approved by:

Ellis McCulloch
Senior Reporting Administrator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

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

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
126522-1	BH2	1.00	Sandy Loamy Clay with Gravel	-	-	14.8
126522-2	BH3	0.30	Sandy Clayey Loam with Gravel	-	-	5.5
126522-3	BH4	0.10	Sandy Clayey Loam with Gravel & Roots	-	-	16.8
126522-4	BH5	0.20	Sandy Loamy Clay with Gravel & Roots	-	-	17.1
126522-5	TPB	0.30	Sand with Gravel & Roots	-	-	5.5
126522-6	TPC	0.02-0.05	Sandy Loam with Gravel & Roots	-	-	3.7
126522-7	TPD	0.00-0.03	Sandy Loamy Clay with Gravel	-	-	12.0

Chemtech Environmental Limited

SOILS

Lab number Sample id Depth (m) Date sampled			126522-1 BH2 1.00 06/09/2023	126522-2 BH3 0.30 06/09/2023	126522-3 BH4 0.10 06/09/2023	126522-4 BH5 0.20 06/09/2023	126522-5 TPB 0.30 06/09/2023	126522-6 TPC 0.02-0.05 06/09/2023
Test	Method	Units						
Arsenic (total)	CE127 ^M	mg/kg As	32	17	38	40	23	6.5
Boron (water soluble)	CE063 ^U	mg/kg B	3.9	1.0	0.6	1.2*	0.7	0.7
Cadmium (total)	CE127 ^M	mg/kg Cd	<2	<2	<2	<2	<2	<2
Chromium (total)	CE127 ^M	mg/kg Cr	26	28	25	34	29	203
Chromium (III)	CE208	mg/kg CrIII	26	28	25	34	29	203
Chromium (VI)	CE263	mg/kg CrVI	<0.04	<0.04	<0.04	<0.04	<0.04	0.11
Copper (total)	CE127 ^M	mg/kg Cu	51	44	63	71	48	21
Lead (total)	CE127 ^M	mg/kg Pb	137	80	142	251	101	36
Mercury (total)	CE127 ^M	mg/kg Hg	<2	<2	<2	<2	<2	<2
Nickel (total)	CE127 ^M	mg/kg Ni	28	31	22	42	35	13
Selenium (total)	CE127 ^M	mg/kg Se	<3	<3	<3	<3	<3	<3
Zinc (total)	CE127 ^M	mg/kg Zn	118	290	103	284	152	88
pH	CE004 ^M	units	6.6	7.3	5.3	6.9	7.3	7.8
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	205	50	21	32	29	160
Sulphide	CE016	mg/kg S ²⁻	158	158	66	133	54	311
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1	<1	<1	<1
Cyanide (total)	CE077	mg/kg CN	<1	<1	<1	<1	<1	<1
Thiocyanate	CE145 ^M	mg/kg SCN	<1	<1	10	<1	<1	3.0
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE197	% w/w C	13.0	11.3	2.7	8.4	3.5	2.6
Estimate of OMC (calculated from TOC)	CE197	% w/w	22.4	19.5	4.7	14.4	6.0	4.5
PAH								
Acenaphthene	CE087 ^M	mg/kg	0.10	<0.02	0.03	<0.02	<0.02	0.57
Acenaphthylene	CE087 ^M	mg/kg	0.10	<0.02	0.03	<0.02	<0.02	0.55
Anthracene	CE087 ^U	mg/kg	1.38	<0.02	0.09	0.05	0.06	2.86
Benzo(a)anthracene	CE087 ^U	mg/kg	3.62	0.08	0.41	0.28	0.28	21.59
Benzo(a)pyrene	CE087 ^U	mg/kg	3.44	0.09	0.43	0.30	0.30	29.72
Benzo(b)fluoranthene	CE087 ^M	mg/kg	3.88	0.09	0.60	0.38	0.28	36.41
Benzo(ghi)perylene	CE087 ^M	mg/kg	2.00	0.07	0.30	0.19	0.21	21.12
Benzo(k)fluoranthene	CE087 ^M	mg/kg	1.69	0.06	0.23	0.14	0.16	14.85
Chrysene	CE087 ^M	mg/kg	2.89	0.08	0.35	0.24	0.24	18.21
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.51	<0.02	0.08	0.06	0.05	4.56
Fluoranthene	CE087 ^M	mg/kg	8.97	0.14	0.81	0.50	0.47	45.56
Fluorene	CE087 ^U	mg/kg	0.40	<0.02	0.03	<0.02	<0.02	0.51
Indeno(123cd)pyrene	CE087 ^M	mg/kg	2.54	0.08	0.36	0.24	0.25	22.46
Naphthalene	CE087 ^M	mg/kg	0.12	0.03	0.25	0.22	0.06	0.14
Phenanthrene	CE087 ^M	mg/kg	6.28	0.08	0.49	0.32	0.23	8.91
Pyrene	CE087 ^M	mg/kg	7.16	0.13	0.69	0.43	0.44	51.36
PAH (total of USEPA 16)	CE087	mg/kg	45.1	0.94	5.16	3.36	3.01	279

Chemtech Environmental Limited

SOILS

Lab number			126522-1	126522-2	126522-3	126522-4	126522-5	126522-6
Sample id			BH2	BH3	BH4	BH5	TPB	TPC
Depth (m)			1.00	0.30	0.10	0.20	0.30	0.02-0.05
Date sampled			06/09/2023	06/09/2023	06/09/2023	06/09/2023	06/09/2023	06/09/2023
Test	Method	Units						
BTEX & TPH								
Benzene	CE192 ^u	mg/kg	-	-	-	<0.01	-	<0.01
Toluene	CE192 ^u	mg/kg	-	-	-	<0.01	-	<0.01
Ethylbenzene	CE192 ^u	mg/kg	-	-	-	<0.01	-	<0.01
m & p-Xylene	CE192 ^u	mg/kg	-	-	-	<0.02	-	<0.02
o-Xylene	CE192 ^u	mg/kg	-	-	-	<0.01	-	<0.01
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	-	-	<0.01	-	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	-	-	<0.01	-	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	-	-	<0.01	-	<0.01
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	<10	-	-	<10	-	<10
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	<10	-	-	<10	-	<10
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	<1	-	-	<1	-	167.33
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	<1	-	-	<1	-	944.04
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	<1	-	-	<1	-	1132.86
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	-	-	<0.1	-	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	-	-	<0.1	-	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	-	-	<0.1	-	<0.1
EPH Aliphatic (>C10-C12)	CE250	mg/kg	<6	-	-	<6	-	<6
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<6	-	-	<6	-	<6
EPH Aliphatic (>C16-C35)	CE250	mg/kg	<15	-	-	<15	-	76.49
EPH Aliphatic (>C35-C44)	CE250	mg/kg	<10	-	-	<10	-	160.21
Subcontracted analysis								
Asbestos (qualitative)	\$	-	-	NAD	NAD	NAD	NAD	-

* LOD raised due to sample matrix

Chemtech Environmental Limited

SOILS

Lab number Sample id Depth (m) Date sampled			126522-7 TPD 0.00-0.03 06/09/2023
Test	Method	Units	
Arsenic (total)	CE127 ^M	mg/kg As	15
Boron (water soluble)	CE063 ^U	mg/kg B	0.9
Cadmium (total)	CE127 ^M	mg/kg Cd	<2
Chromium (total)	CE127 ^M	mg/kg Cr	161
Chromium (III)	CE208	mg/kg CrIII	161
Chromium (VI)	CE263	mg/kg CrVI	0.06
Copper (total)	CE127 ^M	mg/kg Cu	44
Lead (total)	CE127 ^M	mg/kg Pb	82
Mercury (total)	CE127 ^M	mg/kg Hg	<2
Nickel (total)	CE127 ^M	mg/kg Ni	28
Selenium (total)	CE127 ^M	mg/kg Se	<3
Zinc (total)	CE127 ^M	mg/kg Zn	121
pH	CE004 ^M	units	7.9
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	77
Sulphide	CE016	mg/kg S ²⁻	174
Cyanide (free)	CE077	mg/kg CN	<1
Cyanide (total)	CE077	mg/kg CN	<1
Thiocyanate	CE145 ^M	mg/kg SCN	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5
Total Organic Carbon (TOC)	CE197	% w/w C	3.3
Estimate of OMC (calculated from TOC)	CE197	% w/w	5.7
PAH			
Acenaphthene	CE087 ^M	mg/kg	0.08
Acenaphthylene	CE087 ^M	mg/kg	0.09
Anthracene	CE087 ^U	mg/kg	0.46
Benzo(a)anthracene	CE087 ^U	mg/kg	1.19
Benzo(a)pyrene	CE087 ^U	mg/kg	1.17
Benzo(b)fluoranthene	CE087 ^M	mg/kg	1.48
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.69
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.60
Chrysene	CE087 ^M	mg/kg	0.88
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.19
Fluoranthene	CE087 ^M	mg/kg	2.43
Fluorene	CE087 ^U	mg/kg	0.10
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.87
Naphthalene	CE087 ^M	mg/kg	0.06
Phenanthrene	CE087 ^M	mg/kg	1.35
Pyrene	CE087 ^M	mg/kg	1.92
PAH (total of USEPA 16)	CE087	mg/kg	13.6

Chemtech Environmental Limited

SOILS

Lab number			126522-7
Sample id			TPD
Depth (m)			0.00-0.03
Date sampled			06/09/2023
Test	Method	Units	
BTEX & TPH			
Benzene	CE192 ^u	mg/kg	-
Toluene	CE192 ^u	mg/kg	-
Ethylbenzene	CE192 ^u	mg/kg	-
m & p-Xylene	CE192 ^u	mg/kg	-
o-Xylene	CE192 ^u	mg/kg	-
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	<10
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	<10
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	<1
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	96.96
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	109.17
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1
EPH Aliphatic (>C10-C12)	CE250	mg/kg	<6
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<6
EPH Aliphatic (>C16-C35)	CE250	mg/kg	<15
EPH Aliphatic (>C35-C44)	CE250	mg/kg	<10
Subcontracted analysis			
Asbestos (qualitative)	\$	-	-

* LOD raised due to sample matrix

Chemtech Environmental Limited

PREPARED LEACHATES

Lab number Sample id Depth (m)			126522-2L BH3 0.30	126522-4L BH5 0.20
Test	Method	Units		
Arsenic (dissolved)	CE128 ^U	µg/l As	2.31	17.24
Boron (dissolved)	CE128 ^U	µg/l B	28	33
Cadmium (dissolved)	CE128 ^U	µg/l Cd	<0.1	<0.1
Chromium (dissolved)	CE128 ^U	µg/l Cr	<0.5	1.6
Copper (dissolved)	CE128 ^U	µg/l Cu	5.2	16.1
Lead (dissolved)	CE128 ^U	µg/l Pb	<0.6	72.3
Mercury (dissolved)	CE128 ^U	µg/l Hg	<0.05	0.076
Nickel (dissolved)	CE128 ^U	µg/l Ni	1.1	4.6
Selenium (dissolved)	CE128 ^U	µg/l Se	<1.2	<1.2
Zinc (dissolved)	CE128 ^U	µg/l Zn	<3.5	23
pH	CE213 ^U	units	8.2	8.0
Sulphate	CE049 ^U	mg/l SO ₄	4.7	3.5
Sulphur (dissolved)	CE128 ^U	mg/l S	3.5	1.5
Sulphide	CE249	µg/l S ²⁻	187	<100
Cyanide (free)	\$	µg/l CN	<5	<5
Cyanide (total)	\$	µg/l CN	<5	<5
Thiocyanate	CE014	µg/l SCN	<200	267
Phenols (total)	CE148	µg/l PhOH	<10	<10
PAH				
Acenaphthene	CE051	µg/l	0.5	0.4
Acenaphthylene	CE051	µg/l	0.5	0.4
Anthracene	CE051	µg/l	<0.1	<0.1
Benzo(a)anthracene	CE051	µg/l	<0.1	<0.1
Benzo(a)pyrene	CE051	µg/l	<0.1	<0.1
Benzo(b)fluoranthene	CE051	µg/l	<0.1	<0.1
Benzo(ghi)perylene	CE051	µg/l	<0.1	<0.1
Benzo(k)fluoranthene	CE051	µg/l	<0.1	<0.1
Chrysene	CE051	µg/l	<0.1	<0.1
Dibenz(ah)anthracene	CE051	µg/l	<0.1	<0.1
Fluoranthene	CE051	µg/l	0.4	0.3
Fluorene	CE051	µg/l	0.7	0.4
Indeno(123cd)pyrene	CE051	µg/l	<0.1	<0.1
Naphthalene	CE051	µg/l	<0.1	0.6
Phenanthrene	CE051	µg/l	1.1	0.9
Pyrene	CE051	µg/l	0.3	0.3
PAH (total of USEPA 16)	CE051	µg/l	3.3	3.3

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	U	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE263	Chromium (VI)	Discrete Analyser	Dry			mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE016	Sulphide	Distillation, Titration	Dry		10	mg/kg S ²⁻
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE145	Thiocyanate	Weak acid extraction, Colorimetry	Dry	M	1	mg/kg SCN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	As received		0.5	mg/kg PhOH
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	U	0.03	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE192	Benzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Toluene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Ethylbenzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	m & p-Xylene	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	o-Xylene	Headspace GC-FID	As received	U	0.01	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE250	EPH Aromatic (>EC10-EC12)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC12-EC16)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC16-EC21)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC21-EC35)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE250	EPH Aromatic (>EC35-EC44)	Solvent extraction, GCxGC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE250	EPH Aliphatic (>C10-C12)	Solvent extraction, GCxGC-FID	As received		6	mg/kg
CE250	EPH Aliphatic (>C12-C16)	Solvent extraction, GCxGC-FID	As received		6	mg/kg
CE250	EPH Aliphatic (>C16-C35)	Solvent extraction, GCxGC-FID	As received		15	mg/kg
CE250	EPH Aliphatic (>C35-C44)	Solvent extraction, GCxGC-FID	As received		10	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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METHOD DETAILS

METHOD	PREPARED LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE002	Leachate preparation (EA)	L:S 10:1		-	-
CE128	Arsenic (dissolved)	ICP-MS	U	0.06	µg/l As
CE128	Boron (dissolved)	ICP-MS	U	8	µg/l B
CE128	Cadmium (dissolved)	ICP-MS	U	0.07	µg/l Cd
CE128	Chromium (dissolved)	ICP-MS	U	0.2	µg/l Cr
CE128	Copper (dissolved)	ICP-MS	U	0.4	µg/l Cu
CE128	Lead (dissolved)	ICP-MS	U	0.2	µg/l Pb
CE128	Mercury (dissolved)	ICP-MS	U	0.008	µg/l Hg
CE128	Nickel (dissolved)	ICP-MS	U	0.5	µg/l Ni
CE128	Selenium (dissolved)	ICP-MS	U	0.07	µg/l Se
CE128	Zinc (dissolved)	ICP-MS	U	1	µg/l Zn
CE213	pH	Based on BS 1377, pH Meter	U	-	units
CE049	Sulphate	Ion Chromatography	U	1.7	mg/l SO ₄
CE128	Sulphur (dissolved)	ICP-MS	U	0.2	mg/l S
CE249	Sulphide	Distillation, Titration		100	µg/l S ₂ -
\$	Cyanide (free)	Colorimetry		5	µg/l CN
\$	Cyanide (total)	Colorimetry	U	5	µg/l CN
CE014	Thiocyanate	Colorimetry		200	µg/l SCN
CE148	Phenols (total)	Continuous Flow Colorimetry		10	µg/l PhOH
CE051	Acenaphthene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Acenaphthylene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Anthracene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(a)anthracene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(a)pyrene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(b)fluoranthene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(ghi)perylene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Benzo(k)fluoranthene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Chrysene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Dibenz(ah)anthracene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Fluoranthene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Fluorene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Indeno(123cd)pyrene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Naphthalene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Phenanthrene	Solvent extraction, GC-MS		0.1	µg/l
CE051	Pyrene	Solvent extraction, GC-MS		0.1	µg/l
CE051	PAH (total of USEPA 16)	Solvent extraction, GC-MS		1.6	µg/l

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DEVIATING SAMPLE INFORMATION

Comments

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

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

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

Key

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

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
126522-1	BH2	1.00	N	
126522-2	BH3	0.30	N	
126522-3	BH4	0.10	N	
126522-4	BH5	0.20	N	
126522-5	TPB	0.30	N	
126522-6	TPC	0.02-0.05	N	
126522-7	TPD	0.00-0.03	N	

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ADDITIONAL INFORMATION

Notes

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

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

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

Methods, procedures and performance data are available on request.

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

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

Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

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

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