Appendix D

SITE CONDITION REPORT

R COLLARD LTD - 124 CARDIFF ROAD, READING

Site Investigation and Contaminated Land Report

MAY 2022

R Collard Ltd - 124 Cardiff Road, Reading

Site Investigation and Contaminated Land Report

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Report Ref	22-82097

ISSUE NUMBER

Issue	Revision No.	Date Issued	Description of Revision	Reviewed by:
01		10/05/2022		
02	01	06/09/2022	Minor amendment	Anthony Elkins

Site Address

124 Cardiff Road
Reading
RG1 8NH

Client Address

R Collard Ltd
Eversley Haulage Park
Brickhouse Hill
Eversley
Hook
RD27 0PZ

When marked as 'Final' above, this report has been written, checked for technical integrity, and approved for issue by suitably experienced and trained geoscientists working to best practice. If the report is marked as 'Draft' it should not be relied upon.

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EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

Instructions / Brief	ACS were instructed to carry out a review of a desk study previously produced for the Site and to conduct an intrusive ground investigation, including laboratory soil contamination testing, groundwater monitoring and ground gas monitoring, to enable a contaminated land assessment to be made for the Site comprising 124 Cardiff Road, Reading, RG1 8NH. The objective of the investigation and assessment is to ascertain whether there are likely to be any constraints in relation to contamination for redevelopment of the Site for commercial use. The intrusive investigation was carried out in March 2022.
Proposed Development	It is proposed to demolish the existing building and redevelop the Site with a single storey shed, which will be an extension of the existing shed to the west.
Previous Reports	WSP ltd – Preliminary Risk Assessment Report. Dated 12/2020 – REF:70063683-PL6
Exploration & Laboratory Testing	Four windowless boreholes drilled to a maximum depth of 5.0m. Two hand dug pits excavated to the maximum depth of 0.30mbgl. All boreholes were installed with pipe to allow ground gas and groundwater monitoring to be undertaken. Soil samples were submitted for laboratory chemical analysis for determinands chosen based on the known history of the Site. Four rounds of ground gas and ground water monitoring has been undertaken.
Findings (Ground Conditions)	The Site is generally underlain by Made Ground deposits to a maximum depth of 2.40mbgl. This is underlain by superficial deposits comprising Langley Silt Member and/or Alluvium. The Langley Silt Member typically comprises a soft to firm sandy gravelly silt or a dominant silt proven to a depth of 3.40mbgl. The Alluvium deposits typically comprise either a brown sandy silty gravel or silt sand and gravel proven to a depth of 5.00mbgl Hydrogeological site conditions are likely to comprise perched groundwater resting on top of the Langley Silt Member (impermeable strata) for water levels recorded in WS01 and WS02. The standing water levels recorded in WS03, where the installations are at a sufficient depth to record accurate groundwater, were between 1.76m bgl and 2.46m bgl.

Findings (Risk Assessment)	Concentrations of Dibenzo (a h) anthracene (non-volatile PAH), above the GAC for commercial land use, were reported from HDP01 at 0.10-0.30m bgl, in the south of the Site. However further risk assessment indicates that the PAH contaminative hotspot will be removed during construction of the proposed building and the direct exposure pathway between the source and future site users will be removed. Due to the physical and chemical properties of Dibenzo (a h) anthracene, a potential risk from hydrocarbon vapours is not perceived. It is therefore concluded that the potential risk from persistent PAHs to future site users due to contamination of soil is **Low.** For construction workers, appropriate PPE is considered to be sufficient to deal with any potential risk from PAHs concentrations revealed from the site investigation. For controlled waters, considering the low mobility of Dibenzo (a h) anthracene, the low concentrations and since the area will be covered by the footprint of the building, preventing rain infiltration and mobilisation of PAHs, it is further considered that this contaminant represents a **Very Low Risk** to controlled water receptors. Therefore, further investigation or remedial measures are not considered necessary with regard to contaminant concentrations reported from the soil samples. For ground gas, the total four rounds of ground gas monitoring carried out has revealed a maximum steady concentration of methane of 0.1%, and 2.2% for carbon dioxide, and absence of gas flow. Based on the nature of the potential source term (Made Ground) and the monitoring results, the Site has been classified as Characteristic Situation 1 (CS1)**.** For CS1, a **Very Low Risk** is perceived from ground gas, and therefore it is considered that ground gas protection measures are not required at the Site.
Recommendations	Based on the outcome of this intrusive site investigation and ground gas monitoring, it is considered that further investigation or remedial measures are not necessary for the site. Although not strictly necessary, the Client has advised that during construction works, they will be removing the made ground (including the PAH hotspot), where clinker has been identified below the concrete slabs. This will remove the potential source of PAH in made ground and also will remove soils which reported elevated levels of SOM, associated with coal fragments in the made ground materials. This is further considered to further reduce any potential impact to controlled water receptors. In addition, and in accordance with best practice, a Watching Brief, in conjunction with the Discovery Strategy, should always be in place during the site development (site preparation and construction works). Should ground conditions differ from those revealed by this investigation, works should stop immediately within the identified area and expert advice should be sought.

1 INTRODUCTION

1.1 Terms of Reference

ACS Testing Ltd (ACS) was instructed by R Collard Ltd (the Client) in March 2022 to carry out an intrusive site investigation and provide a contaminated land assessment for a site comprising 124 Cardiff Road, Reading, RG1 8NH. The site is proposed to be redeveloped with a new metal warehouse, which will be an extension to the existing R Collards building to the west.

1.2 Site Setting

The term 'Site' within this report refers to the land outlined in red shown on the Site Location Plan included as Figure 1.

The Site is located within an industrial estate, north of Cardiff Road which is in Reading. At the time of the intrusive investigation the Site was occupied by various stockpiles of material associated with the recycling centre adjacent to the Site.

1.3 Previous Reporting

Previous reporting commissioned by the Client for the Site includes:

- WSP Ltd – Preliminary Risk Assessment Report. Dated 12/2020 – Ref: 70063683-PL6

Reference should be made to the report for a better understanding of the Site conditions and their findings. The findings have been summarised in Section 2.0 of this report and also referred to in the relevant sections.

1.4 Proposed Development and Planning Application

It is understood that the Client proposed to demolish the existing building and redevelop the Site with a single storey shed which will be an extension of the existing shed to the west. The purpose of the new building will be to extend the internal footprint of the operations of the waste depot located to the north and west of the Site.

The Clients planning consultant provided a document summarising the expected conditions likely attached to a future planning decision. The expected conditions are as follows:

- Condition 4 Contamination Assessment
- Condition 5 Remediation Scheme (to deal with any contamination identified in condition 4)
- Condition 6 Validation report for any Remediation Scheme
- Condition 7 Remediation scheme (if needed).

1.5 Objectives and Scope

The main objectives of this investigation and assessment are:

- To better characterise the expected ground conditions underlying the Site.

- To enable assessment of the potential risk associated with the proposed development of the Site, in relation to contaminated land, and to inform the design of remedial measures or further investigation, if necessary.
- To provide reassurance to the regulators, a possible owner of the Site or an insurance provider.

The scope of work has included:

- Review of previous reporting by others, intrusive investigation including boreholes, ground gas monitoring and soil laboratory chemical testing; quantitative and qualitative contaminated land risk assessment.

1.6 Limitations

This report has been prepared in accordance with the instructions received from the Client and includes the findings of a ground investigation and contamination assessment based on the works carried out by ACS and others. The information contained in this report is intended for the use of the Client pursuant to the development described above. The recommendations contained in this report may not be appropriate to other development proposals.

We confirm that in preparing this report we have exercised reasonable skill and care as would be expected of a suitably qualified and experienced geoscience consultant working within the limits of the Client's instructions.

The report is based upon the findings of previous reports prepared by others and an intrusive ground investigation which includes soil sampling, gas monitoring and laboratory testing for chemical parameters. It should be appreciated that there may be areas of the Site that have not been investigated where contaminant concentrations or ground conditions may vary from those encountered. It should also be appreciated that the contaminant concentrations or sub-surface features revealed may be more widespread than those identified.

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the desk based and intrusive investigation. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled, and the number of samples tested. No liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the Client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by ACS Testing Ltd.

The investigation, analysis and recommendations in respect of contamination are made solely in respect of the prevention of harm to identified receptors, using where possible, best practice at the date of preparation of the report. Changes in codes of practice and / or legislation, made after preparation of this report could invalidate the conclusions presented within this report.

1.7 Applicable Legislation and Regulation

Part 2A of the Environmental Protection Act (1990) and the subsequent statutory guidance (Defra, 2012) forms the basis for the current statutory regime for the identification and remediation of contaminated land in England and Wales. The 2012 statutory guidance states that the aim of Part 2A is to:

a) To identify and remove unacceptable risks to human health and the environment

b) To seek to ensure that contaminated land is made suitable for its current use

c) To ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

A legal definition of contaminated land is stated in the Environmental Protection Act 1990, Part 2A, Section 78A(2). Within this Act contaminated land is defined as:

"Any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, or under the land that:

- *Significant harm is being caused or there is significant possibility of such harm being caused; or*
- *Pollution of controlled waters is being, or is likely to be caused."*

Contamination within the ground is often addressed via the planning regime. Guidance principles for sites dealt with via planning was outlined in Planning Policy Guidance 23 (PPG23). As part of the governments drive to reduce red tape, PPG23 was withdrawn in 2012 and replaced with more streamlined guidance in the form of the National Planning Policy Framework (NPPF), which has been subsequently revised in July 2021. The following references to contaminated land and site investigation are made within the NPPF:

Paragraph 183 – Planning policies and decisions should ensure that:

a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);

b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and

c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

Paragraph 184 - Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rest with the developer and/or landowner.

The NPPF defines a competent person as:

- *A person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation.*

The Environment Agency 'Land Contamination Risk Management (LCRM) and relevant guidance on the assessment of potentially contaminated sites acknowledges the need for a tiered risk-based approach comprising of:

- Tier 1 Assessment: comparison of the site contaminant levels with generic standards and compliance criteria including an assessment of risk using a source-pathway-receptor model.

- Tier 2 Assessment: derivation of site-specific risk assessment criteria and calculation of site specific clean-up values.

This report has been completed in accordance with the Environment Agency 'Land Contamination Risk Management (LCRM), the revised NPPF 2021 and the Statutory Guidance to Part 2A of the Environmental Protection Act 1990. British standards include BS5930, BS10175 and BS8485.

2 REVIEW OF PREVIOUS REPORTS

2.1 Introduction

This section provides a summary of the findings of the following previous report:

- WSP Ltd – Preliminary Risk Assessment Report. Dated 12/2020 – Ref: 70063683-PL6

The review below provides a summary of the investigation and its findings, and further detail is provided in the relevant sections of this report.

It is recommended that the above report is read in full to gain a better understanding of the Site.

2.2 WSP Preliminary Risk Assessment Report

WSP Ltd was instructed by R Collard Ltd to undertake a Preliminary Risk Assessment for the Site.

2.2.1 Site Conditions

The Site is described as being located within a mixed commercial and light industrial area and is rectangular in shape. At the time of the Site walkover the majority of the Site was occupied by a building that was being used by the adjacent waste depot to store empty bins. Anecdotal evidence indicate that the building was previously used for the production of dyes and cosmetics.

2.2.2 Environmental Setting

- The report describes the geology beneath the Site to comprise superficial geology comprising the Langley Silt Member underlain by Alluvium and the Kempton Park Gravel Member. The bedrock beneath the Site is described to comprise the Seaford Chalk Formation and Newhaven Chalk Formation.
- The Langley Silt Member is classified as unproductive strata, with the Alluvium and Kempton Park Gravel Member both classified as secondary (A) Aquifers. The underlying bedrock is classified as a Principal Aquifer.
- The Site is not located within 500m of a Source Protection Zone (SPZ). The closest groundwater abstraction point is located approximately 110m west of the Site and is used for process water. There are no surface water abstractions recorded within 500m of the Site.
- WSP have considered groundwater to likely flow to the north towards an unnamed water course and the River Thames, located approximately 650m north of the Site.

2.2.3 Preliminary Conceptual Site Model

The desk study identified the following on-Site potential sources of contamination:

- Made Ground

- Historical uses as a metal works, builders' yard, allotments and licensed industrial activities

Off-Site potential sources of contamination were listed as follows:

- Made Ground
- Current waste transfer site and recycling site.
- Railway, sidings, engine sheds, diesel locomotive maintenance depot and coal yard
- Warehouses, works and depots including car service centre and enamellers
- Tank and potential fuel filling point
- Various tanks and Electrical Substations
- Historical landfill

2.2.4 Conclusions and Recommendations

The desk study concluded:

- There is considered to be a **Low Risk** to human health through direct contact pathways. This since the proposed development plans suggest that the entire Site is to be covered by hardstanding or building cover.
- During Site redevelopment, there is the potential for the hardstanding to be temporarily removed or broken. The risk to third party neighbours during this time is considered to be **Low-Moderate**.
- The risk from ground gas on human health is considered to be **Low-Moderate.** This, since the Site and surroundings have historically been developed and it is likely that Made Ground deposits to be present, which have the potential to generate ground gas.
- Construction workers or maintenance workers may come into contact with contaminated soils/groundwater during ground or maintenance works. The risk is considered to be **Low-Moderate**, however these risks should be managed via Health and Safety protocols.
- The proposed development plans include building cover or hardstanding across the entire Site. Therefore, infiltration of surface water to the subsurface will be limited, thus limiting the leaching potential of contaminants to shallow groundwater. In addition, it is considered likely that the Langley Silt Member acts as an aquitard preventing the migration of shallow contaminants to the underlying aquifers within the Alluvium, Kempton Park Gravel Member and Chalk Group. Given the distance to the nearest surface water receptor (240m), groundwater underlying the Site is considered unlikely to significantly impact surface water courses. The risk to controlled waters is considered to be **Low-Moderate.**
- There is the potential for permeation of hydrocarbons into plastic pipes. Given the current and former land uses at the Site, the risk is considered to be **Low-Moderate.**

An intrusive site investigation was recommended to assess plausible contaminant linkages and to determine whether remedial measures were required for the development.

3 ACS INTRUSIVE INVESTIGATION - SCOPE

3.1 Introduction

An intrusive investigation was undertaken by ACS on the 22 March 2022. The investigation was supervised by a suitably qualified and experienced ACS Site Engineer and was designed by ACS to provide information on the underlying ground conditions to enable refinement of the conceptual site model and contaminated land risk assessment.

Plans showing the exploratory hole locations, with the current and proposed layout, are included as Figures 2 and 3.

3.2 Hand Dug Pits

Two hand dug pits were excavated to the maximum depth of 0.30m bgl. Soil samples were collected in suitable containers and submitted for chemical analysis.

3.3 Windowless Lined Boreholes

Four windowless boreholes (labelled WS01-WS04) were drilled to a maximum depth of 5.00m bgl, within accessible areas of the site and outside the footprint of the existing building. Soil samples were retained in rigid core liners to enable the arisings to be logged.

Soil samples were collected at the appropriate soil horizons to enable testing for chemical properties and to determine contaminant levels within the soils. Monitoring wells were installed in all four boreholes to enable ground gas monitoring and ground water monitoring to be undertaken. The boreholes were installed with slotted screen in the Made Ground and natural ground. The potential source of ground gases being the made ground beneath the Site and made ground and a historical landfill offsite.

The windowless borehole logs are included as Appendix A.

3.4 Borehole Installations

All four windowless boreholes were installed with pipe to enable ground gas and groundwater monitoring, as summarised in

Table *1*. The boreholes extended up to 5.0m bgl.

The wells comprised 50mm diameter HDPE slotted pipe surrounded by a gravel filter pack within the response zone. The top section of the monitoring well consisted of plain pipe with a bentonite seal covered by a metal flush cover.

Table 1: Borehole Installations

Exploratory Hole	*Depth of Response Zone (mbgl)*	*Response Zone Geology*
WS01	1.00-2.00 (ground gas)	MG & LSM
WS02	1.00-2.00 (ground gas)	MG
WS03	2.00-3.70 (groundwater)	LSM and Alluvium
WS04	1.00-2.00 (ground gas)	MG & LSM

MG – Made Ground, LSM – Langley Silt Member, A - Alluvial Deposits

3.5 Ground Gas Monitoring

During the intrusive investigation made ground was encountered to depths between 1.30m bgl and 2.40m bgl. Therefore, although no evidence of significant organic matter content was observed, it was determined that there was a potential source of hazardous ground gas on Site, which should be investigated. The desk study previously produced for the Site also identified Made Ground in all directions off site as a potential source of hazardous ground gases as well as a landfill north of the Site. Therefore, a ground gas monitoring programme has been carried out to provide further clarity of the actual ground gas regime.

Ground gas monitoring has been completed for the Site by ACS on four occasions between 28th March and 6th May 2022.

Monitoring was carried out by ACS using a calibrated Geotechnical Instruments GA5000 Gas Analyser and MiniRAE 3000 Photo-ionization Detector (PID), calibrated with isobutylene gas. Boreholes were monitored for gas flow, methane (CH_4), carbon dioxide (CO_2), oxygen (O_2), balance gases, carbon monoxide (CO), hydrogen sulphide (H_2S) and volatile organic compounds (VOC). During the gas monitoring visits, the groundwater level and base level of the boreholes were also measured using a dip meter.

The results of the ground gas monitoring undertaken are included as Appendix B.

3.6 Laboratory Testing

The section below summarises the laboratory testing undertaken for the ACS investigation.

All samples were dispatched to a UKAS accredited laboratory (ACS Environmental) under a chain of custody procedure, and in suitable conditions in accordance with best practice.

Chemical laboratory test result certificates are included as Appendix C.

3.6.1 Chemical Analysis

Soil

Twelve soil samples, ten from the Made Ground and two from the natural soils, were analysed for a suite of contaminants as follows:

- Metals – Arsenic, Cadmium, Chromium (III & VI), Copper, Lead, Mercury, Nickel, Selenium, Zinc
- Speciated Polycyclic Aromatic Hydrocarbons – PAH
- Speciated Total Petroleum Hydrocarbons – TPH aliphatic / aromatic split
- Soil Organic Matter (SOM) & Fraction Organic Carbon (FOC)
- pH

Six soil samples from the Made Ground were analysed for the presence of asbestos

Three soil samples from the Made Ground were analysed for organochlorine and organophosphorus pesticides.

4 GROUND CONDITIONS

4.1 Geology

Table 2 summarises the strata encountered during the intrusive site investigations. Full details are provided in the exploratory hole logs included as Appendix A. The locations of the exploratory holes are shown on Figures 2 and 3.

Table 2: Summary of Strata

Strata	*Exploratory Hole*	*Depth to Base of Stratum (m bgl)*
Made Ground	All	0.30* – 2.40
Langley Silt Member	WS01, WS03 and WS04	1.70 – 3.40
Alluvial Deposits	All	2.40 - 5.00

*Maximum depth excavated in location; therefore, base of unit not proven.

4.1.1 Made Ground

Made ground was revealed in all the exploratory holes to depths of between 1.30m – 2.40m bgl. The Made Ground was generally recorded to be granular units of varying colour sand and gravel dominant strata overlying soft grey sandy gravelly clayey and sandy gravelly and gravelly silt, The gravel constituents were described as a fine to coarse sub-angular to sub-rounded limestone, brick, concrete, brick, flint, macadam, clinker and chalk. Occasional pockets of soft greenish brown clay were recorded in WS01 between 0.05mbgl and 0.40mbgl.

4.1.2 Langley Silt Member

Units interpreted to be the Langley Silt Member were recorded with WS01, WS03 and WS04 proven to depths between 2.40m bgl and 3.40m bgl. The unit was generally described as a soft to firm brown sandy gravelly clayey, sandy gravelly SILT and only comprising a SILT. The gravel constituents were described as a fine to coarse sub-angular to rounded flint.

4.1.3 Alluvial Deposits

Units interpreted as Alluvial deposits were recorded within all boreholes proven to depths between 2.40m bgl and 5.00m bgl with the latter depth the maximum achieved in the investigation. The deposits were generally described as a brown sandy silty GRAVEL of flint or silty SAND and GRAVEL. The dominant gravel constituents were described as a fine to coarse sub-angular to sub-rounded flint

4.2 Groundwater

Groundwater strike was recorded in the boreholes during drilling with a summary of the groundwater data collected shown in Table 3 below.

Table 3: Summary of Groundwater Strikes and Rest Levels Recorded During Intrusive Investigation

Borehole	Water Strike (m bgl)	Geology at Strike
WS01	3.00	Alluvial Deposits
WS02	3.40	Alluvial Deposits
WS03	3.40	Alluvial Deposits
WS04	3.50	Alluvial Deposits

Groundwater levels within the installed borehole have been recorded on four occasions following completion of the drilling works. A summary of the groundwater levels is provided in Table 4 below.

Table 4: Groundwater Levels Recorded During Monitoring

Exploratory Hole	28/03/22 (m bgl)	06/04/22 (m bgl)	28/04/22 (m bgl)	06/05/22 (m bgl)
WS01	1.96	1.98	Dry	Dry
WS02	Dry	Dry	Dry	2.08
WS03	n/a	1.76	2.85	2.31
WS04	Dry	Dry	Dry	Dry

Based on hydrogeological conditions of the area, site data and response zones of the boreholes, it is considered that water recorded in WS01 during ground gas monitoring on 28/03/22 and 06/04/22 and WS02 on 06/05/22 is most likely to be perched water resting on top of the Langley Silt Member (impermeable strata). These boreholes were dry during subsequent monitoring (WS01) and previous ground gas monitoring for SW02. For WS04, this borehole was reported dry on all occasions.

WS03 was the only borehole with a response zone within natural strata, with superficial deposits (alluvium) recorded at 3.40m bgl below the Langley Silt Member. This borehole is most likely to be located down gradient of the site. Groundwater levels from this borehole were recorded between 1.76m and 2.85m bgl.

5 HUMAN HEALTH RISK ASSESSMENT

5.1 Soil Analysis Assessment

5.1.1 Basis of Assessment

The following provides a review of the soil chemical analysis results and an assessment of their significance with respect to the potential harm to people through exposure to the soils, or vapour deriving from hydrocarbon contamination in the soil, underlying the Site. In order to assist in the risk assessment, the results of chemical analysis have been compared to published generic assessment criteria as described below.

S4ULs were published (S4UL3023) by Land Quality Management Ltd (LQM) and the Chartered Institute of Environmental Health (CIEH) in 2015. The S4ULs have been derived in accordance with UK Legislation, Environment Agency (EA) Policy and a modified version of the EA's CLEA Model (v1.06). The S4ULs have been designed to replace the 2009 LQM/CIEH Generic Assessment Criteria (GACs). The approach to collection and use of toxicology data used to produce the S4ULs is in accordance with current EA guidance (SR2 – Human Health Toxicology Assessment of Contaminants in Soil) which are based on the principles of 'minimal' or 'tolerable' risk.

Lead

There is not an S4UL for lead and therefore we have used Category 4 Screening Levels (C4SLs), published by Defra in 2013. The purpose of the C4SLs is to provide a "relevant technical tool" as outlined in paragraph 4.21(c) below, at which if soils show concentrations below, the land is within Category 4 as defined by the 2012 revised Statutory Guidance for Part 2A of the Environmental Protection Act (1990). Category 4 is defined as:

"4.21 The local authority should consider that the following types of land should be placed into Category 4: Human Health:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil, as explained in Section 3 of this Guidance.

(c) Land that has been excluded from the need for further inspection and assessment because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of this Guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of this Guidance.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed in the normal course of their lives).

The local authority may consider that land other than the types described in paragraph 4.21 should be placed into Category 4 - Human Health, if following a detailed quantitative risk assessment, it is satisfied that the level of risk posed is sufficiently low. (Defra, 2012)

C4SLs model a 'low' level of risk; a less conservative level than the 'minimal' risk approach adopted when deriving the S4ULs. In the absence of an alternative criteria for lead, the use of low-risk screening criteria within the planning regime are considered acceptable in this instance.

The assessment criteria for inorganic mercury are for total mercury results as the equilibrium concentrations of elemental and methyl mercury compounds are likely to be very low.

Assumptions

The Site will be redeveloped with a commercial building.

Therefore, the generic assessment criteria (GAC) which relates to 'commercial' scenario has been adopted. Where contaminants are sensitive to soil organic matter (SOM), LQM / CIEH S4UL provide three GAC values for 6%, 2.5% and 1% SOM. A SOM of 1% has been adopted as this is considered to be the most conservative criteria for organic contaminants. The assessment criteria are summarised in Appendix D.

5.1.2 Summary of Results - Soil

Inorganic Determinands

Of the twelve soil samples analysed, none were recorded to have concentrations of inorganic determinands exceeding the GAC. Therefore, it is not considered that inorganic determinand concentrations within the soil pose a significant risk to the future site users, through long term frequent exposure.

Organic Determinands

Of the twelve soil samples tested, one sample from the Made Ground revealed concentrations of Polyaromatic hydrocarbons (PAHs) in excess of the generic assessment criteria. The exceedance is summarised in Table 5.

Table 5: Summary of Organic Determinands Exceedances in the Made Ground

Sample Location and Depth (mbgl)	*Determinand*	*Assessment Criteria (mg/kg)*	*Recorded Concentration (mg/kg)*
HDP01 (0.10-0.30)	Dibenzo (a h) anthracene	3.5*	6.77

* Dibenzo (a h) anthracene GAC for 5% SOM is 3.6mg/kg. Therefore, the use of GACs for 1% SOM are still considered to be more conservative and have been used to threshold contaminant concentrations at the site.

Other Determinands

Asbestos

Asbestos was not detected in any of the samples submitted for presence of asbestos testing.

Organochlorine and organophosphorus pesticides.

Organochlorine and organophosphorus pesticides were not detected in any of the samples submitted for testing.

5.1.3 Discussion of Results

The laboratory chemical analysis carried out during the ACS investigation recorded a concentration of Dibenzo (a h) anthracene that exceeded its GAC for commercial land use. This from a Made Ground soil sample at 0.10-0.30m bgl.

The single soil sample, which recorded the Dibenzo (a h) anthracene exceedance, corresponds to made ground under concrete, described as dark grey and brown very sandy silty fine to coarse angular to sub-rounded GRAVEL of limestone, flint, macadam, concrete and brick. Clinker has also been encountered in near surface made ground soil samples under the concrete. It is therefore considered likely that the source of PAHs in the sample could originate from macadam/clinker present in the made ground.

The location of HDP01 will be covered by a proposed building and will be removed during construction, and therefore no direct exposure pathway will be present after construction works. Dibenzo (a h) anthracene is not readily volatile and therefore hazardous levels of hydrocarbon vapours are unlikely to be produced.

All other inorganic and organic contaminant concentrations reported from the soil samples were below their respective GACs for commercial land use. It is therefore considered that the isolated exceedance of PAHs does not indicate that the made ground soils as a whole could pose a significant risk to future site users. The potential risk posed to future site users is therefore assessed as **Low**.

For construction workers, appropriate PPE in accordance with current H&S regulations is considered to be sufficient to deal with any potential risk from PAHs concentrations revealed from the made ground samples.

5.2 Hazardous Ground Gases and Vapour Assessment

5.2.1 Gas Monitoring

ACS have carried out four rounds of ground gas and hydrocarbon vapour monitoring at the Site between the 28th March and 06th May 2022. The maximum values recorded during the ACS monitoring rounds are summarised in Table 6 below and the full results are provided in Appendix B.

Table 6: Summary of ACS Gas Monitoring Results

Determinand	Maximum Steady State Value	Location of Maximum Value
Flow (l/hr)	0.0	All boreholes
Methane (%)	0.1*	WS04
Carbon Dioxide (%)	2.2**	WS02
VOC (ppm)	1.0	WS04*
Carbon Monoxide (ppm)	5.0	WS01
Hydrogen Sulphide (ppm)	<0.1***	N/A

* Date of monitoring 28/03/22, 1019mb falling atmospheric pressure.

** Date of monitoring 06/05/22, 1023mb falling atmospheric pressure

*** Limit of detection is 0.1ppm

5.2.2 Discussion of Results - Gases

Using the methodology outlined in BS8485 and CIRIA 665, a gas screening value (GSV) has been derived for methane and carbon dioxide using the highest recorded steady flow and maximum steady concentration of gas, as summarised in Table 7. The use of the maximum values in this way is a conservative approach to give an initial indication of the significance of the values recorded.

Table 7: Calculation of Gas Screening Value

Maximum Steady Gas Flow (l/hr)	Methane		Carbon Dioxide	
	Maximum Steady Concentration (%)	Calculated GSV (l/hr)	Maximum Steady Concentration (%)	Calculated GSV (l/hr)
0.0	0.1	0.0000	2.2	0.000

In accordance with the Modified Wilson and Card Classification discussed in the guidance (with reference to Table 2 of BS8485), the GSV for carbon dioxide and methane would correspond to Characteristic Situation 1 (CS1) which equates to a **Very Low Risk**. This due to the low levels of methane and carbon dioxide recorded during the ground gas monitoring and absence of gas flow within the boreholes.

Under CS1, **a Very Low Risk** from ground gas is perceived and ground gas protection measures are not considered necessary for the new building.

For made ground soils and their potential to generate ground gas, WS01, WS02 and HDP02 reported Soil Organic Matter (SOM) from made ground up to 0.30m of 19.6%, 26.5% and 26.8% respectively. Made ground soil samples from WS03, WS04 and HDP01, at depths between 0.10m and 0.50-0.80m bgl, further reported SOM of 6.07%, 9.29% and 9.76% respectively.

Although the SOM for made ground is elevated, particularly made ground up to 0.30m bgl, this is attributed to presence of clinker identified within the soils. Made ground below 0.50-0.80m reported maximum SOM between 0.49% and 3.32%. SOM for indigenous soils was reported as 0.35% and 0.49% for WS02 and WS04 respectively.

Based on the contamination testing results and field observations, it is considered that the elevated SOM levels, particularly at surface level, relates to the presence of clinker identified within the made ground soils, with no significant volume of degradable organic matter identified within the soil samples. This has been corroborated by the ground gas monitoring results, which reported very low levels of methane and carbon dioxide and absence of ground gas flow within the boreholes.

For hydrocarbons, monitoring of vapour associated with volatile organic compounds recorded negligible levels of VOC and none indicative of a significant source term. In addition, observation made during the investigation and chemical analysis carried out on soil samples did not find evidence of a significant source of volatile hydrocarbons.

It is therefore considered that a significant risk from ground gas and/or hydrocarbon vapours is not perceived for the site. No further action is considered necessary in this regard.

5.3 Human Health Risk Assessment Conclusions

Laboratory testing and site data have indicated that there is not a viable source of contamination, which could have a significant impact on the future site users. Concentrations of Dibenzo (a h) anthracene were found to be elevated in one sample of Made Ground in one isolated location (HDP01), in the south of the Site. However, soils in this location will be removed during construction and therefore the direct exposure pathway between the source and receptor will be removed. Dibenzo (a h) anthracene is not readily volatile and therefore hazardous levels of hydrocarbon vapours are unlikely to be produced. For construction workers, appropriate PPE is further considered to be sufficient to deal with any potential risk from PAHs concentrations revealed from the made ground sample.

It is therefore concluded that the potential risk posed to future site users due to contamination of soil is **Low.** It is addressed that if the proposed development changes, the above recommendation will need to be reassessed.

For ground gas, the gas monitoring undertaken for the site, and consideration of the potential soil source term, means that the Site has been classified as CS1 (posing a **Very Low Risk)** and therefore it is considered that ground gas protection measures are not required at the Site.

6 CONTROLLED WATERS RISK ASSESSMENT

6.1 Controlled Waters Risk Assessment

Risk assessment has been undertaken for contaminants that exceeded the GAC for Commercial Land Use. This for Dibenzo (ah) anthracene from HDP01 (0.10-0.30) of 6.77mg/kg, above its GAC of 3.5mg/kg.

For the risk assessment for controlled waters. It is considered:

- The Site is generally underlain by Made Ground deposits proven to a maximum depth of 2.40m bgl. This is underlain by superficial deposits comprising the Langley Silt Member and Alluvium. The Langley Silt Member typically comprised a soft to firm sandy gravelly silt or a dominant silt proven to a maximum depth of 3.40mbgl. The Alluvial Deposits was recorded to generally comprise brown sandy silty gravel or silty sand and gravel proven to a maximum depth of 5.00m bgl.
- The superficial Langley Silt Member is classified as Unproductive Stratum and the Alluvial deposits are classified as a Secondary (A) Aquifer. The bedrock Seaford Chalk Formation and Newhaven Chalk Formation are classified as a principal Aquifer. However, this is likely to be protected by low permeability soils of the Langley Silt Member.
- The Site is not located within a Groundwater Source Protection Zone. The closest groundwater abstraction point is located approximately 110m west of the Site, used for process water. The groundwater flow direction is likely to be towards the north. Therefore, shallow groundwater is unlikely to flow in a westerly direction towards this abstraction point.
- The investigations recorded groundwater strikes in the Alluvial Deposits at depths between 3.00-3.50m. The Standing water levels recorded in WS03, where the installation is likely at a sufficient depth to record accurate groundwater, were between 1.76mbgl to 2.46mbgl.
- The unnamed water course is located approximately 240m north and the river Thames is located approximately 650m north of the Site. It is likely that shallow groundwater flow will be in that direction, although the area is generally level. It is possible that the granular units would allow migration of contaminants to the river, and there may be drains and old river beds which would act as preferential pathways. However, the Langley Silt Member is likely of low permeability; therefore, will limit the downward migration of contaminants from soils on the Site into the Secondary A aquifer below.
- The PAH species found to be at an elevated concentration are not considered to pose a significant risk to the identified off Site sensitive receptors, or generally to the aquifer, due to their low or very low mobility potential. In addition, following redevelopment of the Site, no potential primary source of contamination will remain as surface made ground soils will be removed. The area will be further covered by the footprint of the building, preventing rain infiltration and mobilisation of PAHs contaminants, should some PAHs concentrations remain in soils after construction works.

Based on the above, a **Very Low Risk** is perceived from soil contaminant concentrations to controlled water receptors. No further action is considered necessary in this regard.

7 CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

7.1 Introduction

The following summarises the physical and contaminated land conceptual site model (CSM), and the contaminated land risk assessment. The term 'contaminant linkage' refers to the connection between a contaminant, an exposure pathway and a receptor. Each element may exist in isolation and pose no environmental risk. It is only when all three elements are present that a contaminant linkage is considered possible. The potential risk associated with each contaminant linkage will depend on whether the ground has been impacted by a contaminant from a potential source, and then the likelihood of a receptor being harmed, which is primarily dictated by the physical conditions.

Potential receptors, for which a **Very Low Risk** is perceived from the reported soil contaminant concentrations and/or ground gas (refer to sections 5 and 6 of this report), have been excluded from the refined CSM derived for the site and further risk assessment, as a contaminant linkage is no longer considered to be present. This is the case for controlled water receptors and for future users and buildings/structures via the ground gas/hydrocarbon vapour pathway.

7.2 Contaminant Linkages

7.2.1 Potential Sources

The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a contaminant as:

"A substance which is in, on or under the land which has the potential to cause harm or cause pollution of controlled waters"

Based on the site intrusive investigation and information obtained in this study, the following potential sources of contamination and associated most likely contaminants, have been identified:

On Site Source:

- Made ground beneath the Site – Dibenzo (ah) anthracene from HDP01 (0.10-0.30m). Elevated PAH compound in one location.

7.2.2 Potential Receptors

The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a receptor as:

"Something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property or controlled waters"

Based on the proposed development of the Site, the following sensitive receptors have been identified:

- Future site users
- Utilities and proposed buildings and structures.

7.2.3 Potential Pathways

The statutory guidance for Part 2A of the Environmental Protection Act (1990) defines a Pathway as:

"A route by which a receptor might be affected by contamination"

Following development, the following exposure/migration pathways may be present, in relation to the receptors listed above:

Future Site Users

- Soil and dust ingestion (indoor and outdoor)
- Dermal contact with soil and dust (indoor and outdoor)
- Inhalation of dust (indoor and outdoor)

Utilities, Buildings and Structures

- Direct Contact and absorption into building materials
- Corrosion of concrete
- Corrosion of plastic pipes

7.3 Contaminated Land Risk Assessment

The risk posed by a given contaminant linkage is classified based upon the likelihood of the linkage being realised, and the severity of the consequence should that linkage be realised.

These definitions of likelihood and consequence used in this report are provided below. These are based on those outlined in CIRIA guidance document C552.

A summary of the potential contaminant linkages identified and the assessment of risk for each is provided in Table 12.

7.3.1 Definition of Likelihood

The definition of terms used regarding the likelihood of a linkage being realised is summarised in Table 8.

Table 8: Definitions Relating to Likelihood of Contaminant Linkage

Classification	Definition
High Likelihood	There is a contaminant linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a contaminant linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a contaminant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the short term.
Unlikely	There is a contaminant linkage but circumstances are such that it is improbable that an event would occur even in the very long term

7.3.2 Definition of Consequence

The definition of terms used for the classification of consequence should a receptor be impacted are provided in Table 9 below:

Table 9: Definitions Relating to Consequence of Contaminant Linkage

Classification	Definition
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Agency Act 1990, Part IIA.
	Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property.
	A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.
Medium	Chronic damage to human health.
	Pollution of sensitive water resource.
	A significant change in a particular ecosystem, or organism forming ecological system.

Classification	Definition
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services.
	Damage to sensitive buildings/property/services or the environment.
Minor	Non-permanent health effects to human health (easily prevent by means such as personal protective clothing).
	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.
	Easily repairable effects of damage to buildings, structures and services

7.3.3 Definition of Risk Terms

Once the risk consequence and likelihood have been assessed, it is possible to allocate a risk rating to each contaminant linkage. Table 10 below provides a matrix and Table 11 provides an indication of the meaning of each of the risk ratings.

Table 10: Matrix for Risk Allocation

Risk Classification Matrix					
		Severe	***Medium***	***Mild***	***Minor***
Probability	***High Likelihood***	Very High	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Table 11: Definitions of Risk Terms

Classification	Definition
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not already undertaken) and remediation is likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not already undertaken) is required and remedial works may be necessary in the short term and are likely over the long term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

7.3.4 Contaminated Land Risk Assessment

Table 12 summarises the potential contaminant linkages which are considered to be credible for this site following the proposed development.

Table 12: Summary of Contaminant Linkages and Risk Assessment

Source	*Potential contaminants of concern*	*Potential exposure pathways*	*Receptors following redevelopment*	*Consequence of risk being realised*	*Probability of risk being realised*	*Comments*	*Risk classification*
On Site							
Made ground in one location (HDP01)	Dibenzo (ah) anthracene from HDP01 (0.10-0.30m). Elevated PAH in one location	Soil and dust ingestion (indoor and outdoor) Dermal contact with soil and dust (indoor and outdoor) Inhalation of dust (indoor and outdoor)	Future Site users	Medium	Unlikely	An elevated concentrations of PAH was identified within HDP01 only, which will be covered by a proposed structure. Dibenzo (a h) anthracene is of low volatility, and it is unlikely to produce hazardous levels of vapour. No exposure pathway will exist between the limited source and the receptor due to the removal of soils during construction of the proposed building. A watching brief is recommended during the site development (pre-construction and construction works)	**Low**
		Absorption into building materials Corrosion of concrete Corrosion of plastic pipes	Utilities, buildings and structures	Medium	Unlikely	No evidence of gross contamination has been identified at the site. A watching brief is recommended during the site development (pre-construction and construction works). Contamination testing results should be provided to the service companies to determine specifications for underground services.	**Low**

8 CONCLUSIONS AND RECOMMENDATIONS

Based on the information gathered during review of previous reports and ground investigation the following conclusions have been made. The recommendations contained below are solely in relation to potential contaminant linkages discussed in this report. Some of the following may form the basis of a remediation strategy but further design will be required in conjunction with the development design and Building Control requirements.

8.1.1 Contaminated Land Risk Assessment and Recommendations

This assessment has concluded that the Site poses a **Low Risk** to future Site users and a **Very low Risk** to potential controlled water receptors, and no specific remediation is required in this respect.

There is a single concentration of elevated non-volatile PAH (Dibenzo (a h) anthracene) in the Made Ground at the location of HDP01 (0.10-0.30m bgl), and although this is unlikely to pose a significant risk to future site users and/or controlled waters, it would be good practice to remove this contaminant hotspot. The Client has advised that during construction works, they will be removing the made ground (including the PAH hotspot), where clinker has been identified below the concrete slabs. This will remove the potential source of PAH in made ground and also will remove soils which reported elevated levels of SOM, associated with coal fragments. This is also considered to further reduce any potential impact to controlled water receptors.

For ground gas, based on the nature of the potential source term (Made Ground) and the monitoring results, the Site is classified as Characteristic Situation 1 (CS1)**.** For CS1, a **Very Low Risk** is perceived from ground gas, and therefore, it is considered that ground gas protection measures are not required at the Site. No risks are perceived from hydrocarbon vapours.

In accordance with best practice, a Watching Brief, in conjunction with the Discovery Strategy, should always be in place during the site development (site preparation and construction works). Should ground conditions differ from those revealed by this investigation, works should stop immediately within the identified area and expert advice should be sought.

8.1.2 Construction and Maintenance Workers

Contractors working on the Site should be warned that there is potential for elevated concentrations of contaminants to be present in the soils, so that appropriate protection measures can be adopted to protect their health and safety. In summary, potential hazards during construction and subsequent maintenance include:

- Chemical contaminants – Elevated PAH was identified in the Made Ground at HDP01 in the south of the Site. There may be additional localised areas of impact. Although testing has not indicated the presence of asbestos the Site is underlain by made ground and therefore there is potential for asbestos fibres to be present.

8.1.3 Utilities

It is recommended that chemical laboratory test results are forwarded to the Utility Service Providers so that services can be correctly specified, in particular plastic water supply pipes.

8.1.4 Discovery Strategy

Site investigation is, by its nature, limited; on the basis that hotspots of undiscovered contamination may be present. Should materials different to those revealed by the investigations carried out to date be encountered during the site works, or should impacted soils be suspected, work in that part of the Site should stop immediately. Site staff should inform the Construction Site Manager, who should document any discovery and request assistance from a suitably qualified environmental consultant. Further sampling and risk assessment should then be carried out.

9 REFERENCES

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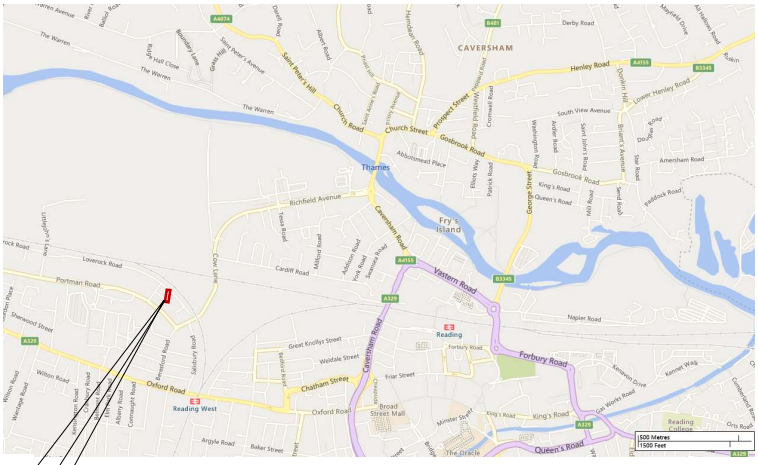
Figure 1 – Site Location Plan (Drawing No. 22-82097/01)



Notes:
Contains BING data.
Base plan from 20.128CD.SITE

Key:

Approximate Site Boundary

N

DO NOT SCALE

Drawing:
Site Location Plan

Client:
R Collard Ltd

Project:
124 Cardiff Road
Reading
RG1 8NH

Project No:
22-82097

Drawing No:
22-82097/01

Revision:

Drawn By:
LF

Date:
11/04/2022

Checked By:
BG

Date:
11/04/2022

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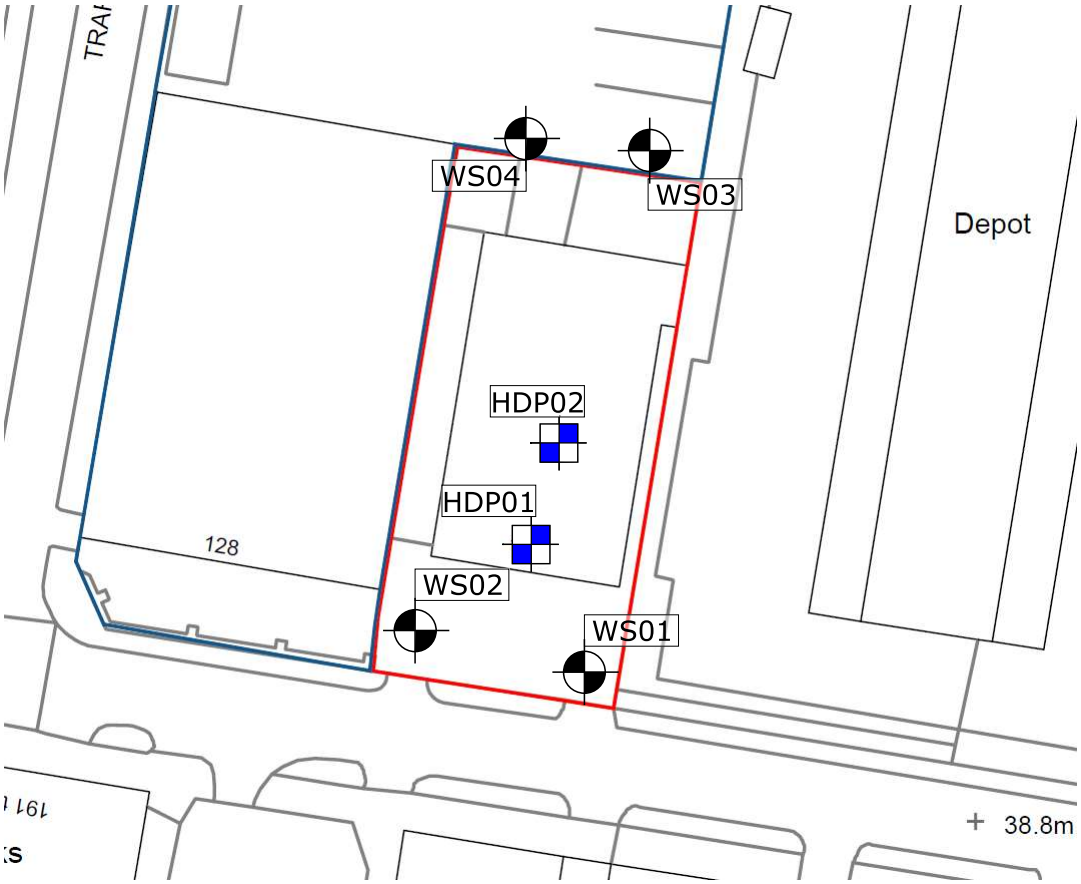
Figure 2 – Exploratory Hole Location Plan – Existing Layout (Drawing No. 22-82097/02)

Notes:
Exploratory hole locations are approximate.
Base plan from 20.128CD.SITE



Key:

- Approximate Site Boundary
- Windowless Borehole
- Hand Dug Pits

N

DO NOT SCALE

Drawing:
Exploratory Hole Location Plan

Client:
R Collard Ltd

Project:
124 Cardiff Road
Reading
RG1 8NH

Project No:
22-82097

Drawing No:
22-82097/02

Revision:

Drawn By:
LF

Date:
11/04/2022

Checked By:
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11/04/2022

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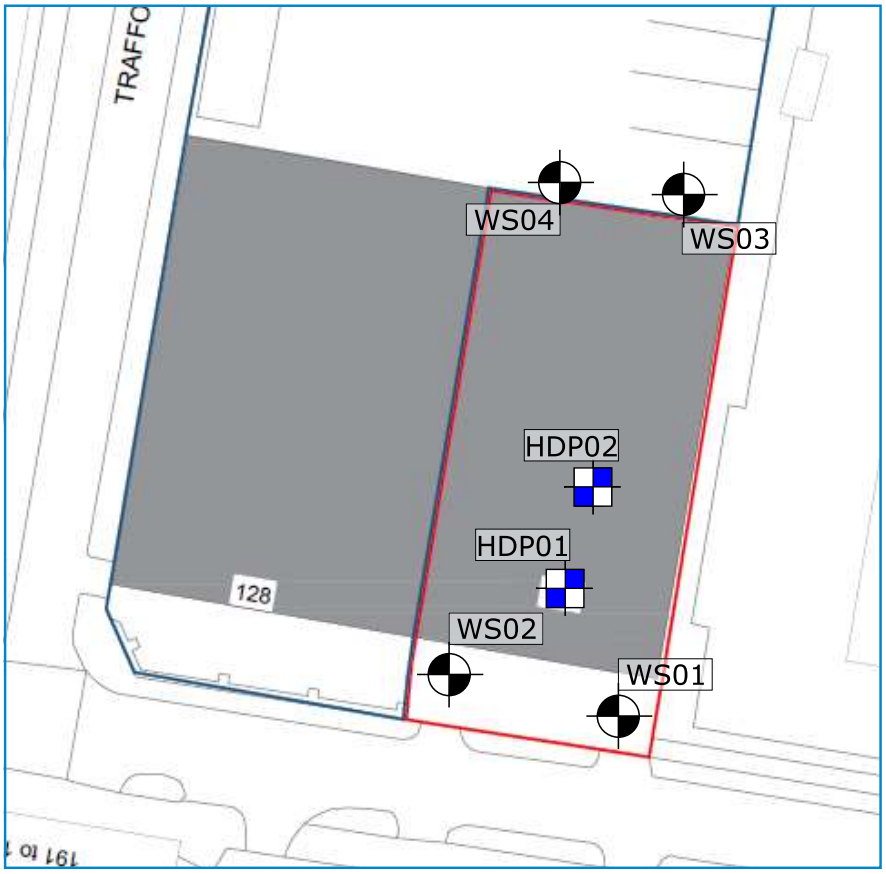
Figure 3 – Exploratory Hole Location Plan – Proposed Layout (Drawing No. 22-82097/03)

Notes:
Base plan from Reynolds Design Architects
Drawing No. 20.128CD.SITE



Key:

Approximate Site Boundary

N

DO NOT SCALE

Drawing:
Proposed Site Plan

Client:
R Collard Ltd

Project:
124 Cardiff Road
Reading
RG1 8NH

Project No:
22-82097

Drawing No:
22-82097/03

Revision:

Drawn By:
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Appendix A

Exploratory Hole Logs

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BOREHOLE LOG

WINDOWLESS SAMPLING

Borehole No.
WS01
Sheet 1 of 1

Client:	R Collard Ltd	**Lab. Ref:**	**22-81401**
Contract:	124 Cardiff Road	**Drilling Equipment:**	Premier Compact 110 Tracked Dynamic Percussion Rig
Location:	Reading, RG1 8NH		
Ground Level (mAOD):	Not Surveyed	**Co-ords:**	Not Surveyed
Date(s):	22/03/2022		

Hole Type WLS
Scale 1:30
Logged By LTM

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing: Depth	In Situ Testing: Type	In Situ Testing: Results	Drill Run
	BOUND MACADAM	0.05									
	MADE GROUND. Blackish brown very sandy silty fine to coarse angular to sub-rounded GRAVEL of flint, limestone and brick. Occasional pockets of soft greenish brown clay throughout.		(0.35)				0.05 (D) 0.20				
	MADE GROUND. Brown very sandy silty fine to coarse very angular to sub-rounded GRAVEL of brick, concrete and flint.	0.40	(0.80)				0.40 (D) 0.50				Hand Dug Pit
1		1.20									
	MADE GROUND. Soft brownish grey slightly sandy gravelly clayey SILT. Gravel comprises fine to coarse sub-angular to sub-rounded brick and flint.		(0.55)				1.30 (D) 1.50				(87mm dia) Rec=100%
	Soft brown slightly sandy slightly gravelly clayey SILT. Gravel comprises fine to coarse sub-angular to rounded flint. (LANGLEY SILT MEMBER)	1.75									
2			(1.25)				2.00 (D) 2.20				(78mm dia) Rec=100%
	Brown very sandy very silty fine to coarse sub-angular to sub-rounded GRAVEL of flint. (ALLUVIUM)	3.00									
3											(75mm dia) Rec=100%
4			(2.00)				3.50 (D) 3.70				(75mm dia) Rec=100%
	End of Borehole at 5.000m	5.00									
5											
6											

Remarks:

Groundwater Observations:

Date	Strike	Casing	Time Elapsed	Standing	Remarks
23-03-2022	3.00m	0.00m	0mins	3.00m	

Technical Notes (where applicable):
Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Densities of granular material based on in situ SPT N-values. Chalk descriptions in accordance with CIRIA C574'

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BOREHOLE LOG

WINDOWLESS SAMPLING

Borehole No.
WS02
Sheet 1 of 1

Client:	R Collard Ltd	**Lab. Ref:** 22-81401	**Hole Type** WLS
Contract:	124 Cardiff Road	**Drilling Equipment:** Premier Compact 110 Tracked Dynamic Percussion Rig	**Scale** 1:30
Location:	Reading, RG1 8NH		**Logged By** LTM
Ground Level (mAOD):	Not Surveyed	**Co-ords:** Not Surveyed	**Date(s):** 22/03/2022

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing: Depth	In Situ Testing: Type	In Situ Testing: Results	Drill Run
	BOUND MACADAM.	0.05									
	MADE GROUND. Dark grey and dark brown very sandy silty fine to coarse angular to sub-rounded GRAVEL of limestone, flint, macadam, concrete, brick and clinker.	0.25					0.10 (D) 0.30				
	MADE GROUND. Red sandy fine to coarse angular to sub-rounded GRAVEL of brick.	0.60	(0.35)				0.60 (D) 0.80				Hand Dug Pit
1	MADE GROUND. Dark brown and grey silty SAND and GRAVEL. Gravel comprises fine to coarse angular to sub-rounded limestone, flint and brick.	1.35	(0.75)				1.40 (D) 1.60				(87mm dia) Rec=100%
	MADE GROUND. Soft brown slightly sandy gravelly SILT. Gravel comprises fine to coarse very angular to sub-angular flint and concrete.	1.80	(0.45)				1.80 (D) 2.00				
2	MADE GROUND. Soft brown slightly gravelly SILT. Gravel comprises fine to coarse sub-angular to sub-rounded brick, flint and chalk.	2.40	(0.60)				2.50 (D) 2.70				(78mm dia) Rec=100%
3	Brown silty SAND and GRAVEL. Gravel comprises fine to coarse, mostly fine to medium sub-angular to sub-rounded flint.(ALLUVIUM)	4.00	(1.60)				3.80 (D) 4.00				(75mm dia) Rec=100%
4	End of Borehole at 4.000m										
5											
6											

Remarks:

Borehole terminated due to hole collapse at 4.00mbgl.

Groundwater Observations:

Date	Strike	Casing	Time Elapsed	Standing	Remarks
23-03-2022	3.40m	0.00m	0mins	3.40m	

Technical Notes (where applicable):
Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Densities of granular material based on in situ SPT N-values. Chalk descriptions in accordance with CIRIA C574'

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BOREHOLE LOG

WINDOWLESS SAMPLING

Borehole No.
WS03
Sheet 1 of 1

Client:	R Collard Ltd	**Lab. Ref:**	**22-81401**
Contract:	124 Cardiff Road	**Drilling Equipment:**	Premier Compact 110 Tracked Dynamic Percussion Rig
Location:	Reading, RG1 8NH		
Ground Level (mAOD):	Not Surveyed	**Co-ords:** Not Surveyed	**Date(s):** 22/03/2022

Hole Type WLS
Scale 1:30
Logged By LTM

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing: Depth	In Situ Testing: Type	In Situ Testing: Results	Drill Run
	CONCRETE.										
	MADE GROUND. Light grey and brown very sandy silty fine to coarse sub-angular to sub-rounded GRAVEL of concrete, brick, clinker and flint.	0.10	(1.25)								Hand Dug Pit
	MADE GROUND. Soft brown slightly sandy slightly gravelly SILT. Gravel comprises fine to coarse angular to sub-rounded flint and concrete.	1.35	(0.35)								(87mm dia) Rec=100%
	Soft to firm greenish brown SILT. (LANGLEY SILT MEMBER)	1.70	(1.70)		▼						(78mm dia) Rec=100%
	Brown very sandy silty fine to coarse mostly fine to medium sub-angular to sub-rounded GRAVEL of flint. (ALLUVIUM)	3.40	(1.60)								(75mm dia) Rec=100%
	End of Borehole at 5.000m	5.00									(75mm dia) Rec=100%

Remarks:

Borehole collapsed back to 3.70mbgl prior to installation.

Groundwater Observations:

Date	Strike	Casing	Time Elapsed	Standing	Remarks
23-03-2022	3.40m	0.00m	0mins	3.40m	

Technical Notes (where applicable):
Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Densities of granular material based on in situ SPT N-values. Chalk descriptions in accordance with CIRIA C574'

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BOREHOLE LOG

WINDOWLESS SAMPLING

Borehole No.
WS04
Sheet 1 of 1

Client:	R Collard Ltd	**Lab. Ref:** 22-81401	**Hole Type** WLS
Contract:	124 Cardiff Road	**Drilling Equipment:** Premier Compact 110 Tracked Dynamic Percussion Rig	**Scale** 1:30
Location:	Reading, RG1 8NH		**Logged By** LTM
Ground Level (mAOD):	Not Surveyed	**Co-ords:** Not Surveyed	**Date(s):** 22/03/2022

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing: Depth	In Situ Testing: Type	In Situ Testing: Results	Drill Run
	CONCRETE.										
	MADE GROUND. Brown and grey very sandy silty fine to coarse angular to sub-rounded GRAVEL of concrete, limestone, brick and flint.	0.10	(1.20)				0.50 (D) 0.80				Hand Dug Pit
1											
	Soft brown slightly sandy slightly gravelly SILT. Gravel comprises fine to medium sub-angular to sub-rounded flint. (LANGLEY SILT MEMBER)	1.30	(1.10)				1.50 (D) 1.80				(87mm dia) Rec=100%
2											
	Brown sandy silty fine to coarse sub-angular to rounded GRAVEL of flint. (ALLUVIUM)	2.40	(1.60)				3.00 (D) 3.40				(78mm dia) Rec=100%
3											(75mm dia) Rec=100%
4	End of Borehole at 4.000m	4.00									
5											
6											

Remarks:

Borehole terminated due to hole collapse at 4.00mbgl.

Groundwater Observations:

Date	Strike	Casing	Time Elapsed	Standing	Remarks
23-03-2022	3.50m	0.00m	0mins	3.50m	

Technical Notes (where applicable):
Consistency of fine grained soil assessed by hand worked tests in accordance with BS5930. Densities of granular material based on in situ SPT N-values. Chalk descriptions in accordance with CIRIA C574'

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HAND AUGER LOG

Borehole No. **HDP01**
Sheet 1 of 1

Client:	R Collard Ltd	**Lab. Ref:**	**22-81401**
Contract:	124 Cardiff Road	**Drilling Equipment:**	Hand Digging Tools
Location:	Reading, RG1 8NH		
Ground Level (mAOD):	Not Surveyed	**Co-ords:**	Not Surveyed
Date(s):	22-03-2022		

Hole Type HA
Scale 1:10
Logged By LTM

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing			Excavation Method
								Depth	Type	Results	
	CONCRETE.										
	MADE GROUND. Dark grey and dark brown very sandy silty fine to coarse angular to sub-rounded GRAVEL of limestone, flint, macadam, concrete and brick.	0.10									
	End of Borehole at 0.300m	0.30									
1											
2											

General Remarks:

1. Groundwater not encountered.

Groundwater Observations:

Date	Strike	Time Elapsed	Standing	Remarks

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HAND AUGER LOG

Borehole No. **HDP02**
Sheet 1 of 1

Client:	R Collard Ltd	**Lab. Ref:**	**22-81401**
Contract:	124 Cardiff Road	**Drilling Equipment:**	Hand Digging Tools
Location:	Reading, RG1 8NH		
Ground Level (mAOD):	Not Surveyed	**Co-ords:**	Not Surveyed
Date(s):	22-03-2022		

Hole Type: HA
Scale: 1:10
Logged By: LTM

All units = (m)	Stratum Description	Depth (Level)	Thickness	Legend	Water Strikes	Backfill	Sample (Type) Depth	In Situ Testing			Excavation Method
								Depth	Type	Results	
	CONCRETE.										
	MADE GROUND. Dark grey and dark brown very sandy silty fine to coarse angular to sub-rounded GRAVEL of limestone, flint, macadam, concrete and brick.	0.10									
	End of Borehole at 0.300m	0.30									
1											
2											

General Remarks:

1. Groundwater not encountered.

Groundwater Observations:

Date	Strike	Time Elapsed	Standing	Remarks

Appendix B

Ground Gas Monitoring Sheets

Project Name	Cardiff Road
Project Number	22-81871
Site Address	R Collard, 124 Cardiff Road, Reading, RG1 8NH
Client	R Collard Ltd

Ground Gas Monitoring Summary

Borehole: WS01

ACS Group Of Companies

Date	Atmospheric Pressure on site (mb)	Pressure Trend (Past 3 hours*)	Methane (%)		Carbon Dioxide (%)		Oxygen (%)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		VOC (ppm)	Flow (l/hr)		Depth to Groundwater (mbgl)	Depth to Base (mbgl)
			Peak	Steady	Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady		Peak	Steady		
28/03/22	1019	Falling	0.0	0.0	1.2	1.2	19.8	19.8	0	0	5	5	0.3	0	0	1.96	2.06
06/04/22	991	Falling	0.0	0.0	0.5	0.5	20.7	20.7	0	0	0	0	0.0	0	0	1.98	2.06
28/04/22	1027	Steady	0	0	0.4	0.4	21.4	21.4	0	0	0	0	0	0	0	Dry	2.02
06/05/22	1023	Steady	0.1	0	2.2	2	17.8	17.9	1	1	1	1	0	0	0	2	2.08

* - Data obtained from nearest public access weather station

Maximum Steady Parameter Values

Parameter	Value	Date
Methane (%)	0	28/03/22
Carbon Dioxide (%)	2	06/05/22
Oxygen (%) (Minimum Value)	17.9	06/05/22
Hydrogen Sulphide (ppm)	1	06/05/22
Carbon Monoxide (ppm)	5	28/03/22
VOC (ppm)	0.3	28/03/22
Flow (l/hr)	0	28/03/22

Comments

Date	Comment

Project Name	Cardiff Road
Project Number	22-81871
Site Address	R Collard, 124 Cardiff Road, Reading, RG1 8NH
Client	R Collard Ltd

Ground Gas Monitoring Summary

Borehole: WS02

ACS Group Of Companies

Date	Atmospheric Pressure on site (mb)	Pressure Trend (Past 3 hours*)	Methane (%)		Carbon Dioxide (%)		Oxygen (%)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		VOC (ppm)	Flow (l/hr)		Depth to Groundwater (mbgl)	Depth to Base (mbgl)
			Peak	Steady	Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady		Peak	Steady		
28/03/22	1019	Falling	0.0	0.0	0.2	0.2	21.1	21.2	0	0	0	0	0.1	0.0	0.0	Dry	2.02
06/04/22	991	Falling	0.0	0.0	1.8	1.8	19.9	19.9	0	0	0	0	0.0	0.0	0.0	Dry	2.03
28/04/22	1027	Steady	0	0	0.4	0.4	21.4	21.4	0	0	0	0	0	0	0	Dry	2.02
06/05/22	1023	Steady	0.1	0.1	1.7	1.7	18.8	18.8	0	0	1	0	0	0	0	Dry	2.01

* - Data obtained from nearest public access weather station

Maximum Steady Parameter Values

Parameter	Value	Date
Methane (%)	0.1	06/05/22
Carbon Dioxide (%)	1.8	06/04/22
Oxygen (%) (Minimum Value)	18.8	06/05/22
Hydrogen Sulphide (ppm)	0	28/03/22
Carbon Monoxide (ppm)	0	28/03/22
VOC (ppm)	0.1	28/03/22
Flow (l/hr)	0	28/03/22

Comments

Date	Comment

Project Name	Cardiff Road
Project Number	22-81871
Site Address	R Collard, 124 Cardiff Road, Reading, RG1 8NH
Client	R Collard Ltd

Ground Gas Monitoring Summary

Borehole: WS03

ACS Group Of Companies

Date	Atmospheric Pressure on site (mb)	Pressure Trend (Past 3 hours*)	Methane (%)		Carbon Dioxide (%)		Oxygen (%)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		VOC (ppm)	Flow (l/hr)		Depth to Groundwater (mbgl)	Depth to Base (mbgl)
			Peak	Steady	Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady		Peak	Steady		
28/03/22	1019	Falling	0.0	0.0	0.1	0.1	20.7	20.7	0	0	1	1	0.3	0.0	0.0		
06/04/22	991	Falling	0.0	0.0	0.4	0.4	20.8	20.9	0	0	0	0	0.0	0.0	0.0	1.76	3.38
28/04/22	1027	Steady	0	0	0.2	0.1	20.3	20.4	0	0	0	0	0	0	0	2.85	3.34
06/05/22	1023	Steady	0	0	0.1	0.1	17.4	17.4	0	0	1	0	0	0	0	2.31	3.34

* - Data obtained from nearest public access weather station

Maximum Steady Parameter Values

Parameter	Value	Date
Methane (%)	0	28/03/22
Carbon Dioxide (%)	0.4	06/04/22
Oxygen (%) (Minimum Value)	17.4	06/05/22
Hydrogen Sulphide (ppm)	0	28/03/22
Carbon Monoxide (ppm)	1	28/03/22
VOC (ppm)	0.3	28/03/22
Flow (l/hr)	0	28/03/22

Comments

Date	Comment
28/03/2022	Unable to dip to base

Project Name	Cardiff Road
Project Number	22-81871
Site Address	R Collard, 124 Cardiff Road, Reading, RG1 8NH
Client	R Collard Ltd

Ground Gas Monitoring Summary

Borehole: WS04

ACS Group Of Companies

Date	Atmospheric Pressure on site (mb)	Pressure Trend (Past 3 hours*)	Methane (%)		Carbon Dioxide (%)		Oxygen (%)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		VOC (ppm)	Flow (l/hr)		Depth to Groundwater (mbgl)	Depth to Base (mbgl)
			Peak	Steady	Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady		Peak	Steady		
28/03/22	1019	Falling	0.1	0.1	0.4	0.4	20.3	20.4	0	0	0	0	1.0	0.0	0.0	Dry	2.05
06/04/22	991	Falling	0.0	0.0	0.5	0.4	20.6	20.7	0	0	0	0	0.0	0.0	0.0	Dry	2.04
28/04/22	1027	Steady	0	0	0.9	0.9	20.7	20.7	0	0	0	0	0	0	0	Dry	2.03
06/05/22	1023	Steady	0	0	0.6	0.6	18.8	18.8	0	0	0	0	0	0	0	Dry	2.03

* - Data obtained from nearest public access weather station

Maximum Steady Parameter Values

Parameter	Value	Date
Methane (%)	0.1	28/03/22
Carbon Dioxide (%)	0.9	28/04/22
Oxygen (%) (Minimum Value)	18.8	06/05/22
Hydrogen Sulphide (ppm)	0	28/03/22
Carbon Monoxide (ppm)	0	28/03/22
VOC (ppm)	1	28/03/22
Flow (l/hr)	0	28/03/22

Comments

Date	Comment

Appendix C

Laboratory Test Certificates

ACS Testing Ltd
Unit 14
Blackhill Road West
Holton Heath Trading Park
Poole
Dorset
BH16 6LE

Certificate of Analysis

Certificate Number : 22-00552-Issue 1-Page: 1

Report Fao:	GEO RESULTS
Site Address^:	Cardiff Road 124
Client Order No:	22-81566
Date of Sampling^:	22/03/2022
Date Received:	25/03/2022
Date of Analysis:	25/03/2022 - 13/04/2022
Report Date:	06/05/2022

Please find your certificates of test attached for your samples received in the laboratory on 25/03/2022 under our laboratory reference 22-00552.

Remarks:

Reissue due to change of sample date at client's request.

Results reviewed by:

Arron O'Hara - Senior Analyst

Test Certificates approved by:

David Redfern *Technical Supervisor*

Any opinions or interpretations indicated are outside the scope of our UKAS accreditation.
This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.
Excel copies of reports are valid only when accompanied by this PDF certificate.
Client's Sample Description / ACS Material Description are noted for reference only.

ACSE Sample Number	62641	62642	62643
Sample ID	641756 - 22-81566	641757 - 22-81566	641758 - 22-81566
Clients Sample Ref.^	WS01	WS01	WS02
Location / Sample Depth (m)^	0.05-0.20	1.30-1.50	0.10-0.30
Date Sampled^	22/03/2022	22/03/2022	22/03/2022
Time Sampled^			
Sample deviating codes			
Client's Sample Description^			
ACS Testing Material Description^	Brown sandy silty GRAVEL	Grey sandy gravelly clayey SILT	Grey and brown sandy silty GRAVEL
ACSE Material Description (Principal Matrix - As Received)	LOAM	LOAM	CONCRETE

Determination	HWOL Acroynm	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon										
FOC		%	MT/ACSE/102	AR	**0.114**		**0.0193**		**0.154**	
Soil Organic Matter		%	MT/ACSE/102	AR	**19.6**		**3.32**		**26.5**	
Cyanide										
Total Cyanide		mg/kg	IHP	AR	< 1.00		< 1.00		< 1.00	
Metals (Soil)										
Arsenic		mg/kg	MT/ACSE/201	AD	**24.1**	*#	**29.5**	*#	**27.1**	
Cadmium		mg/kg	MT/ACSE/201	AD	**1.57**	*#	< 1.00	*#	< 1.00	
Chromium		mg/kg	MT/ACSE/201	AD	**24.5**	*#	**19.2**	*#	**23.9**	
Copper		mg/kg	MT/ACSE/201	AD	**235**	*#	**76.0**	*#	**140**	
Mercury		mg/kg	MT/ACSE/202	AD	**0.210**	*#	**0.864**	*#	**8.94**	
Nickel		mg/kg	MT/ACSE/201	AD	**48.0**	*#	**26.6**	*#	**49.3**	
Lead		mg/kg	MT/ACSE/201	AD	**1140**	*#	**456**	*#	**91.1**	
Selenium		mg/kg	MT/ACSE/201	AD	< 6.00	*#	< 6.00	*#	< 6.00	
Zinc		mg/kg	MT/ACSE/201	AD	**405**	*#	**316**	*#	**87.8**	
Chromium III		mg/kg	NAM/ACSE/X11	AD	**24.5**		**19.2**		**23.9**	
Chromium Hexavalent		mg/kg	NAM/ACSE/X11	AD	< 0.20		< 0.20		< 0.20	
pH and Conductivity										
pH (@ 20℃)		units	MT/ACSE/301	AD	**8.1**	*	**8.0**	*	**8.3**	
Poly Aromatic Hydrocarbons										
Naphthalene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	< 0.10	*#	< 0.10	
Acenaphthylene		mg/kg	MT/ACSE/108	AR	**0.24**	*#	< 0.10	*#	< 0.10	
Acenaphthene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	< 0.10	*#	< 0.10	
Fluorene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	< 0.10	*#	< 0.10	
Phenanthrene		mg/kg	MT/ACSE/108	AR	**0.37**	*#	**0.31**	*#	**1.16**	
Anthracene		mg/kg	MT/ACSE/108	AR	**0.53**	*#	< 0.10	*#	**0.42**	
Fluoranthene		mg/kg	MT/ACSE/108	AR	**2.01**	*#	**0.50**	*#	**2.59**	
Pyrene		mg/kg	MT/ACSE/108	AR	**2.80**	*#	**0.41**	*#	**2.60**	
Benzo (a) anthracene		mg/kg	MT/ACSE/108	AR	**2.57**	*#	**0.32**	*#	**1.90**	
Chrysene		mg/kg	MT/ACSE/108	AR	**2.74**	*#	**0.34**	*#	**2.04**	
Benzo (b) fluoranthene		mg/kg	MT/ACSE/108	AR	**8.79**	*#	**0.39**	*#	**2.31**	
Benzo (k) fluoranthene		mg/kg	MT/ACSE/108	AR	**3.10**	*#	**0.17**	*#	**0.93**	
Benzo (a) pyrene		mg/kg	MT/ACSE/108	AR	**7.34**	*#	**0.28**	*#	**1.65**	
Indeno (1 2 3-CD) pyrene		mg/kg	MT/ACSE/108	AR	**7.46**	*#	**0.18**	*#	**1.13**	
Dibenzo(a h)anthracene		mg/kg	MT/ACSE/108	AR	**1.79**	*#	< 0.10	*#	**0.38**	
Benzo(g h i)perylene		mg/kg	MT/ACSE/108	AR	**8.93**	*#	**0.23**	*#	**1.47**	
Total PAH		mg/kg	MT/ACSE/108	AR	**48.7**	*#	**3.13**	*#	**18.6**	
Speciated BTEX										
MTBE	HS_1D_TOTAL	mg/kg	NAM/ACSE/X12	AR	< 0.0100		< 0.0100		< 0.0100	
Hexane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Heptane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Octane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Benzene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Toluene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Ethylbenzene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	

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ACS Environmental Testing Limited
Registered in England and
Wales No. 6000065

Quality Testing & Materials Consultancy to the Construction Industry

ACSE Sample Number	62641	62642	62643
Sample ID	641756 - 22-81566	641757 - 22-81566	641758 - 22-81566
Clients Sample Ref.^	WS01	WS01	WS02
Location / Sample Depth (m)^	0.05-0.20	1.30-1.50	0.10-0.30
Date Sampled^	22/03/2022	22/03/2022	22/03/2022
Time Sampled^			
Sample deviating codes			
Client's Sample Description^			
ACS Testing Material Description^	Brown sandy silty GRAVEL	Grey sandy gravelly clayey SILT	Grey and brown sandy silty GRAVEL
ACSE Material Description (Principal Matrix - As Received)	LOAM	LOAM	CONCRETE

Determination	HWOL Acroynm	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
m+p-xylene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
o-xylene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Total BTEX	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Speciated Petroleum Hydrocarbons										
C5-C6 Aliphatic	HS_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C6-C8 Aliphatic	HS_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	**12.0**		< 10.0		< 10.0	
>C16-C21 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	**37.2**		< 10.0		< 10.0	
>C21-C35 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	**177**		< 10.0		< 10.0	
C6-C7 Aromatic	HS_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
C7-C8 Aromatic	HS_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	**13.2**		< 10.0		< 10.0	
>C16-C21 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	**47.7**		< 10.0		< 10.0	
>C21-C35 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	**1410**		< 10.0		**16.0**	
Total Speciated TPH (C6-C35)	EH_CU+HS_1D_TOTAL	mg/kg	NAM/ACSE/X07	AR	**1690**		< 10.0		**16.0**	
Subcontracted Analysis										
Asbestos Fibre ID		SC	SC	SC	**Attached**		—		**Attached**	
Pesticides (OC + OP)		SC	SC	SC	—		**Attached**		**Attached**	
Herbicides		SC	SC	SC	—		**Attached**		**Attached**	

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ACS Environmental Testing Limited
Registered in England and
Wales No. 6000065

Quality Testing & Materials Consultancy to the Construction Industry

ACSE Sample Number	62644	62645	62646
Sample ID	641759 - 22-81566	641760 - 22-81566	641761 - 22-81566
Clients Sample Ref.^	WS02	WS02	WS02
Location / Sample Depth (m)^	0.60-0.80	1.40-1.60	2.50-2.70
Date Sampled^	22/03/2022	22/03/2022	22/03/2022
Time Sampled^			
Sample deviating codes		f	f
Client's Sample Description^			
ACS Testing Material Description^	Brown and grey silty SAND	Brown sandy gravelly SILT	Brown silty SAND and GRAVEL
ACSE Material Description (Principal Matrix - As Received)	LOAM	GRAVEL	SAND

Determination	HWOL Acroynm	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon										
FOC		%	MT/ACSE/102	AR	**0.0173**		< 0.0100		< 0.0100	
Soil Organic Matter		%	MT/ACSE/102	AR	**2.98**		**0.49**		**0.35**	
Cyanide										
Total Cyanide		mg/kg	IHP	AR	< 1.00		**1.59**		< 1.00	
Metals (Soil)										
Arsenic		mg/kg	MT/ACSE/201	AD	**23.6**	*#	**24.4**	*	**39.2**	*#
Cadmium		mg/kg	MT/ACSE/201	AD	< 1.00	*#	< 1.00	*	< 1.00	*#
Chromium		mg/kg	MT/ACSE/201	AD	**21.0**	*#	**34.1**	*	**26.9**	*#
Copper		mg/kg	MT/ACSE/201	AD	**76.8**	*#	**16.8**	*	**16.1**	*#
Mercury		mg/kg	MT/ACSE/202	AD	**4.75**	*#	**0.134**	*	**0.023**	*#
Nickel		mg/kg	MT/ACSE/201	AD	**24.5**	*#	**32.7**	*	**26.6**	*#
Lead		mg/kg	MT/ACSE/201	AD	**324**	*#	**33.7**	*	**12.5**	*#
Selenium		mg/kg	MT/ACSE/201	AD	< 6.00	*#	< 6.00	*	< 6.00	*#
Zinc		mg/kg	MT/ACSE/201	AD	**168**	*#	**62.7**	*	**46.9**	*#
Chromium III		mg/kg	NAM/ACSE/X11	AD	**21.0**		**34.1**		**26.9**	
Chromium Hexavalent		mg/kg	NAM/ACSE/X11	AD	< 0.20		< 0.20		< 0.20	
pH and Conductivity										
pH (@ 20°C)		units	MT/ACSE/301	AD	**9.3**	*	**9.3**	*f	**8.8**	*f
Poly Aromatic Hydrocarbons										
Naphthalene		mg/kg	MT/ACSE/108	AR	**0.18**	*#	< 0.10	*	< 0.10	*#
Acenaphthylene		mg/kg	MT/ACSE/108	AR	**0.31**	*#	< 0.10	*	< 0.10	*#
Acenaphthene		mg/kg	MT/ACSE/108	AR	**0.57**	*#	< 0.10	*	< 0.10	*#
Fluorene		mg/kg	MT/ACSE/108	AR	**0.40**	*#	< 0.10	*	< 0.10	*#
Phenanthrene		mg/kg	MT/ACSE/108	AR	**4.45**	*#	**0.20**	*	< 0.10	*#
Anthracene		mg/kg	MT/ACSE/108	AR	**1.65**	*#	< 0.10	*	< 0.10	*#
Fluoranthene		mg/kg	MT/ACSE/108	AR	**8.11**	*#	**0.35**	*	< 0.10	*#
Pyrene		mg/kg	MT/ACSE/108	AR	**8.44**	*#	**0.36**	*	< 0.10	*#
Benzo (a) anthracene		mg/kg	MT/ACSE/108	AR	**5.41**	*#	**0.28**	*	< 0.10	*#
Chrysene		mg/kg	MT/ACSE/108	AR	**5.38**	*#	**0.24**	*	< 0.10	*#
Benzo (b) fluoranthene		mg/kg	MT/ACSE/108	AR	**8.28**	*#	**0.38**	*	< 0.10	*#
Benzo (k) fluoranthene		mg/kg	MT/ACSE/108	AR	**3.02**	*#	**0.16**	*	< 0.10	*#
Benzo (a) pyrene		mg/kg	MT/ACSE/108	AR	**6.35**	*#	**0.26**	*	< 0.10	*#
Indeno (1 2 3-CD) pyrene		mg/kg	MT/ACSE/108	AR	**5.17**	*#	**0.17**	*	< 0.10	*#
Dibenzo(a h)anthracene		mg/kg	MT/ACSE/108	AR	**1.38**	*#	< 0.10	*	< 0.10	*#
Benzo(g h i)perylene		mg/kg	MT/ACSE/108	AR	**5.94**	*#	**0.21**	*	< 0.10	*#
Total PAH		mg/kg	MT/ACSE/108	AR	**65.0**	*#	**2.60**	*	< 2.00	*#
Speciated BTEX										
MTBE	HS_1D_TOTAL	mg/kg	NAM/ACSE/X12	AR	< 0.0100		< 0.0100		< 0.0100	
Hexane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Heptane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Octane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Benzene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Toluene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	

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ACSE Sample Number	62644	62645	62646
Sample ID	641759 - 22-81566	641760 - 22-81566	641761 - 22-81566
Clients Sample Ref.^	WS02	WS02	WS02
Location / Sample Depth (m)^	0.60-0.80	1.40-1.60	2.50-2.70
Date Sampled^	22/03/2022	22/03/2022	22/03/2022
Time Sampled^			
Sample deviating codes		f	f
Client's Sample Description^			
ACS Testing Material Description^	Brown and grey silty SAND	Brown sandy gravelly SILT	Brown silty SAND and GRAVEL
ACSE Material Description (Principal Matrix - As Received)	LOAM	GRAVEL	SAND

Determination	HWOL Acroynm	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Ethylbenzene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
m+p-xylene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
o-xylene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Total BTEX	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Speciated Petroleum Hydrocarbons										
C5-C6 Aliphatic	HS_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C6-C8 Aliphatic	HS_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
C6-C7 Aromatic	HS_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
C7-C8 Aromatic	HS_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
Total Speciated TPH (C6-C35)	EH_CU+HS_1D_TOTAL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
Subcontracted Analysis										
Asbestos Fibre ID		SC	SC	SC	—		Attached		—	
Pesticides (OC + OP)		SC	SC	SC	—		—		—	
Herbicides		SC	SC	SC	—		—		—	

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ACSE Sample Number	62647	62648	62649
Sample ID	641762 - 22-81566	641763 - 22-81566	641764 - 22-81566
Clients Sample Ref.^	WS03	WS03	WS04
Location / Sample Depth (m)^	0.30-0.60	1.35-1.70	0.50-0.80
Date Sampled^	22/03/2022	22/03/2022	22/03/2022
Time Sampled^			
Sample deviating codes		f	
Client's Sample Description^			
ACS Testing Material Description^	Grey and brown sandy silty GRAVEL CONCRETE	Brown sandy gravelly SILT SAND	Brown and grey sandy silty GRAVEL CONCRETE
ACSE Material Description (Principal Matrix - As Received)			

Determination	HWOL Acroynm	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon										
FOC		%	MT/ACSE/102	AR	**0.0352**		< 0.0100		**0.0539**	
Soil Organic Matter		%	MT/ACSE/102	AR	**6.07**		**1.18**		**9.29**	
Cyanide										
Total Cyanide		mg/kg	IHP	AR	< 1.00		< 1.00		< 1.00	
Metals (Soil)										
Arsenic		mg/kg	MT/ACSE/201	AD	**12.5**		**25.7**	*#	**22.3**	
Cadmium		mg/kg	MT/ACSE/201	AD	< 1.00		< 1.00	*#	< 1.00	
Chromium		mg/kg	MT/ACSE/201	AD	**20.0**		**25.8**	*#	**29.8**	
Copper		mg/kg	MT/ACSE/201	AD	**22.9**		**97.4**	*#	**141**	
Mercury		mg/kg	MT/ACSE/202	AD	**0.114**		**0.030**	*#	**5.14**	
Nickel		mg/kg	MT/ACSE/201	AD	**15.4**		**27.2**	*#	**34.3**	
Lead		mg/kg	MT/ACSE/201	AD	**34.7**		**293**	*#	**164**	
Selenium		mg/kg	MT/ACSE/201	AD	< 6.00		< 6.00	*#	< 6.00	
Zinc		mg/kg	MT/ACSE/201	AD	**63.3**		**108**	*#	**264**	
Chromium III		mg/kg	NAM/ACSE/X11	AD	**20.0**		**25.8**		**29.8**	
Chromium Hexavalent		mg/kg	NAM/ACSE/X11	AD	< 0.20		< 0.20		< 0.20	
pH and Conductivity										
pH (@ 20°C)		units	MT/ACSE/301	AD	**10.5**		**8.8**	*f	**10.3**	
Poly Aromatic Hydrocarbons										
Naphthalene		mg/kg	MT/ACSE/108	AR	**0.10**		**0.64**	*#	**1.32**	
Acenaphthylene		mg/kg	MT/ACSE/108	AR	< 0.10		**0.40**	*#	**0.14**	
Acenaphthene		mg/kg	MT/ACSE/108	AR	< 0.10		**0.85**	*#	**1.07**	
Fluorene		mg/kg	MT/ACSE/108	AR	< 0.10		**0.66**	*#	**0.66**	
Phenanthrene		mg/kg	MT/ACSE/108	AR	**0.68**		**11.8**	*#	**10.1**	
Anthracene		mg/kg	MT/ACSE/108	AR	**0.25**		**3.50**	*#	**2.88**	
Fluoranthene		mg/kg	MT/ACSE/108	AR	**1.48**		**20.2**	*#	**10.8**	
Pyrene		mg/kg	MT/ACSE/108	AR	**1.46**		**17.7**	*#	**9.17**	
Benzo (a) anthracene		mg/kg	MT/ACSE/108	AR	**0.96**		**10.6**	*#	**5.57**	
Chrysene		mg/kg	MT/ACSE/108	AR	**1.05**		**10.6**	*#	**5.77**	
Benzo (b) fluoranthene		mg/kg	MT/ACSE/108	AR	**1.44**		**11.5**	*#	**6.14**	
Benzo (k) fluoranthene		mg/kg	MT/ACSE/108	AR	**0.43**		**4.72**	*#	**2.43**	
Benzo (a) pyrene		mg/kg	MT/ACSE/108	AR	**0.91**		**8.78**	*#	**4.62**	
Indeno (1 2 3-CD) pyrene		mg/kg	MT/ACSE/108	AR	**0.66**		**5.71**	*#	**2.97**	
Dibenzo(a h)anthracene		mg/kg	MT/ACSE/108	AR	**0.18**		**0.70**	*#	**0.91**	
Benzo(g h i)perylene		mg/kg	MT/ACSE/108	AR	**0.73**		**6.14**	*#	**3.51**	
Total PAH		mg/kg	MT/ACSE/108	AR	**10.3**		**114**	*#	**68.1**	
Speciated BTEX										
MTBE	HS_1D_TOTAL	mg/kg	NAM/ACSE/X12	AR	< 0.0100		< 0.0100		< 0.0100	
Hexane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Heptane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Octane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Benzene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Toluene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	

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ACSE Sample Number	62647	62648	62649
Sample ID	641762 - 22-81566	641763 - 22-81566	641764 - 22-81566
Clients Sample Ref.^	WS03	WS03	WS04
Location / Sample Depth (m)^	0.30-0.60	1.35-1.70	0.50-0.80
Date Sampled^	22/03/2022	22/03/2022	22/03/2022
Time Sampled^			
Sample deviating codes		f	
Client's Sample Description^			
ACS Testing Material Description^	Grey and brown sandy silty GRAVEL	Brown sandy gravelly SILT	Brown and grey sandy silty GRAVEL
ACSE Material Description (Principal Matrix - As Received)	CONCRETE	SAND	CONCRETE

Determination	HWOL Acroynm	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Ethylbenzene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
m+p-xylene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
o-xylene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Total BTEX	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Speciated Petroleum Hydrocarbons										
C5-C6 Aliphatic	HS_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C6-C8 Aliphatic	HS_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C21-C35 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
C6-C7 Aromatic	HS_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
C7-C8 Aromatic	HS_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		**15.1**		< 10.0	
>C21-C35 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		**239**		< 10.0	
Total Speciated TPH (C6-C35)	EH_CU+HS_1D_TOTAL	mg/kg	NAM/ACSE/X07	AR	< 10.0		**255**		< 10.0	
Subcontracted Analysis										
Asbestos Fibre ID		SC	SC	SC	**Attached**		—		**Attached**	
Pesticides (OC + OP)		SC	SC	SC	—		—		—	
Herbicides		SC	SC	SC	—		—		—	

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ACSE Sample Number	62650	62651	62652
Sample ID	641765 - 22-81566	641766 - 22-81566	641767 - 22-81566
Clients Sample Ref.^	WS04	HDP01	HDP02
Location / Sample Depth (m)^	1.50-1.80	0.10-0.30	0.10-0.30
Date Sampled^	22/03/2022	22/03/2022	22/03/2022
Time Sampled^			
Sample deviating codes	f	f	
Client's Sample Description^			
ACS Testing Material Description^	Soft brown sandy gravelly SILT	Brown very sandy silty GRAVEL	Brown sandy silty GRAVEL
ACSE Material Description (Principal Matrix - As Received)	SILT	GRAVEL	BITUMINOUS

Determination	HWOL Acroynm	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Carbon										
FOC		%	MT/ACSE/102	AR	< 0.0100		**0.0566**		**0.156**	
Soil Organic Matter		%	MT/ACSE/102	AR	**0.49**		**9.76**		**26.8**	
Cyanide										
Total Cyanide		mg/kg	IHP	AR	< 1.00		< 1.00		< 1.00	
Metals (Soil)										
Arsenic		mg/kg	MT/ACSE/201	AD	**20.3**	*#	**22.6**	*	**19.5**	
Cadmium		mg/kg	MT/ACSE/201	AD	< 1.00	*#	< 1.00	*	< 1.00	
Chromium		mg/kg	MT/ACSE/201	AD	**26.9**	*#	**15.5**	*	**22.6**	
Copper		mg/kg	MT/ACSE/201	AD	**11.4**	*#	**102**	*	**145**	
Mercury		mg/kg	MT/ACSE/202	AD	**0.030**	*	**0.053**	*	**0.276**	
Nickel		mg/kg	MT/ACSE/201	AD	**20.1**	*#	**24.7**	*	**37.7**	
Lead		mg/kg	MT/ACSE/201	AD	**16.5**	*#	**483**	*	**533**	
Selenium		mg/kg	MT/ACSE/201	AD	< 6.00	*#	< 6.00	*	< 6.00	
Zinc		mg/kg	MT/ACSE/201	AD	**54.9**	*#	**249**	*	**313**	
Chromium III		mg/kg	NAM/ACSE/X11	AD	**26.9**		**15.5**		**22.6**	
Chromium Hexavalent		mg/kg	NAM/ACSE/X11	AD	< 0.20		< 0.20		< 0.20	
pH and Conductivity										
pH (@ 20℃)		units	MT/ACSE/301	AD	**7.2**	*f	**8.8**	*f	**8.1**	
Poly Aromatic Hydrocarbons										
Naphthalene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**0.48**	*	**0.21**	
Acenaphthylene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**1.95**	*	**0.33**	
Acenaphthene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**5.61**	*	**0.29**	
Fluorene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**6.27**	*	**0.26**	
Phenanthrene		mg/kg	MT/ACSE/108	AR	**0.12**	*#	**31.6**	*	**2.05**	
Anthracene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**13.6**	*	**1.05**	
Fluoranthene		mg/kg	MT/ACSE/108	AR	**0.10**	*#	**40.1**	*	**5.49**	
Pyrene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**39.2**	*	**6.32**	
Benzo (a) anthracene		mg/kg	MT/ACSE/108	AR	**0.13**	*#	**25.8**	*	**4.66**	
Chrysene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**25.0**	*	**4.67**	
Benzo (b) fluoranthene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**33.7**	*	**12.4**	
Benzo (k) fluoranthene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**13.2**	*	**3.61**	
Benzo (a) pyrene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**28.0**	*	**9.63**	
Indeno (1 2 3-CD) pyrene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**18.9**	*	**8.56**	
Dibenzo(a h)anthracene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**6.77**	*	**0.98**	
Benzo(g h i)perylene		mg/kg	MT/ACSE/108	AR	< 0.10	*#	**21.1**	*	**10.3**	
Total PAH		mg/kg	MT/ACSE/108	AR	< 2.00	*#	**311**	*	**70.8**	
Speciated BTEX										
MTBE	HS_1D_TOTAL	mg/kg	NAM/ACSE/X12	AR	< 0.0100		< 0.0100		< 0.0100	
Hexane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Heptane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Octane	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Benzene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Toluene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	

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Quality Testing & Materials Consultancy to the Construction Industry

ACSE Sample Number	62650	62651	62652
Sample ID	641765 - 22-81566	641766 - 22-81566	641767 - 22-81566
Clients Sample Ref.^	WS04	HDP01	HDP02
Location / Sample Depth (m)^	1.50-1.80	0.10-0.30	0.10-0.30
Date Sampled^	22/03/2022	22/03/2022	22/03/2022
Time Sampled^			
Sample deviating codes	f	f	
Client's Sample Description^			
ACS Testing Material Description^	Soft brown sandy gravelly SILT	Brown very sandy silty GRAVEL	Brown sandy silty GRAVEL
ACSE Material Description (Principal Matrix - As Received)	SILT	GRAVEL	BITUMINOUS

Determination	HWOL Acroynm	Units	Method	Prepared As	Result	AS	Result	AS	Result	AS
Ethylbenzene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
m+p-xylene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
o-xylene	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.0100		< 0.0100		< 0.0100	
Total BTEX	HS_1D_TOTAL	mg/kg	NAM/ACSE/X06	AR	< 0.05		< 0.05		< 0.05	
Speciated Petroleum Hydrocarbons										
C5-C6 Aliphatic	HS_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C6-C8 Aliphatic	HS_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		**19.0**		< 10.0	
>C16-C21 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		**136**		**27.5**	
>C21-C35 Aliphatic	EH_CU_1D_AL	mg/kg	NAM/ACSE/X07	AR	< 10.0		**1640**		**902**	
C6-C7 Aromatic	HS_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
C7-C8 Aromatic	HS_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 0.10		< 0.10		< 0.10	
>C8-C10 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C10-C12 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C12-C16 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		< 10.0		< 10.0	
>C16-C21 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		**11.7**		**10.4**	
>C21-C35 Aromatic	EH_CU_1D_AR	mg/kg	NAM/ACSE/X07	AR	< 10.0		**174**		**227**	
Total Speciated TPH (C6-C35)	EH_CU+HS_1D_TOTAL	mg/kg	NAM/ACSE/X07	AR	< 10.0		**1980**		**1170**	
Subcontracted Analysis										
Asbestos Fibre ID		SC	SC	SC	—		**Attached**		—	
Pesticides (OC + OP)		SC	SC	SC	—		**Attached**		—	
Herbicides		SC	SC	SC	—		**Attached**		—	

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Quality Testing & Materials Consultancy to the Construction Industry

Technical Information for Analytical Results

Analysis

* - denotes analysis covered by our UKAS accreditation.
# - denoted analysis covered by our MCERTS certification & UKAS accreditation.
AD = Sample tested in air dried condition.
AR = Sample tested in as-received condition.
AS = Accreditation status.
D = Sample tested in dry condition.
L = Laboratory prepared leachate.
SC = Sub contracted.
^ = Clients supplied information.
All MCERTS certified test values reported on a dry weight basis.
Method uncertainty available on request.

Key to HWOL Acronyms

Acronym		Description
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	-	e.g. EH_2D_Total_#1 means humics mathematically subtracted
#2	-	e.g. EH_2D_Total_#2 means 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

Deviating Codes

Deviating Samples

The use of any of the following symbols indicates that the sample was deviating and it is possible therefore that the results provided may not be representative of the sample taken.

a – The date and /or time of sampling has not been provided, therefore it is not known if the time lapse between sampling and analysis has exceeded the acceptable holding time(s)*.
b – The test item was received in a container which has not been recommended*.
c – On receipt, the temperature of the sample received was found to fall outside the recommendations of BS ISO 18512:2007, Soil Quality. Guidance on long and short term storage of soil samples*.
d – The sample was received in a container that had not been filled as recommended*.
e – The delay between sampling and sample receipt is greater than the recommended holding time for the analyte of interest in this matrix*.
f – The delay between sampling and analysis is greater than the recommended holding time for the analyte of interest in this matrix*.

In accordance with the requirements of Technical Policy Statement TPS 63; UKAS Policy on Deviating Samples, all UKAS accredited testing laboratories are required to notify their clients that calibration or test results may be invalid where samples are found to be deviating. It is the opinion of ACSE that the term invalid should be interpreted as 'not fully representative of the sample taken at source'.

The following Additional Deviating Sample Codes may also be used.

I/S – Insufficient sample mass/volume received for accurate quantification of this analyte.
U/S – The sample received was deemed unsuitable for accurate determination of this analyte using the Test Methods available.

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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	22-39659
Issue:	2. Replaces Analytical Report number 22-39659; issue no.1
Date of Issue:	11/04/2022
Contact:	Dave Redfern
Customer Details:	ACS Environmental testing Ltd Unit 14b Blackhill Road West Holton heath Trading park Poole DorsetBH16 6LE
Quotation No:	Q17-00877
Order No:	E/22-00552/4392
Customer Reference:	22-00552
Date Received:	30/03/2022
Date Approved:	11/04/2022
Details:	22-00552
Approved by:	

Mike Varley, General Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

Sample Summary

Report No.: 22-39659, issue number 2

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
273179	62641 WS01	23/03/2022	30/03/2022		
273180	62642 WS01	23/03/2022	30/03/2022	Sandy silty loam	c
273181	62643 WS02	23/03/2022	30/03/2022	Loamy sand	cg
273182	62645 WS02	23/03/2022	30/03/2022		
273183	62647 WS03	23/03/2022	30/03/2022		
273184	62649 WS04	23/03/2022	30/03/2022		
273185	62651 HDP01	23/03/2022	30/03/2022	Loamy sand	c

Results Summary

Report No.: 22-39659, issue number 2

			ELAB Reference	273180	273181	273185
			Customer Reference	WS01	WS02	HDP01
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	62642	62643	62651
			Sample Depth (m)			
			Sampling Date	23/03/2022	23/03/2022	23/03/2022
Determinand	**Codes**	**Units**	**LOD**			
OrganoChlorine Pesticides						
alpha-HCH	M	ug/kg	10	c < 10	c < 10	c < 10
beta_HCH	M	ug/kg	10	c < 10	c < 10	c < 10
gamma-HCH	M	ug/kg	10	c < 10	c < 10	c < 10
delta-HCH	N	ug/kg	10	c < 10	c < 10	c < 10
Heptachlor	N	ug/kg	10	c < 10	c < 10	c < 10
Aldrin	M	ug/kg	10	c < 10	c < 10	c < 10
Heptachlor expoxide	N	ug/kg	10	c < 10	c < 10	c < 10
trans-Chlordane	N	ug/kg	10	c < 10	c < 10	c < 10
alpha cis-Chlordane	N	ug/kg	10	c < 10	c < 10	c < 10
p,p-DDE	M	ug/kg	10	c < 10	c < 10	c < 10
Dieldrin	M	ug/kg	10	c < 10	c < 10	c < 10
Endrin	N	ug/kg	10	c < 10	c < 10	c < 10
p,p-DDD	M	ug/kg	10	c < 10	c < 10	c < 10
Endosulfan II	N	ug/kg	10	c < 10	c < 10	c < 10
Endrin aldehyde	N	ug/kg	10	c < 10	c < 10	c < 10
p,p-DDT	M	ug/kg	10	c < 10	c < 10	c < 10
Endosulphan sulphate	M	ug/kg	10	c < 10	c < 10	c < 10
Methoxychlor	N	ug/kg	10	c < 10	c < 10	c < 10
Endrin ketone	N	ug/kg	10	c < 10	c < 10	c < 10
OrganoPhosphorus Pesticides						
Acephate	N	ug/kg	100	c < 100	c < 100	c < 100
Aziniphos-methyl	N	ug/kg	100	c < 100	c < 100	c < 100
Chlorpyrifos	N	ug/kg	100	c < 100	c < 100	c < 100
Demeton-s-methyl	N	ug/kg	100	c < 100	c < 100	c < 100
Dichlorvos	N	ug/kg	100	c < 100	c < 100	c < 100
Dimethoate	N	ug/kg	100	c < 100	c < 100	c < 100
Ethion	N	ug/kg	100	c < 100	c < 100	c < 100
Malathion	N	ug/kg	100	c < 100	c < 100	c < 100
Mathidathion	N	ug/kg	100	c < 100	c < 100	c < 100
Methamidophos	N	ug/kg	100	c < 100	c < 100	c < 100
Omethoate	N	ug/kg	100	c < 100	c < 100	c < 100
Pirimifos-methyl	N	ug/kg	100	c < 100	c < 100	c < 100
Profenofos	N	ug/kg	100	c < 100	c < 100	c < 100
Pyrazophos	N	ug/kg	100	c < 100	c < 100	c < 100
Tokuthion	N	ug/kg	100	c < 100	c < 100	c < 100
Tolclofos-methyl	N	ug/kg	100	c < 100	c < 100	c < 100

Results Summary

Report No.: 22-39659, issue number 2

			ELAB Reference	273180	273181	273185
			Customer Reference	WS01	WS02	HDP01
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	62642	62643	62651
			Sample Depth (m)			
			Sampling Date	23/03/2022	23/03/2022	23/03/2022
Determinand	**Codes**	**Units**	**LOD**			
SVOCTIC						
Herbicide Screen	N	mg/kg	0.01	c None Detected	cg None Detected	c None Detected

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Results Summary

Report No.: 22-39659, issue number 2

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
273179		62641 WS01	Brown sandy Soil,Road Stones,Tar,Brick	No asbestos detected	n/t	n/t	n/t	n/t
273181		62643 WS02	Brown sandy Soil,Stones,Brick,Concrete	No asbestos detected	n/t	n/t	n/t	n/t
273182		62645 WS02	Brown sandy Soil,stones	No asbestos detected	n/t	n/t	n/t	n/t
273183		62647 WS03	Brown Sandy soil,Stones,Clinker	No asbestos detected	n/t	n/t	n/t	n/t
273184		62649 WS04	Brown sandy soil,Stones,Brick,Clinker	No asbestos detected	n/t	n/t	n/t	n/t
273185		62651 HDP01	Brown sandy soil,stones,Tar,Concrete	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 22-39659, issue number 2

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
SVOC in solids	N	As submitted sample	31/03/2022	167	GC-MS
Organochlorine Pesticides in solids	M	As submitted sample	31/03/2022	173	GC-MS
Organophosphorus Pesticides in solids	N	As submitted sample	31/03/2022	173	GC-MS
Asbestos identification	U	Air dried sample	06/04/2022	280	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-39659, issue number 2

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
	Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
	ELAB are unable to provide an interpretation or opinion on the content of this report.
	The results relate only to the sample received.
	PCB congener results may include any coeluting PCBs
	Uncertainty of measurement for the determinands tested are available upon request
	Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
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

Appendix D

Human Health Assessment Criteria – Commercial Use

Generic Assessment Criteria (GAC) Comparison - Commercial (1% SOM)			Site:		GAC Source:	Published Suitable for Use Levels (S4UL) and Category 4 Screening Levels (C4SL) - see report for references		Key: Below GAC / Exceeds GAC		
			Project No:							
Exploratory Hole Location			WS01	WS01	WS02	WS02	WS02	WS02	WS03	WS03
Sample Depth			0.05-0.20	1.30-1.50	0.10-0.30	0.60-0.80	1.40-1.60	2.50-2.70	0.30-0.60	1.35-1.70
Soil/Rock Unit			Brown sandy silty GRAVEL	Grey sandy gravelly clayey SILT	Brown sandy silty GRAVEL	Brown and grey silty SAND	Brown sandy gravelly SILT	Brown silty SAND and GRAVEL	Brown sandy silty GRAVEL	Brown sandy gravelly SILT
REPNAME	Units	GAC								
Arsenic	mg/kg	640	24.1	29.5	27.1	23.6	24.4	39.2	12.5	25.7
Cadmium	mg/kg	190	1.57	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Chromium	mg/kg	8600	24.5	19.2	23.9	21	34.1	26.9	20	25.8
Copper	mg/kg	68000	235	76	140	76.8	16.8	16.1	22.9	97.4
Mercury	mg/kg	1100	0.21	0.864	8.94	4.75	0.134	0.023	0.114	0.03
Nickel	mg/kg	980	48	26.6	49.3	24.5	32.7	26.6	15.4	27.2
Lead	mg/kg	2300	1140	456	91.1	324	33.7	12.5	34.7	293
Selenium	mg/kg	12000	< 6.00	< 6.00	< 6.00	< 6.00	< 6.00	< 6.00	< 6.00	< 6.00
Zinc	mg/kg	730000	405	316	87.8	168	62.7	46.9	63.3	108
Chromium III	mg/kg	8600	24.5	19.2	23.9	21	34.1	26.9	20	25.8
Chromium Hexavalent	mg/kg	33	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Naphthalene	mg/kg	190	< 0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10	0.1	0.64
Acenaphthylene	mg/kg	83000	0.24	< 0.10	< 0.10	0.31	< 0.10	< 0.10	< 0.10	0.4
Acenaphthene	mg/kg	84000	< 0.10	< 0.10	< 0.10	0.57	< 0.10	< 0.10	< 0.10	0.85
Fluorene	mg/kg	63000	< 0.10	< 0.10	< 0.10	0.4	< 0.10	< 0.10	< 0.10	0.66
Phenanthrene	mg/kg	22000	0.37	0.31	1.16	4.45	0.2	< 0.10	0.68	11.8
Anthracene	mg/kg	520000	0.53	< 0.10	0.42	1.65	< 0.10	< 0.10	0.25	3.5
Fluoranthene	mg/kg	23000	2.01	0.5	2.59	8.11	0.35	< 0.10	1.48	20.2
Pyrene	mg/kg	54000	2.8	0.41	2.6	8.44	0.36	< 0.10	1.46	17.7
Benzo (a) anthracene	mg/kg	170	2.57	0.32	1.9	5.41	0.28	< 0.10	0.96	10.6
Chrysene	mg/kg	350	2.74	0.34	2.04	5.38	0.24	< 0.10	1.05	10.6
Benzo (b) fluoranthene	mg/kg	44	8.79	0.39	2.31	8.28	0.38	< 0.10	1.44	11.5
Benzo (k) fluoranthene	mg/kg	1200	3.1	0.17	0.93	3.02	0.16	< 0.10	0.43	4.72
Benzo (a) pyrene	mg/kg	35	7.34	0.28	1.65	6.35	0.26	< 0.10	0.91	8.78
ndeno (1 2 3-CD) pyren	mg/kg	500	7.46	0.18	1.13	5.17	0.17	< 0.10	0.66	5.71
Dibenzo(a h)anthracene	mg/kg	3.5	1.79	< 0.10	0.38	1.38	< 0.10	< 0.10	0.18	0.7
Benzo(g h i)perylene	mg/kg	3900	8.93	0.23	1.47	5.94	0.21	< 0.10	0.73	6.14
Benzene	mg/kg	27	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100
Toluene	mg/kg	56000	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100
Ethylbenzene	mg/kg	5700	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100
m+p-xylene	mg/kg	6200	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100
o-xylene	mg/kg	6600	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100
C5-C6 Aliphatic	mg/kg	32000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C6-C8 Aliphatic	mg/kg	7800	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C8-C10 Aliphatic	mg/kg	2000	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
>C10-C12 Aliphatic	mg/kg	9700	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
>C12-C16 Aliphatic	mg/kg	59000	12	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
>C16-C21 Aliphatic	mg/kg	1.6E+06	37.2	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
>C21-C35 Aliphatic	mg/kg	1.6E+06	177	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
C6-C7 Aromatic	mg/kg	26000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
C7-C8 Aromatic	mg/kg	56000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
>C8-C10 Aromatic	mg/kg	3500	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
>C10-C12 Aromatic	mg/kg	16000	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
>C12-C16 Aromatic	mg/kg	36000	13.2	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
>C16-C21 Aromatic	mg/kg	28000	47.7	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	15.1
>C21-C35 Aromatic	mg/kg	28000	1410	< 10.0	16	< 10.0	< 10.0	< 10.0	< 10.0	239

Generic Assessment Criteria (GAC) Comparison - Commercial (1% SOM)			Site:		GAC Source:	Published Suitable for Use Levels (S4UL) and Category 4 Screening Levels (C4SL) - see report for references		Key: Below GAC / Exceeds GAC		
			Project No:							
Exploratory Hole Location			WS04	WS04	HDP01	HDP02				
Sample Depth			0.50-0.80	1.50-1.80	0.10-0.30	0.10-0.30				
Soil/Rock Unit			Brown sandy silty GRAVEL	Brown sandy gravelly SILT	sandy silty GRAVEL	sandy silty GRAVEL				
REPNAME	Units	GAC								
Arsenic	mg/kg	640	22.3	20.3	22.6	19.5				
Cadmium	mg/kg	190	< 1.00	< 1.00	< 1.00	< 1.00				
Chromium	mg/kg	8600	29.8	26.9	15.5	22.6				
Copper	mg/kg	68000	141	11.4	102	145				
Mercury	mg/kg	1100	5.14	0.03	0.053	0.276				
Nickel	mg/kg	980	34.3	20.1	24.7	37.7				
Lead	mg/kg	2300	164	16.5	483	533				
Selenium	mg/kg	12000	< 6.00	< 6.00	< 6.00	< 6.00				
Zinc	mg/kg	730000	264	54.9	249	313				
Chromium III	mg/kg	8600	29.8	26.9	15.5	22.6				
Chromium Hexavalent	mg/kg	33	< 0.20	< 0.20	< 0.20	< 0.20				
Naphthalene	mg/kg	190	1.32	< 0.10	0.48	0.21				
Acenaphthylene	mg/kg	83000	0.14	< 0.10	1.95	0.33				
Acenaphthene	mg/kg	84000	1.07	< 0.10	5.61	0.29				
Fluorene	mg/kg	63000	0.66	< 0.10	6.27	0.26				
Phenanthrene	mg/kg	22000	10.1	0.12	31.6	2.05				
Anthracene	mg/kg	520000	2.88	< 0.10	13.6	1.05				
Fluoranthene	mg/kg	23000	10.8	0.1	40.1	5.49				
Pyrene	mg/kg	54000	9.17	< 0.10	39.2	6.32				
Benzo (a) anthracene	mg/kg	170	5.57	0.13	25.8	4.66				
Chrysene	mg/kg	350	5.77	< 0.10	25	4.67				
Benzo (b) fluoranthene	mg/kg	44	6.14	< 0.10	33.7	12.4				
Benzo (k) fluoranthene	mg/kg	1200	2.43	< 0.10	13.2	3.61				
Benzo (a) pyrene	mg/kg	35	4.62	< 0.10	28	9.63				
ndeno (1 2 3-CD) pyren	mg/kg	500	2.97	< 0.10	18.9	8.56				
Dibenzo(a h)anthracene	mg/kg	3.5	0.91	< 0.10	6.77	0.98				
Benzo(g h i)perylene	mg/kg	3900	3.51	< 0.10	21.1	10.3				
Benzene	mg/kg	27	< 0.0100	< 0.0100	< 0.0100	< 0.0100				
Toluene	mg/kg	56000	< 0.0100	< 0.0100	< 0.0100	< 0.0100				
Ethylbenzene	mg/kg	5700	< 0.0100	< 0.0100	< 0.0100	< 0.0100				
m+p-xylene	mg/kg	6200	< 0.0100	< 0.0100	< 0.0100	< 0.0100				
o-xylene	mg/kg	6600	< 0.0100	< 0.0100	< 0.0100	< 0.0100				
C5-C6 Aliphatic	mg/kg	32000	< 0.10	< 0.10	< 0.10	< 0.10				
>C6-C8 Aliphatic	mg/kg	7800	< 0.10	< 0.10	< 0.10	< 0.10				
>C8-C10 Aliphatic	mg/kg	2000	< 10.0	< 10.0	< 10.0	< 10.0				
>C10-C12 Aliphatic	mg/kg	9700	< 10.0	< 10.0	< 10.0	< 10.0				
>C12-C16 Aliphatic	mg/kg	59000	< 10.0	< 10.0	19	< 10.0				
>C16-C21 Aliphatic	mg/kg	1.6E+06	< 10.0	< 10.0	136	27.5				
>C21-C35 Aliphatic	mg/kg	1.6E+06	< 10.0	< 10.0	1640	902				
C6-C7 Aromatic	mg/kg	26000	< 0.10	< 0.10	< 0.10	< 0.10				
C7-C8 Aromatic	mg/kg	56000	< 0.10	< 0.10	< 0.10	< 0.10				
>C8-C10 Aromatic	mg/kg	3500	< 10.0	< 10.0	< 10.0	< 10.0				
>C10-C12 Aromatic	mg/kg	16000	< 10.0	< 10.0	< 10.0	< 10.0				
>C12-C16 Aromatic	mg/kg	36000	< 10.0	< 10.0	< 10.0	< 10.0				
>C16-C21 Aromatic	mg/kg	28000	< 10.0	< 10.0	11.7	10.4				
>C21-C35 Aromatic	mg/kg	28000	< 10.0	< 10.0	174	227				

Generic Assessment Criteria (GAC) Comparison - Commercial (1% SOM)			Site:		GAC Source:	Published Suitable for Use Levels (S4UL) and Category 4 Screening Levels (C4SL) - see report for references		Key:		
			Project No:					Below GAC		
								Exceeds GAC		
Exploratory Hole Location										
Sample Depth										
Soil/Rock Unit										
REPNAME	Units	GAC								
Arsenic	mg/kg	640								
Cadmium	mg/kg	190								
Chromium	mg/kg	8600								
Copper	mg/kg	68000								
Mercury	mg/kg	1100								
Nickel	mg/kg	980								
Lead	mg/kg	2300								
Selenium	mg/kg	12000								
Zinc	mg/kg	730000								
Chromium III	mg/kg	8600								
Chromium Hexavalent	mg/kg	33								
Naphthalene	mg/kg	190								
Acenaphthylene	mg/kg	83000								
Acenaphthene	mg/kg	84000								
Fluorene	mg/kg	63000								
Phenanthrene	mg/kg	22000								
Anthracene	mg/kg	520000								
Fluoranthene	mg/kg	23000								
Pyrene	mg/kg	54000								
Benzo (a) anthracene	mg/kg	170								
Chrysene	mg/kg	350								
Benzo (b) fluoranthene	mg/kg	44								
Benzo (k) fluoranthene	mg/kg	1200								
Benzo (a) pyrene	mg/kg	35								
ndeno (1 2 3-CD) pyren	mg/kg	500								
Dibenzo(a h)anthracene	mg/kg	3.5								
Benzo(g h i)perylene	mg/kg	3900								
Benzene	mg/kg	27								
Toluene	mg/kg	56000								
Ethylbenzene	mg/kg	5700								
m+p-xylene	mg/kg	6200								
o-xylene	mg/kg	6600								
C5-C6 Aliphatic	mg/kg	32000								
>C6-C8 Aliphatic	mg/kg	7800								
>C8-C10 Aliphatic	mg/kg	2000								
>C10-C12 Aliphatic	mg/kg	9700								
>C12-C16 Aliphatic	mg/kg	59000								
>C16-C21 Aliphatic	mg/kg	1.6E+06								
>C21-C35 Aliphatic	mg/kg	1.6E+06								
C6-C7 Aromatic	mg/kg	26000								
C7-C8 Aromatic	mg/kg	56000								
>C8-C10 Aromatic	mg/kg	3500								
>C10-C12 Aromatic	mg/kg	16000								
>C12-C16 Aromatic	mg/kg	36000								
>C16-C21 Aromatic	mg/kg	28000								
>C21-C35 Aromatic	mg/kg	28000								

Generic Assessment Criteria (GAC) Comparison - Commercial (1% SOM)			Site:		GAC Source:	Published Suitable for Use Levels (S4UL) and Category 4 Screening Levels (C4SL) - see report for references		Key:		
			Project No:					Below GAC		
								Exceeds GAC		
Exploratory Hole Location										
Sample Depth										
Soil/Rock Unit										
REPNAME	Units	GAC								
Arsenic	mg/kg	640								
Cadmium	mg/kg	190								
Chromium	mg/kg	8600								
Copper	mg/kg	68000								
Mercury	mg/kg	1100								
Nickel	mg/kg	980								
Lead	mg/kg	2300								
Selenium	mg/kg	12000								
Zinc	mg/kg	730000								
Chromium III	mg/kg	8600								
Chromium Hexavalent	mg/kg	33								
Naphthalene	mg/kg	190								
Acenaphthylene	mg/kg	83000								
Acenaphthene	mg/kg	84000								
Fluorene	mg/kg	63000								
Phenanthrene	mg/kg	22000								
Anthracene	mg/kg	520000								
Fluoranthene	mg/kg	23000								
Pyrene	mg/kg	54000								
Benzo (a) anthracene	mg/kg	170								
Chrysene	mg/kg	350								
Benzo (b) fluoranthene	mg/kg	44								
Benzo (k) fluoranthene	mg/kg	1200								
Benzo (a) pyrene	mg/kg	35								
ndeno (1 2 3-CD) pyren	mg/kg	500								
Dibenzo(a h)anthracene	mg/kg	3.5								
Benzo(g h i)perylene	mg/kg	3900								
Benzene	mg/kg	27								
Toluene	mg/kg	56000								
Ethylbenzene	mg/kg	5700								
m+p-xylene	mg/kg	6200								
o-xylene	mg/kg	6600								
C5-C6 Aliphatic	mg/kg	32000								
>C6-C8 Aliphatic	mg/kg	7800								
>C8-C10 Aliphatic	mg/kg	2000								
>C10-C12 Aliphatic	mg/kg	9700								
>C12-C16 Aliphatic	mg/kg	59000								
>C16-C21 Aliphatic	mg/kg	1.6E+06								
>C21-C35 Aliphatic	mg/kg	1.6E+06								
C6-C7 Aromatic	mg/kg	26000								
C7-C8 Aromatic	mg/kg	56000								
>C8-C10 Aromatic	mg/kg	3500								
>C10-C12 Aromatic	mg/kg	16000								
>C12-C16 Aromatic	mg/kg	36000								
>C16-C21 Aromatic	mg/kg	28000								
>C21-C35 Aromatic	mg/kg	28000								

Generic Assessment Criteria (GAC) Comparison - Commercial (1% SOM)			Site:		GAC Source:	Published Suitable for Use Levels (S4UL) and Category 4 Screening Levels (C4SL) - see report for references		Key:	Below GAC	ACS
			Project No:						Exceeds GAC	
Exploratory Hole Location										
Sample Depth										
Soil/Rock Unit										
REPNAME	Units	GAC								
Arsenic	mg/kg	640								
Cadmium	mg/kg	190								
Chromium	mg/kg	8600								
Copper	mg/kg	68000								
Mercury	mg/kg	1100								
Nickel	mg/kg	980								
Lead	mg/kg	2300								
Selenium	mg/kg	12000								
Zinc	mg/kg	730000								
Chromium III	mg/kg	8600								
Chromium Hexavalent	mg/kg	33								
Naphthalene	mg/kg	190								
Acenaphthylene	mg/kg	83000								
Acenaphthene	mg/kg	84000								
Fluorene	mg/kg	63000								
Phenanthrene	mg/kg	22000								
Anthracene	mg/kg	520000								
Fluoranthene	mg/kg	23000								
Pyrene	mg/kg	54000								
Benzo (a) anthracene	mg/kg	170								
Chrysene	mg/kg	350								
Benzo (b) fluoranthene	mg/kg	44								
Benzo (k) fluoranthene	mg/kg	1200								
Benzo (a) pyrene	mg/kg	35								
ndeno (1 2 3-CD) pyren	mg/kg	500								
Dibenzo(a h)anthracene	mg/kg	3.5								
Benzo(g h i)perylene	mg/kg	3900								
Benzene	mg/kg	27								
Toluene	mg/kg	56000								
Ethylbenzene	mg/kg	5700								
m+p-xylene	mg/kg	6200								
o-xylene	mg/kg	6600								
C5-C6 Aliphatic	mg/kg	32000								
>C6-C8 Aliphatic	mg/kg	7800								
>C8-C10 Aliphatic	mg/kg	2000								
>C10-C12 Aliphatic	mg/kg	9700								
>C12-C16 Aliphatic	mg/kg	59000								
>C16-C21 Aliphatic	mg/kg	1.6E+06								
>C21-C35 Aliphatic	mg/kg	1.6E+06								
C6-C7 Aromatic	mg/kg	26000								
C7-C8 Aromatic	mg/kg	56000								
>C8-C10 Aromatic	mg/kg	3500								
>C10-C12 Aromatic	mg/kg	16000								
>C12-C16 Aromatic	mg/kg	36000								
>C16-C21 Aromatic	mg/kg	28000								
>C21-C35 Aromatic	mg/kg	28000								

Generic Assessment Criteria (GAC) Comparison - Commercial (1% SOM)			Site:		GAC Source:	Published Suitable for Use Levels (S4UL) and Category 4 Screening Levels (C4SL) - see report for references		Key:		
			Project No:					Below GAC		
								Exceeds GAC		
Exploratory Hole Location										
Sample Depth										
Soil/Rock Unit										
REPNAME	Units	GAC								
Arsenic	mg/kg	640								
Cadmium	mg/kg	190								
Chromium	mg/kg	8600								
Copper	mg/kg	68000								
Mercury	mg/kg	1100								
Nickel	mg/kg	980								
Lead	mg/kg	2300								
Selenium	mg/kg	12000								
Zinc	mg/kg	730000								
Chromium III	mg/kg	8600								
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Pyrene	mg/kg	54000								
Benzo (a) anthracene	mg/kg	170								
Chrysene	mg/kg	350								
Benzo (b) fluoranthene	mg/kg	44								
Benzo (k) fluoranthene	mg/kg	1200								
Benzo (a) pyrene	mg/kg	35								
ndeno (1 2 3-CD) pyren	mg/kg	500								
Dibenzo(a h)anthracene	mg/kg	3.5								
Benzo(g h i)perylene	mg/kg	3900								
Benzene	mg/kg	27								
Toluene	mg/kg	56000								
Ethylbenzene	mg/kg	5700								
m+p-xylene	mg/kg	6200								
o-xylene	mg/kg	6600								
C5-C6 Aliphatic	mg/kg	32000								
>C6-C8 Aliphatic	mg/kg	7800								
>C8-C10 Aliphatic	mg/kg	2000								
>C10-C12 Aliphatic	mg/kg	9700								
>C12-C16 Aliphatic	mg/kg	59000								
>C16-C21 Aliphatic	mg/kg	1.6E+06								
>C21-C35 Aliphatic	mg/kg	1.6E+06								
C6-C7 Aromatic	mg/kg	26000								
C7-C8 Aromatic	mg/kg	56000								
>C8-C10 Aromatic	mg/kg	3500								
>C10-C12 Aromatic	mg/kg	16000								
>C12-C16 Aromatic	mg/kg	36000								
>C16-C21 Aromatic	mg/kg	28000								
>C21-C35 Aromatic	mg/kg	28000								