

GUIDE POST FARM
ARDLEIGH

REPORT ON
GROUND INVESTIGATION

August 2023
Report No. P0355/R01 Issue 1

Prepared for:
Mr G Milleare

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DOCUMENT INFORMATION AND CONTROL SHEET

Report No.	Title	
P0355/R01	Guide Post Farm, Ardleigh Report on Ground Investigation	
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Issue History

Issue	Status	Date	Author	Signature
1	Final	24 August 2023	Sue Slaven MIEnvSc CEnv SiLC 	[REDACTED]

DISCLAIMER

This report should be read with the Service Constraints, Report Limitations & Planning Requirements set out in Appendix A.

Guide Post Farm, Ardleigh
Report on Ground Investigation

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Guide Post Farm, Ardleigh
Report on Ground Investigation

1. INTRODUCTION

1.1 Background Information

1.1.1 Sue Slaven was commissioned by Mr George Milleare to carry out an intrusive ground investigation for the site known as Guide Post Farm, Ardleigh. The purpose of the report is to provide information for the site with regards to ground conditions using published data and data obtained from an intrusive investigation with regards to the proposed redevelopment of the site to a residential land use.

1.1.2 A Phase 1 Geo-environmental Desk Study and Preliminary Risk Assessment¹ has previously been prepared for the site, which should be read in conjunction with this report.

1.1.3 This report has been devised to generally comply with the relevant principles and requirements of a range of guidance with regards to the investigation of potentially contaminated land, including:

BS 10175. Investigation of potentially contaminated sites - Code of practice.

BS 5930. Code of practice for ground investigations.

Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (Defra, April 2012).

Environment Agency (July 2023). Land Contamination: Risk Management.

Environment Agency (2011). Report GPLC1 - Guiding Principles for Land Contamination.

Environment Agency (2012). Report GP3 - Groundwater protection: Principles and Practice.

Essex Contaminated Land Consortium. Land affected by Contamination. Technical Guidance for Applicants and Developers.

National Planning Policy Framework (HCA, 2021).

Part IIA of the Environmental Protection Act, 1990.

1.1.4 In preparation of this report, it is assumed that any information provided by the client or its representatives relating to the commission is accurate, complete and not misleading. However, the accuracy or validity of this information cannot be guaranteed. This also consists of publicly available information including that which may be present on the Internet.

¹ Phase 1 Geo-environmental Desk Study and Preliminary Risk Assessment. Prepared for Mr George Milleare by Sue Slaven. Report No. P0355/R01 Issue 1. June 2023.

2. THE SITE

2.1 Site Location

2.1.1 The location of the site is indicated on Figure 1 below and a brief description of the site is presented in Table 1.



Figure 1 Site Location (not to scale)

Table 1 Summary of the Site and its Environs

Location	The site is situated approximately 900m to the south-west of the village of Ardleigh and 3km to the north-east of Colchester. The area is predominantly agricultural with a vineyard immediately to the west of the site.
Grid Reference	604470, 229030
Post Code	CO7 7PA
Site Area	0.13ha
Topography	The site and surrounding area were generally flat.

2.2 Development Proposals

2.2.1 It is proposed to redevelop the site to a residential land use comprising the construction of a single dwelling with a private garden and garage.

2.3 Environmental Setting

Geology

2.3.1 The records indicate that superficial deposits underlying the site comprise Cover Sands, which consist of fine to very-fine-grained sand. The bedrock geology is the Thames Group, which mainly comprises silty clays and clays, some sandy or gravelly, with some silts, sands, gravels and mudstones.

Hydrogeology

2.3.2 The Cover Sands is classified as a Secondary aquifer and the Thames Group as non-productive strata. The site is located within groundwater Source Protection Zone (SPZ) 3 – Total Catchment.

Hydrology

2.3.3 There are no surface watercourses in the vicinity of the site.

2. FIELDWORK

3.1 Objectives of the Ground Investigation

3.1.1 The principal objective of the ground investigation is to ascertain whether the ground is contaminated as a result of past and/or present uses at the site, as identified within the Desk Study Report. Thus, the aim of the ground investigation is to provide information with regards to potentially contaminated land, as follows:

- to confirm the contaminative status of the ground through chemical testing;
- to assess the nature and depth of the Made Ground (if any); and
- to assess the nature of the natural strata (as far as is practicable).

3.1.2 To achieve the objectives, the specific ground investigation and research activities carried out were as follows:

- One day's intrusive investigation involving the excavation of five trial pits across the site, to a maximum depth of 1.15m below ground level (bgl);
- Collection of solid samples from all exploratory holes for contamination testing;
- Description of the ground generally in accordance with BS5930 - Code of Practice for Ground Investigations; and

An assessment of the chemical testing data.

3.2 Exploratory Holes

3.2.1 The fieldwork was carried out on 1 August 2023 using a mechanical tracked excavator provided by the client. A total of five trial pits was excavated across the site, as shown on Figure 3. The trial pits were located in order to provide an indication of ground conditions across the site. Two trial pits were located adjacent to each other to provide an indication of the differing ground conditions within the footprint of the proposed dwelling.

3.2.2 Sue Slaven was present to observe the fieldwork and describe the ground encountered. Fieldwork procedures were carried out in accordance with relevant sections of British Standards. As part of the ground investigation, soil samples were taken to aid the characterisation of the material, as detailed in Section 5.

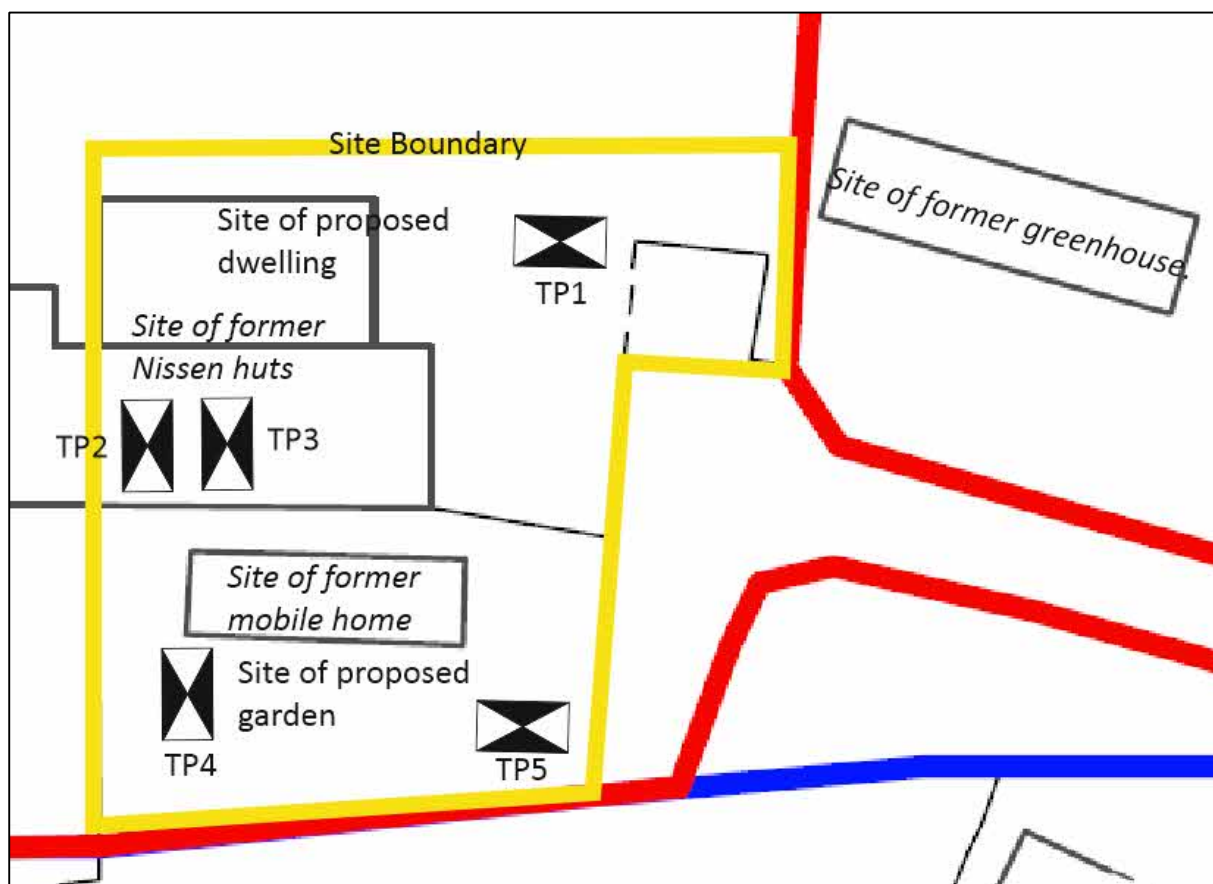


Figure 1 Exploratory Hole Location Plan (not to scale)

3.3 Ground Conditions

3.3.1 Ground conditions varied little across the site, comprising Made Ground overlying reddish brown / brown gravelly sand. The Made Ground was encountered at all locations to a maximum depth of 0.35m bgl.

- 3.3.2 Ground cover at three locations, TP1 – TP3, comprised hardcore of crushed concrete and brick, within the footprint of the proposed dwelling. The Made Ground at locations TP1 and TP2 consisted of dark brown gravelly sand / sandy gravel with occasional brick and concrete. This was subsequently underlain by dark brown / reddish brown / light brown gravelly sand. At TP3, beneath the surface cover of hardcore, the ground consisted of gravelly sand.
- 3.3.3 Ground cover at TP4 and TP5 comprised grass, which is proposed as the garden at the new dwelling. The Made Ground at these locations comprised dark brown silty sand soil with bricks, brick fragments, roof tile fragments, clay pots, etc. Beneath the Made Ground was reddish brown / light brown gravelly sand.
- 3.3.4 No groundwater was encountered during excavation of the trial pits. Fieldwork records, together with photographs of the ground, are presented in Appendix B.

4. LABORATORY TESTING

4.1 Sampling Strategy

- 4.1.1 The selection of samples for laboratory testing and analyses to be carried out were made following observations during the fieldwork. The sample selection rationale was to gain general coverage of the ground at the near surface. Thus, samples were collected from depths ranging from 0.25m to 0.3m bgl, which was generally at the base of the Made Ground.
- 4.1.2 Each sample was contained within a 1kg plastic tub, a 250g amber glass jar and a 100g amber glass jar, labelled and stored in a cool box and then submitted to i2 Analytical Limited (i2 Analytical) in Watford. i2 Analytical is UKAS accredited in accordance with BS EN ISO/IEC 17025:2005² and MCERTS accredited for soil analysis in accordance with the Environment Agency's scheme. Details of the accreditation and methods of analysis are provided on i2 Analytical's test reports included within Appendix C.
- 4.1.3 The testing suite represented a general range of contaminants to assess the potential risk to human health and the environment and was as follows:

Metals: cadmium, chromium, copper, mercury, nickel, selenium, zinc

Non-metals: arsenic

Inorganics: total cyanide, water soluble sulphate, sulphide and pH

Organics: soil organic matter, total organic carbon, total phenols, speciated petroleum hydrocarbons and speciated polycyclic aromatic hydrocarbons (PAHs)

Asbestos (presence/absence).

² BS EN ISO/IEC 17025:2005. General requirements for the competence of testing and calibration laboratories.

5. RESULTS OF CONTAMINATION SURVEY

5.1 Introduction

5.1.1 The assessment of contamination has been carried out in accordance with the guidance presented in Environment Agency's document "Land Contamination: Risk Management" (July 2023), other relevant guidance and legislation. Chemical test results are reviewed as part of a Generic Quantitative Risk Assessment (GQRA), which can be considered as a two-stage process. Firstly, in the Risk Estimation stage, the measured contaminant concentrations are compared to the relevant published C4SLs/S4ULs (also known as general assessment criteria (GAC)). The second stage, Risk Evaluation, comprises an authoritative review of the findings with other pertinent information in cases where the relevant GACs are exceeded, in order to consider if exceedance may be acceptable in the particular circumstances.

5.1.2 General assessment criteria are derived for three different land use scenarios: residential, allotments and commercial/industrial, which are considered appropriate for GQRA for contaminated land. For this site, GACs for residential land use were considered appropriate at this location. The residential land use³ assumes a "typical" residential property that comprises a house on a ground bearing slab with private garden of lawn, flowerbeds, and a fruit and vegetable patch. The occupants are assumed to be parents with young children who make regular use of the garden.

5.2 Test Results

5.2.1 A summary of the chemical test results is presented in Appendix C, together with the laboratory data. The chemical test results have been compared with GACs relevant for a residential land use with gardens, and if present, exceedances of applicable GAC threshold concentrations are indicated in yellow. A discussion of the results, and in particular, any identified exceedances, is presented below.

Metals

5.2.2 A range of metals were tested for within the four solid samples. However, no metals were present at concentrations in excess of the relevant GAC.

Hydrocarbons

5.2.3 Hydrocarbons include polycyclic aromatic hydrocarbons (PAHs) and petroleum hydrocarbons (PH), benzene, toluene and MTBE. Sixteen PAHs, usually known as the USEPA 16, comprise the more common individual carcinogenic PAH compounds, which are a range of over 200 different compounds normally associated with combustion or processing of hydrocarbons and coal.

³ Environment Agency. Updated technical background to the CLEA model. Science Report: SC050021/SR3. January 2009.

5.2.4 PAHs (benzo(b)fluoranthene and dibenzo(ah)anthracene) were identified at concentrations in excess of the relevant GAC at one location, TP4, which was excavated within the proposed garden.

Asbestos

5.2.5 Asbestos was searched for within the soil samples and was detected as loose fibres of chrysotile within one sample collected from TP4.

5.3 Risk Assessment

5.3.1 When assessing the potential hazards and liabilities relating to ground contamination, the following issues must be addressed:

Does the site present a threat to potential receptors in its current state?
Is there a potential for future liabilities due to off-site migration of contaminants?

5.3.2 Current good practice requires evaluation of risk from ground contamination according to the source – pathway – receptor model. The aspects of risk from substances in the ground to be considered are as follows:

Human health;
Pollution of controlled waters;
Plant life;
Water supply pipes; and
Below ground concrete.

Human Health

5.3.3 Principal pathways with respect to residential land use are considered to be ingestion of soil, indoor dust, home-grown vegetables and soil attached to home-grown vegetables, skin contact with soil and dust, inhalation of dust and vapour. One sample from one location, TP4, comprised PAHs at elevated concentrations. This area of the site is proposed as a private garden. Thus, the presence of PAHs could cause harm to human health through inhalation or ingestion of soil or dust and dermal contact.

5.3.4 Asbestos was also detected within one sample (TP4) and was identified as chrysotile (white asbestos) as loose fibres. Chrysotile was one of the main asbestos types to be used until its import ban in 1999. This indicates that there is a risk to human health, including future site occupiers and construction workers, from asbestos in the ground. The principal pathway is inhalation of airborne fibres, the release of which can occur through ground disturbance either during site development or site use, e.g. gardening or children playing.

5.3.5 During the development works, there will be a risk from dust to on-site workers and people occupying adjacent properties. A risk assessment should be carried out by the contractor to

allow appropriate controls for the mitigation of risk to the health of construction workers and neighbours to be in place. This risk can be controlled to within acceptable limits by:

Control of dust generation;

Workers wearing suitable personal protective equipment (PPE);

Having adequate site hygiene facilities allowing staff to keep a good level of personal hygiene;

All groundworkers should have been trained in asbestos awareness and should be aware of this being encountered during excavations. The earthworks contractor should have a contingency plan in place before any works commence for the presence of asbestos encountered during groundworks;

Only permitting smoking or eating on-site in appropriate pre-designated areas.

Controlled Waters

- 5.3.6 The risk posed to controlled waters from total soil concentrations cannot be directly assessed. The risk is either assessed by comparison of results of leachability tests carried out on soil samples, or from the direct testing of samples of ground and/or surface water to screening criteria, neither of which were carried out. The site overlies a Secondary aquifer, thus groundwater is considered to be sensitive to the presence of ground contamination. However, contaminants identified at the one location, PAHs, tend to be immobile. Thus, these are unlikely to present significant ground contamination and it is considered that there is a low risk to groundwater.

Plant Health

- 5.3.7 The concentrations of the phytotoxic metals, copper, chromium, nickel and zinc, have the potential to be harmful to plants. Generic assessment of phytotoxicity is carried out by comparison with guideline values presented in the MAFF document "Code of good agricultural practice for the protection of soil" (October 1998). This is in accordance with CLR's reference to Defra notice CLAN 4/04. As shown in Table 2, concentrations of chromium, copper, nickel and zinc were not present at concentrations that could cause harm to plant life. Thus, there is a negligible risk from phytotoxic elements in the ground.

Table 2 Phytotoxic elements when compared with MAFF guidance

Determinand	No. of Samples	Trigger Value* (mg/kg)	Range of Concentration (mg/kg)	Exceeds Tier 1 Screening (Y/N)
Copper	4	135	18 – 52	N
Chromium	4	400	12 – 19	N
Nickel	4	110	10 – 13	N
Zinc	4	300	42 – 180	N
*Trigger value for a pH of 7. (pH on-site averaged 8.5).				

Water Supply Pipe Material

- 5.3.8 Plastic pipe materials can be vulnerable to attack from elevated levels of hydrocarbons, which can potentially lead to contamination of potable water supplies. Water supply companies also require an assessment of the risk to their workers from ground contamination. However, based on the chemical test results, petroleum hydrocarbons were not present in significant quantities to affect pipe material. A risk to groundworkers has been identified from the presence of PAHs and asbestos at one location.

Chemical Attack on Below Ground Concrete

- 5.3.9 Below ground concrete structures are potentially at risk in areas of elevated sulphate and low pH. An assessment of the soil data (following the guidance published in BRE Special Digest 1, 2005) show that the maximum concentration of water-soluble sulphate at the site was recorded at 0.09g/l and maximum pH was 8.8, which equates to Design Sulphate Class DS-1 and an ACEC Class of AC-1. Therefore, based on the available data, it is likely that no special precautions are required at the site for the design of concrete in terms of durability and structural performance.

5.4 Summary of Contaminant Linkage Assessment

- 5.4.1 The results of the risk assessment indicate that there is a potential risk to human health (future occupiers and construction workers) from contaminants in the ground, identified as elevated concentrations of PAHs, together with asbestos at one location (TP4), which is the proposed private garden in the development scheme. The principal pathways are soil and/or dust ingestion and/or inhalation.
- 5.4.2 No special precautions are required for the design of below ground concrete which should be designed to meet the requirements of ACEC Class AC-1.

2. CONCLUSIONS

6.1 Environmental Risk Assessment

- 6.1.1 A generic quantitative risk assessment (GORA) has been made based on the contaminant - pathway - receptor model as defined in Part 2A of the Environment Protection Act 1990 and in accordance with BS 10175 Investigation of potentially contaminated sites - code of practice. An intrusive investigation was carried out in August 2023, which involved the excavation of five trial pits to a maximum depth of 1.15m bgl across the site, the collection and testing of solid samples. Ground conditions generally comprised Made Ground including fragments of bricks and concrete, overlying gravelly sand.
- 6.1.2 Solid samples were collected from the Made Ground at four locations and submitted for analysis of a range of determinands including metals, inorganic and organic substances, and the presence of asbestos. Chemical testing has shown that there is evidence for elevated

concentrations of PAHs at one location, TP4, together with asbestos. A risk assessment was subsequently carried out, which indicated that the presence of contaminants in the ground is likely to present a potential risk to human health (both future site occupiers and construction workers). Principal pathways are identified as soil/dust ingestion/inhalation.

6.2 Recommendations for Further Works

6.2.1 The following indicative recommendations are made based on the information obtained from the ground investigation carried out, and in the context of the site being redeveloped to a residential use. Based on the information described above, it is considered that remediation works are likely to be required in order to mitigate the risk to future site users. These may comprise:

Removal of the Made Ground from the proposed garden area.

Provision of a suitable capping layer (i.e. 600mm of clean subsoil/topsoil) that may consist of imported material to provide a suitable medium for plant growth.

A watching brief for asbestos containing materials within the ground should be maintained and if encountered, should be removed from site and disposed of at an appropriately licensed waste management facility;

6.2.2 A potential risk to construction workers during redevelopment of the site was identified, therefore it should be ensured that works are carried out in a safe manner and all available contaminant information is provided to the Contractor. The Contractor should have regard to current legislation and guidance, which includes the following:

Health & Safety at Work Act 1974;

Environment Protection Act 1990;

All health and safety matters, in particular the requirements of the Control of Substances Hazardous to Health (COSHH) Regulations 1988 and guidance from the Health & Safety Executive;

Construction (Design and Management) Regulations 2015.

6.2.3 All materials for off-site disposal should be removed to an appropriately licensed waste management facility: disposal being carried out in compliance with S.34 of the EPA, "Duty of Care".

6.3 Unforeseen Ground Contamination

6.3.1 There is the potential for areas of unexpected contamination to be encountered upon removal of material that is present on-site. Any significant quantities of asbestos, significant ashy soils, unusual, brightly coloured or significantly oily or odorous material should be considered in this category. If unexpected contamination is discovered during groundworks, the following procedures should be adhered to:

(1) All site works at the location of the suspected contamination will cease.

- (2) A suitably trained geoenvironmental specialist should assess the visual and olfactory observations of the ground and the extent of contamination and the Client and the Local Authority should be informed of the discovery.
- (3) The suspected contaminated material will be investigated and tested appropriately in accordance with assessed risks. The investigation works will be carried out in the presence of a suitably qualified geoenvironmental engineer. The investigation works shall commence to recover samples for testing and, using visual and olfactory observations of the ground, delineate the area over which contaminated materials are present.
- (4) The unexpected contaminated material will either be left in situ or be stockpiled (except if suspected to be asbestos) whilst testing is carried out and suitable assessments completed to determine whether the material can be re-used on site or requires disposal, as appropriate.
- (5) Where the material is left in situ awaiting results, it will either be reburied or covered with plastic sheeting.
- (6) Where the potentially contaminated material is to be temporarily stockpiled, it will be placed either on a prepared surface of clay, or on 2000-gauge Visqueen sheeting (or other impermeable surface) and covered to prevent dust and odour emissions.
- (7) Any areas where unexpected visual or olfactory ground contamination is identified will be surveyed and testing results incorporated into a Verification Report.
- (8) A photographic record will be made of relevant observations.
- (9) The testing suite will be determined by the independent geoenvironmental specialist based on visual and olfactory observations.
- (10) Test results will be compared against current assessment criteria suitable for the future use of the area of the site affected.
- (11) The results of the investigation and testing of any suspect unexpected contamination will be used to determine the relevant actions. After consultation with the Local Authority, materials should either be:
 - re-used in areas where test results indicate that it meets compliance targets so it can be re-used without treatment; or
 - treatment of material on site to meet compliance targets so it can be re-used; or
 - removal from site to a suitably licensed landfill or permitted treatment facility.
- (12) A Verification Report will be produced for the work and issued to the Client and the Local Authority.

6.4 Health and Safety

6.4.1 As outlined within the HSE publication “Successful Health and Safety Management – HSG65” this report should inform the development of safe systems of work and information as an input into the safety management system. The contents of this report may be used to supplement the contents of the Health and Safety File as required under the Construction Design and Management (CDM) Regulations 2007.

6.4.2 When developing risk control systems, it is recommended that reference be made to the CIRIA report 132 “A guide for safe working on contaminated sites” and the HSE document

“Protection of workers and the public during the development of contaminated land – HSG66”. All risk control measures should be in accordance with the guidelines laid down within the Management of Health and Safety at Work Regulations 1999.

APPENDICES

Appendix A	Service Constraints, Report Limitations & Planning Requirements
Appendix B	Fieldwork Records
Appendix C	Summary of Chemical Testing Data and Laboratory Certificates

Appendix A

Service Constraints, Report Limitations and Planning Requirements

Service Constraints, Report Limitations and Planning Requirements

This consultancy contract, report and the site investigation (together comprise the "Services") were compiled and carried out by Sue Slaven for the Client as named on the front of this report (the "Client") based on a defined programme and scope of works and the terms of a contract between Sue Slaven and the Client. The Services were performed by Sue Slaven with all reasonable skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by Sue Slaven taking into account the limits of the scope of works required by the Client, the prevailing site conditions, the time scale involved and the resources, including financial and manpower resources, agreed between Sue Slaven and the Client. Sue Slaven cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered outwith the agreed scope of works.

Other than that expressly contained in the above paragraph, Sue Slaven provides no other representation or warranty, whether express or implied, in relation to the Services. Unless otherwise agreed, this report has been prepared exclusively for the use and reliance of the Client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of Sue Slaven. If a third party relies on this report, it does so wholly at its own and sole risk and Sue Slaven disclaims any liability to such parties.

It is Sue Slaven's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon, the report in those circumstances by the Client without Sue Slaven's review and advice shall be at the Client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of Sue Slaven.

The report was prepared in the month stated on the front of the report and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Sue Slaven. In the absence of such written advice, reliance on the report in the future shall be at the Client's own and sole risk. Should Sue Slaven be requested to review the report in the future, Sue Slaven shall be entitled to additional payment at the then current rate or such other terms as may be agreed between Sue Slaven and the Client.

The observations and conclusions described in this report are based solely upon the Services that were provided pursuant to the agreement between the Client and Sue Slaven. Sue Slaven has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. Sue Slaven is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Sue Slaven did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, radon gas or other radioactive or hazardous materials.

The Services are based upon Sue Slaven's observations of existing physical conditions at the site gained from a walkover survey of the site, together with Sue Slaven's interpretation of information including documentation, obtained from third parties and from the Client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Sue Slaven has no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified. No responsibility can be accepted for errors within

third party items presented in this report. Furthermore, Sue Slaven was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the Client or third parties, including laboratories and information services, during the performance of the Services. Sue Slaven is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Sue Slaven and including the doing of any independent investigation of the information provided to Sue Slaven save as otherwise provided in the terms of the contract between the Client and Sue Slaven.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

Planning Requirements

The National Planning Policy Framework (NPPF, 2012) has 12 core land-use planning principles, two of which directly relate to the potential for pollution and contaminated land:

Requirement to “contribute to conserving and enhancing the natural environment and reducing pollution” and setting out of a preference for developments to be on land of “lesser environmental value”; and
“encourage the effective use of land by re-using land that has been previously developed (brownfield land), providing that it is not of high environmental value.”.

In accordance with the core principles of NPPF, Paragraph 109 clarifies that enhancing the natural environment includes:

“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and
remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.”.

Paragraph 121 of NPPF states that planning policies and decisions for developments should also ensure that:

“the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;
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
adequate site investigation information, prepared by a competent person, is presented.”.

This report has been prepared and authorised by Sue Slaven who is competent as defined in the NPPF.

Appendix B
Fieldwork Records



Photograph 1: TP1.



Photograph 2: Arisings of TP1.



Photograph 3: Location of TP1.



Photograph 4: TP2.



Photograph 5: Arisings from TP2.



Photograph 6: Arisings from TP3.



Photograph 7: Location of TP2 and TP3.



Photograph 8: TP4.



Photograph 9: Arisings from TP4.



Photograph 10: Location of TP4.



Photograph 11: TP5.



Photograph 12: Arisings from TP5.

Appendix C

Summary of Chemical Testing Data and Laboratory Certificates

SITE: Guide Post Farm, Ardleigh
 PROJECT NO: P0355
 CHEMICAL TESTING DATA ANALYSIS

Determinand	Limit of Detection	SAMPLE				Statistical Analysis			pC4SL		LOM/ClEH S4UL		
		TP1	TP2	TP4	TP5	n	Minimum	Average	Maximum	Screening Criteria			
		0.25	0.3	0.25	0.25					Residential with Home Grown Produce	Pass / Fail		
		01/08/2023								Residential with Home Grown Produce	Pass / Fail		
Metals													
Arsenic (total)	1 mg/kg	15	11	9.4	11	4	9	12	15	37	Pass	37	Pass
Boron (water soluble)	0.2 mg/kg	0.3	0.6	1.6	0.9	4	0	1	2	-	-	-	-
Cadmium (total)	0.2 mg/kg	0.2	0.2	0.2	0.8	4	0	0	1	22	Pass	11	Pass
Chromium (total) (III for S4ULs)	1 mg/kg	14	19	12	16	4	12	15	19	-	-	910	Pass
Copper (total)	1 mg/kg	52	18	34	31	4	18	34	52	-	-	2400	Pass
Lead (total)	1 mg/kg	34	22	140	170	4	22	92	170	210	Pass	-	-
Mercury (total inorganic)	0.3 mg/kg	0.3	0.3	0.3	0.3	4	0	0	0	-	-	40	Pass
Nickel (total)	1 mg/kg	13	12	9.9	12	4	10	12	13	-	-	180	Pass
Selenium (total)	1 mg/kg	1	1	1	1	4	1	1	1	-	-	250	Pass
Zinc (total)	1 mg/kg	78	42	120	180	4	42	105	180	-	-	3700	Pass
Inorganic / Organic													
Asbestos Screen	Detected?	No	No	Yes as loose fibres of chrysotile	No								
pH Value	pH Units	8.2	8.6	8.2	8.8	4	8.2	8.5	8.8	-	-	-	-
(Water Soluble) SO4 expressed as SO4	0.00125 g/l	0.0198	0.0355	0.0282	0.0913	4	0.0	0.0	0.0913	-	-	-	-
Sulphide	1 mg/kg	1	6.7	1.7	6	4	1.0	3.9	6.7	-	-	-	-
TOC	0.10%	0.6	0.3	2.3	1.7	4	0.3	1.2	2.3	-	-	-	-
Cyanide (total)	1 mg/kg	1	1	1	1	4	1.0	1.0	1.0	-	-	-	-
Phenol (Total Monohydric)	1 mg/kg	1	1	1	1	4	1.0	1.0	1.0	-	-	280	Pass
Stone Content	0.10%	<0.1	<0.1	<0.1	<0.1								
Moisture Content	%	5	14	7	5.5								
Total and Speciated USEPA16 PAHs													
Naphthalene	0.05 mg/kg	0.05	0.08	0.61	0.05	4	0.1	0.2	0.6	-	-	2.3	Pass
Acenaphthylene	0.05 mg/kg	0.05	0.05	0.37	0.06	4	0.1	0.1	0.4	-	-	170	Pass
Acenaphthene	0.05 mg/kg	0.05	0.07	0.39	0.05	4	0.1	0.1	0.4	-	-	210	Pass
Fluorene	0.05 mg/kg	0.05	0.08	0.75	0.05	4	0.1	0.2	0.8	-	-	170	Pass
Phenanthrene	0.05 mg/kg	0.62	0.96	12	0.64	4	0.6	3.6	12.0	-	-	95	Pass
Anthracene	0.05 mg/kg	0.1	0.16	0.84	0.16	4	0.1	0.3	0.8	-	-	2400	Pass
Fluoranthene	0.05 mg/kg	1.2	1.2	11	1.5	4	1.2	3.7	11.0	-	-	280	Pass
Pyrene	0.05 mg/kg	0.99	0.95	8.3	1.3	4	1.0	2.9	8.3	-	-	620	Pass
Benz(a)anthracene	0.05 mg/kg	0.55	0.49	3.3	0.68	4	0.5	1.3	3.3	-	-	7.2	Pass
Chrysene	0.05 mg/kg	0.54	0.6	4.6	0.72	4	0.5	1.6	4.6	-	-	15	Pass
Benzo(b)fluoranthene	0.05 mg/kg	0.77	0.65	4.9	0.95	4	0.7	1.8	4.9	-	-	2.6	Fail
Benzo(k)fluoranthene	0.05 mg/kg	0.29	0.24	1.6	0.38	4	0.2	0.6	1.6	-	-	77	Pass
Benzo(a)pyrene	0.05 mg/kg	0.65	0.52	3.3	0.82	4	0.5	1.3	3.3	5.0	Pass	2.2	Fail
Indeno(123cd)pyrene	0.05 mg/kg	0.33	0.28	1.5	0.45	4	0.3	0.6	1.5	-	-	27	Pass
Dibenzo(a,h)anthracene	0.05 mg/kg	0.1	0.1	0.57	0.14	4	0.10	0.23	0.57	-	-	0.24	Fail
Benzo(ghi)perylene	0.05 mg/kg	0.35	0.26	1.4	0.48	4	0.3	0.6	1.4	-	-	320	Pass
Total EPA-16 PAHs	0.8 mg/kg	6.44	6.62	55.7	8.3	4	6.4	19.3	55.7	-	-	-	-
TPH (CWG) with MTBE & BTEX													
Benzene	0.005 mg/kg	0.005	0.005	0.005	0.005	4	0	0	0	0.87	Pass	0.087	Pass
Toluene	0.005 mg/kg	0.005	0.005	0.005	0.005	4	0	0	0	-	-	130	Pass
Ethyl Benzene	0.005 mg/kg	0.005	0.005	0.005	0.005	4	0	0	0	-	-	47	Pass
M/P Xylene	0.005 mg/kg	0.005	0.005	0.005	0.005	4	0	0	0	-	-	56	Pass
O Xylene	0.005 mg/kg	0.005	0.005	0.005	0.005	4	0	0	0	-	-	60	Pass
Methyl tert-Butyl Ether	0.005 mg/kg	0.005	0.005	0.005	0.005	4	0	0	0	-	-	-	-
TPH-CWG - Aliphatic >EC5 - EC6	0.001 mg/kg	0.001	0.001	0.001	0.001	4	0	0	0	-	-	42	Pass
TPH-CWG - Aliphatic >EC6 - EC8	0.001 mg/kg	0.001	0.001	0.001	0.001	4	0	0	0	-	-	100	Pass
TPH-CWG - Aliphatic >EC8 - EC10	0.001 mg/kg	0.001	0.001	0.001	0.001	4	0	0	0	-	-	27	Pass
TPH-CWG - Aliphatic >EC10 - EC12	1 mg/kg	1	1	1	1	4	1	1	1	-	-	130	Pass
TPH-CWG - Aliphatic >EC12 - EC16	2 mg/kg	2	2	3.6	2	4	2	2	4	-	-	1100	Pass
TPH-CWG - Aliphatic >EC16 - EC21	8 mg/kg	9	8	8	8	4	8	8	9	-	-	65000	Pass
TPH-CWG - Aliphatic >EC21 - EC35	8 mg/kg	56	9.4	220	8	4	8	73	220	-	-	65000	Pass
TPH-CWG - Aliphatic (EC5 - EC35)	10 mg/kg	65	10	230	10	4	10	79	230	-	-	-	-
TPH-CWG - Aromatic >EC6 - EC7	0.001 mg/kg	0.1	0.1	0.1	0.1	4	0	0	0	-	-	70	Pass
TPH-CWG - Aromatic >EC7 - EC8	0.001 mg/kg	0.1	0.1	0.1	0.1	4	0	0	0	-	-	130	Pass
TPH-CWG - Aromatic >EC8 - EC10	0.001 mg/kg	0.1	0.1	0.1	0.1	4	0	0	0	-	-	34	Pass
TPH-CWG - Aromatic >EC10 - EC12	1 mg/kg	1	1	1	1	4	1	1	1	-	-	74	Pass
TPH-CWG - Aromatic >EC12 - EC16	2 mg/kg	2	2	3.1	2	4	2	2	3	-	-	140	Pass
TPH-CWG - Aromatic >EC16 - EC21	10 mg/kg	10	10	24	10	4	10	14	24	-	-	260	Pass
TPH-CWG - Aromatic >EC21 - EC35	10 mg/kg	27	12	73	11	4	11	31	73	-	-	1100	Pass
TPH-CWG - Aromatic (EC5 - EC35)	10 mg/kg	34	18	100	14	4	14	42	100	-	-	-	-
Below Detection Limits Exceeded pC4SL / S4ULs													
Notes													
1. Results lower than detection limit are shaded in grey.													
2. When the test result is recorded as being less than the detection limit, the result used for the analysis is the detection limit.													
3. Cyanide (total)*, in the absence of a GOAC based on current CLEA 1.06 Model, the Atrisk Soil Value for Cyanide (free) has been used.													
4. pC4SL based on adjusted toxicology and exposure assumptions													
5. Assessment criteria for pH, sulphide and sulphate are not based on human health. Sulphate criteria assumes DS-1 ACEC classification for concrete.													
6. pC4SL for Benzene assumes 6% SOM													



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Preliminary Report Number : 23-49167

Project / Site name:	Guide Post Farm, Ardleigh	Samples received on:	04/08/2023
Your job number:	P0355	Samples instructed on/ Analysis started on:	04/08/2023
Your order number:	P0355	Analysis completed by:	/ /
Report Issue Number:	0	Report issued on:	15/08/2023
Samples Analysed:	4 soil samples		

Signed: [REDACTED]

Dominika Warjan
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.

Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.

Application of uncertainty of measurement would provide a range within which the true result lies.

An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-49167
 Project / Site name: Guide Post Farm, Arleigh
 Your Order No: P0355

Lab Sample Number	2771366		2771367		2771368		2771369	
Sample Reference	TP1		TP2		TP3		TP5	
Sample Number	None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.25		0.30		0.25		0.25	
Date Sampled	01/08/2023		01/08/2023		01/08/2023		01/08/2023	
Time Taken	None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	5	14	7	5.5	5.5
Total mass of sample received	kg	0.001	NONE	1.4	0.8	0.7	1.2	1.2

Asbestos in Soil	Type	N/A	ISO 17025	To follow	To follow	To follow	To follow
Asbestos Analyst ID	N/A	N/A	N/A	N/A	N/A	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	8.6	8.2	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	160	290	360	1300
Water Soluble SO4 10hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0198	0.0355	0.0282	0.0913
Sulphide	mg/kg	1	MCERTS	< 1.0	6.7	1.7	6
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.6	0.3	2.3	1.7

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.08	0.61	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.37	0.06
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.07	0.39	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.08	0.75	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.62	0.96	12	0.64
Anthracene	mg/kg	0.05	MCERTS	0.1	0.16	0.84	0.16
Fluoranthene	mg/kg	0.05	MCERTS	1.2	1.2	11	1.5
Pyrene	mg/kg	0.05	MCERTS	0.99	0.95	8.3	1.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.55	0.49	3.3	0.68
Chrysene	mg/kg	0.05	MCERTS	0.54	0.6	4.6	0.72
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.77	0.65	4.9	0.95
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.29	0.24	1.6	0.38
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.65	0.52	3.3	0.82
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.33	0.28	1.5	0.45
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.1	0.1	0.57	0.14
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.35	0.26	1.4	0.48

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	6.44	6.62	55.7	8.3

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	11	9.4	11
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.6	1.6	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	19	12	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	52	18	34	31
Lead (aqua regia extractable)	mg/kg	1	MCERTS	34	22	140	170
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	12	9.9	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	78	42	120	180

Analytical Report Number: 23-49167
 Project / Site name: Guide Post Farm, Ardleigh
 Your Order No: P0355

Lab Sample Number	2771366	2771367	2771368	2771369
Sample Reference	TP1	TP2	TP3	TP5
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.25	0.30	0.25	0.25
Date Sampled	01/08/2023	01/08/2023	01/08/2023	01/08/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Monoaromatics & Oxygenates

Compound	µg/kg	Limit of detection	Accreditation Status	2771366	2771367	2771368	2771369
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH C10 - C40 _{EH,CU,1D,TOTAL}	mg/kg	Limit of detection	Accreditation Status	2771366	2771367	2771368	2771369
TPH C10 - C40 _{EH,CU,1D,TOTAL}	mg/kg	10	MCERTS	100	27	370	20

TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	Limit of detection	Accreditation Status	2771366	2771367	2771368	2771369
TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	MCERTS	< 2.0	< 2.0	3.6	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	9	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	56	9.4	220	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,1D,AL}	mg/kg	10	NONE	65	< 10	230	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	Limit of detection	Accreditation Status	2771366	2771367	2771368	2771369
TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	MCERTS	< 2.0	< 2.0	3.1	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10	24	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	27	12	73	11
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,1D,AR}	mg/kg	10	NONE	34	18	100	14

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number : 23-49167
 Project / Site name: Guide Post Farm, Ardleigh

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2771366	TP1	None Supplied	0.25	Brown sand with gravel.
2771367	TP2	None Supplied	0.3	Brown clay and sand with gravel.
2771368	TP3	None Supplied	0.25	Brown loam and clay with gravel and vegetation.
2771369	TP5	None Supplied	0.25	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 23-49167
 Project / Site name: Guide Post Farm, Ardleigh

Water matrix abbreviations:
 Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

Analytical Report Number : 23-49167
 Project / Site name: Guide Post Farm, Ardleigh

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total