



Report type	Phase 2 Intrusive Site Investigation
Date	25 February 2022
Client	Gemma Verrells
Site address	Poplar Farm, Moor Gate, Holbeach, Spalding, PE12 8QW
Report prepared by	Mr Louis Turner BSc (Hons)
Supervised by	Mr Joseph Turner

Contents

1. Introduction

- 1.1 Project Overview
- 1.2 Purpose of Investigation
- 1.3 Scope of Work
- 1.4 Limitations

2. Site

- 2.1 Site Description and Location
- 2.2 Proposed Development
- 2.3 Previous Investigations

3. Methodology

- 3.1 Sampling Work
- 3.2 Sampling Strategy
- 3.3 Health & Safety

4. Ground Conditions

5. Evaluation of Results

- 5.1 Screening Levels
- 5.2 Results
- 5.3 Summary of Results
- 5.4 Risk Assessment Methodology
- 5.5 Conceptual Site Model

6. Conclusions

- 6.1 Risk Evaluation
- 6.2 Further Investigation

7. References

Appendix

Laboratory Results

1. Introduction

The following document is a Phase 2 Intrusive Site Investigation carried out by Oakshire Environmental, commissioned by Gemma Verrells, and includes details of the site, sampling methodology, ground conditions, an evaluation of risk and an assessment of further investigations.

1.1 Project Overview

The client's proposed project involves the conversion, partial demolition and extension of barn into a new dwelling at Poplar Farm, Moor Gate, Holbeach, Spalding, PE12 8QW. A Phase 1 Preliminary Risk Assessment has been carried out by Oakshire Environmental (February 2022). This assessment recommended that an intrusive site investigation should be carried out. Oakshire Environmental was carried out a Phase 2 Intrusive Site Investigation, as described below.

1.2 Purpose of Investigation

The objectives of the Phase 2 Intrusive Site Investigation were to:

- Establish the context and setting of development at the site.
- Identify and assess the nature and extent of contamination risk at the site.
- Determine the requirement for further investigations, remediation or mitigation measures.

1.3 Scope of Work

- Brief introductory information has been noted to provide context to the report and includes an Introduction, Project Overview, Scope of Work, Limitations.
- Assess the site and previous investigations, to establish the context and setting of development.
- In order to identify the nature and extent of contamination, 3 x samples were taken down to a maximum depth of ~0.6m and analysed for Metals (As, Be, Cd, Co, Cu, Fe, Hg, Pb, Ni, Mn, Se, V, Zn), Chromium (III & VI), Cyanide, Phenols, PAHs, BTEX & MTBE, TPH CWG (Aliphatic/ Aromatic), pH, Asbestos (Qualitative) and Organic Matter in a UKAS accredited laboratory.
- Borehole logs have been produced as part of the sampling process, to assess ground conditions encountered at the site, this information will be used to inform recommendations and conclusions.
- Results of laboratory testing were assessed with reference to suitable screening values, including LQM/CIEH Suitable 4 Use Levels (S4ULs), CL:AIRE Category 4 Screening Levels (C4SLs) and Generic Assessment Criteria (GAC).
- This information has been used to update the Conceptual Site Model, produced as part of the Phase 1 Preliminary Risk Assessment to categorise the severity of consequence and probability of identified contaminant linkages, and conduct an evaluation of contamination risk to determine the requirement for further investigations, remediation or mitigation measures.
- Supporting appendix includes photographs, maps and plans of the site.
- Sample locations and depths have been chosen to allow identification of spatial variability on the site and provide adequate sampling of proposed use areas, taking into account proposed development at the site.
- Site investigations have been carried out, by professional Environmental Consultants with BSc (Hons) in Environmental Science or above, in accordance with the Environment Agency's Land Contamination: Risk Management (LCRM) guidelines as updated from Environment Agency's Model Procedures for the Management of Land Contamination (CLR11) framework.

1.4 Limitations

Quantum Intelligent Trading Ltd is previously and hereafter referred to as "Oakshire Environmental" or "the company". Oakshire Environmental has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. This report is only valid when used in its entirety and any information or advice contained within the report should not be relied upon until considered in the context of the whole report. Oakshire Environmental disclaims any responsibility to the client and others in respect of any matters outside the scope of this work. 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. This report has been prepared solely for the benefit of the client and any other party using or placing reliance upon any information contained in this report does so at their own risk. Oakshire Environmental accepts no responsibility or liability for the contents of this report being used for any purpose or project for which it was not commissioned. Oakshire Environmental accepts no liability whatsoever for any loss or damage arising from the interpretation or use of the information contained within this report. Furthermore, Oakshire Environmental does not accept any liability for the consequences of any legislative changes or the release of subsequent guidance documentation and following delivery of the report has no obligation to advise the client or any other party of such changes or their repercussions.

This report excludes consideration of potential hazards arising from any activities at the site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities. Oakshire Environmental does not warrant or guarantee that the site is free of hazardous or potentially hazardous materials or conditions. It should be noted that this report has been produced for environmental purposes only.

Oakshire Environmental cannot be held responsible for incorrect analysis of samples as the laboratory analysis presented in this report was carried out by Chemtech Environmental Ltd. The information and conclusions provided in this report are limited to, and representative of, the samples taken and cannot be extended to apply to the whole site, in addition, Oakshire Environmental cannot guarantee the accuracy of analysis for samples not taken at the source by the company or those which deviate due to exceedance of holding time or inappropriate sampling practises. The findings and/or recommendations of this report do not take into account any conditions that may be present but have hitherto not been encountered and as such further investigation and/or a reconsideration of the findings of this report should be undertaken if such conditions are subsequently encountered or an alternative development plan or land use is subsequently proposed.

2. Site

The following section provides a description of the site and location, proposed development and previous investigations, utilising information obtained from the client and publicly available sources.

2.1 Site Description and Location

The site is located on Moor Gate in Holbeach and is approximately 3,500m². The site is comprised of agricultural buildings at the north and west, gravel surfacing and a metal storage container at the centre, with an access road from the east, and soft landscaping at the south.

The site is bordered by a storage container and structures to the north, a residential dwelling to the north west, agricultural land to the west and south and Moor Gate to the east. The surrounding area is predominantly agricultural, with isolated residential dwellings. There are no woodlands, ancient monuments or archaeological sites within 500m of the site.

National Grid Reference: 537316 322214

2.2 Proposed Development

The proposed development includes the conversion, partial demolition and extension of the existing barns into a new 5 bed dwelling and the construction of a detached garage block with storage above.

2.3 Previous Investigations

A Phase 1 Preliminary Risk Assessment has been carried out by Oakshire Environmental in February 2022. This assessment considered there to be a low to moderate risk to residential end users due to the agricultural use of the site. The assessment recommended further investigation to include sampling of shallow soil at the site to be tested for suite of contaminants including heavy metals, hydrocarbons and asbestos.

Based on the findings of the Phase 1 Preliminary Risk Assessment, Oakshire Environmental has carried out sampling of shallow soil in proposed soft landscaping areas which has been tested for a comprehensive suite of contaminants including Metals (As,Be,Cd,Co,Cu,Fe,Hg,Pb,Ni,Mn,Se,V,Zn), Chromium (III & VI), pH, Cyanide, Phenols, Organic Matter, Polycyclic Aromatic Hydrocarbons (PAH), BTEX, Total Petroleum Hydrocarbons (TPH) and Asbestos (qualitative).

3. Methodology

3.1 Sampling Work

Boreholes were dug at the locations shown on plans in the appendix. Soil conditions were noted through the process in order to produce borehole logs.

Undisturbed soil samples were collected using a window sampler and soil was then collected from the sampler and placed into sample containers. Some disturbed material was collected where made ground was present due to the high proportion of stones and gravel. Samples collected for VOC analysis were filled as much as possible to minimise air spaces, as volatile compounds can be lost into these spaces. Sampling equipment was wiped clean between sample locations to minimise cross contamination.

3.2 Sampling Strategy

Three samples was considered to be a sufficient sample size, based on the size of the proposed soft landscaping areas and the levels of contamination expected. Locations were chosen to focus on the proposed soft landscaping areas.

A sample depth of 0.3m was chosen as this will represent the soil that is most likely to impact future site users through inhalation, ingestion and dermal contact pathways.

3.3 Health & Safety

When collecting soil samples on a potentially contaminated site it must be assumed that the soil is contaminated in order to protect the health of the assessor. Protective rubber gloves were worn at all times as well as substantial footwear. Equipment was washed thoroughly before and after use and kept in a container when transported to avoid the spread of any possible contamination. Sample containers were packed with biodegradable fill for protection and placed in a sealed plastic container for transportation to the laboratory.

4. Ground Conditions

The following table summarises the ground conditions observed during sampling work. Groundwater was not encountered.

Table 1: Ground conditions encountered at sample locations

Depth	BH01	BH02	BH03
0.1m	Grass overlying clayey Loam with rootlets		
0.2m	Sandy loamy Clay with gravel, brick fragments and rootlets		
0.3m			
		Grass overlying sandy loamy Clay with rootlets	Sandy loamy Clay with gravel and brick fragments

5. Evaluation of Results

5.1 Screening Levels

Results of laboratory testing of soil samples were analysed by comparing them to industry standard screening levels used for risk assessments. Screening levels used include the DEFRA Category 4 Screening Levels (C4SLs) based on Low Level of Toxicological Risk and the LQM/CIEH S4ULs for Human Health Risk Assessment. These levels cover multiple Soil Organic Matter (SOM) contents (1%, 2% and 6%) and assume a pH of 8. The 'residential with plant uptake' screening values were used to assess results. This land use considers direct soil and indoor dust ingestion and inhalation, skin contact with soils and dust, inhalation of vapours and ingestion of homegrown produce as exposure pathways. These levels take a conservative approach to assessing potential risk and concentrations below these screening values can be considered to represent 'uncontaminated conditions' which pose 'LOW' risk to human health based on the proposed land use.

It is important to note that exceedance of a relevant screening value does not necessarily constitute evidence of either a 'significant possibility of significant harm' or the need for remediation under the UK's planning regimes. Rather such exceedance should usually trigger a further detailed quantitative risk assessment, where site-specific parameters are used to derive site-specific assessment criteria. Common sense tells us, and a robust risk evaluation reveals, that a gross exceedance is a good indicator that an unacceptable risk is present.

5.2 Results

Table 2: Results of chemical testing for samples taken on 15th February 2022

Sample ID			BH01	BH02	BH03
Depth (m)					
Test	Method	Units			
Arsenic (total)	CE127 ^M	mg/kg As	12	22	16
Beryllium (total)	CE127 ^U	mg/kg Be	<1	1.1	1.2
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	0.2	0.3
Chromium (total)	CE127 ^M	mg/kg Cr	53	63	62
Chromium (III)	CE208	mg/kg CrIII	53	63	62
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1
Cobalt (total)	CE127 ^M	mg/kg Co	8.7	11	9.8
Copper (total)	CE127 ^M	mg/kg Cu	16	17	19
Iron (total)	CE127	mg/kg Fe	18362	26518	21567
Lead (total)	CE127 ^M	mg/kg Pb	51	37	45
Manganese (total)	CE127	mg/kg Mn	411	439	429
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	23	29	25
Selenium (total)	CE127 ^M	mg/kg Se	1.1	1.6	1.5
Vanadium (total)	CE127 ^M	mg/kg V	43	66	55
Zinc (total)	CE127 ^M	mg/kg Zn	89	96	93
pH	CE004 ^M	units	7.6	7.8	7.6
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1

Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5
Total Organic Carbon	CE072 ^M	% w/w	2.1	2.9	2.7
PAH					
Naphthalene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Acenaphthylene	CE087 ^M	mg/kg	<0.02	0.02	<0.02
Acenaphthene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Fluorene	CE087 ^U	mg/kg	<0.02	<0.02	<0.02
Phenanthrene	CE087 ^M	mg/kg	0.11	0.26	0.04
Anthracene	CE087 ^U	mg/kg	0.04	0.04	<0.02
Fluoranthene	CE087 ^M	mg/kg	0.25	0.36	0.15
Pyrene	CE087 ^M	mg/kg	0.22	0.30	0.14
Benzo(a)anthracene	CE087 ^U	mg/kg	0.14	0.16	0.11
Chrysene	CE087 ^M	mg/kg	0.12	0.16	0.10
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.14	0.16	0.14
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.06	0.07	0.06
Benzo(a)pyrene	CE087 ^U	mg/kg	0.12	0.15	0.10
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.09	0.08	0.08
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.08	0.07	0.07
PAH (total of USEPA 16)	CE087	mg/kg	1.37	1.84	0.99
BTEX & TPH					
Benzene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01
Toluene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01
Ethylbenzene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01
m & p-Xylene	CE192 ^U	mg/kg	<0.02	<0.02	<0.02
o-Xylene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	0.02	<0.01	0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	12	<1	9
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	27	<1	28
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	12	<1	14
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	76	<1	104
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	9	<1	8
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1

EPH Aliphatic (>C10-C12)	CE250	mg/kg	<6	<6	<6
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<6	<6	<6
EPH Aliphatic (>C16-C35)	CE250	mg/kg	72	<15	31
EPH Aliphatic (>C35-C44)	CE250	mg/kg	<10	<10	<10
Subcontracted analysis					
Asbestos (qualitative)	\$	-	NAD	NAD	NAD

5.3 Summary of Results

- No metal concentrations exceeded the residential screening values
- pH is slightly alkaline in all samples
- Cyanide (free) and Phenols (total) concentrations are all below the laboratory limit of detection suggesting they may not be present at all
- Total Organic Carbon values were low in all samples
 - Soils with low organic matter content may allow the leaching of hydrocarbons through the soil as organic contaminants adsorb to organic matter particles
- PAH concentrations were all below the residential screening values
 - PAHs are often present in made ground deposits and they are also the by-products of exhaust emissions from vehicles and can, therefore, build up to high concentrations near roads
- BTEX concentrations were all below the laboratory limit of detection
- TPH concentrations were all below the residential screening values and many of the more volatile fractions were below the laboratory limit of detection
 - These substances are used in various oil and fuel products such as petrol, diesel and lubricant oils
 - These contaminants often impact soils near industrial sites where fuel and oils are stored such as garages and farms

5.4 Risk Assessment Methodology

The potential level of risk posed by a particular source is determined by assessing the potential severity of the impact of the contaminant linkage on the receptor, if it is assumed to be present, and the probability of the contaminant linkage being present.

Severities are categorised from Minor to Severe and probabilities are categorised from Unlikely to High Likelihood to give a potential level of risk output.

Table 3: Risk Matrix

Probability	Severity of Consequence			
	Severe	Medium	Mild	Minor
High Likelihood	Very High Risk	High Risk	Moderate Risk	Low / Moderate Risk
Likely	High Risk	Moderate Risk	Low / Moderate Risk	Low Risk
Low Likelihood	Moderate Risk	Low / Moderate Risk	Low Risk	Very Low Risk
Unlikely	Low / Moderate Risk	Low Risk	Very Low Risk	Very Low Risk

Very High Risk

There is a high probability that severe harm could arise to a designated receptor from an identified source; or there is evidence that severe harm to a designated receptor is currently happening.

High Risk

Harm is likely to arise to a designated receptor from an identified source.

Moderate Risk

It is possible that harm could arise to a designated receptor from an identified source. It is 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.

Low Risk

It is possible that harm could arise to a designated receptor from an identified source, however, it is likely that this harm, if realised, would normally be mild.

Very Low Risk

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.

5.5 Conceptual Site Model

The information in this section has been compiled to produce a conceptual site model outlining the identified sources, pathways and receptors at the site. The level of risk was categorised by considering the severity and probability, as outlined in the previous section.

Table 4: Conceptual site model

Sources	Pathways	Receptors	Severity	Probability	Potential Level of Risk	
Agricultural Use	Ingestion/inhalation of contaminated soil dust Dermal contact with contaminated soil Inhalation of soil vapours Ingestion of homegrown produce Permeation into drinking water pipes	Residential end users	Minor	Low Likelihood	Very Low	Contaminant concentrations in proposed soft landscaping areas are all below the residential screening values suggesting a low risk to residential end users.

6. Conclusions

6.1 Risk Evaluation

The conceptual site model has identified the following contaminant linkages present at the site and the following conclusions have been drawn:

- There is a **very low risk** to residential end users from the ingestion/inhalation of contaminated soil dust, dermal contact with contaminated soil, inhalation of soil vapours, ingestion of homegrown produce and permeation into drinking water pipes from the agricultural use of the site.

6.2 Further Investigation

Based on laboratory testing of soil samples from the site and the updated conceptual site model, the risk at the site to residential end users is considered to be very low. Further investigation or remediation is, therefore, not considered necessary. It is important to note that this conclusion is based on the proposed development plan.

If visible or olfactory evidence of contamination is identified during excavations at the site, work should cease in order to allow further investigation to be carried out. In addition, to ensure regulatory compliance, Waste Classification & Waste Acceptance Criteria (WAC) testing of excavated material from the site may be required prior to off-site disposal.

7. References

Environment Agency *Land contamination: risk management*. [online] Available at: <gov.uk/guidance/land-contamination-how-to-manage-the-risks>.

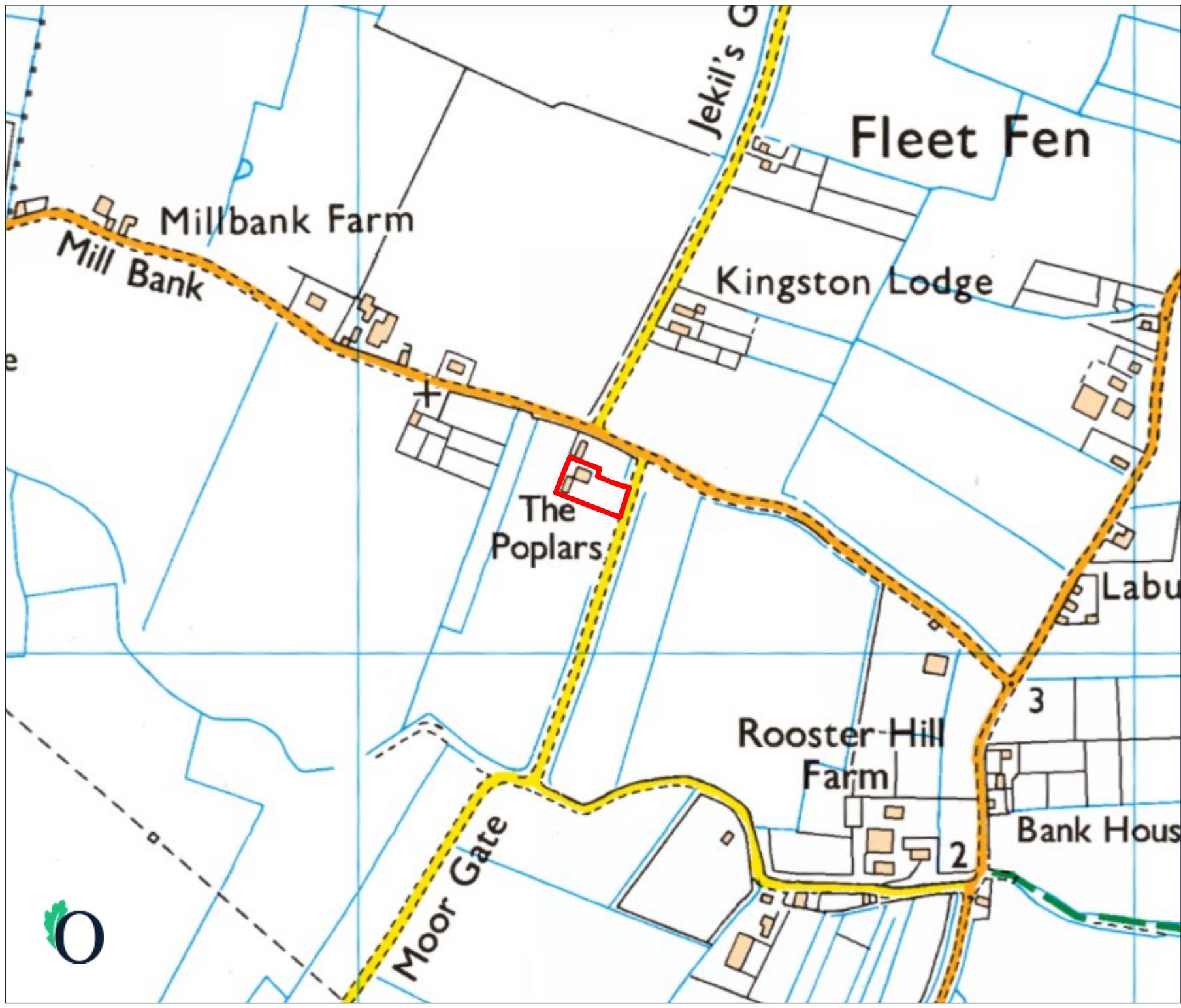
Oakshire Environmental, 2021. *Phase 1 Preliminary Risk Assessment*.

DEFRA, 2014. *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*. London: Department for the Environmental and Rural Affairs

Nathanail, C.P.; McCaffrey, C.; Gillett, A.G.; Ogden, R.C. & Nathanail, J.F., 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Nottingham: Land Quality Press

USEPA, 2021. *Regional Screening Levels (RSLs)*. [online] Available at: <epa.gov/risk/regional-screening-levels-rsls>.

Oakshire Environmental Available at: <oakshireenvironmental.co.uk>.



Appendix A - Site Maps & Plans	
Description	
OS location plan	
Sources	
Contains OS data © Crown copyright and database rights 2021	
Key	
	Site boundary
Name	Figure 1





Appendix A - Site Maps & Plans	
Description	
Proposed site plan, showing sample locations	
Sources	
Key	
	Site boundary
	Existing building outline
	Proposed building outline
	Sample location
Name	Figure 2





Appendix B - Site Photos

Description

Photo of existing yard and access road at the east of the site, facing east

Sources

Oakshire Environmental

Key

Name

Figure 3



Appendix B - Site Photos

Description

Photo of existing agricultural buildings and yard area at the west of the site, facing west

Sources

Oakshire Environmental

Key

Name

Figure 4



Appendix B - Site Photos

Description

Photo of existing grass area at the south of the site, facing south

Sources

Oakshire Environmental

Key

[illegible]

Name

Figure 5



Appendix B - Site Photos

Description

Photo of existing agricultural buildings and grass area at the south west of the site, facing north west

Sources

Oakshire Environmental

Key

Name

Figure 6



Appendix B - Site Photos

Description

Photo of existing grass area at the south of the site, facing north east

Sources

Oakshire Environmental

Key

Name	Figure 7
------	----------



Appendix B - Site Photos

Description

Photo showing location of sample BH01

Sources

Oakshire Environmental

Key

Name

Figure 8



Appendix B - Site Photos

Description	
Photo showing depth of sample BH01	
Sources	
Oakshire Environmental	
Key	

Name	Figure 9
------	----------



Appendix B - Site Photos

Description

Photo showing location of sample BH02

Sources

Oakshire Environmental

Key

Name

Figure 10



Appendix B - Site Photos

Description

Photo showing depth of sample
BH02

Sources

Oakshire Environmental

Key

Name

Figure 11



Appendix B - Site Photos

Description	
Photo showing location of sample BH03	
Sources	
Oakshire Environmental	
Key	

Name	Figure 12
------	-----------



Appendix B - Site Photos

Photo showing depth of sample
BH03

Oakshire Environmental

[illegible]



ANALYTICAL TEST REPORT

Contract no: 106022

Contract name: Verrells

Client reference: -

Clients name: Oakshire Environmental

Clients address: 6 Vine Close
Bottesford
Nottingham
NG13 0FW

Samples received: 17 February 2022

Analysis started: 17 February 2022

Analysis completed: 24 February 2022

Report issued: 24 February 2022

Key

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

Approved by:

Rachael Burton

Reporting Team Lead

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

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

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
106022-1	BH01	0.30	Sandy Loamy Clay with Gravel	-	-	20.2
106022-2	BH02	0.30	Sandy Loamy Clay with Gravel & Roots	-	-	21.2
106022-3	BH03	0.30	Sandy Loamy Clay with Gravel	-	-	21.5

Chemtech Environmental Limited

SOILS

Lab number Sample id Depth (m) Date sampled			106022-1 BH01 0.30 15/02/2022	106022-2 BH02 0.30 15/02/2022	106022-3 BH03 0.30 15/02/2022
Test	Method	Units			
Arsenic (total)	CE127 ^M	mg/kg As	12	22	16
Beryllium (total)	CE127 ^U	mg/kg Be	<1	1.1	1.2
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	0.2	0.3
Chromium (total)	CE127 ^M	mg/kg Cr	53	63	62
Chromium (III)	CE208	mg/kg CrIII	53	63	62
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1
Cobalt (total)	CE127 ^M	mg/kg Co	8.7	11	9.8
Copper (total)	CE127 ^M	mg/kg Cu	16	17	19
Iron (total)	CE127	mg/kg Fe	18362	26518	21567
Lead (total)	CE127 ^M	mg/kg Pb	51	37	45
Manganese (total)	CE127	mg/kg Mn	411	439	429
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	23	29	25
Selenium (total)	CE127 ^M	mg/kg Se	1.1	1.6	1.5
Vanadium (total)	CE127 ^M	mg/kg V	43	66	55
Zinc (total)	CE127 ^M	mg/kg Zn	89	96	93
pH	CE004 ^M	units	7.6	7.8	7.6
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE197	% w/w C	2.1	2.9	2.7
PAH					
Naphthalene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Acenaphthylene	CE087 ^M	mg/kg	<0.02	0.02	<0.02
Acenaphthene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Fluorene	CE087 ^U	mg/kg	<0.02	<0.02	<0.02
Phenanthrene	CE087 ^M	mg/kg	0.11	0.26	0.04
Anthracene	CE087 ^U	mg/kg	0.04	0.04	<0.02
Fluoranthene	CE087 ^M	mg/kg	0.25	0.36	0.15
Pyrene	CE087 ^M	mg/kg	0.22	0.30	0.14
Benzo(a)anthracene	CE087 ^U	mg/kg	0.14	0.16	0.11
Chrysene	CE087 ^M	mg/kg	0.12	0.16	0.10
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.14	0.16	0.14
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.06	0.07	0.06
Benzo(a)pyrene	CE087 ^U	mg/kg	0.12	0.15	0.10
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.09	0.08	0.08
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.08	0.07	0.07
PAH (total of USEPA 16)	CE087	mg/kg	1.37	1.84	0.99
BTEX & TPH					
Benzene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01
Toluene	CE192 ^U	mg/kg	<0.01	<0.01	<0.01

Chemtech Environmental Limited

SOILS

Lab number			106022-1	106022-2	106022-3
Sample id			BH01	BH02	BH03
Depth (m)			0.30	0.30	0.30
Date sampled			15/02/2022	15/02/2022	15/02/2022
Test	Method	Units			
Ethylbenzene	CE192 ^u	mg/kg	<0.01	<0.01	<0.01
m & p-Xylene	CE192 ^u	mg/kg	<0.02	<0.02	<0.02
o-Xylene	CE192 ^u	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	0.02	<0.01	0.01
EPH Aromatic (>EC10-EC12)	CE250	mg/kg	12	<1	9
EPH Aromatic (>EC12-EC16)	CE250	mg/kg	27	<1	28
EPH Aromatic (>EC16-EC21)	CE250	mg/kg	12	<1	14
EPH Aromatic (>EC21-EC35)	CE250	mg/kg	76	<1	104
EPH Aromatic (>EC35-EC44)	CE250	mg/kg	9	<1	8
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE250	mg/kg	<6	<6	<6
EPH Aliphatic (>C12-C16)	CE250	mg/kg	<6	<6	<6
EPH Aliphatic (>C16-C35)	CE250	mg/kg	72	<15	31
EPH Aliphatic (>C35-C44)	CE250	mg/kg	<10	<10	<10
Subcontracted analysis					
Asbestos (qualitative)	\$	-	NAD	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Beryllium (total)	Aqua regia digest, ICP-MS	Dry	U	1	mg/kg Be
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Cobalt (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Co
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Iron (total)	Aqua regia digest, ICP-MS	Dry		38	mg/kg Fe
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Manganese (total)	Aqua regia digest, ICP-MS	Dry		1	mg/kg Mn
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Vanadium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg V
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	As received		0.5	mg/kg PhOH
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE192	Benzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Toluene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Ethylbenzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	m & p-Xylene	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	o-Xylene	Headspace GC-FID	As received	U	0.01	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg

Chemtech Environmental Limited

METHOD DETAILS

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

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

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

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

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

Key

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

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
106022-1	BH01	0.30	N	
106022-2	BH02	0.30	N	
106022-3	BH03	0.30	N	

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

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

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

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

Methods, procedures and performance data are available on request.

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

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

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

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

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

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