



adeptus
ENVIRONMENTAL

LAND CONTAMINATION PHASE 2 SITE INVESTIGATION

17 PROSPECT PLACE

**HEYWOOD
ROCHDALE
OL10 4JQ**

On behalf of:

Direct Construction Works Ltd

Report No.: A240705-R01

Date: August 2024

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1.0 INTRODUCTION

1.1 Background

Adeptus was appointed to undertake a Land Contamination Phase 2 Site Investigation on behalf of Direct Construction Works Ltd (the client) for the site known as 17 Prospect Place. The investigation is required in support of a planning application for redevelopment of the site and to further assess potentially significant contaminant linkages identified in an earlier phase 1 desk study.

Land contamination is a material consideration under the National Planning Policy Framework (2012). This means that local authorities must take the potential or actual presence of contamination into account when considering planning applications.

“Contamination” is defined in BS 10175:2011 as:

presence of a substance or agent, as a result of human activity, in, on or under land, which has the potential to cause harm or to cause pollution.

1.2 Scope and Objectives

The following scope of works has been undertaken:

- Review of desk study and preliminary risk assessment
- Design and implementation of suitable exploratory investigation
- Sample retrieval and laboratory chemical analysis
- Tier 1 quantitative risk assessment
- Update of the initial conceptual site model
- Factual and interpretive reporting

The objectives of the works were as follows:

- Obtain site specific chemical data on potential contaminants
- Provide an assessment of risks to relevant receptors in line with the principles of Environment Agency publication Land Contamination Risk Management (LCRM).

1.3 Supporting Information

Phase 1 Desk Study (STJM, February 2023) Ref: PH1-2023-000007

A site plan is presented as Appendix A.

Other sources of information utilised in producing this report are listed as Appendix B.

2 SITE LOCATION AND DESCRIPTION

This section provides a review of the land use on and in the vicinity of the Site, with the purpose of identifying potential contaminant sources and environmental constraints.

2.1 Location and Description

Table 2-1: Site Summary

Location	The site is situated south of Prospect Place, in a predominantly residential area at the northeast of Heywood.
Grid Reference	385900, 411106 (centred on, approx.)
Area & Shape	0.02 ha – roughly rectangular.
Development Proposals	Erection of a new block of three numbers of terraced dwellings.



Figure 2-1: Site Location (based on the plan in Appendix A)

2.2 Summary of Preliminary Risk Assessment

The risk assessment identified a number of potentially significant pollutant linkages and a moderate risk, suggesting that further assessment should be undertaken.

It was established by review of historical mapping and planning records that the site has been subject to previous potentially contaminative use.

This includes a small domestic garage and unknown ground workings/refuse heap while off site potential sources include allotment gardens (25m w), infilled marl pit (85m SE), 4no. infilled reservoirs (90m SW, 130m S, 135m SE & 240m SW), refuse tip (115m SW) and mutual street historical landfill (217m E). Potential Coal Mine Gas was also identified.

Moderate risk was identified to future site users as a result of potential soil contamination and ground gas.

3 PHASE 2 EXPLORATORY INVESTIGATION

3.1 Scope of Works

An exploratory investigation was designed based on the findings of the desk study. The scope of works was as follows.

- Formation of exploratory boreholes
- Strata logging and sample retrieval
- PID screening of selected samples
- Construction of environmental monitoring installations in selected boreholes
- Chemical laboratory analysis
- Factual and interpretive reporting of investigation findings

3.2 Fieldworks & Testing

3.2.1 Fieldworks

3No windlowless sampler boreholes were advanced to enable strata logging, sample retrieval and installation of environmental monitoring wells.

Fieldworks were completed on the 22nd of July 2024 and are summarised in the table below.

Table 3-1: Fieldworks Summary

Location Reference* and Rationale		Max Depth (mbgl)	Monitoring Wells Response Zone (mbgl)	PID Screening
WS1	At the southwest, targeting proposed back garden and for general coverage.	5.0	1 - 5	0 ppm
WS2	Centrally within the site for general coverage.	5.0	-	0 ppm

WS3	At the northeast for general coverage.	5.0	1 - 5	0 ppm
WS1	At the southeast, targeting proposed back garden and for general coverage.	0.6	-	0 ppm

Notes: * HP = Hand Pit; TP = Mechanically Excavated Trial Pit; WS = Windowless Sampler Borehole; BH = Cable Percussion Borehole | ** + Indicates base of stratum was not reached.

Monitoring installations consisted of 1m of plain pipe with a bentonite seal at the surface to prevent flooding of the response zone with surface water and to prevent atmospheric leakage/ingress. The standpipes were sealed with a bung and valve with a flush fitting cover.

Exploratory hole locations are shown on the plan in Appendix A.

Laboratory Analysis

5No. selected samples were submitted for a range of chemical analyses comprising pH, soil organic matter (SOM); total and speciated polycyclic-aromatic hydrocarbons (PAHs); TPH; metals/metalloids, and asbestos ID.

Samples were also screened on site for VOCs using a hand-held photo ionisation detector. No significant PID readings were obtained.

Analytical work was undertaken by UKAS accredited laboratory. Results are summarised and discussed below, and the lab report is attached as Appendix C, with borehole logs as Appendix D.

3.3 Ground Conditions

Made Ground

Made Ground was encountered in all of the locations, consisting primarily of boiler ash to around 1m, and reworked clay with a high proportion of boiler ash to around 2m in WS2 and WS3, and within WS1 a low proportion of boiler ash to around 3.8m.

Topsoil

Topsoil consisting of silty fine sand with some vey occasional small brick fragment was encountered to a depth of 0.25m in all of the locations.

Superficial Deposits

Soft to firm light brown mottled grey clay was proven to the full dept of 6m in all three boreholes.

Solid Geology

Bedrock was not anticipated or encountered at the investigation depth.

3.4 Groundwater Conditions

No groundwater was encountered.

No visual or olfactory evidence of groundwater contamination was noted.

3.5 Environmental Monitoring

Monitoring of permanent ground gases was carried out via WS1 and WS3. The monitoring results are assessed in Section 4.

4 CONTAMINATED LAND RISK ASSESSMENT

4.1 Human Health Risk Assessment

A Tier 1 (generic) quantitative risk assessment has been undertaken by screening measured contaminant concentrations against reference values for chronic (long term) risk to human health known as generic assessment criteria (GAC).

Concentrations exceeding the relevant screening values are described as 'elevated' and indicate a requirement to further characterise or otherwise address health and environmental risks.

In line with the initial conceptual site model, GAC for the residential with consumption of homegrown produce (RwHP) scenario have been utilised. The GAC are based on 2.5% SOM, the highest available as the measured values were all above this.

The assessment is summarised in Table 4-1, and the source of GAC is indicated in the final column and footnotes to the table.

Table 4-1: Summary of Soil Analytical Results vs Tier 1 Screening Values

Determinand	GAC	Units	No. of Samples	No. of Exceedances	Exceedance Locations	Summary Statistics*			**
						Minimum	Maximum	Average	
Inorganics & Metals / Metalloids									
Asbestos	N/A	-	5	-	-	-	-	-	***
Arsenic	37	mg/kg	5	-	WS1-0.1m (0.49mg/kg) WS2-0.1m (130mg/kg)	17.0	130.0	53.4	1
Barium	1300	mg/kg	5	-	-	120.0	490.0	234.0	2
Beryllium	1.7	mg/kg	5	-	WS1-0.1m (5.6mg/kg) WS1-0.6m(3.2mg/kg) WS2-0.1m (2.9mg/kg)	0.74	5.6	2.8	1
Boron	290	mg/kg	5	-	-	0.00	0.5	0.4	1
Cadmium	11	mg/kg	5	-	-	0.00	2.1	2.1	1

Chromium	910	mg/ kg	5	-	-	16.0	23.0	19.8	1
Copper	2400	mg/ kg	5	-	-	55.0	370. 0	165. 0	1
Lead	200	mg/ kg	5	-	WS1-0.1m (310mg/kg) HP1-0.1m (230mg/kg)	100. 0	310. 0	190. 0	3
Mercury	1.2	mg/ kg	5	-	-	<0.3	<0.3	<0.3	1
Nickel	180	mg/ kg	5	-	-	18.0	72.0	46.6	1
Selenium	250	mg/ kg	5	-	-	0.00	1.8	1.8	1
Vanadium	1200	mg/ kg	5	-	-	34.0	94.0	61.2	1
Zinc	3700	mg/ kg	5	-	-	69.0	510. 0	183. 8	1
Determinand	GAC	Units	5	No. of Exceedances	Exceedance Locations	Summary Statistics*			**
						Minimum	Maxi mum	Average	
PAHs - at 2.5% SOM									
Naphthalene	5.6	mg/ kg	5	-	-	< 0.05	0.4	0.3	1
Acenaphthylene	420	mg/ kg	5	-	-	< 0.05	0.3	0.1	1
Acenaphthene	510	mg/ kg	5	-	-	< 0.05	0.5	0.5	1
Fluorene	400	mg/ kg	5	-	-	< 0.05	0.6	0.4	1
Phenanthrene	220	mg/ kg	5	-	-	0.09	6.9	2.7	1
Anthracene	5400	mg/ kg	5	-	-	< 0.05	2.0	0.9	1
Fluoranthene	560	mg/ kg	5	-	-	0.09	9.7	4.5	1
Pyrene	1200	mg/ kg	5	-	-	0.09	10.0	4.3	1

Benzo(a)anthracene	11	mg/kg	5	-	-	0.05	6.3	2.5	1
Chrysene	22	mg/kg	5	-	-	0.07	6.9	2.7	1
Benzo(b)fluoranthene	3.3	mg/kg	5	-	WS1-0.6m (11mg/kg)	0.07	11.0 0	3.68	1
Benzo(k)fluoranthene	93	mg/kg	5	-	-	< 0.05	5.1	2.1	1
Benzo(a)pyrene	2.7	mg/kg	5	-	WS1-0.6m (13mg/kg) HP1-0.1m (3.3mg/kg)	0.06	13.0	3.9	1
Indeno(1,2,3-cd)pyrene	36	mg/kg	5	-	-	< 0.05	9.2	3.1	1
Dibenz(a,h)anthracene	0.28	mg/kg	5	-	WS1-0.1m (0.34mg/kg) WS1-0.6m (1.5mg/kg) HP1-0.1m (0.3mg/kg)	< 0.05	1.5	0.7	1
Benzo(ghi)perylene	340	mg/kg	5	-	-	< 0.05	12.0	3.9	1

Notes: * Summary statistics based on targeted sampling are provided for information only.

** Source of GAC: 1 = LQM / CIEH (2014) S4UL3785 | 2 = CL:AIRE (2009) Soil Generic Assessment Criteria for Human Health | 3 = Defra (2014) C4SL

*** For asbestos, the number of detections is shown and does not relate to any GAC. N.D = Not detected

TPH results are omitted from the table above for brevity but are presented in Appendix C.

Principal findings of the quantitative screening summarised in Table 4-1 are as follows.

- Arsenic was highly elevated in 2No samples at up to 3.5 times the guideline value
- Beryllium was highly elevated in 3No samples at up to 3.3 times the guideline value
- Lead was elevated in 2No samples at up to 1.6 times the guideline value
- Benzo(b)fluoranthene was highly elevated in 1No sample at 3.3 times the guideline value
- Benzo(a)pyrene was highly elevated in 2No samples at up to 4.8 times the guideline value
- Dibenz(a,h)anthracene was highly elevated in 3No samples at up to 5.4 times the guideline value
- No asbestos was detected in any samples
- The majority of TPH bands were not present above lab detection limits. The small number of heavier end TPHs that were detected remained orders of magnitude below the respective guideline values.

4.2 Controlled Waters Risk Assessment

Groundwater was not encountered during the investigation and no samples could be obtained during the investigation or subsequent monitoring visits. Further to this, established site history and the nature of material encountered within the exploratory locations are not suggestive of a significant source of mobile contamination, and risk is considered to be low.

4.3 Ground Gas Quantitative Risk Assessment

Soil gas flow and steady state concentration readings have been taken over two monitoring visits to date. A summary of the monitoring results is provided in the table below based on the highest values measured.

Gas screening values (GSV) are a function of gas concentration and gas flow from a borehole, and therefore provide an indication of gas flux from the ground. The GSVs below are based on the highest steady state flow rate and concentration of each hazardous gas recorded in any of the wells, thereby giving a worst-case scenario for the risk assessment.

Table 3-2: Summary of Gas Screening Values

Monitoring well ID	aP (mb)	Flow (l/h)	CH ₄ (%)	CO ₂ (%)	VOC (ppm)	O ₂	CH ₄ GSV (l/hr)	CO ₂ GSV (l/hr)	Characteristic Situation	Date
WS1	991	<0.1	0	0.6	0	19.2	0	<0.06	CS1	26/07/24
WS3		<0.1	0	0.3	0	19.0	0	<0.03	CS1	26/07/24
WS1	1007	<0.1	0	0.5	0	20.4	0	<0.05	CS1	01/08/24
WS3		<0.1	0	0.1	0	20.1	0	<0.01	CS1	01/08/24

The monitoring has detected no methane and a maximum carbon dioxide concentration of 0.5%, with detected borehole flow rates of zero.

However, in line with the precautionary approach set out in BS8485, assuming a borehole flow rate at the limit of detection (0.1l/h) a GSV of <0.05l/hr is calculated. The calculated GSV is equivalent to Characteristic Situation 1 (very low risk).

As the Made Ground encountered consisted primarily of reworked clay with ash, the monitoring results are considered consistent with this low organic content material and matrix cohesive material.

Vapours

Total VOC concentrations were also monitored using a ppb RAE handled photoionization detector and no significant concentrations were detected.

4.4 Gas Protection Measures

BS8485 sets out a points system for the selection of appropriate gas protection measures. Essentially, higher characteristic situation sites and more sensitive uses require a greater number of 'points' to be scored in terms of gas protective measures and construction methods.

However, according to the above framework, no specific gas protection measures are required for Characteristic Situation 1 sites.

4.5 Updated Conceptual Site Model

The initial conceptual site model has been updated in Table 4-2, below, to reflect the presence of sources proven by the investigation works.

Table 4-2. Updated Conceptual Site Model

Source	Pathway	Receptor	Consequence	Likelihood	Classification*	Rationale
Contaminants exceeding GAC in soil: • Metals - Arsenic - Beryllium - Lead - PAHS (Benzo(a) pyrene)	Dermal contact, ingestion, particulate inhalation	Future site occupants & users	Medium	Likely	Moderate Risk	The exceedances are distributed across the site, suggesting the whole area is likely to be affected. Given that the proposals are for residential development with gardens, the presence of a significant contaminant linkage with sensitive receptors such as children is likely. Adeptus considered that remediation will be necessary in relation to these elevated levels of PAHs and lead.
	Consumption of homegrown produce		Medium	Low Likelihood	Moderate/Low Risk	

**in the absence of any mitigation or remedial measure*

5 CONCLUSIONS

5.1 Summary

Adeptus was appointed to undertake a Land Contamination Phase 2 Site Investigation on behalf of Direct Construction Works Ltd (the client) for the site known as 17 Prospect Place.

The investigation is required in support of a planning application for redevelopment of the site and to further assess potentially significant contaminant linkages identified in an earlier phase 1 desk study.

The primary objective of the works was to provide a quantitative assessment of risks to relevant receptors in line with the principles of Environment Agency publication 'Land contamination risk management' (LCRM).

Proposals are for erection of a new block of three numbers of terraced dwellings.

The preliminary risk assessment identified a number of potentially significant pollutant linkages and a moderate risk, suggesting that further assessment should be undertaken.

It was established by review of historical mapping and planning records that the site has been subject to previous potentially contaminative use. This includes a small domestic garage and unknown ground workings/refuse heap while off site potential sources include allotment gardens (25m w), infilled marl pit (85m SE), 4no. infilled reservoirs (90m SW, 130m S, 135m SE & 240m SW), refuse tip (115m SW) and mutual street historical landfill (217m E). Potential Coal Mine Gas was also identified.

Moderate risk was identified to future site users as a result of potential soil contamination and ground gas.

A phase 2 investigation was undertaken consisting of 3No. window sampler boreholes advanced to circa 5m to allow gas monitoring, as well as targeted sampling of shallow soil and Made Ground.

Samples were tested for the following range of contaminants: organic matter (SOM), metals suite, PAH (USEPA-16), Total Petroleum Hydrocarbons and asbestos ID.

In summary, highly elevated metals/metalloids and PAHs were detected in several samples taken from across the site.

Therefore, remediation will be required to ensure sensitive receptors are not exposed to elevated contamination or that may otherwise remain in gardens.

Three rounds of ground gas monitoring have been undertaken to date, after a period of equilibration following the fieldworks. A worst-case GSV for carbon dioxide of <0.06l/hr was calculated, which is equivalent to CS1 (very low risk). No methane was detected.

As no significant thickness of Made Ground was encountered and no gas flow detected, the assumption of gas flow rates at the limit of detection produces a conservative assessment.

Additionally, the presence of homogenous very low permeability clays to the full depth of the boreholes indicates a viable pathway with any off-site sources would be very unlikely to exist.

5.2 Recommendations

Measures will be required to ensure soil to a depth of 0.6m in the proposed soft landscaped areas does not contain elevated contamination. The most feasible methods of achieving this would initially appear to be by either:

- a. Excavating to 0.6m below proposed finished levels and reinstating to levels with certified clean topsoil from an approved source; or
- b. Raising finished levels in soft landscaped areas to provide a clean cover system of at least 0.6m thickness.

The 0.6m clean cover system should comprise circa 0.45m of subsoil and at least 0.15m of topsoil, both from an approved source as set out above.

However, the local authority will require further verification of the cover system once in-situ, both in terms of its chemical composition and thickness above the Made Ground remaining in-situ.

In-situ verification should be carried out on the following basis:

- 1No. hand excavated trial pit per 100m² of soft landscaped area
- 2No. samples per hand pit submitted for chemical testing - this being 1No. from each of topsoil and subsoil

Subsoil and topsoil verification samples will be subjected to the following suite of chemical testing to ensure suitability for use in soft landscaped areas.

Human Health

- pH, SOM, As, Ba, Be, W/S Boron, Cd, Cr, Cu, Hg, Pb, Ni, Se, V & Zn, PAH EPA-16, TPH-CWG, Asbestos Screen & ID, pesticide suite.

The above testing results will be screened against guidelines values for human health risk, as follows (in order of preference).

- LQM/CIEH (2015) Suitable 4 Use Levels (S4UL3785)
- Defra (2014) Category 4 Screening Levels
- CL:AIRE (2009) Soil Generic Assessment Criteria for Human Health

Alternatively, it may also be feasible to substitute some proportion of the proposed soft landscaped areas for hard cover such as paving. Permanent hardstandings are considered to sever contaminant linkages with solid phase contaminants in soil.

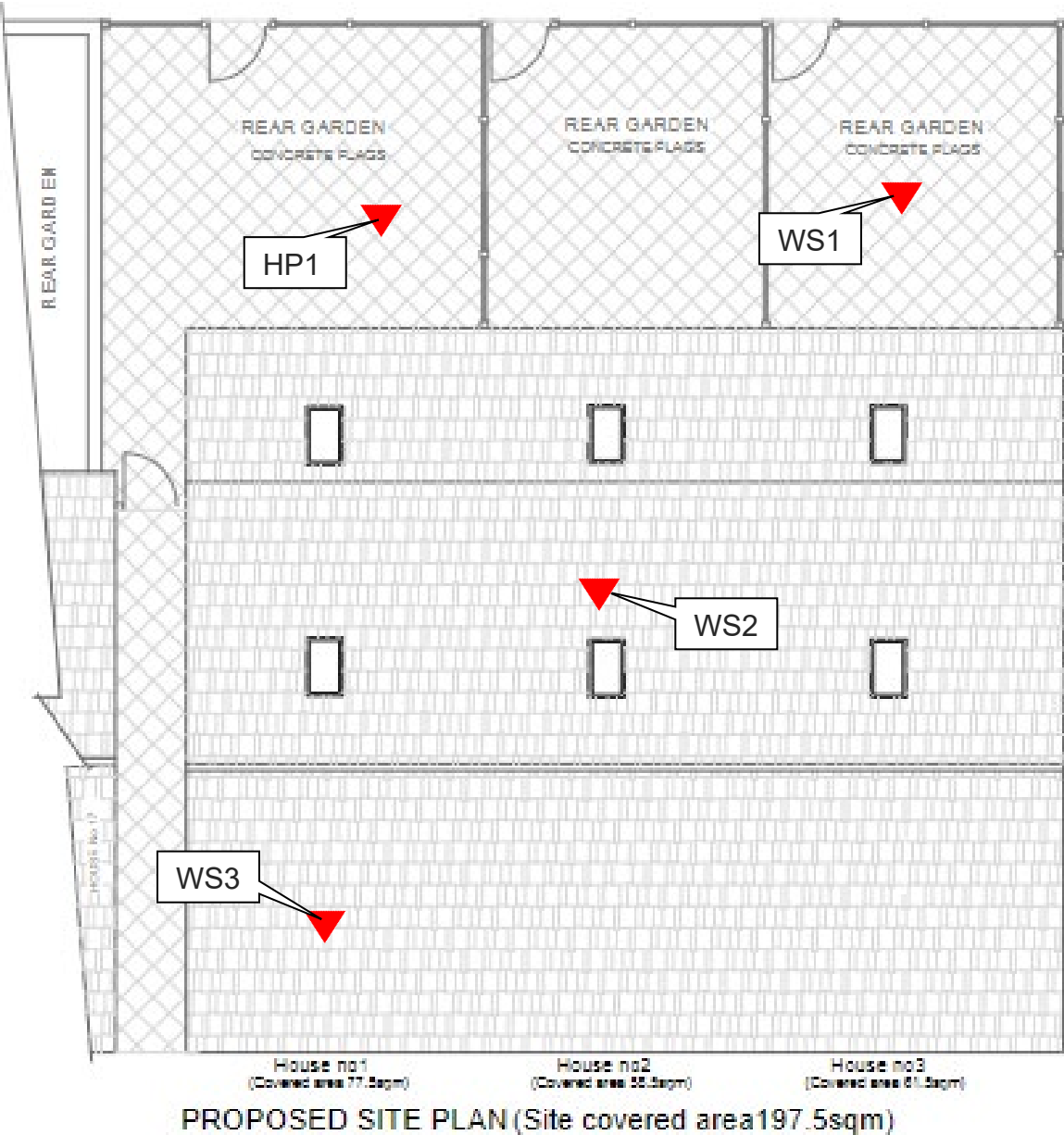
Mitigation will also be required to ensure site workers and adjacent land users are not exposed to short term particulate inhalation. Typically, such measures include the use of the correct PPE and wetting down to prevent fugitive dust.

Following waste classification, any excavated material should be disposed of at a suitably licenced facility.

It is emphasized however that LPA approval should be obtained before any works commence on-site.

N.B.: This summary forms part of the overall risk assessment and should not be viewed or used as an independent report.

APPENDIX A – SITE & EXPLORATORY HOLE LOCATION PLAN





PROPOSED SITE PLAN



PROPOSED BLOCK PLAN @ Scale :1 : 500 on A3

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This drawing is not to be copied or disclosed by or to any unauthorized person without the prior written consent of IPS Architects.

Do not scale from this drawing.

All dimensions are to be checked on site prior to construction, manufacture of any components and ordering of materials and equipment.

Any discrepancies are to be reported to the architects for clarification.

All materials and workmanship to be accordance with the current British Standards and codes of practice.

This drawing is to be read in conjunction with all relevant Architectural Structural Engineers, Mechanical Engineers, Electrical Engineers and Specialists drawings and specifications.

IPS Planning Services 2A Cook Street,
Bury, Lancashire,
email: ipsuk@live.co.uk BL9 0RP,
0161 8717405

Proposed Site Plan
of Land next to 17 Prospect Place, Heywood OL10 4JQ

Scale :1 : 200 on A3	All Dimensions in Meters
Ref.: IPS/R/17/OL104JQ	Date : 10/08/2023
REV:D Date: 12/04/2024	Propsoal
SHT 4a of 9	



APPENDIX B – SUPPORTING INFORMATION

The following information and data sources are utilised in compiling this report:

Phase 1 Desk Study (STJM, February 2023) Ref: PH1-2023-000007

This report is based on information available at the time of writing and is subject to the limitations set out in Appendix E.

APPENDIX C – LABORATORY CERTIFICATE - SOIL RESULTS



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Analytical Report Number : 24-032296

Project / Site name:	17 Prospect Place, Heywood	Samples received on:	23/07/2024
Your job number:	A240705-R01	Samples instructed on/ Analysis started on:	24/07/2024
Your order number:		Analysis completed by:	30/07/2024
Report Issue Number:	1	Report issued on:	30/07/2024
Samples Analysed:	5 soil samples		

Signed: _____

Anna Goc
PL Head of Reporting Team
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

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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.



4041



Environmental Science

Analytical Report Number: 24-032296

Project / Site name: 17 Prospect Place, Heywood

Lab Sample Number				265819	265820	265821	265822	265823
Sample Reference				WS1A	WS1B	WS2A	WS3A	HP1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.60	0.10	0.50	0.10
Date Sampled				22/07/2024	22/07/2024	22/07/2024	22/07/2024	22/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Test Limit of detection	Test Accreditation Status		

Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	13	12	16	13	22
Total mass of sample received	kg	0.1	NONE	2	2	0.5	0.5	0.1

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MJN	MJN	MJN	MJN	MJN

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.4	7.4	7.7	7.7	8.1
Organic Matter (automated)	%	0.1	MCERTS	7.7	6.3	5.4	2.7	4

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.38	0.36	0.28	< 0.05	0.18
Acenaphthylene	mg/kg	0.05	MCERTS	0.05	0.26	< 0.05	< 0.05	0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.43	0.53	< 0.05	< 0.05	0.51
Fluorene	mg/kg	0.05	MCERTS	0.28	0.56	< 0.05	< 0.05	0.23
Phenanthrene	mg/kg	0.05	MCERTS	2.9	6.9	0.33	0.09	3.2
Anthracene	mg/kg	0.05	MCERTS	0.62	2	0.06	< 0.05	0.76
Fluoranthene	mg/kg	0.05	MCERTS	5.6	9.7	0.28	0.09	7
Pyrene	mg/kg	0.05	MCERTS	5.1	10	0.24	0.09	6.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3	6.3	0.15	0.05	2.9
Chrysene	mg/kg	0.05	MCERTS	3	6.9	0.19	0.07	3.4
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	3.3	11	0.14	0.07	3.9
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.6	5.1	0.06	< 0.05	1.5
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.9	13	0.13	0.06	3.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.6	9.2	0.05	< 0.05	1.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.34	1.5	< 0.05	< 0.05	0.3
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.8	12	0.09	< 0.05	1.7

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	32.9	96.2	2.01	< 0.80	36.7
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	49	35	130	17	36
Barium (aqua regia extractable)	mg/kg	1	MCERTS	490	150	190	120	220
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	5.6	3.2	2.9	0.74	1.7
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.5	0.3	0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	2.1	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	19	20	16	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	370	110	170	55	120
Lead (aqua regia extractable)	mg/kg	1	MCERTS	310	100	130	180	230
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	72	46	64	18	33
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.8	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	80	51	94	34	47
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	510	110	90	69	140

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Lab Sample Number				265819	265820	265821	265822	265823
Sample Reference				WS1A	WS1B	WS2A	WS3A	HP1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.60	0.10	0.50	0.10
Date Sampled				22/07/2024	22/07/2024	22/07/2024	22/07/2024	22/07/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Test Limit of detection	Test Accreditation Status		

Petroleum Hydrocarbons

TPHCWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.01	MCERTS	< 0.020	-	-	< 0.020	< 0.020
TPHCWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.01	MCERTS	< 0.020	-	-	< 0.020	< 0.020
TPHCWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.01	MCERTS	< 0.050	-	-	< 0.050	< 0.050
TPHCWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0	< 1.0
TPHCWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	< 2.0	-	-	< 2.0	< 2.0
TPHCWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	-	-	< 8.0	< 8.0
TPHCWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	12	-	-	< 8.0	9.9
TPHCWG - Aliphatic >EC5 - EC35 _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	12	-	-	< 10	< 10

TPHCWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.01	MCERTS	< 0.010	-	-	< 0.010	< 0.010
TPHCWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.01	MCERTS	< 0.010	-	-	< 0.010	< 0.010
TPHCWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.02	MCERTS	< 0.050	-	-	< 0.050	< 0.050
TPHCWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	2.5	-	-	< 1.0	< 1.0
TPHCWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	7.4	-	-	< 2.0	4.1
TPHCWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	22	-	-	< 10	20
TPHCWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	42	-	-	< 10	32
TPHCWG - Aromatic >EC5 - EC35 _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	74	-	-	< 10	56

VOCs

MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	-	-	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	-	-	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	-	-	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	-	-	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	-	-	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	-	-	< 5.0	< 5.0

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

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* 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 *
265819	WS1A	None Supplied	0.1	Brown loam and sand with gravel and vegetation
265820	WS1B	None Supplied	0.6	Brown loam and sand with gravel and vegetation
265821	WS2A	None Supplied	0.1	Brown loam and sand with gravel and vegetation
265822	WS3A	None Supplied	0.5	Brown loam and sand with gravel and vegetation
265823	HP1	None Supplied	0.1	Brown loam and sand with gravel and vegetation

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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
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, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
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	L038B	D	MCERTS
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	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
BTEX and/or Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS	In-house method based on USEPA 8260	L073B	W	MCERTS
Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	Determination of total petroleum hydrocarbons in soil by GC-FID/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L076B/L088	D/W	MCERTS

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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
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099	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 30oC.

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 - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution



Sample Deviation Report



Analytical Report Number : 24-032296

Project / Site name: 17 Prospect Place, Heywood

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
HP1	N/A	S	265823	b	BTEX and/or Volatile organic compounds in soil	L073B	b
HP1	N/A	S	265823	b	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	b
HP1	N/A	S	265823	b	Total petroleum hydrocarbons with carbon banding by GC-FID/GC-MS HS in soil	L076B/L088	b

APPENDIX D – SOIL LOGS

APPENDIX E - LIMITATIONS

This report was prepared by Adeptus (registered in England: 05908395) for the use of the client, named on page 1. The report has been prepared specifically on the basis of the end use as defined by the client. Any change of end use would necessitate review of this report and its findings. Use of or reliance on this report by any third party is not permitted without our express written agreement, and where this is given, will be subject to our terms and conditions.

We have prepared this report in our professional capacity using reasonable skill, care and diligence. The assessments, conclusions and recommendations within this report pertain to the study site (the extents of which are in Figure 1, below) and the immediate area in continuity with the Site. They are based on the established historical uses, information available at the time of writing and the proposed use of the Site. Where any information supplied by the client or other sources have been utilised, it has been assumed that the information is correct. No responsibility can be accepted by Adeptus for inaccuracies in data supplied by any other party.

Any plans, diagrams, cross sections or images are for illustrative purposes only and should be checked for accuracy on-site. In the event of changes to the proposed end use of the Site, the report may require updating to reflect such changes. Although reference may be made to archaeological, ecological or geotechnical issues, invasive species, flood risk and the presence of asbestos containing materials (ACMs), this report does not constitute an archaeological assessment, ecological assessment, geotechnical assessment, invasive species survey, flood risk assessment or asbestos survey and liability for any claim caused by arising out of or in any way involving asbestos is excluded.

New information relating to environmental matters can come to light after the report has been prepared and changes in conditions and regulatory requirements may occur in future. Either of those factors may change the conclusions presented in our report. If development does not take place within the expected timescales, consideration should be given to reviewing this assessment to confirm that no changes to the site or relevant legislation have taken place. No part of this report is intended to provide legal advice or opinion of any nature.