



OUR REF: A5182/22 27th April 2023

Armaan Chohan

By Email (armaan@thepropertyinvestmentclub.com)

Dear Armaan,

Soil Contamination Delineation Letter Report
Dobfield Road, Rochdale

Background

A follow up site investigation has been commissioned by to undertake soil sampling around an area of previously detected soil contamination.

The following reports have previously been prepared for the site by Earth Environmental & Geotechnical Ltd and should be read in conjunction with this Letter Report:

- Earth Environmental & Geotechnical Ltd, Phase II Geo-Environmental Investigation Report (Reference: A5182/22/SI/V3, March 2023)

Reference

Earth Environmental & Geotechnical Ltd were commissioned by the client, to undertake an Environmental Investigation of the site with the following objectives:

- *Assess the presence and likely extent of any potential environmental hazards (soil contamination) associated within the area of contamination.*

Proposed Development

It is understood that the client intends to demolish all existing structures on-site and construct eight new detached residential properties.

The development will include private gardens and parking for each property, along with slight alterations to the existing access.

A site location plan has been provided as Figure 1 overleaf with a development show in Figure 2.

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Figure 1 Site Location Plan



Figure 2 Development Layout Plan



Fieldwork

A site visit was conducted on the 22nd March 2023, to retrieve samples from around three identified “metal” hotspots.

Eighteen hand dug pits (designated HP1 to HP18 inclusive), six around each hotspot location, were excavated to depths of between 0.20m - 0.50m bgl, at distances between 2.50m - 7.00m from the original hotspot location.

All locations were surveyed by use of a Trimble GeoXH GPS instrument that is capable of the measurement of positional accuracy of less than 10cm depending on proximity to trees, structures, and satellite coverage.

Each excavation was sampled and backfilled upon completion.

Sampling locations are shown in Figure 3 below.

Ground Conditions

The BGS records the underlying ground conditions to be glaciofluvial deposits of sand and gravel, with the underlying bedrock recorded to be the Pennine Lower Coal measures.

During the delineation site investigation, the ground conditions generally comprised underlying a sandy CLAY.

HP1 encountered Made Ground comprising slightly sandy, gravelly CLAY, containing gravel of red brick, sandstone, concrete, and tarmac.

Aside from the made ground encountered in HP1, no notable visual and olfactory evidence of contamination was observed during the site sampling process.

Exploratory hole logs can be found as Appendix A.

Figure 3 Exploratory Hole Location Plan



Laboratory Testing

The environmental chemistry of the ground was investigated by specialist analysis of selected samples, scheduled by EEG, and carried out by DETS.

Chemical analyses were carried out on eighteen soil samples and were submitted for the following suite of determinants:

Arsenic, Beryllium, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, Cyanide, Phenol, Sulphate (SO₄), Sulphide, pH, Sulphur, Soil Organic Matter and Speciated Polyaromatic Hydrocarbons (PAH).

Soil Contamination Assessment

At a Tier I stage the long term (chronic) human health toxicity of the soil has been assessed with reference to DEFRA/Environment Agency Contaminated Land Exposure Assessment (CLEA) Soil Guideline Values (SGV) for generic site land uses, soils, and exposure. Where Environment Agency generic guidance is absent, reference has been made to the Chartered Institute of Environmental Health (CIEH) S4ULs for human health risk assessment.

In the case of arsenic, cadmium, hexavalent chromium, lead, and benzo(a)pyrene DEFRA Category 4 Screening levels have been adopted.

For organic chemicals, a Soil Organic Matter (SOM) of 6% has been adopted as the average concentration is 7.1%.

Full results of the chemical analyses are presented in Appendix B and summarised in Table 2 overleaf.

Based on the chemical results shown in Table 2, the samples collected from HP8, HP9, HP10, HP11 and HP18 contained concentrations of contaminants in exceedance of the screening criteria relevant to a residential end use with plant uptake. This refers to exceedances of lead.

Asbestos was not identified in any of the tested samples.

Table 2: Soil Results Comparison with C4SL/S4UL Values

Determinand	C4SL/S4UL Levels SOM 6% (mg/kg)	HP1 0.20m	HP2 0.20m	HP3 0.20m	HP4 0.20m	HP5 0.20m	HP6 0.20m	HP7 0.30m	HP8 0.30m	HP9 0.30m	No of Exceedances
Metals											
Arsenic	37	16	37	29	22	28	31	15	13	17	0
Beryllium	1.7	0.8	1	1.2	1.2	1.2	1.2	0.9	0.8	0.8	0
Boron	290	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0
Cadmium	11	< 0.2	< 0.2	< 0.2	0.3	0.3	0.3	< 0.2	< 0.2	< 0.2	0
Chromium	910	15	18	17	18	18	19	18	18	19	0
Chromium VI	21	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	0
Copper	2400	31	86	81	52	60	78	51	37	70	0
Lead	200	187	199	133	102	140	155	186	547	570	2
Inorganic Mercury	40	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0
Nickel	130	15	18	23	20	20	20	19	18	17	0
Selenium	250	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	0
Vanadium	410	26	38	39	31	33	36	28	26	28	0
Zinc	3700	59	65	66	93	97	105	105	203	162	0
Polycyclic Aromatic Hydrocarbons											
Naphthalene	13	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Acenaphthylene	920	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Acenaphthene	1100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Fluorene	860	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Phenanthrene	440	0.75	0.47	0.28	0.27	0.32	0.2	< 0.1	< 0.1	0.31	0
Anthracene	11000	0.13	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Fluoranthene	890	1.16	0.59	0.24	0.32	0.55	0.15	< 0.1	< 0.1	0.32	0
Pyrene	2000	0.97	0.68	0.25	0.3	0.51	0.13	< 0.1	< 0.1	0.37	0
Benzo(a)anthracene	13	0.39	0.48	0.14	0.19	0.28	< 0.1	< 0.1	< 0.1	0.31	0
Chrysene	27	0.5	0.55	0.24	0.25	0.39	< 0.1	< 0.1	< 0.1	0.28	0
Benzo(a)pyrene	5	0.28	0.33	0.13	0.16	0.23	< 0.1	< 0.1	< 0.1	0.2	0
Benzo(b)fluoranthene	3.7	0.44	0.52	0.25	0.3	0.37	< 0.1	< 0.1	< 0.1	0.27	0
Benzo(k)fluoranthene	100	< 0.1	0.15	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Indeno(1,2,3-cd)pyrene	41	0.17	0.21	< 0.1	< 0.1	0.15	< 0.1	< 0.1	< 0.1	< 0.1	0
Dibenz(a,h)anthracene	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Benzo(ghi)perylene	350	0.15	0.17	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Phenols											
Phenol	1100	< 2	< 2	3	< 2	< 2	3	< 2	< 2	< 2	0

Table 2 continued: Soil Results Comparison with C4SL/S4UL Values

Determinand	C4SL/S4UL Levels Resi w/ HP SOM 6% (mg/kg)	HP10 0.30m	HP11 0.30m	HP12 0.50m	HP13 0.50m	HP14 0.50m	HP15 0.50m	HP16 0.50m	HP17 0.50m	HP18 0.50m	No of Exceedances
Metals											
Arsenic	37	24	25	12	12	9	11	13	15	24	0
Beryllium	1.7	1	0.9	0.9	1	0.7	0.9	0.9	0.8	1	0
Boron	290	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0
Cadmium	22	0.2	0.2	0.2	0.2	< 0.2	0.2	< 0.2	< 0.2	0.2	0
Chromium	910	20	21	18	19	14	17	17	16	20	0
Chromium VI	21	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	0
Copper	2400	329	84	26	28	21	28	31	58	329	0
Lead	200	808	309	48	50	35	46	56	64	808	3
Mercury	40	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0
Nickel	130	16	19	18	21	16	19	18	15	16	0
Selenium	250	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	0
Vanadium	410	29	34	27	30	19	26	30	28	29	0
Zinc	3700	313	116	81	89	63	87	86	64	313	0
Polycyclic Aromatic Hydrocarbons											
Naphthalene	13	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Acenaphthylene	920	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Acenaphthene	1100	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Fluorene	860	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Phenanthrene	440	0.22	0.28	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.22	0
Anthracene	11000	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Fluoranthene	890	0.29	0.53	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.29	0
Pyrene	2000	0.25	0.48	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.25	0
Benzo(a)anthracene	13	0.16	0.27	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.16	0
Chrysene	27	0.26	0.36	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.26	0
Benzo(a)pyrene	5	0.17	0.26	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.17	0
Benzo(b)fluoranthene	3.7	0.34	0.4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.34	0
Benzo(k)fluoranthene	100	0.14	0.15	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.14	0
Indeno(1,2,3-cd)pyrene	41	0.22	0.23	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.22	0
Dibenz(a,h)anthracene	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
Benzo(ghi)perylene	350	0.15	0.15	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.15	0
Phenols											
Phenol	1100	< 2	< 2	3.4	< 2	< 2	< 2	< 2	< 2	< 2	0

Soil Waste Assessment

An assessment of the disposal characteristics of the soil in accordance with Environment Agency guidance WM3.1, edition of June 2018, "Guidance on the classification and assessment of waste" has been carried out on soils recovered from the site, using HazWasteOnline.

The results are summarised in Table 2 below and presented in full in Appendix C.

Table 2: Waste Classification of Soils

Location	Depth (m bgl)	WM3.1 Classification	Comments
HP1	0.20	Non-hazardous	-
HP2	0.20	Non-hazardous	-
HP3	0.20	Non-hazardous	-
HP4	0.20	Non-hazardous	-
HP5	0.20	Non-hazardous	-
HP6	0.20	Non-hazardous	-
HP7	0.30	Non-hazardous	-
HP8	0.30	Non-hazardous	-
HP9	0.30	Non-hazardous	-
HP10	0.30	Non-hazardous	-
HP11	0.30	Non-hazardous	-
HP12	0.30	Non-hazardous	-
HP13	0.50	Non-hazardous	-
HP14	0.50	Non-hazardous	-
HP15	0.50	Non-hazardous	-
HP16	0.50	Non-hazardous	-
HP17	0.50	Non-hazardous	-
HP18	0.50	Non-hazardous	-

The above table shows that all of the soil samples collected during this investigation were classified as **Non-Hazardous** in accordance with WM3.1.

Further Waste Acceptance Criteria (WAC) testing may prove that this material is acceptable as inert waste.

Conclusions & Recommendations

Hotspot TP1 (elevated Arsenic)

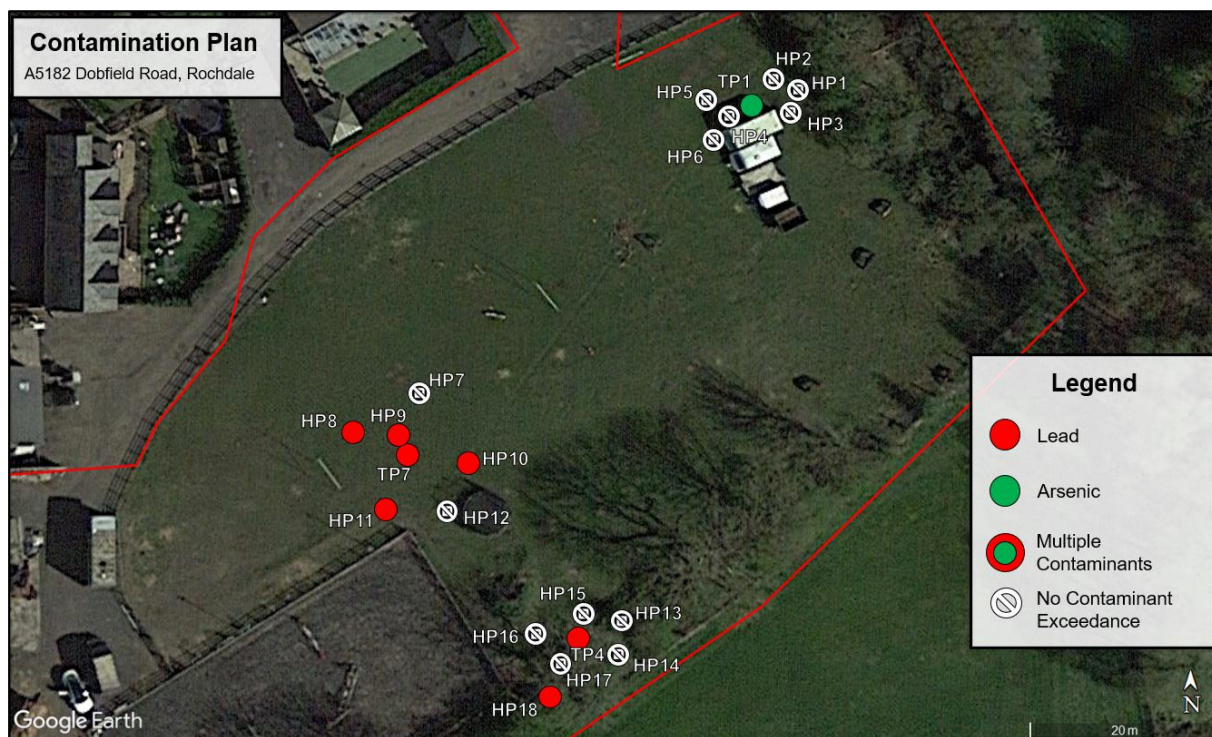
Arsenic soil contamination in exceedance of the screening criteria relevant to a residential end use, was found in TP1 during the original investigation conducted by EEG. The delineation testing proved an absence of further soil contamination. This suggests that the original contamination found in TP1 can be deemed an isolated hotspot.

No remedial action is considered necessary in this area.

Hotspot TP4 & TP7 (elevated Lead)

Lead soil contamination in exceedance of the screening criteria relevant to a residential end use, was found in TP4 and TP7 during the original investigation conducted by EEG. The delineation testing identified additional lead exceedances across the two hotspots, in HP8, HP9, HP10, HP11 (0.30m bgl) and HP18 (0.50m bgl).

Figure 4 Contamination Plan



Remediation

Additional delineation sampling around detected contamination hotspots in the EEG site investigation report has identified further lead contamination around TP4 and TP7.

As a result, a remediation strategy can be created to detail the measures needed to safely develop the area. The remediation strategy would put forth recommendations, such as, removing the hotspots and/or installing a capping layer of clean cover soils. It will also include which plots will require remediation.

The findings of this and the previous reports, as well as the details of any necessary remediation, should be re-visited and formalised in a site-specific remediation strategy that follows this letter report.

Yours Sincerely,

A Czarnecki

Adam Czarnecki
Company Owner

For and on behalf of Earth Environmental & Geotechnical Ltd

*Enclosed: Appendix A – Exploratory Hole Logs
Appendix B – Chemical Testing Results
Appendix C – Soil Waste Assessment*

APPENDIX A

EXPLORATORY HOLE LOGS

APPENDIX B

CHEMICAL TESTING RESULTS

APPENDIX C

SOIL WASTE ASSESSMENT