

Ruddlesden geotechnical

Validation Report

Mount Close, Pontesbury, Shropshire

Housing Plus April 2024 CM/SR/19425/VR/01

REPORT CONTROL SHEET

Site Address	Mount Close, Pontesbury, Shropshire				
Client	Housing Plus				
Report Title	Validation Report				
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CONTENTS

1	I NTF 1.1 1.2	RODUCTION General Scope of Investigation and Structure of Report	1 1 1
2	THE	SITE	2
3	BAC	KGROUND INFORMATION	3
4	FIEL	DWORK	5
5	LAB	ORATORY TESTING	6
6	RES 6.1 6.2 6.3	ULTS OF THE INVESTIGATION General Ground Conditions Encountered Contamination Testing Results	7 7 7 7
7	CON	ICLUSIONS	9
8	LIM	ITATIONS	10
9	TERI	MS AND CONDITIONS	11

APPENDICES

APPENDI X A	PHOTOGRAPHS (9 pages)
APPENDI X B	LABORATORY TESTING RESULTS Contamination Test Results (12 pages) Generic Assessment Criteria (2 pages)
APPENDI X C	VALIDATION TEST LOCATION PLAN (1 page)



1 INTRODUCTION

1.1 General

In April 2024, validation testing was undertaken by Ruddlesden geotechnical at Mount Close, Pontesbury, Shropshire, on behalf of Housing Plus.

As part of a previously undertaken contamination investigation, a contamination risk assessment showed that the levels of contamination recorded at the site were potentially harmful to human health, but not to the controlled waters.

Proposed remedial measures included providing a capping of 600mm of clean topsoil/ subsoil underlain by a geotextile membrane in garden areas.

In order to confirm that the capping of garden areas has been completed satisfactorily and the site is suitable for the proposed end use, validation testing has been undertaken. This testing comprised nine hand-excavated trial pits, with photographs and contamination laboratory testing.

This report covers the validation of the remedial measures carried out for all eighteen plots on the site.

A plan showing the proposed layout and locations tested is included in Appendix C of this report.

1.2 Scope of Investigation and Structure of Report

The scope of investigation comprised the following:

- undertake a representative number of hand-excavated trial pits in the garden areas of the site;
- record and photograph the strata in each pit;
- schedule laboratory testing;
- compare results to relevant generic assessment criteria (GAC); and
- state whether remedial measures have been undertaken correctly.

The report is presented as a description of the procedures employed and the data obtained followed by a discussion of results together with comments on the suitability of the remedial works.



2 THE SITE

The site comprises fourteen semi-detached houses and four semi-detached bungalows, all with accompanying private gardens, parking and infrastructure.

At the time of the validation testing, the soft landscaping on all plots had been recently completed, but turf had not been laid.

Site photographs are included within Appendix A of this report.

The site layout is shown on the validation test location plan (Dwg. No. 19425/10, presented in Appendix C of this report).



3 BACKGROUND INFORMATION

General

The site has been the subject of several ground investigations by Ruddlesden geotechnical, the most recent and relevant of which is the Geotechnical Investigation and Contamination Assessment Report (ref: TB/GD/SR/19425/GICAR/04, dated April 2023).

The contamination remedial measures were set out in Contamination Remediation Strategy (ref: CG/SR/19425/CRS; dated May 2023), also produced by Ruddlesden geotechnical.

Site History

The desk study information indicated that historical coal mining activity has taken place on, and beneath, the site during the late-19th century. However, other than historical mining, the site was not known to have had any land use other than farmland.

Site Geology

The British Geological Survey (BGS) map of the area indicated the site to be underlain by the Carboniferous Halesowen Formation, which is described as grey mudstones with sandstone beds and coal seams.

Ground Conditions Encountered

Nine trial pits typically encountered ground conditions of topsoil and/ or made ground, to depths of between 0.70m and 0.90m, underlain by stiff silty clay, to depths of between 1.30m and 2.90m, underlain by slightly clayey/ silty gravel, occasionally grading into very weak to weak siltstone, to the base of the trial pits, to depths of between 2.50m and 3.90m.

Groundwater was encountered within two of the nine trial pits at depths of 2.45m and 3.00m.

Contamination Testing Results

Elevated levels of heavy metal contamination recorded within the made ground in the northeast of the site, and within both of the topsoil samples tested.

Contamination Risk Assessment

The contamination risk assessment showed that the recorded levels of contamination were potentially harmful to human health given the proposed end use but were unlikely to cause significant pollution to controlled waters.

Contamination Remedial Measures

Proposed remedial measures include providing a capping of at least 600mm of inert topsoil (typically 150mm in depth) and subsoil (typically 450mm in depth) in private garden areas.

Radon

No radon protective measures are required.



Ground Gas

Ground gas protection measures are recommended, to protect against CS2 conditions, in accordance with BS 8485: 2015 (+A1: 2019), i.e. a gas proof membrane and subfloor ventilation beneath all properties.

The membrane is to meet all the criteria set out in BS 8485 and the installation is to be verified by a third party specialist in accordance with CIRIA C735.

It is understood that the installation of the gas proof membrane was verified by a separate, independent third-party specialist.



4 FIELDWORK

All fieldwork was undertaken on 03 April 2024 and carried out in accordance with British Standard BS10175 (2011 (+A2: 2019)): Investigation of Potentially Contaminated Sites – Code of Practice.

Nine hand-excavated trial pits were formed to depths of up to 0.80m in the rear/ private garden areas of Mount Close, Pontesbury.

A close visual inspection of the walls and arisings of the trial pits was made and samples were recovered for laboratory testing from the excavated soils. The samples were placed into amber glass jars and stored in a cool box before being transported to the laboratory by an overnight courier.

Photographs of the ground conditions and soil arisings encountered are presented in Appendix A of this report.

The locations of the validation tests are shown on the photographs (Appendix A) and the validation test location plan (Dwg. No. 19425/10, Appendix C).



5 LABORATORY TESTING

All laboratory testing was scheduled by Ruddlesden geotechnical and the results are presented in Appendix B of this report.

The samples were tested for a range of contaminants considered to provide a reasonable indication of soil cleanliness. Nine samples were tested for the following suites of tests; all of the testing was MCERTS accredited unless stated otherwise:

Asbestos

Presence & identification.

General

pH, soluble sulphate, organic matter.

Heavy Metals/ Metalloids

Arsenic, boron, cadmium, chromium (VI), chromium (total), copper, lead, mercury, nickel, selenium, zinc.

Speciated Polyaromatic Hydrocarbons (PAH)

Acenaphthene,acenaphthylene,anthracene,benzo(a)anthracene,benzo(a)pyrene,benzo(b)fluoranthene,benzo(g,h,i)perylene,benzo(k)fluoranthene,chrysene,dibenzo(a,h)anthracene,fluoranthene,chrysene,dibenzo(a,h)anthracene,fluoranthene,indeno(1,2,3-cd)pyrene,naphthalene,phenanthrene,pyrene.

Total Phenols

Total Phenols (monohydric).

Speciated Extractable Petroleum Hydrocarbons (EPH)

Aliphatic >C5-C6; aliphatic >C6-C8; aliphatic >C8-C10 aliphatic >C10-C12; aliphatic >C12-C16; aliphatic >C16-C21; aliphatic >C21-C34; aromatic >C5-C7; aromatic >C7-C8; aromatic >C8-C10; aromatic >C10-C12; aromatic >C12-C16; aromatic >C16-C21; aromatic >C21-C35.



6 RESULTS OF THE INVESTIGATION

6.1 General

The following sections provide a detailed account of the ground conditions encountered within the garden area during the validation testing.

6.2 Ground Conditions Encountered

Topsoil, comprising dark brown (slightly sandy and occasional rootlets in VT02 and VT03) slightly gravelly clay was encountered in all nine trial pit to depths of between 0.60m and 0.80m.

The topsoil was underlain by a geotextile membrane in all of the hand-excavated trial pits.

In VT05, the membrane was underlain by yellow mottled greyish blue clay.

6.3 Contamination Testing Results

6.3.1 Generic Qualitative Risk Assessment

A Generic Qualitative Risk Assessment (GQRA) has been undertaken to assess the level of risk posed to human health by soil contamination.

The results of the contamination laboratory testing have been compared to Generic Assessment Criteria (GAC) to aid the evaluation of the extent of contamination at the site. If any of the GAC are exceeded, this may be indicative of an unacceptable risk to the health of site-users and that further investigation and/ or remediation is required.

The proposed end use of residential with home grown produce land use has been used in this risk assessment.

Where Soil Guideline Values (SGVs), published by DEFRA and derived from the Contaminated Land Exposure Assessment (CLEA) model, are available, the results of the laboratory testing have been compared against the published SGVs for the proposed end use.

For analytes where SGVs have not yet been produced, GAC produced by Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) have been referenced. The LQM/ CIEH GAC have been derived using the DEFRA and Environment Agency CLEA UK (1.04) model, which is the same methodology as the Government's Soil Guideline Values (SGVs) and is the Environment Agency's currently recommended exposure model.

Category 4 Screening Levels (C4SLs), published by Contaminated Land Applications in Real Environments (CL:AIRE), and supported by DEFRA, are generic screening levels that are more pragmatic but still strongly precautionary compared to the existing SGVs and other similarly derived numbers. The C4SLs are cautious estimates of contaminant concentrations in soil that are still considered to present an acceptable level of risk, within the context of Part 2A, by combining latest information on human health toxicology, exposure assessment and normal ambient levels of contaminants in the environment. C4SLs have therefore been used for comparison for each contaminant where they exist and are relevant.



6.3.2 Generic Assessment Criteria

All the laboratory testing results, together with the Generic Assessment Criteria to which they have been compared, are presented in Appendix B of this report and the implications are discussed in Section 7 of this report.

In summary, none of the nine samples tested exceeded the Generic Assessment Criteria (GAC) for residential with home grown produce land use.

In addition, no asbestos-containing materials (ACMs) were recorded within any of the samples tested at the laboratory.



7 CONCLUSIONS

The ground conditions encountered and photographs (Appendix A) confirm that the capping layer has been installed to a minimum depth of 600mm in the garden areas and that this is underlain by a suitable geotextile membrane.

The laboratory testing (Appendix B) has confirmed that the capping material is suitably clean for its end use in private garden areas.

In conclusion, this testing has demonstrated that the remedial measures have been undertaken satisfactorily in the garden areas, and the site is therefore suitable for the proposed land use, subject to approval by the local authority and/ or warranty provider.



8 LIMITATIONS

- 1. The comments given in this report assume that ground conditions do not vary beyond the range revealed by the investigation. There may, however, be conditions at or adjacent to the site that have not been disclosed by the investigation and which, therefore, have not been considered in this report. Accordingly, a careful watch should be maintained during any future groundworks and the recommendations of this report reviewed as necessary.
- 2. All comments and recommendations relating to groundwater are based on conditions encountered at the time of investigation. It should be noted that groundwater levels might fluctuate according to the season and from year to year. It should also be noted that observations of groundwater flowing into exploratory holes, whilst useful for giving recommendations on the practicalities of construction, may not accurately reflect the long-term groundwater pressures. This can only be fully understood through the installation of groundwater monitoring instruments.
- 3. All third-party data referred to in the report, e.g. laboratory testing, has been obtained in good faith from bona-fide sources. Ruddlesden geotechnical ltd cannot be held liable for any incorrect information supplied to us.
- 4. The location of exploratory holes was limited to the plots completed at the time of the investigation.
- 5. The presence of asbestos-containing materials (ACM) within buildings and invasive plants are outside the scope of this report and should be addressed by respective suitably qualified experts, if necessary.



9 TERMS AND CONDITIONS

- 1. The copyright of this report is owned by Ruddlesden geotechnical ltd. With the exception of the named client, who may copy and distribute the report for purposes directly relating to its commission, this report may not be reproduced, published or adapted without written consent of Ruddlesden geotechnical ltd.
- 2. Assignment of this report to any third party is prohibited without the written consent of Ruddlesden geotechnical ltd.
- 3. New information and updated practices and legislation may necessitate an alteration to this report in whole or in part after its submission. Therefore, with any change in circumstances, including changes to site conditions, this report should be referred to Ruddlesden geotechnical Itd for reassessment and, if necessary, reappraisal.
- 4. Whilst Ruddlesden geotechnical Itd is confident in the findings of this report, the recommendations may not necessarily be accepted by other authorities without question. It is advisable that, where appropriate, the report be submitted to the relevant statutory authorities and approval obtained before detailed design, site works or other irrevocable action is undertaken.
- 5. All samples recovered during this investigation shall be disposed of upon the expiry of 28 days after the issue date of this report, unless agreed otherwise in writing.



APPENDICES



APPENDI X A PHOTOGRAPHS







































APPENDIX B

LABORATORY TEST RESULTS



CONTAMINATION TEST RESULTS



GENERIC ASSESSMENT CRITERIA



Residential with Home Grown Produce Land Use Generic Assessment Criteria (GAC)

Determinand	Unit	GAC	Highest Recorded Value	Location of Highest Recorded Value	No. of values exceeding GAC	Source of GAC
Phenols (total)	mg/kg	1% 2.5% 6% SOM SOM SOM 120 200 380	<2	ALL	0 of 9	S4UL
Naphthalene	mg/kg	1% 2.5% 6% SOM SOM SOM 2.3 5.6 13	<0.1	ALL	0 of 9	S4UL
Acenaphthylene	mg/kg	1% 2.5% 6% SOM SOM SOM 170 420 920	<0.1	ALL	0 of 9	S4UL
Acenaphthene	mg/kg	1% 2.5% 6% SOM SOM SOM 210 510 1100	<0.1	ALL	0 of 9	S4UL
Fluorene	mg/kg	1% 2.5% 6% SOM SOM SOM 170 400 860	<0.1	ALL	0 of 9	S4UL
Phenanthrene	mg/kg	1% 2.5% 6% SOM SOM SOM 95 220 440	<0.1	ALL	0 of 9	S4UL
Anthracene	mg/kg	1% 2.5% 6% SOM SOM SOM 2400 5400 11000	<0.1	ALL	0 of 9	S4UL
Fluoranthene	mg/kg	1% 2.5% 6% SOM SOM SOM 280 560 890	0.22	VT03	0 of 9	S4UL
Pyrene	mg/kg	1% 2.5% 6% SOM SOM SOM 620 1200 2000	0.19	VT03	0 of 9	S4UL
Benzo(a)anthracene	mg/kg	1% 2.5% 6% SOM SOM SOM 7.2 11 13	<0.1	ALL	0 of 9	S4UL
Chrysene	mg/kg	1% 2.5% 6% SOM SOM SOM 15 22 27	0.13	VT03	0 of 9	S4UL
Benzo(b)fluoranthene	mg/kg	1% 2.5% 6% SOM SOM SOM 2.6 3.3 3.7	0.13	VT03	0 of 9	S4UL
Benzo(k)fluoranthene	mg/kg	1% 2.5% 6% SOM SOM SOM 77 93 100	<0.1	ALL	0 of 9	S4UL
Benzo(a)pyrene	mg/kg	1% 2.5% 6% SOM SOM SOM 2.2 2.7 3.0	<0.1	ALL	0 of 9	S4UL
Indeno(1,2,3-cd)pyrene	mg/kg	1% 2.5% 6% SOM SOM SOM 27 36 41	<0.1	ALL	0 of 9	S4UL
Dibenzo(a,h) anthracene	mg/kg	1% 2.5% 6% SOM SOM SOM 0.24 0.28 0.30	<0.1	ALL	0 of 9	S4UL
Benzo(g,h,i)perylene	mg/kg	1% 2.5% 6% SOM SOM SOM 320 340 350	<0.1	ALL	0 of 9	S4UL
Arsenic	mg/kg	37	14	VT01 & VT06	0 of 9	S4UL
Boron (water soluble)	mg/kg	290	<1	ALL	0 of 9	S4UL
Cadmium	mg/kg	11	<0.2	ALL	0 of 9	S4UL
Chromium (VI)	mg/kg	6	<2	ALL	0 of 9	S4UL
Chromium (total)	mg/kg	910	27	VT01	0 of 9	S4UL
Copper	mg/kg	2400	38	VT01	0 of 9	S4UL
Lead	mg/kg	200	68	VT01	0 of 9	C4SL
Elemental Mercury	mg/kg	1.2	<1	ALL	0 of 9	S4UL
Nickel	mg/kg	180	29	VT06	0 of 9	S4UL
Selenium	mg/kg	250	<2	ALL	0 of 9	S4UL
Zinc	mg/kg	3700	217	VT01	0 of 9	S4UL



Benzene	µg/kg	1% SOM 87	2.5% 6% SOM SOM 170 370	<2	ALL	0 of 9	S4UL
Ethylbenzene	µg∕kg	1% SOM 47000	2.5% 6% SOM SOM	37	VT04	0 of 9	S4UL
Toluene	µg/kg	1% SOM 130000	2.5% 6% SOM SOM 290000 660000	<2	ALL	0 of 9	S4UL
m- & p-xylene	µg/kg	1% SOM 115000	2.5% 6% SOM SOM 270000 630000	<2	ALL	0 of 9	S4UL
o-xylene	µg/kg	1% SOM 60000	2.5% 6% SOM SOM 140000 330000	<2	ALL	0 of 9	S4UL
EPH (Aliphatic EC 5-6)	mg/kg	1% SOM 42	2.5% 6% SOM SOM 78 160	<0.01	ALL	0 of 9	S4UL
EPH (Aliphatic EC >6-8)	mg/kg	1% SOM 100	2.5% 6% SOM SOM 230 530	<0.05	ALL	0 of 9	S4UL
EPH (Aliphatic EC >8-10)	mg/kg	1% SOM 27	2.5% 6% SOM SOM 65 150	<2	ALL	0 of 9	S4UL
EPH (Aliphatic EC >10-12)	mg/kg	1% SOM 130	2.5% 6% SOM SOM 330 760	<2	ALL	0 of 9	S4UL
EPH (Aliphatic EC >12-16)	mg/kg	1% SOM 1100	2.5% 6% SOM SOM 2400 4300	<3	ALL	0 of 9	S4UL
EPH (Aliphatic EC >16-35)	mg/kg	1% SOM 65000	2.5% 6% SOM SOM 92000 110000	<10	ALL	0 of 9	S4UL
EPH (Aromatic EC 5-7)	mg/kg	1% SOM 70	2.5% 6% SOM SOM 140 300	<0.01	ALL	0 of 9	S4UL
EPH (Aromatic EC >7-8)	mg/kg	1% SOM 130	2.5% 6% SOM SOM 290 660	<0.05	ALL	0 of 9	S4UL
EPH (Aromatic EC >8-10)	mg/kg	1% SOM 34	2.5% 6% SOM SOM 83 190	<2	ALL	0 of 9	S4UL
EPH (Aromatic EC >10- 12)	mg/kg	1% SOM 74	2.5% 6% SOM SOM 180 380	<2	ALL	0 of 9	S4UL
EPH (Aromatic EC >12- 16)	mg/kg	1% SOM 140	2.5% 6% SOM SOM 330 660	<2	ALL	0 of 9	S4UL
EPH (Aromatic EC >16- 21)	mg/kg	1% SOM 260	2.5% 6% SOM SOM 540 930	<3	ALL	0 of 9	S4UL
EPH (Aromatic EC >21- 35)	mg/kg	1% SOM 1100	2.5% 6% SOM SOM 1500 1700	<10	ALL	0 of 9	S4UL

Key:

- 1. S4UL = Suitable for Use Level
- 2. C4SL = Category 4 Screening Level

Notes:

- 1. Italic entries indicate GAC exceeded.
- Based on a sandy loam soil, as defined in SR3 (Environment Agency (2009): Updated Technical background to the CLEA Model) and 6% SOM (unless otherwise stated).
- 3. S4ULs for phenols, polyaromatic hydrocarbons and total petroleum hydrocarbons will vary according to SOM for all land uses.
- 4. Values are rounded to two significant figures.
- 5. S4ULs assume that free phase contamination is not present.
- 6. S4ULs are based on a sub-surface soil to indoor air correction factor of 1.
- 7. For naphthalene, the S4UL is based on a comparison of inhalation exposure with the TDI_{inhal} for localised effects.
- 8. For chromium (VI), the S4UL is based on comparison of inhalation exposure with inhalation ID.
- 9. Exposure to all xylene isomers should be considered together, because the HCV is based on the intake of total xylene and not an individual isomer in isolation.



APPENDI X C

VALIDATION TEST LOCATION PLAN





N	LEGEND:							
18	Hand Excavated Trial Pit							
PRIJIK R								
52								
	<u>NOTES:</u>							
	Drawn on plan supplied by client.							
	Job Title:	Mount Close Pontesbury Shropshire						
/ .	Drawing Title:	Validation Test Location Plan						
1	Client:	Housing Plus						
	Ruddlesden geotechnical Itd The Stables 65 Langaton Lane Pinhoe Exeter EX1 3SP www.ruddlesden.co.uk							
	Dwg. No:	19425/10						
	Date:	April 2024						
	Scale:	1:500 @ A3						