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VERIFICATION REPORT

FOR

**1-3 CASTLE CRESCENT
READING
RG1 6AQ**



JOMAS ASSOCIATES LTD

6-9 The Square, Stockley Park, Uxbridge, UB11 1FW

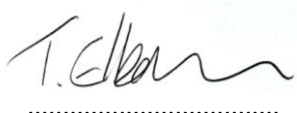
www.jomasassociates.com 0843-289-2187 info@jomasassociates.com

Report Title: Verification Report for 1-3 Castle Crescent, Reading, RG1 6AQ**Report Status:** Final v1.0**Job No:** P9864J1122/TE**Date:** 28/02/2020**Quality Control: Previous Release**

Version	Date	Issued By

Prepared by: JOMAS ASSOCIATES LTD **For:** LUCAS DESIGN

Prepared by
Tom Elbourne BSc (Hons), FGS
Geo-environmental Engineer


.....

Reviewed & Approved by
Suneel Law BSc (Hons), MSc FGS
Principal Geo-environmental
Engineer


.....**Should you have any queries relating to this report, please contact****JOMAS ASSOCIATES LTD****www.jomasassociates.com****0843 289 2187****info@jomasassociates.com**

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1 INTRODUCTION

1.1 Background

1.1.1 Lucas Design ("The Client") has commissioned Jomas Associates Ltd ('Jomas'), to produce a verification report for the site at 1-3 Castle Crescent, Reading, following completion of remedial measures on site.

1.1.2 The proposed development comprised refurbishment of the existing residential building to provide 5No residential dwellings including internal and external alterations alongside demolition of existing coach house and garage along the eastern boundary of the site and development of 8No residential dwellings with communal soft landscaping.

1.1.3 This document is based on the requirements defined within the Remediation Strategy report, prepared following the findings of the Ground Investigation Report.

1.1.4 The following reports have been produced for the site by Jomas. This report should be read in conjunction with the following:

- Phase 1 Geo-environmental Desk Study Report, Lister Geotechnical Consultants, ref 15.07.030, August 2015
- Geo-environmental Assessment (Ground Investigation) Report, Final V2.0 P9864J1122, 22nd September 2017, Jomas Associates Ltd.
- Gas monitoring letter report, ref P9864J1122/ps, dated 21 December 2017, Jomas Associates Ltd.
- Remediation Strategy and Verification Plan for Proposed Development at 1-3 Castle Crescent, Reading, Jomas Associates, P9864J1122, December 2017.

1.1.5 This report seeks to address Condition 13 of planning application ref 151924 granted by Reading Council by providing a final Verification Report to confirm the completion of the required remedial measures. It will also address Condition 15 of the same permission by discussing any additional contamination reported during the development.

1.2 Scope of Works

1.2.1 To date, the following works have been undertaken to achieve compliance with the above referenced Remediation Strategy Report:

- Encapsulation of soils beneath a hardstanding/topsoil cover layer;
- Collection of samples of imported topsoil for chemical analysis.

1.2.2 This report details the above measures to verify that the completed development should be considered suitable for the proposed end use.

1.3 Limitations

- 1.3.1 Jomas Associates Ltd ('Jomas') has prepared this report for the sole use Lucas Design in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of Jomas. No other third party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.
- 1.3.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas has actual knowledge to the contrary, information obtained from public sources or provided to Jomas by site personnel and other information sources, have been assumed to be correct. Jomas does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.
- 1.3.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.

2 SITE ASSESSMENTS - JOMAS

2.1 Ground Investigation Summary

2.1.1 The ground investigation was undertaken by Jomas on 21 July 2017, and consisted of the following:

- 6 No. window sampling boreholes, drilled up to 3.5m below ground level (bgl)
- 3 No. monitoring standpipes;
- Laboratory analysis for chemical and geotechnical purposes.

2.1.2 The results of the ground investigation revealed a ground profile comprising a variable thickness of Made Ground (up to 1.2mbgl depth), overlying deposits of medium dense to very dense sandy gravel, to a maximum depth of 2.8mbgl. These deposits were interpreted as the Taplow Gravel. In one borehole (WS1), cohesive deposits were found to underlie the granular Taplow Gravel, from a depth of 2.80m to the base of the borehole at 3.5mbgl. No materials considered to represent the expected chalk beneath the site were encountered.

2.1.3 Groundwater was not encountered in the exploratory holes during drilling. During return monitoring visits, water was only reported within WS1, at depths between 2.69mbgl and 2.73mbgl.

2.1.4 Visual or olfactory evidence of contamination was not observed during the course of the investigation.

2.1.5 Following generic risk assessments, two soil samples were found to contain concentrations of lead in excess of generic assessment criteria for a residential without plant uptake end use scenario.

2.1.6 In addition, one sample was found to contain zinc concentrations in excess of threshold levels for phytotoxic effects.

2.1.7 UBM BARGE bioavailability testing was undertaken on the samples displaying elevated lead levels to determine whether the elevated lead levels pose a risk to human health. The results indicate that a significant proportion of the lead content is biologically available, and therefore the quantity of bioavailable lead exceeds the generic screening criteria and therefore poses a potential risk to future residents.

2.1.8 Groundwater analysis did not report any elevated levels of contaminants contained within the testing suite. On this basis, the site is not considered to pose a risk to controlled waters.

2.2 Gas Risk Assessment Letter Report

2.2.1 Following the ground investigation, four return monitoring visits were undertaken from 1st August 2017 to 25th August 2017, with a fifth visit undertaken on 14th December 2017 to monitor wells installed within boreholes at the site for soil gas

concentrations and groundwater levels. During these visit atmospheric pressures varied between 984mb and 1018mb, and barometric pressures trends were steady and falling.

- 2.2.2 Although calculation of the Gas Screening Value (GSV) in accordance with BS8485 indicated that the site could be considered Characteristic Situation (CS) 1 and therefore no formal gas protection measures would be considered necessary, elevated carbon dioxide concentrations in excess of 5% required further consideration to be given to upgrading the classification to CS2.
- 2.2.3 Site specific calculations were undertaken to assess the potential for gas build up within the proposed structures on site, taking into account the maximum reported gas concentrations, flow rates and the smallest rooms within the proposed development in order to provide a “worst-case” assessment.
- 2.2.4 The calculations concluded that the site does not pose a significant gas risk and therefore no formal gas protection measures were considered necessary either within the new structures or within the existing structure being retained and redeveloped.

3 VERIFICATION OF REMEDIAL MEASURES

3.1 Topsoil Cover Layer

- 3.1.1 A Jomas engineer attended the site on 20th December 2019 to obtain samples of the topsoil for laboratory analysis to confirm the suitability for use.
- 3.1.2 On excavating pits to obtain samples and verify the required depth of cover layer and presence of the geotextile membrane, it was apparent that the topsoil component of the cover layer was overlying very dense gravelly clay that could not easily be excavated by hand. The Jomas engineer was informed that this material was overlying the membrane, and formed the initial thickness of the required cover layer, underlying the topsoil.
- 3.1.3 It was confirmed by the client that the made ground had been removed from site, following by a placement of a geotextile membrane, followed by making up of levels with demolition crush and imported topsoil.
- 3.1.4 Five hand dug pits were excavated, as shown on the plan provided as Figure 1. The ground conditions observed are described below:

P1

GL – 0.38m: *Very soft consistency* dark brown sandy slightly gravelly clay with strong organic odour and occasional rootlets. Sand is fine. Gravel consists of fine to medium, sub-angular to rounded flint, with occasional brick. (MADE GROUND – Topsoil)*

0.38m - *Red gravel with high cobble content. Gravel consists of fine to coarse, angular to sub-angular brick. Cobbles consist of angular to sub-angular brick. (MADE GROUND).*

P2

GL – 0.40m: *Very soft consistency* dark brown sandy slightly gravelly clay with strong organic odour and occasional rootlets. Sand is fine. Gravel consists of fine to medium, sub-angular to rounded flint, with occasional brick. (MADE GROUND – Topsoil)*

0.40m – *Firm consistency* brown sandy very gravelly clay. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint and brick. (MADE GROUND).*

P3

GL – 0.49m: *Very soft consistency* dark brown sandy slightly gravelly clay with strong organic odour and occasional rootlets. Sand is fine. Gravel consists of fine to medium, sub-angular to rounded flint, with occasional brick. (MADE GROUND – Topsoil)*

0.49m - *Firm consistency* brown sandy very gravelly clay. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint and brick. (MADE GROUND).*

P4

GL – 0.45m: Grass over very soft consistency* mid-brown sandy gravelly clay with slight organic odour and occasional rootlets. Sand is fine. Gravel consists of fine to coarse, sub-angular to rounded flint, with occasional brick. (MADE GROUND – Topsoil)

0.45m – Firm consistency* brown sandy very gravelly clay. Sand is fine. Gravel consists of fine to coarse, angular to rounded flint and brick. (MADE GROUND).

P5

GL – 0.25m: Very soft consistency* dark brown sandy slightly gravelly clay with strong organic odour and occasional rootlets. Sand is fine. Gravel consists of fine to medium, sub-angular to rounded flint, with occasional brick. (MADE GROUND – Topsoil)

0.25m - Firm consistency* light brown sandy very gravelly clay. Sand is fine. Gravel consists of fine to coarse, angular to sub-rounded flint, brick and concrete. (MADE GROUND).

P6

GL – 0.15m: Very soft consistency* dark brown sandy slightly gravelly clay with strong organic odour and occasional rootlets. Sand is fine. Gravel consists of fine to medium, sub-angular to rounded flint, with occasional brick. (MADE GROUND – Topsoil)

0.15m – 0.31m: Soft consistency* brown very sandy very gravelly clay. Sand is fine to medium. Gravel consists of fine to coarse, angular to rounded flint, with occasional brick and ceramic. (MADE GROUND).

3.1.5 Samples of the topsoil were obtained from each of those positions, and 3No sample were scheduled for analysis at a UKAS and MCERTS accredited laboratory for analysis. A future visit was agreed to further excavate the dense material beneath the topsoil to verify the total cover layer thickness and confirm the presence of the geotextile membrane.

3.1.6 On 13th February 2020, a Jomas engineer attended site for the return visit. Four pits were excavated at the locations shown on Figure 2, exposing the presence of the membrane at each location. The ground conditions were as described below:

TP101

GL – 0.25m: Grass over dark brown clayey gravelly sand with occasional rootlets. Sand is fine. Gravel consists of fine to coarse, sub-angular to rounded flint, with occasional brick and concrete. (MADE GROUND – Topsoil)

0.25m – 0.34m: Red sandy gravel. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded brick, with occasional concrete and flint. (MADE GROUND)

0.34m: Black membrane.

TP102

GL – 0.16m: Grass over dark brown clayey gravelly sand with occasional rootlets. Sand is fine. Gravel consists of fine to coarse, sub-angular to rounded flint, with occasional brick and concrete. (MADE GROUND – Topsoil)

0.16m – 0.36m: Red sandy gravel with low cobble content. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded brick, with occasional concrete, flint, glass and slate. Cobbles consist of sub-angular brick. (MADE GROUND)

0.36m: Black membrane.

TP103

GL – 0.30m: Grass over dark brown clayey gravelly sand with occasional rootlets. Sand is fine. Gravel consists of fine to coarse, sub-angular to rounded flint, with occasional brick and concrete. (MADE GROUND – Topsoil)

0.30m – 0.42m: Red sandy gravel with low cobble content. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded brick, with occasional concrete, flint, glass, slate and asphalt. Cobbles consist of sub-angular brick. (MADE GROUND)

0.42m: Black membrane.

TP104

GL – 0.30m: Grass over dark brown clayey gravelly sand with occasional rootlets. Sand is fine. Gravel consists of fine to coarse, sub-angular to rounded flint, with occasional brick and concrete. (MADE GROUND – Topsoil)

0.30m – 0.70m: Red sandy gravel with low cobble content. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-rounded brick, with occasional concrete, flint, glass, slate and asphalt. Cobbles consist of sub-angular brick. (MADE GROUND)

0.70m: Black membrane.

- 3.1.7 Samples of the subsoil directly above the membrane were obtained from each of the pits, with 3No scheduled for analysis at a UKAS and MCERTS accredited laboratory.
- 3.1.8 It is noted that within the pits that exposed the membrane, 1No was slightly below the required 450mm cover layer thickness (420mm) and 2No were approximately 100mm below the required thickness. On the basis that the landscaping is communal

in nature, the subsoil was of such density that it could not be easily dug by hand, and that a membrane has been verified to be present across the site, the reduced thickness in these areas is not considered to pose a risk to end users. It is also noted that in TP104 the thickness of the cover layer was far in excess of the required 450mm.

3.1.9 Site photographs from the validation visits are provided as Figure 3.

3.1.10 In total, 6No samples have been scheduled for analysis to confirm the suitability for use on site. 3 samples of the imported topsoil have been tested and 3 samples of the underlying demolition crush. The samples were tested for the presence of a range of contaminants to assess the suitability of the soil for use in soft landscaped areas on site. The test suite and related information is outlined below:

Table 3.1: Basic Suite of Determinands

DETERMINAND	LIMIT OF DETECTION (mg/kg)	UKAS ACCREDITATION	TECHNIQUE
Arsenic	1	Y (MCERTS)	ICPMS
Cadmium	0.5	Y (MCERTS)	ICPMS
Chromium	5	Y (MCERTS)	ICPMS
Chromium (Hexavalent)	0.02	N	Colorimetry
Lead	5	Y (MCERTS)	ICPMS
Mercury	0.5	Y (MCERTS)	ICPMS
Nickel	5	Y (MCERTS)	ICPMS
Selenium	1	PENDING	ICPMS
Copper	5	Y (MCERTS)	ICPMS
Zinc	45	Y (MCERTS)	ICPMS
Boron (Water Soluble)	0.5	N	ICPMS
pH Value	0.1 units	Y (MCERTS)	Electrometric
Sulphate (Water Soluble)	0.02g/l	Y (MCERTS)	Ion Chromatography
Total Cyanide	1	Y (MCERTS)	Colorimetry
Speciated/Total PAH	0.1/0.4	Y (MCERTS)	GCFID
Phenols	5	Y (MCERTS)	HPLC
Total Petroleum Hydrocarbons (banded)	1	N	Gas Chromatography

3.2 Verification Test Results

3.2.1 The results of the chemical testing are outlined below in Table 2.3. The site-specific criteria used to derive the relevant screening criteria are provided in Table 3.2.

Table 3.2: Site Specific Data

Input Details	Value
Land Use	Residential without plant uptake

Soil Organic Matter 1%

3.2.2 It is noted that within the previously published Remediation Strategy, the verification criteria were set based on a “residential with plant uptake” end use. ON completion of the project it has been confirmed that no private soft landscaping is present, and therefore adoption of “residential without plant uptake” criteria is considered appropriate.

Table 3.3: Soil Laboratory Analysis Results – Metals, Metalloids, Phenol, Cyanide

Determinand	Unit	No. samples tested	Screening Criteria	Min	Max	No. Exceeding
Arsenic	mg/kg	6	40 S4UL	7.4	12	0
Cadmium	mg/kg	6	85 S4UL	<0.2	0.3	0
Chromium	mg/kg	6	910 S4UL	16	19	0
Lead	mg/kg	6	310 C4SL	24	290	0
Mercury	mg/kg	6	56 S4UL	<0.3	<0.3	0
Nickel	mg/kg	6	180 S4UL	8.1	15	0
Copper	mg/kg	6	7100 S4UL	10	21	0
Zinc	mg/kg	6	40000 S4UL	55	120	0
Total Cyanide ^B	mg/kg	6	33 CLEA v 1.06	<1	<1	0
Selenium	mg/kg	6	430 S4UL	<1	<1	0
Boron Water Soluble	mg/kg	6	11000 S4UL	0.4	3.6	0
Phenols	mg/kg	6	440 S4UL	<1	<1	0

Notes: ^B Generic assessment criteria derived for free inorganic cyanide.

Table 3.4: Soil Laboratory Analysis Results – Polycyclic Aromatic Hydrocarbons (PAHs)

Determinand	Unit	No. Samples Tested	Screening Criteria	Min	Max	No. Exceeding
Naphthalene	mg/kg	3	S4UL 2.3	<0.05	<0.05	0
Acenaphthylene	mg/kg	3	S4UL 2900	<0.05	<0.05	0
Acenaphthene	mg/kg	3	S4UL 3000	<0.05	<0.05	0
Fluorene	mg/kg	3	S4UL 2800	<0.05	<0.05	0
Phenanthrene	mg/kg	3	S4UL 1300	<0.05	<0.05	0
Anthracene	mg/kg	3	S4UL 2300	<0.05	0.33	0
Fluoranthene	mg/kg	3	S4UL 1500	<0.05	1.3	0
Pyrene	mg/kg	3	S4UL 3700	<0.05	1.1	0
Benzo(a)anthracene	mg/kg	3	S4UL 11	<0.05	0.63	0

Determinand	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
Chrysene	mg/kg	3	S4UL	30	<0.05	0.60	0
Benzo(b)fluoranthene	mg/kg	3	S4UL	3.9	<0.05	0.64	0
Benzo(k)fluoranthene	mg/kg	3	S4UL	110	<0.05	0.34	0
Benzo(a)pyrene	mg/kg	3	S4UL	3.2	<0.05	0.54	0
Indeno(123-cd)pyrene	mg/kg	3	S4UL	45	<0.05	0.27	0
Dibenzo(ah)anthracene	mg/kg	3	S4UL	0.31	<0.05	<0.05	0
Benzo(ghi)perylene	mg/kg	3	S4UL	360	<0.05	0.34	0
Total PAH	mg/kg	3	-	-	<0.80	6.88	0

Table 3.5: Soil Laboratory Analysis Results – Total Petroleum Hydrocarbons (TPH)

TPH Band	Unit	No. Samples Tested	Screening Criteria		Min	Max	No. Exceeding
C ₈ -C ₁₀	mg/kg	3	S4UL	27	<0.1	<0.1	0
>C ₁₀ -C ₁₂	mg/kg	3	S4UL	130	<2.0	<2.0	0
>C ₁₂ -C ₁₆	mg/kg	3	S4UL	1100	<4.0	<4.0	0
>C ₁₆ -C ₂₁	mg/kg	3	S4UL	1900	<1.0	26	0
>C ₂₁ -C ₃₅	mg/kg	3	S4UL	1900	<10	250	0
Total TPH	mg/kg	3	-	-	<17.1	276	-

Note: *The lower value of guidelines for Aromatic/Aliphatics has been selected

- 3.2.3 In addition to the above, all 6No samples were scheduled for asbestos analysis. No asbestos fibres were detected in any of the samples screened.
- 3.2.4 As shown in the tables above, no contaminants included within the scheduled testing suites returned results above the relevant screening criteria.
- 3.2.5 On this basis the subsoil and topsoil are considered suitable and safe for use on site with a “residential without plant uptake” end use.
- 3.2.6 Topsoil certification and laboratory certificates are provided in Appendix 2

4 SITE OBSERVATIONS - OTHERS

4.1 Reports from Client/Contractor

- 4.1.1 Jomas has not been informed of any further evidence of contamination encountered on site during the progression of works.

4.2 Summary

- 4.2.1 The topsoil and subsoil in use on site has been confirmed as suitable for the proposed end use, and the presence of a membrane has been verified beneath the soil.
- 4.2.2 Gas risk assessment concluded no significant gas risks to be present on site, and therefore no formal gas protection measures are considered necessary.
- 4.2.3 Based upon these findings, the site is considered suitable for its proposed use.

5 REFERENCES

Code Of Practice For Site Investigations BS5930: 1999

Gas monitoring letter report, ref P9864J1122/ps, dated 21 December 2017, Jomas Associates Ltd.

Geo-environmental Assessment (Ground Investigation) Report, Final V2.0 P9864J1122, 22nd September 2017, Jomas Associates Ltd.

Investigation of Potentially Contaminated Sites – Code Of Practise BS10175: 2011

LQM Report No LQ01. Method For Deriving Site-Specific Human Health Assessment Criteria For Contaminants In Soil. April 2003

Model Procedures For The Management Of Contaminated Land, Contaminated Land

Report 11, (CLR11) Environment Agency, September 2004

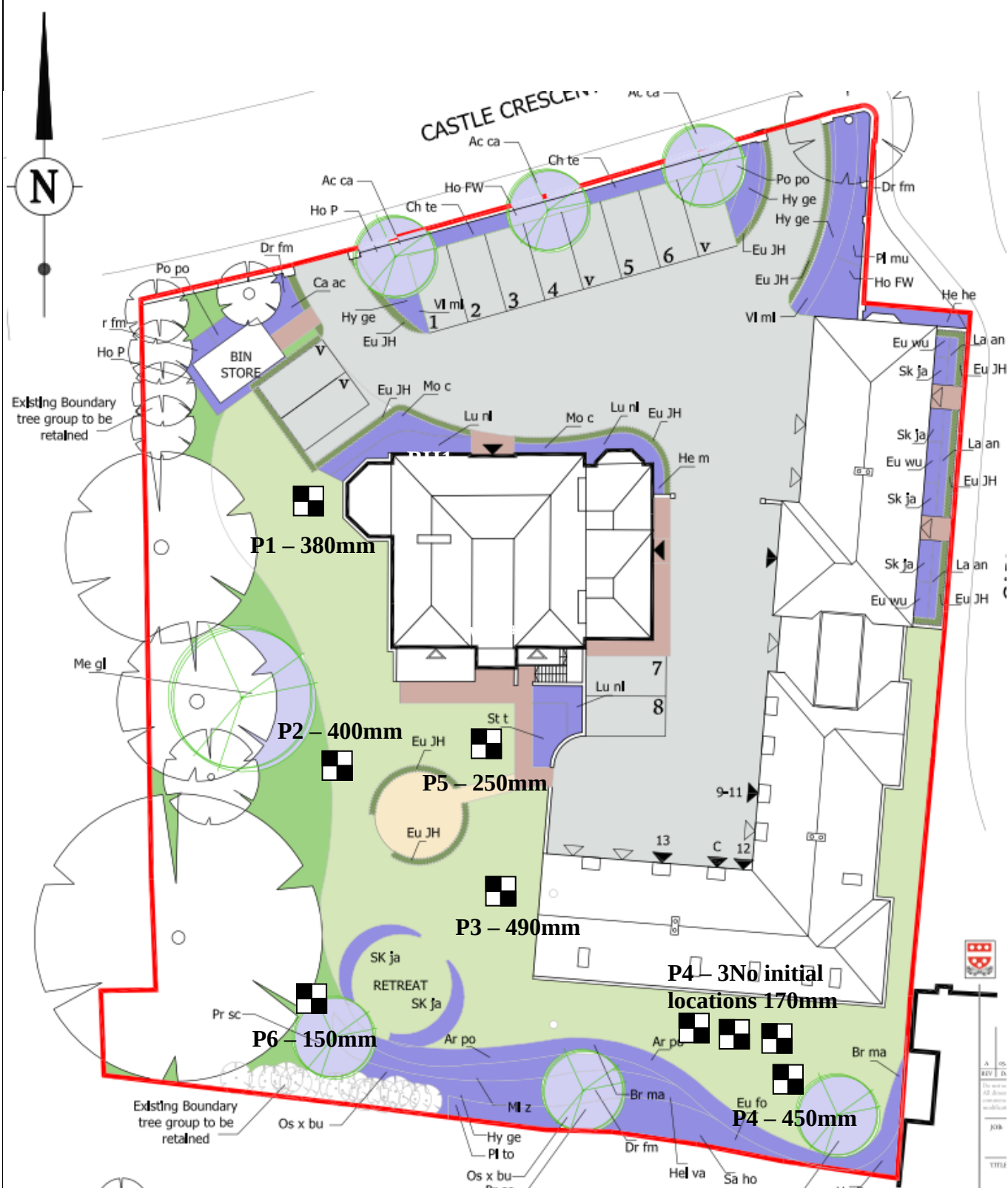
Phase 1 Geo-environmental Desk Study Report, Lister Geotechnical Consultants, ref 15.07.030, August 2015

Remediation Strategy and Verification Plan for Proposed Development at 1-3 Castle Crescent, Reading, Jomas Associates, P9864J1122, December 2017.

APPENDICES

APPENDIX 1 – FIGURES

Project Name	1-3 Castle Crescent	Client	Lucas Design
Project No.	P9864J1122	Date	December 2019
Title	Completed Sampling Positions	Figure	1



Project Name	1-3 Castle Crescent	Client	Lucas Design
Project No.	P9864J1122	Date	February 2020
Title	Validation Sampling Plan (Return Visit)	Figure	2



PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 1: P1 – 380mm topsoil**Photo 2:** P1 – 380mm topsoil

PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 3: P2 – 400mm topsoil**Photo 4:** P2 – 400mm topsoil

PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 5: P3 – 490mm topsoil**Photo 6:** P3 – 490mm topsoil

PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 7: P4 – 450mm topsoil**Photo 8:** P4 – 450mm topsoil

PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 9: P5 – 250mm topsoil**Photo 10:** P5 – 250mm topsoil

PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 11: P6 – 150mm topsoil**Photo 12:** P6 – 150mm topsoil

PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 13: TP101 in the foreground to TP104 in the rear of the photo.



Photo 14: TP101 – membrane at 0.34m



PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 15: TP101 – membrane at 0.34m



Photo 16: TP102 – membrane at 0.36m



PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 17: TP102 – membrane at 0.36m



Photo 18: TP102 – membrane at 0.36m



PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 19: TP103 in the foreground and TP104 in the rear of the photo



Photo 20: TP103 – membrane at 0.42m



PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 21: TP103 – membrane at 0.42m**Photo 22:** TP103 – membrane at 0.42m

PROJECT NAME	1-3 Castle Crescent, Reading	CLIENT	Lucas Design
TITLE	Validation Sampling Photo Plan	FIGURE	3

Photo 23: TP104 – membrane at 0.70m (not visible due to water ingress)



Photo 24: TP104 – membrane at 0.70m (not visible due to water ingress)



APPENDIX 2 – LABORATORY CHEMICAL TEST DATA



Certificate of Analysis

Client: MR ANDREW WEST
(R248) FGS AGRI LTD
 STANFORD BRIDGE FARM
 STATION RD
 PLUCKLEY
 ASHFORD KENT TN27 0RU

Originator: FGS AGRI LTD

Lab ID: 33546 - 412029
Sample ID: COLLIERS TOPSOIL
Sample Weight: 5900g

Date Received: 08/11/2018
Date Reported: 14/11/2018

BS 3882 : 2015 SPECIFICATION FOR TOPSOIL Multipurpose Grade

				Compliant with range (Y/N)					
				Multi-P	Acid	Calc	Low-F	Low-F	Low-F
								Acid	Calc
		Unit	Result						
Texture:	Clay	% w/w	11						
	Silt	% w/w	13						
	Sand	% w/w	76						
	Textural Class		Sandy Loam	Y	Y	Y	Y	Y	Y
					<i>See area of permitted soil textural classes in Fig. 1.</i>				
Organic Matter:		% w/w	6.1	Y	Y	Y	Y	Y	Y
Coarse	>2 mm	% w/w	12.7	Y	Y	Y	Y	Y	Y
Fragment	>20 mm	% w/w	0.7	Y	Y	Y	Y	Y	Y
Content:	>50 mm	% w/w	0.0	Y	Y	Y	Y	Y	Y
Soil pH:			7.3	Y	N	N	Y	N	N
Carbonate:		% w/w	2.2			Y			Y
Available	Nitrogen	% w/w	0.250	Y	Y	Y			
Plant	Phosphorus	mg/l	47.8 (4)*	Y	Y	Y	N	N	N
Nutrients:	Potassium	mg/l	684.4 (5)*	Y	Y	Y			
	Magnesium	mg/l	122.1 (3)*	Y	Y	Y			
Carbon:Nitrogen Ratio:		:1	14.2	Y	Y	Y	Y	Y	Y
Exchangeable Sodium Percentage:		%	2.8						
Phytotoxic	Total Zinc	mg/kg	82.8	Y	Y	Y	Y	Y	Y
Contaminants:	Total Copper	mg/kg	19.5	Y	Y	Y	Y	Y	Y
	Total Nickel	mg/kg	11.2	Y	Y	Y	Y	Y	Y
Visible	> 2mm	% w/w	0.03	Y	Y	Y	Y	Y	Y
Contaminants:	Plastics	% w/w	0.00	Y	Y	Y	Y	Y	Y
	Number of Sharps		0	Y	Y	Y	Y	Y	Y
Additional	Available Sodium	mg/l	77.0						
Analysis:	Available Calcium	mg/l	1748.4						
	Conductivity	uS/cm	2548	Y					
Compliance:				Y	N	N	N	N	N

Results are expressed on a dry matter basis.

* Soil indices from RB209

Released by:

Katie Dunn

Date: 14/11/2018

DECLARATION:

I certify that this sample has been analysed by NRM in accordance with BS 3882 Specification for Topsoil (2015).

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS

Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www:** nrm.uk.com



Emma Hucker

Jomas Associates Ltd
Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: Jomas Associates -

Analytical Report Number : 19-79176

Project / Site name:	1-3 Castle Crescent, Reading, RG1 6AQ	Samples received on:	23/12/2019
Your job number:	JJ1122	Samples instructed on:	23/12/2019
Your order number:	P9864JJ1122.7	Analysis completed by:	06/01/2020
Report Issue Number:	1	Report issued on:	06/01/2020
Samples Analysed:	3 soil samples		

Signed: *Karolina Marek*

Karolina Marek
Technical Reviewer (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

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

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-79176

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

Your Order No: P9864JJ1122.7

Lab Sample Number	1402408	1402409	1402410		
Sample Reference	P1	P2	P4		
Sample Number	P1	P2	P4		
Depth (m)	None Supplied	None Supplied	None Supplied		
Date Sampled	20/12/2019	20/12/2019	20/12/2019		
Time Taken	None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	25	25
Total mass of sample received	kg	0.001	NONE	1.4	1.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected		
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	8.0	8.4		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Total Sulphate as SO ₄	mg/kg	50	MCERTS	610	840	710		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.045	0.060	0.10		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	45.3	60.0	105		

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80		
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.4	9.0	6.7		
Boron (water soluble)	mg/kg	0.2	MCERTS	2.5	3.6	3.5		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	19	18		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	21	19		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	24	26	54		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.2	8.9	8.1		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	55	77	55		

Petroleum Hydrocarbons

Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1		
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TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH (C21 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10		



Analytical Report Number : 19-79176

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

* 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 *
1402408	P1	P1	None Supplied	Brown loam and clay with vegetation.
1402409	P2	P2	None Supplied	Brown loam and clay with vegetation and gravel
1402410	P4	P4	None Supplied	Brown loam and clay with vegetation and gravel

Analytical Report Number : 19-79176

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

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 disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' 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.



Analytical Report

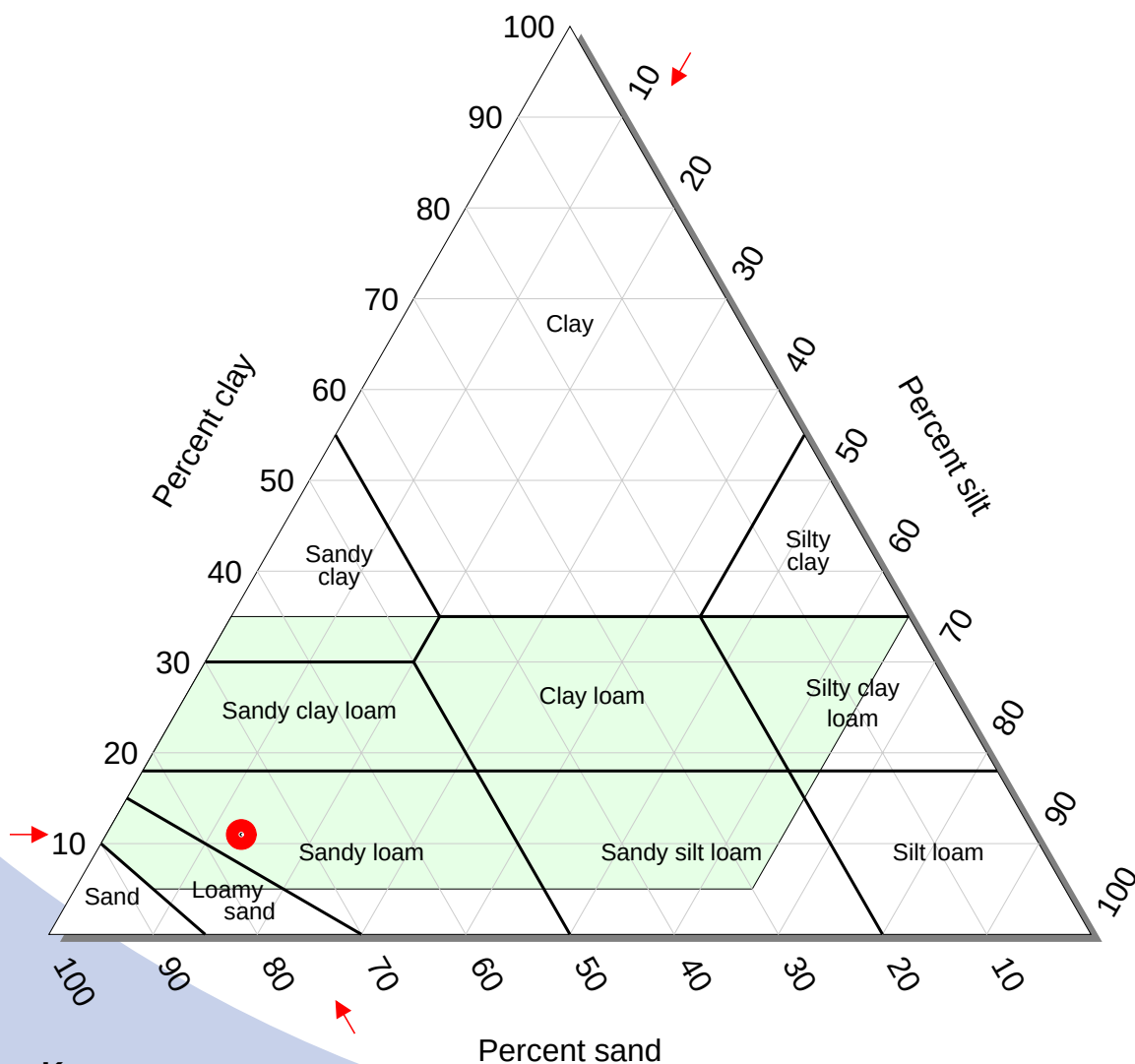
Client: MR ANDREW WEST
(R248) FGS AGRI LTD
STANFORD BRIDGE FARM
STATION RD
PLUCKLEY
ASHFORD KENT TN27 0RU

Originator: FGS AGRI LTD

Lab ID: 33546 - 412029
Sample ID: COLLIERS TOPSOIL
Sample Weight: 5900g

Date Received: 08/11/2018
Date Reported: 14/11/2018

Fig. 1. Textural Class: Sandy Loam (compliant)



Key



Area within which texture of topsoil is required to fall.

**Emma Hucker**

Jomas Associates Ltd
Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: Jomas Associates -

Analytical Report Number : 19-79176

Project / Site name:	1-3 Castle Crescent, Reading, RG1 6AQ	Samples received on:	23/12/2019
Your job number:	JJ1122	Samples instructed on:	23/12/2019
Your order number:	P9864JJ1122.7	Analysis completed by:	06/01/2020
Report Issue Number:	1	Report issued on:	06/01/2020
Samples Analysed:	3 soil samples		

Signed: *Karolina Marek*

Karolina Marek
Technical Reviewer (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.

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

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Analytical Report Number: 19-79176

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

Your Order No: P9864JJ1122.7

Lab Sample Number	1402408	1402409	1402410		
Sample Reference	P1	P2	P4		
Sample Number	P1	P2	P4		
Depth (m)	None Supplied	None Supplied	None Supplied		
Date Sampled	20/12/2019	20/12/2019	20/12/2019		
Time Taken	None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	25	25
Total mass of sample received	kg	0.001	NONE	1.4	1.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected		
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	8.0	8.4		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Total Sulphate as SO ₄	mg/kg	50	MCERTS	610	840	710		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.045	0.060	0.10		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	45.3	60.0	105		

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80		
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.4	9.0	6.7		
Boron (water soluble)	mg/kg	0.2	MCERTS	2.5	3.6	3.5		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	19	18		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	21	19		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	24	26	54		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.2	8.9	8.1		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	55	77	55		

Petroleum Hydrocarbons

Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1		
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TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH (C21 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10		

Analytical Report Number : 19-79176

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

* 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 *
1402408	P1	P1	None Supplied	Brown loam and clay with vegetation.
1402409	P2	P2	None Supplied	Brown loam and clay with vegetation and gravel
1402410	P4	P4	None Supplied	Brown loam and clay with vegetation and gravel

Analytical Report Number : 19-79176

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

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 disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' 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.



Emma Hucker
Jomas Associates Ltd
Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: Jomas Associates -

Analytical Report Number : 20-87039

Project / Site name:	1-3 Castle Crescent, Reading, RG1 6AQ	Samples received on:	14/02/2020
Your job number:	JJ1122	Samples instructed on:	17/02/2020
Your order number:	P9864JJ122.8	Analysis completed by:	21/02/2020
Report Issue Number:	1	Report issued on:	21/02/2020
Samples Analysed:	3 soil samples		


Signed:

Rachel Bradley

Deputy Quality Manager
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.

Analytical Report Number: 20-87039

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

Your Order No: P9864JJ122.8

Lab Sample Number	1442920	1442921	1442922		
Sample Reference	TP102	TP103	TP104		
Sample Number	None Supplied	None Supplied	None Supplied		
Depth (m)	0.30	0.35	0.60		
Date Sampled	13/02/2020	13/02/2020	13/02/2020		
Time Taken	None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	16	12
Total mass of sample received	kg	0.001	NONE	1.4	1.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected		
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	8.1	9.7		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Total Sulphate as SO ₄	mg/kg	50	MCERTS	5400	6200	9300		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	2.0	1.9	2.1		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	2020	1860	2060		
Total Organic Carbon (TOC)	%	0.1	MCERTS	3.2	0.7	0.6		

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.46	0.81		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.21	0.33		
Fluoranthene	mg/kg	0.05	MCERTS	0.29	1.3	1.3		
Pyrene	mg/kg	0.05	MCERTS	0.24	1.1	1.1		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.57	0.63		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.58	0.60		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.63	0.64		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.34	0.34		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.52	0.54		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.27	0.26		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.34	0.33		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	6.29	6.88		
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.2	8.3	12		
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	1.0	1.6		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	16	16		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	13	10	12		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	220	290	250		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	12	14		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	120	93		

Petroleum Hydrocarbons

Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1		
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TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
TPH (C16 - C21)	mg/kg	1	MCERTS	8.5	26	26		

Analytical Report Number: 20-87039

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

Your Order No: P9864JJ122.8

Lab Sample Number				1442920	1442921	1442922		
Sample Reference				TP102	TP103	TP104		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.30	0.35	0.60		
Date Sampled				13/02/2020	13/02/2020	13/02/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
	mg/kg	10	MCERTS	21	250	150		



Analytical Report Number : 20-87039

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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 *
1442920	TP102	None Supplied	0.30	Light brown loam and clay with gravel.
1442921	TP103	None Supplied	0.35	Light brown loam and clay with gravel.
1442922	TP104	None Supplied	0.60	Light brown loam and clay with gravel.

Analytical Report Number : 20-87039

Project / Site name: 1-3 Castle Crescent, Reading, RG1 6AQ

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

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 disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' 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.