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Remedial Methodology Verification

Battle Hospital, Portman Way, Reading, RG30 1AN

Bellway Homes Limited (Thames Valley)

CRM.1265.007.GE.R.003.A

'Experience and expertise working in union'

enzygo.com

Battle Hospital, Portman Way, Reading, RG30 1AN
Bellway Homes Limited (Thames Valley)

AGS Association of Geotechnical & Geoenvironmental Specialists

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Remedial Methodology

Project:	CRM.1265.007.GE.R.003.A
For:	Bellway Homes Limited (Thames Valley)
Status:	Revision A
Date:	March 2023
Author:	Richard Reece **Environmental Consultant**
Reviewer:	Steve Rhodes **Director**

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1.0 INTRODUCTION

1.1 Background

1.1.1 Enzygo Geo Environmental Limited were commissioned by Bellway Homes Limited (Thames Valley) to prepare a Remedial Methodology for the proposed re-development of a former hospital site, for residential use comprising a mixture of apartments with communal open space and residential houses with domestic gardens. The scheme also includes areas of public open space.

1.2 Previous Ground Investigations

1.2.1 Previous Phase I Desk Study and subsequent Phase II Intrusive Ground Investigations were undertaken at the site by RSK. An assessment of the risk to human health was undertaken by comparison to GAC values. This showed exceedances of Lead, Polycyclic Aromatic Hydrocarbons (PAH) and Asbestos within the Made Ground.

1.2.2 Concentrations of hydrocarbons were recorded in groundwater exceeding Environmental Quality Standards (EQS).

1.2.3 Ground gas and flow rates reported by RSK confirm that the central and northern areas of the site fall within Characteristic Situation 2 of CIRIA C665. The south eastern area of the site falls within Characteristic Situation 1 of CIRIA C665.

1.3 Remediation Strategy

1.3.1 In order to better assess the potential risk to controlled waters a Detailed Quantitative Risk Assessment (DQRA) was prepared by Enzygo Geo Environmental Limited and is incorporated into report CRM.1265.007.GE.R.001.

1.3.2 A Remedial Methodology was prepared by Enzygo Geo Environmental Limited providing details of the proposed remedial works. The Remedial Methodology incorporates the DQRA derived remedial targets for protection of controlled waters. The Remedial Methodology is presented in report CRM.1265.007.GE.R.002A which was submitted to the Local Planning Authority and was approved. The approved remediation strategy is summarised below:

- Above ground tanks to be removed together with any soils with contamination exceeding the DQRA derived remedial targets for protection of controlled waters;
- Ground Gas protective measures meeting the requirements of Characteristic Situation (CS)2 required to the ground floor slabs of selected buildings due to elevated ground gas risk. The extent of the gas protective measures is shown on Drawing CRM.1265.008.GE.D.002;
- Use of barrier pipe to potable water pipes;
- Use of buildings and hardstanding to break the potential pollutant linkage. Clean cover soils over a Geo Textile Barrier to soft landscape areas, to break the pollutant linkage between residual contaminants in the underlying soils and future site users.

1.3.3 None of the contaminants identified in groundwater by RSK exceeded the DQRA derived remedial target values and so the risk from groundwater below the site was dismissed.

1.4 Supplementary Investigation

1.4.1 In order to better assess the potential extent of source removal for controlled waters remediation and to supplement the previous investigation works undertaken by RSK, a supplementary investigation was undertaken on 13th March 2019 by Enzygo Geo Environmental Limited.

1.4.2 The supplementary investigation comprised twelve trial pits (TP1 to TP12) and was undertaken following removal of tanks and demolition of structures so allowing access into areas where RSK could not previously access. Locations of the trial pits are shown on Drawing CRM.1265.007.GE.D.003.

1.4.3 Chemical results from the supplementary investigation are included in Appendix A and confirmed exceedances of the DQRA values below the former tanks (TP1), and also identified another hotspot (TP11) located below a former building.

2.0 CONTROLLED WATERS REMEDIATION

2.1 General

2.1.1 The approved remedial methodology was to remove tanks and excavate hydrocarbon impacted soils, which exceeded the Controlled Waters Remedial Target values included in the Remedial Methodology and which are included in Appendix B.

2.1.2 Locations of the hydrocarbon areas remediated are shown on Drawing CRM.1265.007.GE.D.004 and details of the source areas, their remediation and validation are discussed in the sections below:

2.2 Fuel Tanks

2.2.1 Excavation below the heating oil tanks was undertaken during May and June 2019 and involved excavation of an area around the tanks. Excavation was undertaken down to the groundwater depth and the extent of the excavation is shown on Drawing CRM.1265.007.GE.D.004.

2.2.2 Following removal of soils, the sides and base of the excavation were sampled -HP East, HP West, HP North, HP South, HPB and HP Base 2. Locations of the samples are shown on Drawing CRM.1265.007.GE.D.004.

2.2.3 Laboratory tests confirm that hydrocarbon concentrations within residual soils in the base and sides of the excavation were below the Controlled Water Remedial target values. Results are included in Appendix C.

2.3 Attenuation Tank

2.3.1 An underground tank was encountered within the area of a proposed attenuation tank, the location of which is shown on Drawing CRM.1265.007.GE.D.004. The tank was removed.

2.3.2 An investigation was undertaken by Enzygo Geo Environmental Limited on 6 February 2019 with the excavation of eight trial pits (TPA to TPC and TPE to TPI) within the area of the proposed attenuation tank.

2.3.3 Locations of the pits are shown on Drawing CRM.1265.007.GE.D.004, and chemical results of the samples collected show no exceedances of the Controlled Water Remedial target values. Results are included in Appendix C.

2.4 Trial Pit TP11

2.4.1 The hydrocarbon hotspot encountered in Trial Pit TP11 was excavated during March 2019, the location and extent of the excavation is shown on Drawing CRM.1265.007.GE.D.004. The excavation was validated on 1st April 2019 with five samples (TP11A to TP11D and TP11 Base) being collected and tested.

2.4.2 The locations of the samples is shown on Drawing CRM.1265.007.GE.D.004.

2.4.3 Results of the chemical testing are included in Appendix C and the results show no exceedance of the Controlled Water Remedial target values.

2.5 Unforeseen Contamination

2.5.1 No other contamination sources were encountered during the site preparation works.

3.0 GROUND GAS

3.1 General

3.1.1 As Ground Gas was detected during the monitoring phase of the site investigation within the central and northern areas of the site, these areas fall into Characteristic Situation 2 of CIRIA C665.

3.1.2 Gas protection measures were proposed, comprising of a ventilated underfloor void, and installation of gas membranes within the effected structures to mitigate the presence of Methane. The south eastern area of the site falls within Characteristic Situation 1 of CIRIA C665, therefore no gas protection measures are required in this area. These areas are shown on drawing CRM.1265.007.GE.D.002.

3.2 Verification

3.2.1 Installation of the membrane was to be undertaken by a licenced contractor during the construction phase. As the installation was undertaken by experienced professionals, independent verification is not required.

3.2.2 Independent verification of the installation of the gas membrane would not be required, as the contractors undertaking the installation were to be suitably qualified to provide self-certification.

3.2.3 Photographs and certification of the Gas membrane installation are included in Appendix D.

4.0 SOFT LANDSCAPING

4.1 General

4.1.1 As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed, due to the presence of Lead, Polycyclic Aromatic Hydrocarbons (PAH) and Hydrocarbons within Made Ground. Asbestos fibres were also detected.

4.1.2 Made Ground materials were to be removed to sub formation level, 400mm below finish level within communal garden areas, and 600mm below finish level within private gardens. A Geo Textile Membrane no dig barrier was then to be placed, to prevent new soils intermixing with any possible remaining contamination beneath, and covered with clean materials incorporating a minimum 150mm Topsoil, creating and effective capping system.

4.2 Inspections

4.2.1 As areas became available for testing during the construction phase, Hand Pits were to be excavated within the soft landscaping areas in the locations shown on attached drawing CRM.1265.007.GE.D.001 in line with the approved RMS. These Hand Pits would be used to show the depths of the soils placed, confirm the presence of the Geo Textile Membrane, and to retrieve samples for chemical testing to confirm the soils used meet the relevant GAC Values.

4.2.2 All Hand Pits excavated, showed sufficient depths within the respective areas – 600mm within private gardens and 400mm within areas of communal landscaping. Samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

4.3 Chemical Testing

4.3.1 Soil samples from the validation pits were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that was cleaned at each sampling location.

4.3.2 Soil samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and Asbestos screen.

4.3.3 Verification letters CRM.1265.007.GE.L.001 – CRM.1265.007.GE.L.011 were produced following each verification inspection. These are shown in Appendix E.

4.3.4 Chemical results from the samples collected were compared to the relevant GAC values, which are shown in Appendix F. Throughout the verification process, no exceedances were identified.

4.3.5 All waste transfer tickets are shown in Appendix G.

4.3.6 All imported soils tickets are shown in Appendix H.

5.0 POTABLE WATER PIPES

5.1 Assessment

5.1.1 Chemical analysis results were provided to the local water authority for assessment in relation to the requirement for barrier pipe. It was determined that barrier pipe would be used for potable water to protect from any remaining or unforeseen contamination.

5.2 Confirmation

5.2.1 The client has confirmed that barrier pipe has been installed inline with the agreement with Thames Water.

5.2.2 A signed statement is included in Appendix I.

6.0 SUMMARY AND CONCLUSION

6.1 Summary Of Works Undertaken

6.1.1 During the demolition phase, contamination was encountered below the existing buildings, as expected from the original RSK investigation. Contamination was delineated and removed in accordance with the approved RMS.

6.1.2 Removal of material showing visual or olfactory evidence of gross contamination was undertaken, and the exposed excavation inspected and sampled in accordance with the agreed RMS and no changes were required or made to the remedial strategy.

6.1.3 All buildings requiring gas mitigation measures were installed with ventilated underfloor voids, and gas membranes.

6.1.4 Remediation to the soft landscaping areas was undertaken throughout the construction phase, and verified as areas were completed. No unforeseen contamination was identified, and soils tested meet the GAC Values detailed in the RMS.

6.1.5 Barrier pipe for potable water has been installed onsite in line with the agreement with Thames Water.

6.2 Conclusion

6.2.1 Based on the site inspections undertaken, information provided and chemical analysis results, it is considered that the remediation works undertaken on site are in line with the approved RMS.

6.2.2 This report has been prepared to discharge Conditions 19, 20 and 23 of planning application 180319 produced by Reading Borough Council.



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001



Key

- SIte Boundary
- Building Requiring Gas Protective Measures

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: MG

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Gas Protective Measures

FIGURE NO: CRM.1265.007.GE.D.002



Key

Site Boundary

Trial Pit Locations (TP)
(TP1 - TP12)

Notes:

- Do not scale for construction purposes.
- All dimensions are in meters unless stated otherwise.
- This drawing is to be read in conjunction with all relevant drawings and documents associated with this project.
- All existing and proposed dimensions, levels and locations to be checked and verified by the main contractor on site prior to the commencement of the works and any anomalies reported to the engineer.

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Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:
Bellway Homes Limited
(Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: MG

CHECKED: SR

DATE: Feb 2023

PROJECT:
Portman Way, Reading

TITLE:
Supplementary Investigation

FIGURE NO:
CRM.1265.007.GE.D.003



0 20 40 60 80 100m

Scale 1:1,000@A3

Key

- Site Boundary
- Source Removal Area
- Trial Pit Locations (TP)
- Hand Pit Locations (HP)

Notes:

- Do not scale for construction purposes.
- All dimensions are in meters unless stated otherwise.
- This drawing is to be read in conjunction with all relevant drawings and documents associated with this project.
- All existing and proposed dimensions, levels and locations to be checked and verified by the main contractor on site prior to the commencement of the works and any anomalies reported to the engineer.

enzygo environmental consultants
Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: MG

CHECKED: SR

DATE: Feb 2023

PROJECT: Portman Way, Reading

TITLE: Source Removal Plan

FIGURE NO: CRM.1265.007.GE.D.004

Appendix A - Supplementary Investigation Laboratory Results

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Herts,
WD18 8YS

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e: reception@i2analytical.com

Analytical Report Number : 19-33686

Project / Site name:	Battle Hospital Reading	**Samples received on:**	20/03/2019
Your job number:	CRM.1265.007	**Samples instructed on:**	20/03/2019
Your order number:		**Analysis completed by:**	26/03/2019
Report Issue Number:	1	**Report issued on:**	26/03/2019
Samples Analysed:	23 soil samples		

Signed:

Dr Claire Stone
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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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-33686

Project / Site name: Battle Hospital Reading

Lab Sample Number				1181208	1181209	1181210	1181211	1181212
Sample Reference				TP1	TP1	TP2	TP2	TP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60-2.70	3.40	1.50-2.20	2.70	0.80-2.40
Date Sampled				14/03/2019	14/03/2019	14/03/2019	14/03/2019	14/03/2019
Time Taken				None Supplied	None Supplied	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	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	45	25	42	65	45
Total mass of sample received	kg	0.001	NONE	0.47	0.50	0.51	0.40	0.46
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	2.1	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	35	< 1.0	32	19	28
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	710	< 2.0	44	24	39
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	2000	< 8.0	81	28	73
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	570	< 8.0	360	89	250
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	3300	< 10	520	160	390
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	20	< 1.0	21	9.8	22
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	400	< 2.0	19	9.9	18
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	820	< 10	44	19	56
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	200	< 10	160	58	210
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	1400	< 10	240	97	310

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-33686

Project / Site name: Battle Hospital Reading

Lab Sample Number				1181213	1181214	1181215	1181216	1181217
Sample Reference				TP3	TP4	TP4	TP5	TP5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00	1.30-2.40	2.70	1.70-2.80	3.20
Date Sampled				14/03/2019	14/03/2019	14/03/2019	14/03/2019	14/03/2019
Time Taken				None Supplied	None Supplied	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	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	16	50	50	40	31
Total mass of sample received	kg	0.001	NONE	0.50	0.45	0.43	0.49	0.48
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	14	< 1.0	34	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	24	< 2.0	60	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	37	< 8.0	99	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	150	< 8.0	430	26
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	220	< 10	620	26
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	34	4.9	22	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	29	8.3	71	5.3
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	87	27	620	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	250	65	970	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	400	110	1700	< 10

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-33686

Project / Site name: Battle Hospital Reading

Lab Sample Number				1181218	1181219	1181220	1181221	1181222
Sample Reference				TP6	TP6	TP7	TP8	TP8
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.90-1.80	2.70	0.80-2.40	1.50-2.60	4.20
Date Sampled				14/03/2019	14/03/2019	14/03/2019	14/03/2019	14/03/2019
Time Taken				None Supplied	None Supplied	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	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	28	16	46	36	28
Total mass of sample received	kg	0.001	NONE	0.24	0.55	0.49	0.42	0.50
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	22	< 1.0	42	34	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	28	< 2.0	100	41	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	29	< 8.0	290	41	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	80	< 8.0	1100	210	24
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	160	< 10	1500	320	24
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	7.8	< 1.0	7.7	22	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	12	< 2.0	35	24	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	20	< 10	280	100	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	47	< 10	780	430	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	87	< 10	1100	580	< 10

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Analytical Report Number: 19-33686

Project / Site name: Battle Hospital Reading

Lab Sample Number				1181223	1181224	1181225	1181226	1181227
Sample Reference				TP9	TP9	TP10	TP10	TP11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-1.80	3.20	0.00-0.90	2.00	0.70-2.20
Date Sampled				14/03/2019	14/03/2019	14/03/2019	14/03/2019	14/03/2019
Time Taken				None Supplied	None Supplied	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	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	16	15	15	45
Total mass of sample received	kg	0.001	NONE	0.49	0.54	0.50	0.47	0.46
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	1.1	15	57
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	2.2	30	320
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	32	780
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	59	45	1800
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	67	120	2900
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	1.0	10	19	21
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	3.8	18	33	550
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	11	< 10	40	53	2700
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	58	23	130	59	2100
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	69	34	200	160	5400

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Analytical Report Number: 19-33686

Project / Site name: Battle Hospital Reading

Lab Sample Number				1181228	1181229	1181230		
Sample Reference				TP11	TP12	TP12		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				3.20	0.10-2.70	3.40		
Date Sampled				14/03/2019	14/03/2019	14/03/2019		
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	< 0.1		
Moisture Content	%	N/A	NONE	16	37	40		
Total mass of sample received	kg	0.001	NONE	0.54	0.49	0.45		
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	5.9	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	11	< 2.0		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	17	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	150	< 8.0		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	190	< 10		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	16	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	21	< 2.0		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	200	< 10		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	730	< 10		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	960	< 10		

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Analytical Report Number : 19-33686

Project / Site name: Battle Hospital Reading

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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 *
1181208	TP1	None Supplied	0.60-2.70	Brown clay and sand with gravel.
1181209	TP1	None Supplied	3.40	Grey clay.
1181210	TP2	None Supplied	1.50-2.20	Black sludge. **
1181211	TP2	None Supplied	2.70	Brown clay.
1181212	TP3	None Supplied	0.80-2.40	Black sludge with vegetation.
1181213	TP3	None Supplied	3.00	Grey clay and gravel.
1181214	TP4	None Supplied	1.30-2.40	Brown clay and sand.
1181215	TP4	None Supplied	2.70	Brown clay.
1181216	TP5	None Supplied	1.70-2.80	Brown clay and sand with vegetation.
1181217	TP5	None Supplied	3.20	Grey clay.
1181218	TP6	None Supplied	0.90-1.80	Brown gravelly clay.
1181219	TP6	None Supplied	2.70	Light brown clay and sand with gravel.
1181220	TP7	None Supplied	0.80-2.40	Black clay and sand with gravel.
1181221	TP8	None Supplied	1.50-2.60	Black clay and sand with gravel.
1181222	TP8	None Supplied	4.20	Grey clay.
1181223	TP9	None Supplied	0.70-1.80	Brown loam and sand.
1181224	TP9	None Supplied	3.20	Beige clay with chalk.
1181225	TP10	None Supplied	0.00-0.90	Brown loam and clay with gravel.
1181226	TP10	None Supplied	2.00	Light brown clay and sand.
1181227	TP11	None Supplied	0.70-2.20	Brown sludge with vegetation. **
1181228	TP11	None Supplied	3.20	Light grey sandy clay with gravel.
1181229	TP12	None Supplied	0.10-2.70	Black loam and clay with gravel.
1181230	TP12	None Supplied	3.40	Grey loam and clay.

** Non MCERTS matrix.

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Analytical Report Number : 19-33686

Project / Site name: Battle Hospital Reading

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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	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.	L019-UK/PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

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Appendix B - Controlled Waters Remedial Targets

Contaminant	Remedial Target	
	Within Soils (mg/kg)	Within Groundwater (mg/l)
C_8-C_{10} Aliphatic	1650	770
C_8-C10 Aromatic	3320	$1.76E^{7}$
C_{10}-C_{12} Aliphatic	8800	17.3
C_{10}-C_{12} Aromatic	84.6	$9.9E^{4}$
C_{12}-C_{16} Aliphatic	$1.76E^{6}$	17.3
C_{12}-C_{16} Aromatic	300	$4.27E^{6}$
C_{16}-C_{21} Aliphatic	$2.21E^{7}$	17.3
C_{16}-C_{21} Aromatic	3880	355
C_{21}-C_{35} Aliphatic	2.22^{E7}	17.3
C_{21}-C_{35} Aromatic	2460	231
Benzo(a)Pyrene	$1.75E^{147}$	No Impact

Appendix C - Validation of Source Removal

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Analytical Report Number : 19-45937

Project / Site name:	Battle Hospital	**Samples received on:**	18/06/2019
Your job number:	CRM.1265.007	**Samples instructed on:**	18/06/2019
Your order number:		**Analysis completed by:**	20/06/2019
Report Issue Number:	1	**Report issued on:**	20/06/2019
Samples Analysed:	2 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
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.

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Analytical Report Number: 19-45937

Project / Site name: Battle Hospital

Lab Sample Number				1246876	1246877			
Sample Reference				HP East	HP West			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-2.50	0.00-2.50			
Date Sampled				17/06/2019	17/06/2019			
Time Taken				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	23	14			
Total mass of sample received	kg	0.001	NONE	1.2	1.3			

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	1.2	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	12	2.2			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	730	160			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	2400	610			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	680	350			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	3800	1100			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	19	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	210	180			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	2100	610			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	940	490			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	3300	1300			

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Analytical Report Number : 19-45937

Project / Site name: Battle Hospital

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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 *
1246876	P North-Scrap	None Supplied	0.00-2.50	Grey clay and loam with stones and brick.
1246877	P South-Scrap	None Supplied	0.00-2.50	Grey clay and loam with stones.

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Analytical Report Number : 19-45937

Project / Site name: Battle Hospital

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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	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.	L019-UK/PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

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Analytical Report Number : 19-45932

Project / Site name:	Battle Hospital	**Samples received on:**	18/06/2019
Your job number:	CRM.1265.007	**Samples instructed on:**	18/06/2019
Your order number:		**Analysis completed by:**	20/06/2019
Report Issue Number:	1	**Report issued on:**	20/06/2019
Samples Analysed:	1 soil sample		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
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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Analytical Report Number: 19-45932

Project / Site name: Battle Hospital

Lab Sample Number				1246833				
Sample Reference				HP Base 2				
Sample Number				None Supplied				
Depth (m)				2.50-2.70				
Date Sampled				17/06/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	16				
Total mass of sample received	kg	0.001	NONE	1.3				

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0				
Toluene	µg/kg	1	MCERTS	< 1.0				
Ethylbenzene	µg/kg	1	MCERTS	< 1.0				
p & m-xylene	µg/kg	1	MCERTS	< 1.0				
o-xylene	µg/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	6.9				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	160				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	520				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	350				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	1000				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	5.6				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	190				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	660				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	520				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	1400				

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 19-45932

Project / Site name: Battle Hospital

* 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 *
1246833	HP Base 2	None Supplied	2.50-2.70	Grey clay and loam with gravel.

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Analytical Report Number : 19-45932

Project / Site name: Battle Hospital

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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	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.	L019-UK/PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

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Analytical Report Number : 19-45936

Project / Site name:	Battle Hospital	**Samples received on:**	18/06/2019
Your job number:	CRM.1265.007	**Samples instructed on:**	18/06/2019
Your order number:		**Analysis completed by:**	20/06/2019
Report Issue Number:	1	**Report issued on:**	20/06/2019
Samples Analysed:	3 soil samples		

Signed:

Rexona Rahman
Head of Customer Services
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.

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Analytical Report Number: 19-45936

Project / Site name: Battle Hospital

Lab Sample Number				1246873	1246874	1246875		
Sample Reference				HP North	HP South	HPB		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.00-2.50	0.00-2.50	2.50-2.70		
Date Sampled				17/06/2019	17/06/2019	17/06/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	5.5	9.4	8.2		
Moisture Content	%	N/A	NONE	7.3	15	12		
Total mass of sample received	kg	0.001	NONE	1.4	1.4	1.2		

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.6	< 1.0	1.2		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	14	18	82		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	33	69	280		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	80	78	110		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	130	160	470		

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	3.8	7.9		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	9.3	15	120		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	67	70	320		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	180	120	310		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	250	210	760		

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Analytical Report Number : 19-45936

Project / Site name: Battle Hospital

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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 *
1246873	HP North	None Supplied	0.00-2.50	Grey loam and gravel with stones and vegetation.
1246874	HP South	None Supplied	0.00-2.50	Grey loam and clay with stones and chalk.
1246875	HPB	None Supplied	2.50-2.70	Grey loam and gravel with stones.

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Analytical Report Number : 19-45936

Project / Site name: Battle Hospital

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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	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.	L019-UK/PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

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Analytical Report Number : 19-28213

Project / Site name:	Battle Hospital Reading	**Samples received on:**	08/02/2019
Your job number:	CRM.1265.007	**Samples instructed on:**	08/02/2019
Your order number:		**Analysis completed by:**	14/02/2019
Report Issue Number:	1	**Report issued on:**	14/02/2019
Samples Analysed:	8 soil samples		

Signed:

Rexona Rahman
Head of Customer Services
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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Analytical Report Number: 19-28213

Project / Site name: Battle Hospital Reading

Lab Sample Number				1151535	1151536	1151537	1151538	1151539
Sample Reference				TPA	TPB	TPC	TPE	TPF
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.75	0.00-0.75	0.00-0.75	0.00-0.75	0.00-0.75
Date Sampled				06/02/2019	06/02/2019	06/02/2019	06/02/2019	06/02/2019
Time Taken				None Supplied	None Supplied	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	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	25	25	29	27	28
Total mass of sample received	kg	0.001	NONE	0.52	0.47	0.12	0.47	0.48
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	< 0.001	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	< 0.001	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	2.1	4.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	19	29
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	19	21	57	120	220
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	12	40
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	19	25	66	150	250
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	19	25	66	160	290

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	1.4	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	11	9.6	2.3	13
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	23	140	200	84	360
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	100	450	510	330	1300
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	54	36	49	120
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	120	600	720	420	1700
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	120	660	760	460	1800

TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	11	11	4.4	17
TPH (C16 - C21)	mg/kg	1	MCERTS	24	140	210	100	390
TPH (C21 - C35)	mg/kg	1	MCERTS	120	470	570	450	1600
TPH (C35 - C44)	mg/kg	10	NONE	< 10	54	43	61	160
TPH Total C5 - C44	mg/kg	10	NONE	140	680	830	620	2100

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Analytical Report Number: 19-28213

Project / Site name: Battle Hospital Reading

Lab Sample Number				1151540	1151541	1151542		
Sample Reference				TPG	TPH	TPI		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.00-0.75	0.00-0.75	0.00-0.75		
Date Sampled				06/02/2019	06/02/2019	06/02/2019		
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	< 0.1		
Moisture Content	%	N/A	NONE	18	20	27		
Total mass of sample received	kg	0.001	NONE	0.49	0.48	0.49		
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected		
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-		
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	2.0	3.8		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	21	54		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	32	140	440		
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	14	110		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	37	160	500		
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	37	170	610		

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	8.0	14	29		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	130	210	490		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	470	820	2000		
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	100	110	280		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	600	1000	2500		
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	700	1200	2800		

TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1		
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH (C12 - C16)	mg/kg	4	MCERTS	8.0	16	32		
TPH (C16 - C21)	mg/kg	1	MCERTS	130	230	540		
TPH (C21 - C35)	mg/kg	1	MCERTS	500	960	2500		
TPH (C35 - C44)	mg/kg	10	NONE	100	130	390		
TPH Total C5 - C44	mg/kg	10	NONE	740	1300	3400		

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-28213
Project / Site name: Battle Hospital Reading
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1151538	TPE	0.00-0.75	116	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

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

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Analytical Report Number : 19-28213

Project / Site name: Battle Hospital Reading

* 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 *
1151535	TPA	None Supplied	0.00-0.75	Brown clay and loam with gravel and vegetation.
1151536	TPB	None Supplied	0.00-0.75	Brown loam and clay with gravel and vegetation.
1151537	TPC	None Supplied	0.00-0.75	Brown loam and clay with vegetation and gravel
1151538	TPE	None Supplied	0.00-0.75	Brown loam and clay with vegetation and gravel
1151539	TPF	None Supplied	0.00-0.75	Brown clay and loam with vegetation and gravel
1151540	TPG	None Supplied	0.00-0.75	Brown loam and clay with vegetation and gravel
1151541	TPH	None Supplied	0.00-0.75	Brown clay and sand with gravel.
1151542	TPI	None Supplied	0.00-0.75	Brown clay and sand with gravel.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 19-28213

Project / Site name: Battle Hospital Reading

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
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	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.	L019-UK/PL	D	NONE
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	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Steve Rhodes
Enzygo Geoenvironmental Ltd
The Byre
Woodend Lane
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Gloucestershire
GL12 8AA

e: steve.rhodes@enzygo.com

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

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

Analytical Report Number : 19-36610-2

Replaces Analytical Report Number: 19-36610, issue no. 1
Report format change

Project / Site name:	Battle Hospital Reading	**Samples received on:**	04/04/2019
Your job number:	CRM.1265.007	**Samples instructed on:**	04/04/2019
Your order number:		**Analysis completed by:**	11/04/2019
Report Issue Number:	2	**Report issued on:**	16/02/2023
Samples Analysed:	5 soil samples		

Signed:

Joanna Wawrzeczko
Reporting Specialist
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.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 19-36610-2

Project / Site name: Battle Hospital Reading

Lab Sample Number				1196466	1196467	1196468	1196469	1196470
Sample Reference				TP11 Base	TP11A	TP11B	TP11C	TP11D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.70-3.00	0.40-2.40	0.30-3.00	0.40-2.00	0.40-1.90
Date Sampled				01/04/2019	01/04/2019	01/04/2019	01/04/2019	01/04/2019
Time Taken				None Supplied	None Supplied	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	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	53	32	32	18	14
Total mass of sample received	kg	0.001	NONE	0.46	0.48	0.46	0.50	0.52
Monoaromatics & Oxygenates								
Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	25	1.9	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	37	< 2.0	2.3	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	87	8.4	17	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	320	88	100	31	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	470	100	120	36	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	30	2.9	< 1.0	2.3	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	60	9.5	4.0	3.9	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	110	56	34	15	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	260	190	97	34	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	460	260	130	56	< 10

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 19-36610-2

Project / Site name: Battle Hospital Reading

* 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 *
1196466	TP1G	None Supplied	0.60-3.00	Black clay and sand with gravel.
1196467	TP11A	None Supplied	0.40-2.40	Brown clay and sand with gravel and vegetation.
1196468	TP11B	None Supplied	0.30-3.00	Brown clay and sand with gravel and vegetation.
1196469	TP11C	None Supplied	0.40-2.00	Brown clay and sand with gravel.
1196470	TP11D	None Supplied	0.40-1.90	Brown clay and sand with gravel.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 19-36610-2

Project / Site name: Battle Hospital Reading

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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	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.	L019-UK/PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

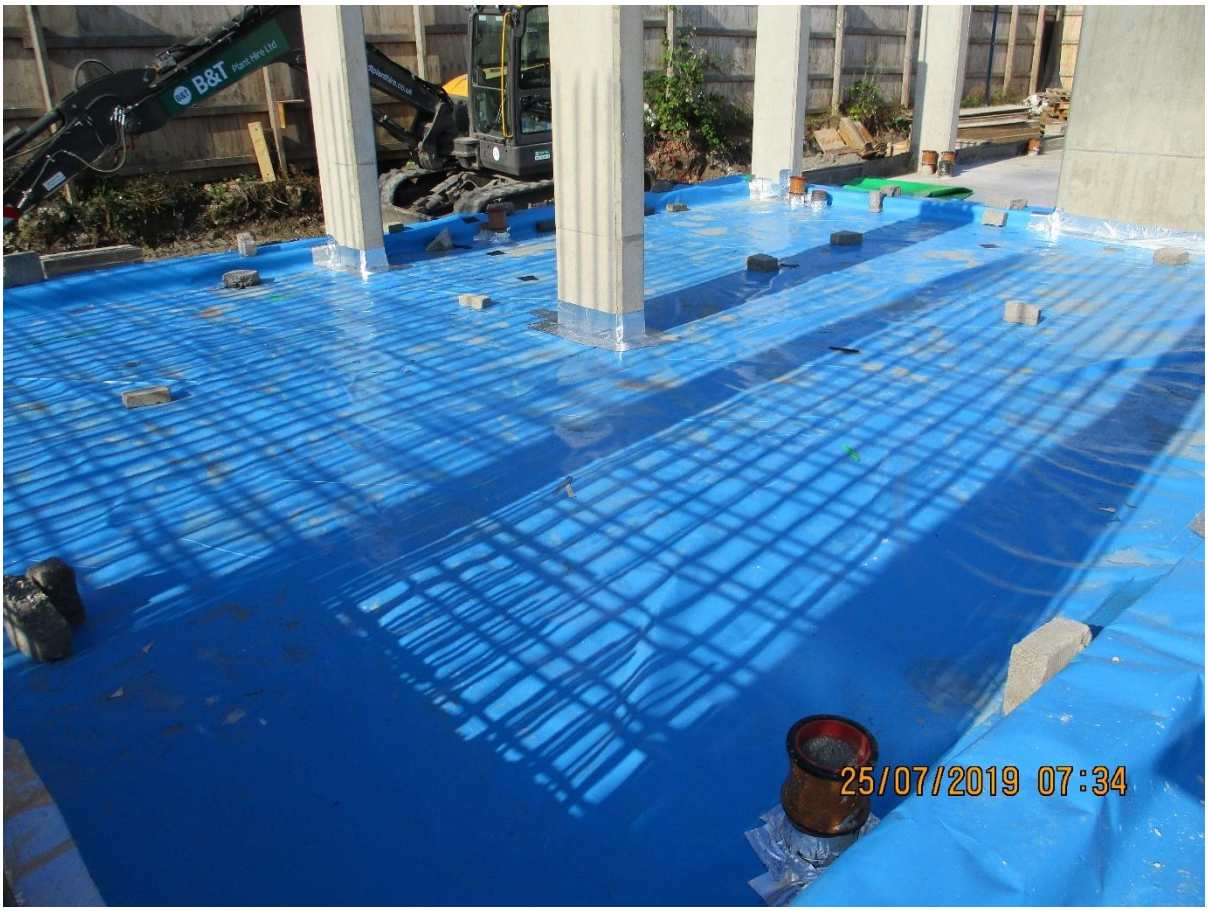
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received 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.

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Appendix D - Gas Membrane Validation

Block 1




B&T
Plant Hire Ltd
25/07/2019 07:34


22/07/2019 14:29

Block 2



Block 3



Plot 26



Plot 27



Plot 28



Plot 29



Plot 30



Plot 31



Plot 32



Plot 33



Plot 34



Plot 35



Plot 36



Plot 37



Plot 38



Plot 39



Plot 40



Plot 41



Plot 42



Plot 43



Plot 44



Plot 45



Plot 46



Plot 47



Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Block 1, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
Potton Road ● Abbotsley ● Cambridgeshire PE19 6TY
T 01767 677405 **E** info@reevetecmembranes.co.uk
www.reevetecmembranes.co.uk
Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
iii. The membrane must not have been damaged in anyway including but not limited to physical or chemical impact.
iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Block 2, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
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www.reevetecmembranes.co.uk
Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
iii. The membrane must not have been damaged in anyway including but not limited to physical or chemical impact.
iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **3, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
Potton Road ● Abbotsley ● Cambridgeshire PE19 6TY
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www.reevetecmembranes.co.uk
Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
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iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Block 4, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
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www.reevetecmembranes.co.uk
Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
iii. The membrane must not have been damaged in anyway including but not limited to physical or chemical impact.
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If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Block 5, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
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Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
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www.reevetecmembranes.co.uk
Registered in England No: 07798604

Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 26, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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T 01767 677405 **E** info@reevetecmembranes.co.uk
www.reevetecmembranes.co.uk
Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
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www.reevetecmembranes.co.uk
Registered in England No: 07798604

Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NEE

APPLICATION: **Plot 27, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
Potton Road ● Abbotsley ● Cambridgeshire PE19 6TY
T 01767 677405 **E** info@reevetecmembranes.co.uk
www.reevetecmembranes.co.uk
Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

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The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
iii. The membrane must not have been damaged in anyway including but not limited to physical or chemical impact.
iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
Potton Road ● Abbotsley ● Cambridgeshire PE19 6TY
T 01767 677405 **E** info@reevetecmembranes.co.uk
www.reevetecmembranes.co.uk
Registered in England No: 07798604

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T 01767 677405 **E** info@reevetecmembranes.co.uk
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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 28, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
Potton Road ● Abbotsley ● Cambridgeshire PE19 6TY
T 01767 677405 **E** info@reevetecmembranes.co.uk
www.reevetecmembranes.co.uk
Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
iii. The membrane must not have been damaged in anyway including but not limited to physical or chemical impact.
iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 29, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Guarantee of Installation by ReeveTec Membranes Ltd

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The foregoing representations are subject to the following conditions:

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iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 30, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Guarantee of Installation by ReeveTec Membranes Ltd

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The foregoing representations are subject to the following conditions:

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ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
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iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 31, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

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iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

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CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 32, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

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CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 33, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Guarantee of Installation by ReeveTec Membranes Ltd

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 34, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
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iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 35, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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T 01767 677405 **E** info@reevetecmembranes.co.uk
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Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
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If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 36, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Guarantee of Installation by ReeveTec Membranes Ltd

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CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 37, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Guarantee of Installation by ReeveTec Membranes Ltd

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Registered in England No: 07798604

Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 38, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
Potton Road ● Abbotsley ● Cambridgeshire PE19 6TY
T 01767 677405 **E** info@reevetecmembranes.co.uk
www.reevetecmembranes.co.uk
Registered in England No: 07798604

Guarantee of Installation by ReeveTec Membranes Ltd

All materials supplied and fitted by ReeveTec Membranes Ltd employees are installed in accordance with our standard working procedures, construction drawings and all written instructions from the original purchaser. When installed and subject to normal conditions of use, the membranes will provide and effective barrier which will be substantially impervious to the transmission of gas and water vapour for the life of the building. A Certificate of Conformity is issued for each unit upon completion of installation

The foregoing representations are subject to the following conditions:

i. The gas membrane is required to have been supplied and installed by ReeveTec Membranes Ltd (RTML).
ii. The site preparation in all aspects must have been carried out in accordance with the standard contract terms and conditions of RTML and site preparation must be accepted by RTML prior to installation.
iii. The membrane must not have been damaged in anyway including but not limited to physical or chemical impact.
iv. RTML must be given full access to the installation about which a claim has been made, with a view to identifying the matter complained of. Exposure of the membrane and covering it up will not be at RTML expense.

If the membrane is altered in anyway after installation, this must be reported to RTML, so that works can be carried out to maintain the integrity of the gas membrane – costs to be confirmed. Failure to do so could nullify this guarantee.

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 39, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

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Project Manager **Director** **Date**

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 40, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 41, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 42, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

Reeve-Tec Membranes Ltd ● Unit 5, Gransden Park
Potton Road ● Abbotsley ● Cambridgeshire PE19 6TY
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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 43, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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www.reevetecmembranes.co.uk
Registered in England No: 07798604

Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 44, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

REEVETEC MEMBRANES LTD certifies the following:

That the above products conform to the specification and details on the purchase order and dispatch documents.

ReeveTec Membranes Ltd also confirms that our NVQ Level 2 supervised Installation Technicians have carried out the method of installation of the above materials in accordance with BRE 212 & 414, BS 8485 and CIRIA reports 635 & 735 guidelines.

31/10/2022

Project Manager **Director** **Date**

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 45, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 46, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

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Certificate of Conformity

CUSTOMER: **O'Halloran & O'Brien Ltd**
O'Brien House
197-199 Garth Road
Morden
Surrey
SM4 4NE

APPLICATION: **Plot 47, Portman Road, Reading**

MATERIALS: **'RTEC' VOC BBA APPROVED Gas & Hydrocarbon Resistant Membrane.**

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Appendix E - Cover Soils Validation

Enzygo Geoenvironmental Limited
The Byre, Woodend Lane
Cromhall, Gloucestershire GL12 8AA

Tel: 01454 269237
www.enzygo.com

Jack Johnson
Bellway Homes Limited (Thames Valley)
Pacific House
Imperial Way
Reading
Berkshire
RG2 0TD

Our Ref: CRM.1265.007.L.001.A

28 June 2020

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH

Introduction

A Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 300mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 17th February 2020 Enzygo Geo Environmental Limited undertook a site visit to obtain samples of subsoil. One sample was taken between the locations of HPK and HPL as there was no property divide in place. This was done to ensure the subsoil was suitable before placing topsoil.

On the 22nd June 2020 Enzygo Geo Environmental Limited undertook a site inspection to excavate and confirm the presence of a Geotextile no-dig barrier beneath 600mm clean materials. During this inspection, the property divide had been erected. Therefore, as per the Remedial Methodology Statement, samples were obtained from HPK and HPL.

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Photos of Hand Pits are shown in Appendix A. The locations of the hand pits are shown on Drawing CRM.1265.007.GE.D.001, which is included in Appendix B.

No further areas of contamination were identified during the construction phase or during the validation inspection, therefor no additional remedial measures were required or undertaken.

Cover Soils

Hand Pits confirmed the presence of 600mm of cover soils over a geotextile no dig barrier, meeting the required depth for residential use with plant uptake. Photographs of the hand pits are included in Appendix A. Samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pits were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples we sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D.

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils placed within plots 41 – 47 are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo

Richard Reece
Environmental Consultant

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APPENDICES

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APPENDIX A – PHOTOGRAPHS

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HPK



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HPL



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APPENDIX B – LOCATION PLAN



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

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APPENDIX C – IMPORTED SOILS CHEMICAL ANALYSIS

MCM
020 8339 9909
Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Freeland
HORTICULTURE LIMITED

Attention: Philippa Lambourne

Our Ref: 816-SA

16 January 2020

Dear Philippa

Topsoil Analysis Report : Beenham Topsoil –January 2020

We have completed the analysis of the topsoil sample recently taken from the above site and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes.

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, slightly moist, friable *loamy sand* with a well developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
- major plant nutrients (N, P, K, Mg) & organic matter content;
- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).
- Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Freeland 01322 619161

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in reaction (pH 8.5) with a pH value that would be suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1395/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

Particle Size Distribution & Stone Content

The sample contained 85% sand and fell into the *loamy sand* texture class. Suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding. As such, we would not consider this sand level to be problematic.

The sample was free from stones of 20 mm and upwards in diameter and only contained a slight fraction of smaller stones (4.4%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil so the following comments are based on the Soil Guideline Values (SGVs) for residential end-use presented in the Contaminated Land Exposure Assessment (CLEA) Model (EA/DEFRA:2002). The SGVs currently only consider a limited range of parameters so where a potential contaminant is not covered by the CLEA Model other relevant schedules for contamination assessment, such as the Dutch Guidelines, and professional judgement have been used.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined and the sand content would not be considered problematic. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland 01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1395
Neutralising Value ($CaCO_3$ equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.312
Carbon:Nitrogen Ratio	:1	10
Available Phosphorus	mg/l	76.0
Available Potassium	mg/l	1162
Available Magnesium	mg/l	140
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	[illegible]
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	95
Texture Class	UK Class	Sand
Stones 2-20mm	% by DW	1.3
Stones 20-50mm	% by DW	1.1
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	3.7
Total Cadmium (Cd)	mg/kg	0.23
Total Chromium (Cr)	mg/kg	<10
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	11.9
Total Lead (Pb)	mg/kg	20.1
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	<10
Total Selenium (Se)	mg/kg	<0.09
Total Zinc (Zn)	mg/kg	51.4
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.6
Total Vanadium (V)	mg/kg	<10
Hot Water Soluble Boron (B)	mg/kg	2.0
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.8
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	70.2
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	9.1
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12
Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	12.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2
Total Petroleum Hydrocarbons (C_6-C_{44})	mg/kg	21.1

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

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APPENDIX D – LABORATORY RESULTS

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Croxley Green
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Watford,
Herts,
WD18 8YS

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

Analytical Report Number : 20-87416

Replaces Analytical Report Number : 20-87416, issue no. 1

Client references/information amended.

Project / Site name:	Battle Hospital	**Samples received on:**	18/02/2020
Your job number:	CRM.1265.007	**Samples instructed on:**	18/02/2020
Your order number:	CRM.1265.007	**Analysis completed by:**	24/02/2020
Report Issue Number:	2	**Report issued on:**	24/02/2020
Samples Analysed:	1 soil sample		

Signed:

Zina Abdul Razzak
Senior Quality Specialist

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.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 20-87416

Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1444879				
Sample Reference				Plot 45				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				17/02/2020				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	15				
Total mass of sample received	kg	0.001	NONE	2.0				
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.6				
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.8				

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Analytical Report Number: 20-87416

Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1444879				
Sample Reference				Plot 45				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				17/02/2020				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.11				
Acenaphthylene	mg/kg	0.05	MCERTS	0.05				
Acenaphthene	mg/kg	0.05	MCERTS	0.12				
Fluorene	mg/kg	0.05	MCERTS	0.12				
Phenanthrene	mg/kg	0.05	MCERTS	0.71				
Anthracene	mg/kg	0.05	MCERTS	0.17				
Fluoranthene	mg/kg	0.05	MCERTS	0.81				
Pyrene	mg/kg	0.05	MCERTS	0.73				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.48				
Chrysene	mg/kg	0.05	MCERTS	0.36				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.38				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.36				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.42				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.26				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.07				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.30				
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	5.45				

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Analytical Report Number: 20-87416

Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1444879				
Sample Reference				Plot 45				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				17/02/2020				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.8				
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	39				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	35				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	92				
Petroleum Hydrocarbons								

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Analytical Report Number: 20-87416

Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1444879				
Sample Reference				Plot 45				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				17/02/2020				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10				
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	12				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	13				
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	25				
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	25				
TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0				
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0				
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1				
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0				
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0				
TPH (C16 - C21)	mg/kg	1	MCERTS	12				
TPH (C21 - C35)	mg/kg	1	MCERTS	13				
TPH (C35 - C44)	mg/kg	10	NONE	< 10				
TPH Total C5 - C44	mg/kg	10	NONE	25				

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 20-87416

Project / Site name: Battle Hospital

* 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 *
1444879	Plot 45	None Supplied	None Supplied	Brown clay and sand with vegetation.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 20-87416

Project / Site name: Battle Hospital

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 diphenylcarbazide 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
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
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
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
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	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

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e: reception@i2analytical.com

Analytical Report Number : 20-11091

Project / Site name:	Battle Hospital Reading	**Samples received on:**	27/05/2020
Your job number:	CRM 1265 007	**Sample instructed/ Analysis started on:**	27/05/2020
Your order number:		**Analysis completed by:**	29/05/2020
Report Issue Number:	1	**Report issued on:**	29/05/2020
Samples Analysed:	2 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska

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.

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 20-11091

Project / Site name: Battle Hospital Reading

Lab Sample Number				1518059	1518060			
Sample Reference				HPK	HPL			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-0.15	0.00-0.15			
Date Sampled				22/05/2020	22/05/2020			
Time Taken				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	15	11			
Total mass of sample received	kg	0.001	NONE	2.0	2.0			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.6	8.7			
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.3	1.7			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.3	3.6			
Boron (water soluble)	mg/kg	0.2	MCERTS	3.1	3.3			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	7.5			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	18	12			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	39	21			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	0.5			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	3.7			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	190	58			
Petroleum Hydrocarbons								

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Analytical Report Number: 20-11091

Project / Site name: Battle Hospital Reading

Lab Sample Number				1518059	1518060			
Sample Reference				HPK	HPL			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-0.15	0.00-0.15			
Date Sampled				22/05/2020	22/05/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	9.8	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	34	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	110	25			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	23	< 8.4			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	150	32			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	170	32			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10			
TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH (C12 - C16)	mg/kg	4	MCERTS	9.8	< 4.0			
TPH (C16 - C21)	mg/kg	1	MCERTS	34	6.8			
TPH (C21 - C35)	mg/kg	1	MCERTS	110	25			
TPH (C35 - C44)	mg/kg	10	NONE	23	< 10			
TPH Total C5 - C44	mg/kg	10	NONE	170	32			

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Analytical Report Number : 20-11091

Project / Site name: Battle Hospital Reading

* 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 *
1518059	HPK	None Supplied	0.00-0.15	Brown sand.
1518060	HPL	None Supplied	0.00-0.15	Brown sand with vegetation.

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Analytical Report Number : 20-11091

Project / Site name: Battle Hospital Reading

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 diphenylcarbazide 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
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
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
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
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	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

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Tel: 01454 269237
www.enzygo.com

Jack Johnson
Bellway Homes Ltd
Pacific House,
Imperial Way,
Reading,
RG2 0TD
Bicester, OX27 8TG

Our Ref: CRM.1265.007.GE.L.002.A

17 July 2020

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH – HPI & HPJ

Background

Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 300mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 25th February 2020 Enzygo Geo Environmental Limited undertook a site inspection to excavate two hand pits (HPI and HPJ) to confirm the presence of a Geotextile no-dig barrier beneath 600mm clean materials. The locations of the Hand Pits are shown on drawing CRM.1265.007.GE.D.001 in Appendix B.

Cover Soils

Hand Pits confirmed the presence of 600mm of cover soils over a Geotextile no dig barrier, meeting the required depth for residential use with plant uptake. Photographs of the hand pits are included in Appendix A. Samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

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Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pits were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples we sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils within Hand Pits HPI and HPJ are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo



Richard Reece
Senior Technician

Enzygo Geoenvironmental Limited
The Byre, Woodend Lane
Cromhall, Gloucestershire GL12 8AA

Tel: 01454 269237
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APPENDIX A – PHOTOGRAPHS

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HPI



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HPJ



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APPENDIX B – DRAWING



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

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APPENDIX C IMPORTED SOILS CHEMICAL ANALYSIS

MCM
020 8339 9909
Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Freeland
HORTICULTURE LIMITED

Attention: Philippa Lambourne

Our Ref: 816-SA

16 January 2020

Dear Philippa

Topsoil Analysis Report : Beenham Topsoil –January 2020

We have completed the analysis of the topsoil sample recently taken from the above site and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes.

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, slightly moist, friable *loamy sand* with a well developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
- major plant nutrients (N, P, K, Mg) & organic matter content;
- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).
- Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Freeland 01322 619161

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in reaction (pH 8.5) with a pH value that would be suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1395/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

Particle Size Distribution & Stone Content

The sample contained 85% sand and fell into the *loamy sand* texture class. Suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding. As such, we would not consider this sand level to be problematic.

The sample was free from stones of 20 mm and upwards in diameter and only contained a slight fraction of smaller stones (4.4%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil so the following comments are based on the Soil Guideline Values (SGVs) for residential end-use presented in the Contaminated Land Exposure Assessment (CLEA) Model (EA/DEFRA:2002). The SGVs currently only consider a limited range of parameters so where a potential contaminant is not covered by the CLEA Model other relevant schedules for contamination assessment, such as the Dutch Guidelines, and professional judgement have been used.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined and the sand content would not be considered problematic. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland 01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1395
Neutralising Value ($CaCO_3$ equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.312
Carbon:Nitrogen Ratio	:1	10
Available Phosphorus	mg/l	76.0
Available Potassium	mg/l	1162
Available Magnesium	mg/l	140
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	[illegible]
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	95
Texture Class	UK Class	Sand
Stones 2-20mm	% by DW	1.3
Stones 20-50mm	% by DW	1.1
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	3.7
Total Cadmium (Cd)	mg/kg	0.23
Total Chromium (Cr)	mg/kg	<10
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	11.9
Total Lead (Pb)	mg/kg	20.1
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	<10
Total Selenium (Se)	mg/kg	<0.09
Total Zinc (Zn)	mg/kg	51.4
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.6
Total Vanadium (V)	mg/kg	<10
Hot Water Soluble Boron (B)	mg/kg	2.0
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.8
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	70.2
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	9.1
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12
Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	12.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2
Total Petroleum Hydrocarbons (C_6-C_{44})	mg/kg	21.1

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

Material: Subsoil
Source: Bourne Amenity Ltd
Date Tested: 31/01/2020
Tested Against: BS8601:2013
Tested By: Tim O'Hare Associates (Report ID TOHA/20/9380/SS)

Parameter	Unit	BS8601:2013 Range	Result	Compliance
Texture:				
Clay (<0.002mm)	% w/w	5 - 30%	6	*Yes*
Silt (0.002 - 0.05mm)	% w/w	0 - 65%	2	*Yes*
Sand (0.063 - 2.0mm)	% w/w	20 - 90%	92	*No*
Textual Class:	**Sand**			
Stones (2 - 20mm)	% w/w DW	40%	2	*Yes*
Stones (20-75mm)	% w/w DW	20%	0	*Yes*
Stones (>75mm)	% w/w DW	0%	0	*Yes*
Sand Fraction (USGA Sieve Sizes):				
Very Fine Sand (0.05 - 0.15mm)	% w/w	n/a	7	--
Fine Sand (0.15 - 0.25mm)	% w/w	n/a	15	--
Medium Sand (0.25 - 0.50mm)	% w/w	n/a	35	--
Coarse Sand (0.50 - 1.0mm)	% w/w	n/a	31	--
Very Coarse Sand (1.0 - 2.0mm)	% w/w	n/a	4	--
Organic Matter (LOI)	% w/w	0.0 - 2.0	0.7	*Yes*
Ph		5.5 - 8.5	5.7	*Yes*
Exchangeable Sodium Percentage	%	< 15%	1.0	*Yes*
Phytotoxic Contaminants:				
Total Zinc	mg/kg	0 - 200	18	*Yes*
Total Copper	mg/kg	0 - 135	<1.0	*Yes*
Total Nickel	mg/kg	0 - 75	16	*Yes*
Additional Analysis:				
Electrical Conductivity (1:2:5 water extract)	µS/cm	n/a	93	--
Electrical Conductivity (CaSO4 extract)	µS/cm	n/a	2053	--
Saturated Hydraulic Conductivity	mm/hr	n/a	64	--
Visible Contaminants:				
>2.0mm	% w/w	< 0.5	0.0	*Yes*
Plastics	% w/w	< 0.25	0.0	*Yes*
Sharps	% w/w	0.0	0.0	*Yes*

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Parameter	Unit	Guidelines	Value	Result	Compliance
Heavy Metals and Hydrocarbons					
Total Antimony (Sb)	mg/kg	S4UL	<500	1.4	*Yes*
Total Arsenic (As)	mg/kg	S4UL	<37	12	*Yes*
Total Barium (Ba)	mg/kg	S4UL	<1300	15	*Yes*
Total Beryllium (Be)	mg/kg	S4UL	<1.7	0.6	*Yes*
Total Cadmium (Cd)	mg/kg	S4UL	<11	<0.2	*Yes*
Total Chromium III (Cr)	mg/kg	S4UL	<910	26	*Yes*
Hexavalent Chromium (Cr Vi)	mg/kg	S4UL	<6	<4.0	*Yes*
Total Cyanide (Cn)	mg/kg	Dutch Action Value (DAV)	<20	<1	*Yes*
Total Lead (Pb)	mg/kg	SP1010 (Defra Category 4)	<200	3.9	*Yes*
Total Mercury (Hg)	mg/kg	S4UL	<1.2	<0.3	*Yes*
Total (mono) Phenols	mg/kg	S4UL^	<550	<1.0	*Yes*
Total Selenium (Se)	mg/kg	S4UL	<250	<1.0	*Yes*
Total Vanadium (V)	mg/kg	S4UL	<410	52	*Yes*
Water Soluble Boron (B)	mg/kg	S4UL	<290	0.3	*Yes*
Water Soluble Sulphate (SO4)	g/l	BRE Special Digest 1:2005 (BRE)	<1.2	0.14	*Yes*
Acenaphthylene	mg/kg	S4UL^	<420	<0.05	*Yes*
Acenaphthene	mg/kg	S4UL^	<510	<0.05	*Yes*
Anthracene	mg/kg	S4UL^	<5400	<0.05	*Yes*
Benzo (a) Anthracene	mg/kg	S4UL^	<11	<0.05	*Yes*
Benzo (a) Pyrene	mg/kg	S4UL^	<2.7	<0.05	*Yes*
Benzo (b) Fluoranthene	mg/kg	S4UL^	<3.3	<0.05	*Yes*
Benzo (g,h,i) Perylene	mg/kg	S4UL^	<340	<0.05	*Yes*
Benzo (k) Fluoranthene	mg/kg	S4UL^	<93	<0.05	*Yes*
Chrysene	mg/kg	S4UL^	<22	<0.05	*Yes*
Dibenzo (a,h) Anthracene	mg/kg	S4UL^	<0.28	<0.05	*Yes*
Fluoranthene	mg/kg	S4UL^	<560	<0.05	*Yes*
Fluorene	mg/kg	S4UL^	<400	<0.05	*Yes*
Indeno (1,2,3-cd) Pyrene	mg/kg	S4UL^	<36	<0.05	*Yes*
Naphthalene	mg/kg	S4UL^	<5.6	<0.05	*Yes*
Phenanthrene	mg/kg	S4UL^	<220	<0.05	*Yes*
Pyrene	mg/kg	S4UL^	<1200	<0.05	*Yes*
Aliphatic TPH (C5 - C6)	mg/kg	S4UL^	<78	<0.001	*Yes*
Aliphatic TPH (C6 - C8)	mg/kg	S4UL^	<230	<0.001	*Yes*
Aliphatic TPH (C8 - C10)	mg/kg	S4UL^	<65	<0.001	*Yes*
Aliphatic TPH (C10 - C12)	mg/kg	S4UL^	<330	<1.0	*Yes*
Aliphatic TPH (C12 - C16)	mg/kg	S4UL^	<2400	<2.0	*Yes*
Aliphatic TPH (C16 - C21)	mg/kg	S4UL^	<92000	<8.0	*Yes*
Aliphatic TPH (C21 - C35)	mg/kg	S4UL^		<8.0	*Yes*
Aliphatic TPH (C35 - C44)	mg/kg	S4UL^	<92000	<8.4	*Yes*
Aromatic TPH (C5 - C7)	mg/kg	S4UL^	<140	<0.001	*Yes*
Aromatic TPH (C7 - C8)	mg/kg	S4UL^	<290	<0.001	*Yes*
Aromatic TPH (C8 - C10)	mg/kg	S4UL^	<83	<0.001	*Yes*
Aromatic TPH (C10 - C12)	mg/kg	S4UL^	<180	<1.0	*Yes*
Aromatic TPH (C12 - C16)	mg/kg	S4UL^	<330	<2.0	*Yes*
Aromatic TPH (C16 - C21)	mg/kg	S4UL^	<540	<10	*Yes*
Aromatic TPH (C21 - C35)	mg/kg	S4UL^	<1500	<10	*Yes*
Aromatic TPH (C35 - C44)	mg/kg	S4UL^	<1500	>8.4	*Yes*
Benzene	mg/kg	S4UL^	<0.17	<0.001	*Yes*
Toluene	mg/kg	S4UL^	<290	<0.001	*Yes*
Ethylbenzene	mg/kg	S4UL^	<110	<0.001	*Yes*
O-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
M-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
P-xylene	mg/kg	S4UL^	<130		*Yes*
MTBE	mg/kg	Sail Guideline Values	<470	<0.001	*Yes*
Asbestos	mg/kg	Control of Asbestos Regulations 2006	Absent	Absent	*Yes*

**All reports originate from samples collected in accordance with the guidelines laid out in the BS3882:2015 standard. Tests of this material are carried out a minimum of every 6 months.*

Bourne Amenity Ltd

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APPENDIX D LABORATORY TEST RESULTS

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e: steve.rhodes@enzygo.com

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

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

Analytical Report Number : 20-88966

Project / Site name:	Battle Hospital	**Samples received on:**	26/02/2020
Your job number:	CRM.1265.007	**Samples instructed on:**	26/02/2020
Your order number:	CRM.1265.007	**Analysis completed by:**	28/02/2020
Report Issue Number:	1	**Report issued on:**	28/02/2020
Samples Analysed:	2 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.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 20-88966

Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1453186	1453187			
Sample Reference				HPI	HPJ			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-0.60	0.00-0.60			
Date Sampled				25/02/2020	25/02/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	5.4	< 0.1			
Moisture Content	%	N/A	NONE	12	18			
Total mass of sample received	kg	0.001	NONE	1.7	1.7			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.4	8.3			
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.3	2.7			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	25	27			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	1.7			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	71	22			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	8.9			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	8.1	15			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	28	11			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	35	41			

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Analytical Report Number: 20-88966

Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1453186	1453187			
Sample Reference				HPI	HPJ			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-0.60	0.00-0.60			
Date Sampled				25/02/2020	25/02/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10			
TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0			
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (C35 - C44)	mg/kg	10	NONE	< 10	< 10			
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10			

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 20-88966

Project / Site name: Battle Hospital

* 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 *
1453186	HPI	None Supplied	0.00-0.60	Light brown sandy clay with stones.
1453187	HPJ	None Supplied	0.00-0.60	Brown sandy clay.

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Analytical Report Number : 20-88966

Project / Site name: Battle Hospital

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 diphenylcarbazide 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
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
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
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
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	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

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Jack Johnson
Bellway Homes Ltd
Pacific House,
Imperial Way,
Reading,
RG2 0TD
Bicester, OX27 8TG

Our Ref: CRM.1265.007.GE.L.003.A

17 July 2020

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH – HPG & HPH

Background

Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 300mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 17th June 2020 Enzygo Geo Environmental Limited undertook a site inspection to excavate two hand pits (HPG and HPH) to confirm the presence of a Geotextile no-dig barrier beneath 600mm clean materials. The locations of the Hand Pits are shown on drawing CRM.1265.007.GE.D.001 in Appendix B.

Cover Soils

Hand Pits confirmed the presence of 600mm of cover soils over a Geotextile no dig barrier, meeting the required depth for residential use with plant uptake. Photographs of the hand pits are included in Appendix A. Samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

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Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pits were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples we sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils within Hand Pits HPG and HPH are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo



Richard Reece
Senior Technician

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APPENDIX A – PHOTOGRAPHS

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HPG



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HPH



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APPENDIX B – DRAWING



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

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APPENDIX C IMPORTED SOILS CHEMICAL ANALYSIS

MCM
020 8339 9909
Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Freeland
HORTICULTURE LIMITED

Attention: Philippa Lambourne

Our Ref: 816-SA

16 January 2020

Dear Philippa

Topsoil Analysis Report : Beenham Topsoil –January 2020

We have completed the analysis of the topsoil sample recently taken from the above site and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes.

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, slightly moist, friable *loamy sand* with a well developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
- major plant nutrients (N, P, K, Mg) & organic matter content;
- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).
- Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Freeland 01322 619161

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in reaction (pH 8.5) with a pH value that would be suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1395/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

Particle Size Distribution & Stone Content

The sample contained 85% sand and fell into the *loamy sand* texture class. Suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding. As such, we would not consider this sand level to be problematic.

The sample was free from stones of 20 mm and upwards in diameter and only contained a slight fraction of smaller stones (4.4%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil so the following comments are based on the Soil Guideline Values (SGVs) for residential end-use presented in the Contaminated Land Exposure Assessment (CLEA) Model (EA/DEFRA:2002). The SGVs currently only consider a limited range of parameters so where a potential contaminant is not covered by the CLEA Model other relevant schedules for contamination assessment, such as the Dutch Guidelines, and professional judgement have been used.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined and the sand content would not be considered problematic. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland 01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1395
Neutralising Value ($CaCO_3$ equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.312
Carbon:Nitrogen Ratio	:1	10
Available Phosphorus	mg/l	76.0
Available Potassium	mg/l	1162
Available Magnesium	mg/l	140
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	[illegible]
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	95
Texture Class	UK Class	Sand
Stones 2-20mm	% by DW	1.3
Stones 20-50mm	% by DW	1.1
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	3.7
Total Cadmium (Cd)	mg/kg	0.23
Total Chromium (Cr)	mg/kg	<10
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	11.9
Total Lead (Pb)	mg/kg	20.1
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	<10
Total Selenium (Se)	mg/kg	<0.09
Total Zinc (Zn)	mg/kg	51.4
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.6
Total Vanadium (V)	mg/kg	<10
Hot Water Soluble Boron (B)	mg/kg	2.0
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.8
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	70.2
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	9.1
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12
Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	12.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2
Total Petroleum Hydrocarbons (C_6-C_{44})	mg/kg	21.1

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

Material: Subsoil
Source: Bourne Amenity Ltd
Date Tested: 31/01/2020
Tested Against: BS8601:2013
Tested By: Tim O'Hare Associates (Report ID TOHA/20/9380/SS)

Parameter	Unit	BS8601:2013 Range	Result	Compliance
Texture:				
Clay (<0.002mm)	% w/w	5 - 30%	6	*Yes*
Silt (0.002 - 0.05mm)	% w/w	0 - 65%	2	*Yes*
Sand (0.063 - 2.0mm)	% w/w	20 - 90%	92	*No*
Textual Class:	**Sand**			
Stones (2 - 20mm)	% w/w DW	40%	2	*Yes*
Stones (20-75mm)	% w/w DW	20%	0	*Yes*
Stones (>75mm)	% w/w DW	0%	0	*Yes*
Sand Fraction (USGA Sieve Sizes):				
Very Fine Sand (0.05 - 0.15mm)	% w/w	n/a	7	--
Fine Sand (0.15 - 0.25mm)	% w/w	n/a	15	--
Medium Sand (0.25 - 0.50mm)	% w/w	n/a	35	--
Coarse Sand (0.50 - 1.0mm)	% w/w	n/a	31	--
Very Coarse Sand (1.0 - 2.0mm)	% w/w	n/a	4	--
Organic Matter (LOI)	% w/w	0.0 - 2.0	0.7	*Yes*
Ph		5.5 - 8.5	5.7	*Yes*
Exchangeable Sodium Percentage	%	< 15%	1.0	*Yes*
Phytotoxic Contaminants:				
Total Zinc	mg/kg	0 - 200	18	*Yes*
Total Copper	mg/kg	0 - 135	<1.0	*Yes*
Total Nickel	mg/kg	0 - 75	16	*Yes*
Additional Analysis:				
Electrical Conductivity (1:2:5 water extract)	µS/cm	n/a	93	--
Electrical Conductivity (CaSO4 extract)	µS/cm	n/a	2053	--
Saturated Hydraulic Conductivity	mm/hr	n/a	64	--
Visible Contaminants:				
>2.0mm	% w/w	< 0.5	0.0	*Yes*
Plastics	% w/w	< 0.25	0.0	*Yes*
Sharps	% w/w	0.0	0.0	*Yes*

Bourne Amenity Ltd

Parameter	Unit	Guidelines	Value	Result	Compliance
Heavy Metals and Hydrocarbons					
Total Antimony (Sb)	mg/kg	S4UL	<500	1.4	*Yes*
Total Arsenic (As)	mg/kg	S4UL	<37	12	*Yes*
Total Barium (Ba)	mg/kg	S4UL	<1300	15	*Yes*
Total Beryllium (Be)	mg/kg	S4UL	<1.7	0.6	*Yes*
Total Cadmium (Cd)	mg/kg	S4UL	<11	<0.2	*Yes*
Total Chromium III (Cr)	mg/kg	S4UL	<910	26	*Yes*
Hexavalent Chromium (Cr Vi)	mg/kg	S4UL	<6	<4.0	*Yes*
Total Cyanide (Cn)	mg/kg	Dutch Action Value (DAV)	<20	<1	*Yes*
Total Lead (Pb)	mg/kg	SP1010 (Defra Category 4)	<200	3.9	*Yes*
Total Mercury (Hg)	mg/kg	S4UL	<1.2	<0.3	*Yes*
Total (mono) Phenols	mg/kg	S4UL^	<550	<1.0	*Yes*
Total Selenium (Se)	mg/kg	S4UL	<250	<1.0	*Yes*
Total Vanadium (V)	mg/kg	S4UL	<410	52	*Yes*
Water Soluble Boron (B)	mg/kg	S4UL	<290	0.3	*Yes*
Water Soluble Sulphate (SO4)	g/l	BRE Special Digest 1:2005 (BRE)	<1.2	0.14	*Yes*
Acenaphthylene	mg/kg	S4UL^	<420	<0.05	*Yes*
Acenaphthene	mg/kg	S4UL^	<510	<0.05	*Yes*
Anthracene	mg/kg	S4UL^	<5400	<0.05	*Yes*
Benzo (a) Anthracene	mg/kg	S4UL^	<11	<0.05	*Yes*
Benzo (a) Pyrene	mg/kg	S4UL^	<2.7	<0.05	*Yes*
Benzo (b) Fluoranthene	mg/kg	S4UL^	<3.3	<0.05	*Yes*
Benzo (g,h,i) Perylene	mg/kg	S4UL^	<340	<0.05	*Yes*
Benzo (k) Fluoranthene	mg/kg	S4UL^	<93	<0.05	*Yes*
Chrysene	mg/kg	S4UL^	<22	<0.05	*Yes*
Dibenzo (a,h) Anthracene	mg/kg	S4UL^	<0.28	<0.05	*Yes*
Fluoranthene	mg/kg	S4UL^	<560	<0.05	*Yes*
Fluorene	mg/kg	S4UL^	<400	<0.05	*Yes*
Indeno (1,2,3-cd) Pyrene	mg/kg	S4UL^	<36	<0.05	*Yes*
Naphthalene	mg/kg	S4UL^	<5.6	<0.05	*Yes*
Phenanthrene	mg/kg	S4UL^	<220	<0.05	*Yes*
Pyrene	mg/kg	S4UL^	<1200	<0.05	*Yes*
Aliphatic TPH (C5 - C6)	mg/kg	S4UL^	<78	<0.001	*Yes*
Aliphatic TPH (C6 - C8)	mg/kg	S4UL^	<230	<0.001	*Yes*
Aliphatic TPH (C8 - C10)	mg/kg	S4UL^	<65	<0.001	*Yes*
Aliphatic TPH (C10 - C12)	mg/kg	S4UL^	<330	<1.0	*Yes*
Aliphatic TPH (C12 - C16)	mg/kg	S4UL^	<2400	<2.0	*Yes*
Aliphatic TPH (C16 - C21)	mg/kg	S4UL^	<92000	<8.0	*Yes*
Aliphatic TPH (C21 - C35)	mg/kg	S4UL^		<8.0	*Yes*
Aliphatic TPH (C35 - C44)	mg/kg	S4UL^	<92000	<8.4	*Yes*
Aromatic TPH (C5 - C7)	mg/kg	S4UL^	<140	<0.001	*Yes*
Aromatic TPH (C7 - C8)	mg/kg	S4UL^	<290	<0.001	*Yes*
Aromatic TPH (C8 - C10)	mg/kg	S4UL^	<83	<0.001	*Yes*
Aromatic TPH (C10 - C12)	mg/kg	S4UL^	<180	<1.0	*Yes*
Aromatic TPH (C12 - C16)	mg/kg	S4UL^	<330	<2.0	*Yes*
Aromatic TPH (C16 - C21)	mg/kg	S4UL^	<540	<10	*Yes*
Aromatic TPH (C21 - C35)	mg/kg	S4UL^	<1500	<10	*Yes*
Aromatic TPH (C35 - C44)	mg/kg	S4UL^	<1500	>8.4	*Yes*
Benzene	mg/kg	S4UL^	<0.17	<0.001	*Yes*
Toluene	mg/kg	S4UL^	<290	<0.001	*Yes*
Ethylbenzene	mg/kg	S4UL^	<110	<0.001	*Yes*
O-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
M-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
P-xylene	mg/kg	S4UL^	<130		*Yes*
MTBE	mg/kg	Sail Guideline Values	<470	<0.001	*Yes*
Asbestos	mg/kg	Control of Asbestos Regulations 2006	Absent	Absent	*Yes*

**All reports originate from samples collected in accordance with the guidelines laid out in the BS3882:2015 standard. Tests of this material are carried out a minimum of every 6 months.*

Bourne Amenity Ltd

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APPENDIX D LABORATORY TEST RESULTS

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Analytical Report Number : 20-15058

Project / Site name:	Battle Hospital	**Samples received on:**	18/06/2020
Your job number:	CRM.1265.007	**Sample instructed/ Analysis started on:**	18/06/2020
Your order number:	CRM.1265.007	**Analysis completed by:**	17/07/2020
Report Issue Number:	1	**Report issued on:**	17/07/2020
Samples Analysed:	2 soil samples		

Signed: Karolina Marek

Karolina Marek
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

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.

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 20-15058

Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1538838	1538839			
Sample Reference				HPG	HPH			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-0.60	0.00-0.60			
Date Sampled				17/06/2020	17/06/2020			
Time Taken				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	11	35			
Total mass of sample received	kg	0.001	NONE	2.0	2.0			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.2	8.6			
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.2	3.2			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	22	4.7			
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	3.1			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	56	9.6			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	2.8	16			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	7.2	23			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	28	5.0			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	30	49			

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Analytical Report Number: 20-15058

Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1538838	1538839			
Sample Reference				HPG	HPH			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.00-0.60	0.00-0.60			
Date Sampled				17/06/2020	17/06/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10			
TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0			
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH (C35 - C44)	mg/kg	10	NONE	< 10	< 10			
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10			

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 20-15058

Project / Site name: Battle Hospital

* 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 *
1538838	HPG	None Supplied	0.00-0.60	Brown loam and clay with gravel and vegetation.
1538839	HPH	None Supplied	0.00-0.60	Brown loam and clay with gravel and vegetation.

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 20-15058

Project / Site name: Battle Hospital

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 diphenylcarbazide 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
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
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
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
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	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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.

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The results included within the report relate only to the sample(s) submitted for testing.

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Cromhall, Gloucestershire GL12 8AA

Tel: 01454 269237
www.enzygo.com

Jack Johnson
Bellway Homes Ltd
Pacific House,
Imperial Way,
Reading,
RG2 0TD
Bicester, OX27 8TG

Our Ref: CRM.1265.007.GE.L.004.A

3 September 2020

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH – HPE & HPF

Background

Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 300mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 26th August 2020 Enzygo Geo Environmental Limited undertook a site inspection to excavate two hand pits (HPE and HPF) to confirm the presence of a Geotextile no-dig barrier beneath 600mm clean materials. The locations of the Hand Pits are shown on drawing CRM.1265.007.GE.D.001 in Appendix B.

Cover Soils

Hand Pits confirmed the presence of 600mm of cover soils over a Geotextile no dig barrier, meeting the required depth for residential use with plant uptake. Photographs of the hand pits are included in Appendix A. Samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

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Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pits were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples we sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils within Hand Pits HPE and HPF are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo



Richard Reece
Senior Technician

Enzygo Geoenvironmental Limited
The Byre, Woodend Lane
Cromhall, Gloucestershire GL12 8AA

Tel: 01454 269237
www.enzygo.com

APPENDIX A – PHOTOGRAPHS

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Cromhall, Gloucestershire GL12 8AA

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HPE



HPF



Enzygo Geoenvironmental Limited
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APPENDIX B – DRAWINGS



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

Enzygo Geoenvironmental Limited
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PPENDIX C – CHEMICAL LABORATORY TESTING

Steve Rhodes
Enzygo Geoenvironmental Ltd
The Byre
Woodend Lane
Cromhall
Gloucestershire
GL12 8AA

e: steve.rhodes@enzygo.com

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

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

Analytical Report Number : 20-26793

Project / Site name:	Battle Hospital	**Samples received on:**	27/08/2020
Your job number:	CRM.1265.007	**Samples instructed on/ Analysis started on:**	27/08/2020
Your order number:	CRM.1265.007	**Analysis completed by:**	03/09/2020
Report Issue Number:	1	**Report issued on:**	03/09/2020
Samples Analysed:	2 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

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.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 20-26793
Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1603890	1603891
Sample Reference				HPE	HPF
Sample Number				None Supplied	None Supplied
Depth (m)				0.00-0.60	0.00-0.60
Date Sampled				26/08/2020	26/08/2020
Time Taken				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	11	8.8
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
General Inorganics					
pH - Automated	pH Units	N/A	MCERTS	8.1	8.6
Total Organic Carbon (TOC)	%	0.1	MCERTS	3.7	3.1
Speciated PAHs					
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Total PAH					
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.4	5.5
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3	2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	12
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20	25
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	7.3	5.2
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47	53
Petroleum Hydrocarbons					
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 20-26793
Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1603890	1603891
Sample Reference				HPE	HPF
Sample Number				None Supplied	None Supplied
Depth (m)				0.00-0.60	0.00-0.60
Date Sampled				26/08/2020	26/08/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10
TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C35 - C44)	mg/kg	10	NONE	< 10	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 20-26793
Project / Site name: Battle Hospital

* 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 *
1603890	HPE	None Supplied	0.00-0.60	Brown loam and sand with vegetation.
1603891	HPF	None Supplied	0.00-0.60	Brown loam and sand with vegetation.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 20-26793
Project / Site name: Battle Hospital

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
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
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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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	NONE

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.

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The results included within the report are representative of the samples submitted for analysis.

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APPENDIX D – IMPORTED SOIL CERTIFICATES

MCM
020 8339 9909
Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Freeland
HORTICULTURE LIMITED

Attention: Philippa Lambourne

Our Ref: 816-SA

16 January 2020

Dear Philippa

Topsoil Analysis Report : Beenham Topsoil –January 2020

We have completed the analysis of the topsoil sample recently taken from the above site and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes.

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, slightly moist, friable *loamy sand* with a well developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
- major plant nutrients (N, P, K, Mg) & organic matter content;
- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).
- Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Freeland 01322 619161

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in reaction (pH 8.5) with a pH value that would be suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1395/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

Particle Size Distribution & Stone Content

The sample contained 85% sand and fell into the *loamy sand* texture class. Suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding. As such, we would not consider this sand level to be problematic.

The sample was free from stones of 20 mm and upwards in diameter and only contained a slight fraction of smaller stones (4.4%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil so the following comments are based on the Soil Guideline Values (SGVs) for residential end-use presented in the Contaminated Land Exposure Assessment (CLEA) Model (EA/DEFRA:2002). The SGVs currently only consider a limited range of parameters so where a potential contaminant is not covered by the CLEA Model other relevant schedules for contamination assessment, such as the Dutch Guidelines, and professional judgement have been used.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined and the sand content would not be considered problematic. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland 01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1395
Neutralising Value ($CaCO_3$ equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.312
Carbon:Nitrogen Ratio	:1	10
Available Phosphorus	mg/l	76.0
Available Potassium	mg/l	1162
Available Magnesium	mg/l	140
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	[illegible]
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	95
Texture Class	UK Class	Sand
Stones 2-20mm	% by DW	1.3
Stones 20-50mm	% by DW	1.1
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	3.7
Total Cadmium (Cd)	mg/kg	0.23
Total Chromium (Cr)	mg/kg	<10
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	11.9
Total Lead (Pb)	mg/kg	20.1
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	<10
Total Selenium (Se)	mg/kg	<0.09
Total Zinc (Zn)	mg/kg	51.4
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.6
Total Vanadium (V)	mg/kg	<10
Hot Water Soluble Boron (B)	mg/kg	2.0
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.8
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	70.2
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	9.1
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12
Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	12.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2
Total Petroleum Hydrocarbons (C_6-C_{44})	mg/kg	21.1

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

Enzygo Geoenvironmental Limited
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Cromhall, Gloucestershire GL12 8AA

Tel: 01454 269237
www.enzygo.com

Jack Johnson
Bellway Homes Ltd
Pacific House,
Imperial Way,
Reading,
RG2 0TD
Bicester, OX27 8TG

Our Ref: CRM.1265.007.GE.L.005.A

3 September 2020

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH – HPE & HPF

Background

Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 400mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 21st December 2020 Enzygo Geo Environmental Limited undertook a site inspection to excavate two hand pits (HP3 and HP4) to confirm the presence of a Geotextile no-dig barrier beneath 400mm clean materials. The locations of the Hand Pits are shown on drawing CRM.1265.007.GE.D.001 in Appendix B.

Cover Soils

Hand Pits confirmed the presence of 400mm of cover soils over a Geotextile no dig barrier, meeting the required depth for communal gardens and open space areas. Photographs of the hand pits are included in Appendix A. Samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

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Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pits were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples we sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils within Hand Pits HP3 and HP4 are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo



Richard Reece
Senior Technician

Enzygo Geoenvironmental Limited
The Byre, Woodend Lane
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APPENDICES

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APPENDIX A – PHOTOGRAPHS

Enzygo Geoenvironmental Limited
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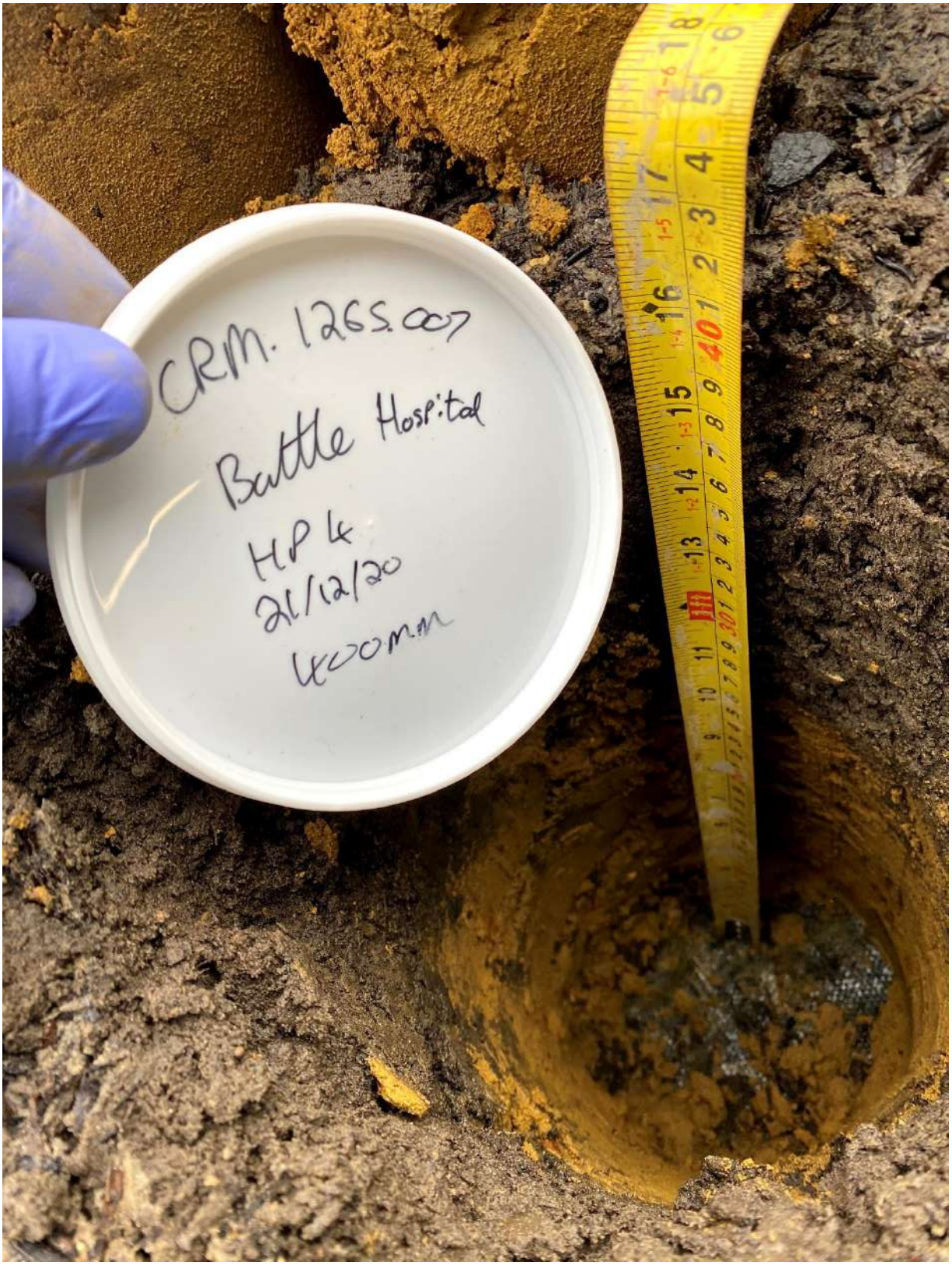
HP3



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HP4



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APPENDIX B – DRAWINGS



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

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APPENDIX C – IMPORTED SOIL CERTIFICATES

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Jonathan Bourne
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

31st January 2020
Our Ref: TOHA/20/9380/SS
Your Ref: see below

Bourne Amenity Ltd

Dear Sirs

Subsoil Analysis Report: Nuffield Subsoil

We have completed the analysis of the soil sample recently submitted, referenced *Nuffield Subsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

This report presents the results of analysis for the sample submitted, and it should be considered 'indicative' of the subsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, especially after the subsoil has left the Bourne Amenity Ltd site.

SAMPLE EXAMINATION

The sample was described as a yellowish brown (Munsell Colour 10YR 5/6), slightly moist, friable, non-calcareous SAND with a single grain structure*. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-75mm, >75mm);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- organic matter content;
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cr(VI), Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C44 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *sand* texture class and would be described as light in texture. Such soils typically have good aeration and drainage properties, but can possess poor water retention capacities. As a consequence they often have a greater risk of drought, particularly during prolonged dry periods, and additional irrigation should be considered.

Further detailed particle size analysis revealed the sample to have a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm) and *coarse sand* (0.50-1.0mm). This is acceptable for subsoil in general landscape applications as porosity levels are maintained in a compacted state and the risk of particle interpacking is minimised. The subsoil represented by this sample would be described as 'free-draining'.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for use as subsoil in general landscape purposes.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity result (64 mm/hr) recorded for the sample indicates that the material would demonstrate satisfactory drainage performance for subsoil in general landscape applications.

pH and Electrical Conductivity Values

The sample was acid in reaction (pH 5.7), with a pH value that would be suitable as subsoil for general landscape purposes providing species with a wide pH tolerance or those known to prefer acid soils are selected for planting.

The electrical conductivity (salinity) value (water extract) was very low, which indicates that soluble salts were not present at levels that would be harmful to plants.

Organic Matter Content

The organic matter content was low (0.7%) and compliant with *BS8601:2013 – Table 1*.

Bourne Amenity Ltd

Potential Contaminants

With reference to *BS8601:2013 – Section 4.2: Note 2*, there is a recommendation to confirm levels of potential contaminants in relation to the subsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations of selected potential contaminants that affect human health have been assessed for the concentrations that affect human health have been assessed for *residential* end-use against the Suitable For Use Levels (S4ULs) presented in the LQM/CIEH S4ULs for Human Health Risk Assessment (2015) and the DEFRA SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (2014).

Of the potential contaminants determined, none exceeded their respective guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS8601:2013 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

From the soil examination and subsequent laboratory analysis, the sample was described as an acid, non-saline, non-calcareous sand with a single grain structure and low stone content. The organic matter content was low and consistent with subsoil. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the soil represented by this sample would be considered suitable as subsoil for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer acid soils are selected and the physical condition of the soil is satisfactory.

The sample was largely compliant with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil)* with the exception of the high sand content (92%) which exceeded the maximum specified sand content.

On this occasion, this non-compliance is considered minor and insignificant when reviewed in the context of all the other results and considering the proposed end-use of this soil.

Soil Handling Recommendations

Reference should be made to Section 6.0 of *BS8601:2013* with regard to the handling and management of the subsoil:

"Soils generally lose strength and become less resistant to damage as they become wetter; therefore, it is essential that they are stripped, handled and trafficked only in the appropriate conditions of weather and soil moisture, and with suitable machinery. If sustained heavy rainfall (e.g. >10 mm in 24 h) occurs during soil stripping operations, work should be suspended and not restarted until the ground has had at least one dry day or until a suitable moisture content has been reached. A soil can be considered to have a suitable moisture content for stripping and handling if the whole thickness of the subsoil layer being stripped and/or handled is at a moisture content below the plastic limit as determined in accordance with BS 1377-2:1990 (incorporating Amendment No. 1).

Machinery should be selected and routed to minimise soil compaction."

Further guidance is provided in Clauses 6.1–6.5.

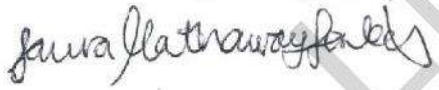
Bourne Amenity Ltd

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



Matthew Heins
BSc (Hons)
Soil Scientist



Laura Hathaway-Jenkins
BSc MSc EngD MISoilSci
Senior Associate

Bourne Amenity Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Ltd**
Project:	**Nuffield Subsoil**
Job:	**Subsoil Analysis (BS8601:2013)**
Date:	**31/01/2020**
Job Ref No:	**TOHA/20/9380/SS**

Sample Reference			**Nuffield Subsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	6
Silt (0.002-0.05mm)	%	UKAS	2
Very Fine Sand (0.05-0.15mm)	%	UKAS	7
Fine Sand (0.15-0.25mm)	%	UKAS	15
Medium Sand (0.25-0.50mm)	%	UKAS	35
Coarse Sand (0.50-1.0mm)	%	UKAS	31
Very Coarse Sand (1.0-2.0mm)	%	UKAS	4
Total Sand (0.002 - 2.0mm)	%	UKAS	92
Texture Class (UK Classification)	--	UKAS	S
Stones (2-20mm)	% DW	GLP	2
Stones (20-75mm)	% DW	GLP	0
Stones (>75mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	5.7
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	93
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2053
Exchangeable Sodium Percentage	%	UKAS	1.0
Organic Matter (LOI)	%	UKAS	0.7
Saturated Hydraulic Conductivity	mm/hr	A2LA	64
Total Antimony (Sb)	mg/kg	MCERTS	1.4
Total Arsenic (As)	mg/kg	MCERTS	12
Total Barium (Ba)	mg/kg	MCERTS	15
Total Beryllium (Be)	mg/kg	MCERTS	0.6
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	26
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	< 1.0
Total Lead (Pb)	mg/kg	MCERTS	3.9
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	16
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	52
Total Zinc (Zn)	mg/kg	MCERTS	18
Water Soluble Boron (B)	mg/kg	MCERTS	0.3
Total Cyanide (CN)	mg/kg	MCERTS	< 1
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur	mg/kg	MCERTS	< 5.0
Acid Volatile Sulphide	mg/kg	MCERTS	< 1.0
Water Soluble Sulphate (SO_4)	g/l	MCERTS	0.14
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C35 - C44	mg/kg	MCERTS	< 8.4
Aliphatic TPH (C5 - C44)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH >C35 - C44	mg/kg	MCERTS	< 8.4
Aromatic TPH (C5 - C44)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos Screen	ND/D	ISO 17025	Not-detected

S = SAND

Visual Examination

The sample was described as a yellowish brown (Munsell Colour 10YR 5/6), slightly moist, friable, non-calcareous SAND with a single grain structure. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Matthew Heins
BSc (Hons)
Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

The contents of this certificate shall not be reproduced without the express written permission of Tim O'Hare Associates LLP.

Bourne Amenity Ltd

Material: Subsoil
Source: Bourne Amenity Ltd
Date Tested: 31/01/2020
Tested Against: BS8601:2013
Tested By: Tim O'Hare Associates (Report ID TOHA/20/9380/SS)

Parameter	Unit	BS8601:2013 Range	Result	Compliance
Texture:				
Clay (<0.002mm)	% w/w	5 - 30%	6	*Yes*
Silt (0.002 - 0.05mm)	% w/w	0 - 65%	2	*Yes*
Sand (0.063 - 2.0mm)	% w/w	20 - 90%	92	*No*
Textual Class:	**Sand**			
Stones (2 - 20mm)	% w/w DW	40%	2	*Yes*
Stones (20-75mm)	% w/w DW	20%	0	*Yes*
Stones (>75mm)	% w/w DW	0%	0	*Yes*
Sand Fraction (USGA Sieve Sizes):				
Very Fine Sand (0.05 - 0.15mm)	% w/w	n/a	7	--
Fine Sand (0.15 - 0.25mm)	% w/w	n/a	15	--
Medium Sand (0.25 - 0.50mm)	% w/w	n/a	35	--
Coarse Sand (0.50 - 1.0mm)	% w/w	n/a	31	--
Very Coarse Sand (1.0 - 2.0mm)	% w/w	n/a	4	--
Organic Matter (LOI)	% w/w	0.0 - 2.0	0.7	*Yes*
Ph		5.5 - 8.5	5.7	*Yes*
Exchangeable Sodium Percentage	%	< 15%	1.0	*Yes*
Phytotoxic Contaminants:				
Total Zinc	mg/kg	0 - 200	18	*Yes*
Total Copper	mg/kg	0 - 135	<1.0	*Yes*
Total Nickel	mg/kg	0 - 75	16	*Yes*
Additional Analysis:				
Electrical Conductivity (1:2:5 water extract)	µS/cm	n/a	93	--
Electrical Conductivity (CaSO4 extract)	µS/cm	n/a	2053	--
Saturated Hydraulic Conductivity	mm/hr	n/a	64	--
Visible Contaminants:				
>2.0mm	% w/w	< 0.5	0.0	*Yes*
Plastics	% w/w	< 0.25	0.0	*Yes*
Sharps	% w/w	0.0	0.0	*Yes*

Bourne Amenity Ltd

Parameter	Unit	Guidelines	Value	Result	Compliance
Heavy Metals and Hydrocarbons					
Total Antimony (Sb)	mg/kg	S4UL	<500	1.4	*Yes*
Total Arsenic (As)	mg/kg	S4UL	<37	12	*Yes*
Total Barium (Ba)	mg/kg	S4UL	<1300	15	*Yes*
Total Beryllium (Be)	mg/kg	S4UL	<1.7	0.6	*Yes*
Total Cadmium (Cd)	mg/kg	S4UL	<11	<0.2	*Yes*
Total Chromium III (Cr)	mg/kg	S4UL	<910	26	*Yes*
Hexavalent Chromium (Cr Vi)	mg/kg	S4UL	<6	<4.0	*Yes*
Total Cyanide (Cn)	mg/kg	Dutch Action Value (DAV)	<20	<1	*Yes*
Total Lead (Pb)	mg/kg	SP1010 (Defra Category 4)	<200	3.9	*Yes*
Total Mercury (Hg)	mg/kg	S4UL	<1.2	<0.3	*Yes*
Total (mono) Phenols	mg/kg	S4UL^	<550	<1.0	*Yes*
Total Selenium (Se)	mg/kg	S4UL	<250	<1.0	*Yes*
Total Vanadium (V)	mg/kg	S4UL	<410	52	*Yes*
Water Soluble Boron (B)	mg/kg	S4UL	<290	0.3	*Yes*
Water Soluble Sulphate (SO4)	g/l	BRE Special Digest 1:2005 (BRE)	<1.2	0.14	*Yes*
Acenaphthylene	mg/kg	S4UL^	<420	<0.05	*Yes*
Acenaphthene	mg/kg	S4UL^	<510	<0.05	*Yes*
Anthracene	mg/kg	S4UL^	<5400	<0.05	*Yes*
Benzo (a) Anthracene	mg/kg	S4UL^	<11	<0.05	*Yes*
Benzo (a) Pyrene	mg/kg	S4UL^	<2.7	<0.05	*Yes*
Benzo (b) Fluoranthene	mg/kg	S4UL^	<3.3	<0.05	*Yes*
Benzo (g,h,i) Perylene	mg/kg	S4UL^	<340	<0.05	*Yes*
Benzo (k) Fluoranthene	mg/kg	S4UL^	<93	<0.05	*Yes*
Chrysene	mg/kg	S4UL^	<22	<0.05	*Yes*
Dibenzo (a,h) Anthracene	mg/kg	S4UL^	<0.28	<0.05	*Yes*
Fluoranthene	mg/kg	S4UL^	<560	<0.05	*Yes*
Fluorene	mg/kg	S4UL^	<400	<0.05	*Yes*
Indeno (1,2,3-cd) Pyrene	mg/kg	S4UL^	<36	<0.05	*Yes*
Naphthalene	mg/kg	S4UL^	<5.6	<0.05	*Yes*
Phenanthrene	mg/kg	S4UL^	<220	<0.05	*Yes*
Pyrene	mg/kg	S4UL^	<1200	<0.05	*Yes*
Aliphatic TPH (C5 - C6)	mg/kg	S4UL^	<78	<0.001	*Yes*
Aliphatic TPH (C6 - C8)	mg/kg	S4UL^	<230	<0.001	*Yes*
Aliphatic TPH (C8 - C10)	mg/kg	S4UL^	<65	<0.001	*Yes*
Aliphatic TPH (C10 - C12)	mg/kg	S4UL^	<330	<1.0	*Yes*
Aliphatic TPH (C12 - C16)	mg/kg	S4UL^	<2400	<2.0	*Yes*
Aliphatic TPH (C16 - C21)	mg/kg	S4UL^	<92000	<8.0	*Yes*
Aliphatic TPH (C21 - C35)	mg/kg	S4UL^		<8.0	*Yes*
Aliphatic TPH (C35 - C44)	mg/kg	S4UL^	<92000	<8.4	*Yes*
Aromatic TPH (C5 - C7)	mg/kg	S4UL^	<140	<0.001	*Yes*
Aromatic TPH (C7 - C8)	mg/kg	S4UL^	<290	<0.001	*Yes*
Aromatic TPH (C8 - C10)	mg/kg	S4UL^	<83	<0.001	*Yes*
Aromatic TPH (C10 - C12)	mg/kg	S4UL^	<180	<1.0	*Yes*
Aromatic TPH (C12 - C16)	mg/kg	S4UL^	<330	<2.0	*Yes*
Aromatic TPH (C16 - C21)	mg/kg	S4UL^	<540	<10	*Yes*
Aromatic TPH (C21 - C35)	mg/kg	S4UL^	<1500	<10	*Yes*
Aromatic TPH (C35 - C44)	mg/kg	S4UL^	<1500	>8.4	*Yes*
Benzene	mg/kg	S4UL^	<0.17	<0.001	*Yes*
Toluene	mg/kg	S4UL^	<290	<0.001	*Yes*
Ethylbenzene	mg/kg	S4UL^	<110	<0.001	*Yes*
O-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
M-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
P-xylene	mg/kg	S4UL^	<130		*Yes*
MTBE	mg/kg	Sail Guideline Values	<470	<0.001	*Yes*
Asbestos	mg/kg	Control of Asbestos Regulations 2006	Absent	Absent	*Yes*

**All reports originate from samples collected in accordance with the guidelines laid out in the BS3882:2015 standard. Tests of this material are carried out a minimum of every 6 months.*

Bourne Amenity Ltd

Bourne Amenity Ltd, The Wharf, Rye Road, Newenden, Kent TN18 5QG
01797 252299 • enquiries@bourneamenity.co.uk
www.bourneamenity.co.uk
VAT No: 863 1196 22 • Registered in England No: 3453821

MCM
020 8339 9909
Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Freeland
HORTICULTURE LIMITED

Attention: Philippa Lambourne

Our Ref: 816-SA

16 January 2020

Dear Philippa

Topsoil Analysis Report : Beenham Topsoil –January 2020

We have completed the analysis of the topsoil sample recently taken from the above site and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes.

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, slightly moist, friable *loamy sand* with a well developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
- major plant nutrients (N, P, K, Mg) & organic matter content;
- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).
- Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Freeland 01322 619161

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in reaction (pH 8.5) with a pH value that would be suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1395/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

Particle Size Distribution & Stone Content

The sample contained 85% sand and fell into the *loamy sand* texture class. Suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding. As such, we would not consider this sand level to be problematic.

The sample was free from stones of 20 mm and upwards in diameter and only contained a slight fraction of smaller stones (4.4%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil so the following comments are based on the Soil Guideline Values (SGVs) for residential end-use presented in the Contaminated Land Exposure Assessment (CLEA) Model (EA/DEFRA:2002). The SGVs currently only consider a limited range of parameters so where a potential contaminant is not covered by the CLEA Model other relevant schedules for contamination assessment, such as the Dutch Guidelines, and professional judgement have been used.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined and the sand content would not be considered problematic. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland 01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1395
Neutralising Value ($CaCO_3$ equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.312
Carbon:Nitrogen Ratio	:1	10
Available Phosphorus	mg/l	76.0
Available Potassium	mg/l	1162
Available Magnesium	mg/l	140
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	[illegible]
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	95
Texture Class	UK Class	Sand
Stones 2-20mm	% by DW	1.3
Stones 20-50mm	% by DW	1.1
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	3.7
Total Cadmium (Cd)	mg/kg	0.23
Total Chromium (Cr)	mg/kg	<10
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	11.9
Total Lead (Pb)	mg/kg	20.1
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	<10
Total Selenium (Se)	mg/kg	<0.09
Total Zinc (Zn)	mg/kg	51.4
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.6
Total Vanadium (V)	mg/kg	<10
Hot Water Soluble Boron (B)	mg/kg	2.0
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.8
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	70.2
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	9.1
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12
Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	12.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2
Total Petroleum Hydrocarbons (C_6-C_{44})	mg/kg	21.1

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM
020 8339 9909
Freeland Horticulture Ltd
Rosedale Nursery
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Hextable
Kent
BR8 7LT

Freeland
HORTICULTURE LIMITED

Attention: Philippa Lambourne

Our Ref: 816-SA

16 January 2020

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SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, slightly moist, friable *loamy sand* with a well developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

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The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
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- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).
- Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Freeland 01322 619161

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in reaction (pH 8.5) with a pH value that would be suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1395/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

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The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

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Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined and the sand content would not be considered problematic. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

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George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland 01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1395
Neutralising Value ($CaCO_3$ equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.312
Carbon:Nitrogen Ratio	:1	10
Available Phosphorus	mg/l	76.0
Available Potassium	mg/l	1162
Available Magnesium	mg/l	140
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	[illegible]
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	95
Texture Class	UK Class	Sand
Stones 2-20mm	% by DW	1.3
Stones 20-50mm	% by DW	1.1
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	3.7
Total Cadmium (Cd)	mg/kg	0.23
Total Chromium (Cr)	mg/kg	<10
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	11.9
Total Lead (Pb)	mg/kg	20.1
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	<10
Total Selenium (Se)	mg/kg	<0.09
Total Zinc (Zn)	mg/kg	51.4
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.6
Total Vanadium (V)	mg/kg	<10
Hot Water Soluble Boron (B)	mg/kg	2.0
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.8
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	70.2
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	9.1
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12
Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	12.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2
Total Petroleum Hydrocarbons (C_6-C_{44})	mg/kg	21.1

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

Enzygo Geoenvironmental Limited
The Byre, Woodend Lane
Cromhall, Gloucestershire GL12 8AA

Tel: 01454 269237
www.enzygo.com

APPENDIX D – LABORATORY TEST RESULTS

Steve Rhodes
Enzygo Geoenvironmental Ltd
The Byre
Woodend Lane
Cromhall
Gloucestershire
GL12 8AA

e: steve.rhodes@enzygo.com

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

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

Analytical Report Number : 20-49084

Project / Site name:	Battle Hospital	**Samples received on:**	22/12/2020
Your job number:	CRM.1265.007	**Samples instructed on/ Analysis started on:**	23/12/2020
Your order number:	CRM.1265.007	**Analysis completed by:**	04/01/2021
Report Issue Number:	1	**Report issued on:**	04/01/2021
Samples Analysed:	2 soil samples		

Signed: Karolina Marek

Karolina Marek
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

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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 20-49084
Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1727916	1727917
Sample Reference				HP3	HP4
Sample Number				None Supplied	None Supplied
Depth (m)				4.00	4.00
Date Sampled				21/12/2020	21/12/2020
Time Taken				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	%	0.01	NONE	20	24
Total mass of sample received	kg	0.001	NONE	1.5	1.5
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
General Inorganics					
pH - Automated	pH Units	N/A	MCERTS	9.0	8.8
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.9	2.3
Speciated PAHs					
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Total PAH					
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17	7.0
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	1.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	45	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	6.8	11
Lead (aqua regia extractable)	mg/kg	1	MCERTS	13	16
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	6.0
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	35	34

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 20-49084
Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1727916	1727917
Sample Reference				HP3	HP4
Sample Number				None Supplied	None Supplied
Depth (m)				4.00	4.00
Date Sampled				21/12/2020	21/12/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Petroleum Hydrocarbons					
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10
TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C35 - C44)	mg/kg	10	NONE	< 10	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 20-49084
Project / Site name: Battle Hospital

* 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 *
1727916	HP3	None Supplied	4	Brown sand.
1727917	HP4	None Supplied	4	Brown sand with vegetation.

Analytical Report Number : 20-49084
Project / Site name: Battle Hospital

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
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
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
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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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	NONE

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.

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Tel: 01454 269237
www.enzygo.com

Jack Johnson
Bellway Homes Ltd
Pacific House,
Imperial Way,
Reading,
RG2 0TD
Bicester, OX27 8TG

Our Ref: CRM.1265.007.GE.L.006.A

24th June 2021

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH – HP5

Background

Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 400mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 17th June 2021 Enzygo Geo Environmental Limited undertook a site inspection to excavate a hand pit (HP5) to confirm the presence of a Geotextile no-dig barrier beneath 400mm clean materials. The locations of the Hand Pit is shown on drawing CRM.1265.007.GE.D.001 in Appendix B.

Cover Soils

Hand Pits confirmed the presence of 400mm of cover soils over a Geotextile no dig barrier, meeting the required depth for communal gardens and open space areas. Photographs of the hand pit are included in Appendix A. Samples were recovered from the Hand Pit, and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

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Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pit were collected in appropriate containers provided by the analytical laboratory. Samples were stored in a cool box prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples were sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D.

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils within Hand Pit HP5 are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo

Richard Reece
Senior Technician

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APPENDIX A – PHOTOGRAPHS

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HP5



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APPENDIX B – DRAWINGS



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

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APPENDIX C – IMPORTED SOIL CERTIFICATES

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Jonathan Bourne
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

31st January 2020
Our Ref: TOHA/20/9380/SS
Your Ref: see below

Bourne Amenity Ltd

Dear Sirs

Subsoil Analysis Report: Nuffield Subsoil

We have completed the analysis of the soil sample recently submitted, referenced *Nuffield Subsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

This report presents the results of analysis for the sample submitted, and it should be considered 'indicative' of the subsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, especially after the subsoil has left the Bourne Amenity Ltd site.

SAMPLE EXAMINATION

The sample was described as a yellowish brown (Munsell Colour 10YR 5/6), slightly moist, friable, non-calcareous SAND with a single grain structure*. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-75mm, >75mm);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- organic matter content;
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cr(VI), Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C44 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *sand* texture class and would be described as light in texture. Such soils typically have good aeration and drainage properties, but can possess poor water retention capacities. As a consequence they often have a greater risk of drought, particularly during prolonged dry periods, and additional irrigation should be considered.

Further detailed particle size analysis revealed the sample to have a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm) and *coarse sand* (0.50-1.0mm). This is acceptable for subsoil in general landscape applications as porosity levels are maintained in a compacted state and the risk of particle interpacking is minimised. The subsoil represented by this sample would be described as 'free-draining'.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for use as subsoil in general landscape purposes.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity result (64 mm/hr) recorded for the sample indicates that the material would demonstrate satisfactory drainage performance for subsoil in general landscape applications.

pH and Electrical Conductivity Values

The sample was acid in reaction (pH 5.7), with a pH value that would be suitable as subsoil for general landscape purposes providing species with a wide pH tolerance or those known to prefer acid soils are selected for planting.

The electrical conductivity (salinity) value (water extract) was very low, which indicates that soluble salts were not present at levels that would be harmful to plants.

Organic Matter Content

The organic matter content was low (0.7%) and compliant with *BS8601:2013 – Table 1*.

Bourne Amenity Ltd

Potential Contaminants

With reference to *BS8601:2013 – Section 4.2: Note 2*, there is a recommendation to confirm levels of potential contaminants in relation to the subsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations of selected potential contaminants that affect human health have been assessed for the concentrations that affect human health have been assessed for *residential* end-use against the Suitable For Use Levels (S4ULs) presented in the LQM/CIEH S4ULs for Human Health Risk Assessment (2015) and the DEFRA SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (2014).

Of the potential contaminants determined, none exceeded their respective guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS8601:2013 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

From the soil examination and subsequent laboratory analysis, the sample was described as an acid, non-saline, non-calcareous sand with a single grain structure and low stone content. The organic matter content was low and consistent with subsoil. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the soil represented by this sample would be considered suitable as subsoil for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer acid soils are selected and the physical condition of the soil is satisfactory.

The sample was largely compliant with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil)* with the exception of the high sand content (92%) which exceeded the maximum specified sand content.

On this occasion, this non-compliance is considered minor and insignificant when reviewed in the context of all the other results and considering the proposed end-use of this soil.

Soil Handling Recommendations

Reference should be made to Section 6.0 of *BS8601:2013* with regard to the handling and management of the subsoil:

"Soils generally lose strength and become less resistant to damage as they become wetter; therefore, it is essential that they are stripped, handled and trafficked only in the appropriate conditions of weather and soil moisture, and with suitable machinery. If sustained heavy rainfall (e.g. >10 mm in 24 h) occurs during soil stripping operations, work should be suspended and not restarted until the ground has had at least one dry day or until a suitable moisture content has been reached. A soil can be considered to have a suitable moisture content for stripping and handling if the whole thickness of the subsoil layer being stripped and/or handled is at a moisture content below the plastic limit as determined in accordance with BS 1377-2:1990 (incorporating Amendment No. 1).

Machinery should be selected and routed to minimise soil compaction."

Further guidance is provided in Clauses 6.1–6.5.

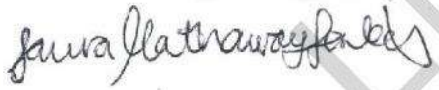
Bourne Amenity Ltd

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



Matthew Heins
BSc (Hons)
Soil Scientist



Laura Hathaway-Jenkins
BSc MSc EngD MISoilSci
Senior Associate

Bourne Amenity Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Ltd**
Project:	**Nuffield Subsoil**
Job:	**Subsoil Analysis (BS8601:2013)**
Date:	**31/01/2020**
Job Ref No:	**TOHA/20/9380/SS**

Sample Reference			**Nuffield Subsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	6
Silt (0.002-0.05mm)	%	UKAS	2
Very Fine Sand (0.05-0.15mm)	%	UKAS	7
Fine Sand (0.15-0.25mm)	%	UKAS	15
Medium Sand (0.25-0.50mm)	%	UKAS	35
Coarse Sand (0.50-1.0mm)	%	UKAS	31
Very Coarse Sand (1.0-2.0mm)	%	UKAS	4
Total Sand (0.002 - 2.0mm)	%	UKAS	92
Texture Class (UK Classification)	--	UKAS	S
Stones (2-20mm)	% DW	GLP	2
Stones (20-75mm)	% DW	GLP	0
Stones (>75mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	5.7
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	93
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2053
Exchangeable Sodium Percentage	%	UKAS	1.0
Organic Matter (LOI)	%	UKAS	0.7
Saturated Hydraulic Conductivity	mm/hr	A2LA	64
Total Antimony (Sb)	mg/kg	MCERTS	1.4
Total Arsenic (As)	mg/kg	MCERTS	12
Total Barium (Ba)	mg/kg	MCERTS	15
Total Beryllium (Be)	mg/kg	MCERTS	0.6
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	26
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	< 1.0
Total Lead (Pb)	mg/kg	MCERTS	3.9
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	16
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	52
Total Zinc (Zn)	mg/kg	MCERTS	18
Water Soluble Boron (B)	mg/kg	MCERTS	0.3
Total Cyanide (CN)	mg/kg	MCERTS	< 1
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur	mg/kg	MCERTS	< 5.0
Acid Volatile Sulphide	mg/kg	MCERTS	< 1.0
Water Soluble Sulphate (SO_4)	g/l	MCERTS	0.14
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C35 - C44	mg/kg	MCERTS	< 8.4
Aliphatic TPH (C5 - C44)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH >C35 - C44	mg/kg	MCERTS	< 8.4
Aromatic TPH (C5 - C44)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos Screen	ND/D	ISO 17025	Not-detected

S = SAND

Visual Examination

The sample was described as a yellowish brown (Munsell Colour 10YR 5/6), slightly moist, friable, non-calcareous SAND with a single grain structure. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Matthew Heins
BSc (Hons)
Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

The contents of this certificate shall not be reproduced without the express written permission of Tim O'Hare Associates LLP.

Bourne Amenity Ltd

Material: Subsoil
Source: Bourne Amenity Ltd
Date Tested: 31/01/2020
Tested Against: BS8601:2013
Tested By: Tim O'Hare Associates (Report ID TOHA/20/9380/SS)

Parameter	Unit	BS8601:2013 Range	Result	Compliance
Texture:				
Clay (<0.002mm)	% w/w	5 - 30%	6	*Yes*
Silt (0.002 - 0.05mm)	% w/w	0 - 65%	2	*Yes*
Sand (0.063 - 2.0mm)	% w/w	20 - 90%	92	*No*
Textual Class:	**Sand**			
Stones (2 - 20mm)	% w/w DW	40%	2	*Yes*
Stones (20-75mm)	% w/w DW	20%	0	*Yes*
Stones (>75mm)	% w/w DW	0%	0	*Yes*
Sand Fraction (USGA Sieve Sizes):				
Very Fine Sand (0.05 - 0.15mm)	% w/w	n/a	7	--
Fine Sand (0.15 - 0.25mm)	% w/w	n/a	15	--
Medium Sand (0.25 - 0.50mm)	% w/w	n/a	35	--
Coarse Sand (0.50 - 1.0mm)	% w/w	n/a	31	--
Very Coarse Sand (1.0 - 2.0mm)	% w/w	n/a	4	--
Organic Matter (LOI)	% w/w	0.0 - 2.0	0.7	*Yes*
Ph		5.5 - 8.5	5.7	*Yes*
Exchangeable Sodium Percentage	%	< 15%	1.0	*Yes*
Phytotoxic Contaminants:				
Total Zinc	mg/kg	0 - 200	18	*Yes*
Total Copper	mg/kg	0 - 135	<1.0	*Yes*
Total Nickel	mg/kg	0 - 75	16	*Yes*
Additional Analysis:				
Electrical Conductivity (1:2:5 water extract)	µS/cm	n/a	93	--
Electrical Conductivity (CaSO4 extract)	µS/cm	n/a	2053	--
Saturated Hydraulic Conductivity	mm/hr	n/a	64	--
Visible Contaminants:				
>2.0mm	% w/w	< 0.5	0.0	*Yes*
Plastics	% w/w	< 0.25	0.0	*Yes*
Sharps	% w/w	0.0	0.0	*Yes*

Bourne Amenity Ltd

Parameter	Unit	Guidelines	Value	Result	Compliance
Heavy Metals and Hydrocarbons					
Total Antimony (Sb)	mg/kg	S4UL	<500	1.4	*Yes*
Total Arsenic (As)	mg/kg	S4UL	<37	12	*Yes*
Total Barium (Ba)	mg/kg	S4UL	<1300	15	*Yes*
Total Beryllium (Be)	mg/kg	S4UL	<1.7	0.6	*Yes*
Total Cadmium (Cd)	mg/kg	S4UL	<11	<0.2	*Yes*
Total Chromium III (Cr)	mg/kg	S4UL	<910	26	*Yes*
Hexavalent Chromium (Cr Vi)	mg/kg	S4UL	<6	<4.0	*Yes*
Total Cyanide (Cn)	mg/kg	Dutch Action Value (DAV)	<20	<1	*Yes*
Total Lead (Pb)	mg/kg	SP1010 (Defra Category 4)	<200	3.9	*Yes*
Total Mercury (Hg)	mg/kg	S4UL	<1.2	<0.3	*Yes*
Total (mono) Phenols	mg/kg	S4UL^	<550	<1.0	*Yes*
Total Selenium (Se)	mg/kg	S4UL	<250	<1.0	*Yes*
Total Vanadium (V)	mg/kg	S4UL	<410	52	*Yes*
Water Soluble Boron (B)	mg/kg	S4UL	<290	0.3	*Yes*
Water Soluble Sulphate (SO4)	g/l	BRE Special Digest 1:2005 (BRE)	<1.2	0.14	*Yes*
Acenaphthylene	mg/kg	S4UL^	<420	<0.05	*Yes*
Acenaphthene	mg/kg	S4UL^	<510	<0.05	*Yes*
Anthracene	mg/kg	S4UL^	<5400	<0.05	*Yes*
Benzo (a) Anthracene	mg/kg	S4UL^	<11	<0.05	*Yes*
Benzo (a) Pyrene	mg/kg	S4UL^	<2.7	<0.05	*Yes*
Benzo (b) Fluoranthene	mg/kg	S4UL^	<3.3	<0.05	*Yes*
Benzo (g,h,i) Perylene	mg/kg	S4UL^	<340	<0.05	*Yes*
Benzo (k) Fluoranthene	mg/kg	S4UL^	<93	<0.05	*Yes*
Chrysene	mg/kg	S4UL^	<22	<0.05	*Yes*
Dibenzo (a,h) Anthracene	mg/kg	S4UL^	<0.28	<0.05	*Yes*
Fluoranthene	mg/kg	S4UL^	<560	<0.05	*Yes*
Fluorene	mg/kg	S4UL^	<400	<0.05	*Yes*
Indeno (1,2,3-cd) Pyrene	mg/kg	S4UL^	<36	<0.05	*Yes*
Naphthalene	mg/kg	S4UL^	<5.6	<0.05	*Yes*
Phenanthrene	mg/kg	S4UL^	<220	<0.05	*Yes*
Pyrene	mg/kg	S4UL^	<1200	<0.05	*Yes*
Aliphatic TPH (C5 - C6)	mg/kg	S4UL^	<78	<0.001	*Yes*
Aliphatic TPH (C6 - C8)	mg/kg	S4UL^	<230	<0.001	*Yes*
Aliphatic TPH (C8 - C10)	mg/kg	S4UL^	<65	<0.001	*Yes*
Aliphatic TPH (C10 - C12)	mg/kg	S4UL^	<330	<1.0	*Yes*
Aliphatic TPH (C12 - C16)	mg/kg	S4UL^	<2400	<2.0	*Yes*
Aliphatic TPH (C16 - C21)	mg/kg	S4UL^	<92000	<8.0	*Yes*
Aliphatic TPH (C21 - C35)	mg/kg	S4UL^		<8.0	*Yes*
Aliphatic TPH (C35 - C44)	mg/kg	S4UL^	<92000	<8.4	*Yes*
Aromatic TPH (C5 - C7)	mg/kg	S4UL^	<140	<0.001	*Yes*
Aromatic TPH (C7 - C8)	mg/kg	S4UL^	<290	<0.001	*Yes*
Aromatic TPH (C8 - C10)	mg/kg	S4UL^	<83	<0.001	*Yes*
Aromatic TPH (C10 - C12)	mg/kg	S4UL^	<180	<1.0	*Yes*
Aromatic TPH (C12 - C16)	mg/kg	S4UL^	<330	<2.0	*Yes*
Aromatic TPH (C16 - C21)	mg/kg	S4UL^	<540	<10	*Yes*
Aromatic TPH (C21 - C35)	mg/kg	S4UL^	<1500	<10	*Yes*
Aromatic TPH (C35 - C44)	mg/kg	S4UL^	<1500	>8.4	*Yes*
Benzene	mg/kg	S4UL^	<0.17	<0.001	*Yes*
Toluene	mg/kg	S4UL^	<290	<0.001	*Yes*
Ethylbenzene	mg/kg	S4UL^	<110	<0.001	*Yes*
O-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
M-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
P-xylene	mg/kg	S4UL^	<130		*Yes*
MTBE	mg/kg	Sail Guideline Values	<470	<0.001	*Yes*
Asbestos	mg/kg	Control of Asbestos Regulations 2006	Absent	Absent	*Yes*

**All reports originate from samples collected in accordance with the guidelines laid out in the BS3882:2015 standard. Tests of this material are carried out a minimum of every 6 months.*

Bourne Amenity Ltd

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MCM
020 8339 9909
Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Freeland
HORTICULTURE LIMITED

Attention: Philippa Lambourne

Our Ref: 816-SA

16 January 2020

Dear Philippa

Topsoil Analysis Report : Beenham Topsoil –January 2020

We have completed the analysis of the topsoil sample recently taken from the above site and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes.

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, slightly moist, friable *loamy sand* with a well developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
- major plant nutrients (N, P, K, Mg) & organic matter content;
- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).
- Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Freeland 01322 619161

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in reaction (pH 8.5) with a pH value that would be suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1395/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

Particle Size Distribution & Stone Content

The sample contained 85% sand and fell into the *loamy sand* texture class. Suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding. As such, we would not consider this sand level to be problematic.

The sample was free from stones of 20 mm and upwards in diameter and only contained a slight fraction of smaller stones (4.4%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil so the following comments are based on the Soil Guideline Values (SGVs) for residential end-use presented in the Contaminated Land Exposure Assessment (CLEA) Model (EA/DEFRA:2002). The SGVs currently only consider a limited range of parameters so where a potential contaminant is not covered by the CLEA Model other relevant schedules for contamination assessment, such as the Dutch Guidelines, and professional judgement have been used.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined and the sand content would not be considered problematic. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland 01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1395
Neutralising Value ($CaCO_3$ equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.312
Carbon:Nitrogen Ratio	:1	10
Available Phosphorus	mg/l	76.0
Available Potassium	mg/l	1162
Available Magnesium	mg/l	140
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	[illegible]
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	95
Texture Class	UK Class	Sand
Stones 2-20mm	% by DW	1.3
Stones 20-50mm	% by DW	1.1
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	3.7
Total Cadmium (Cd)	mg/kg	0.23
Total Chromium (Cr)	mg/kg	<10
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	11.9
Total Lead (Pb)	mg/kg	20.1
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	<10
Total Selenium (Se)	mg/kg	<0.09
Total Zinc (Zn)	mg/kg	51.4
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.6
Total Vanadium (V)	mg/kg	<10
Hot Water Soluble Boron (B)	mg/kg	2.0
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.8
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	70.2
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	9.1
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12
Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	12.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2
Total Petroleum Hydrocarbons (C_6-C_{44})	mg/kg	21.1

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

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APPENDIX D – LABORATORY TEST RESULTS

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e: steve.rhodes@enzygo.com

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7 Woodshots Meadow,
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Herts,
WD18 8YS

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

Analytical Report Number : 21-81969

Project / Site name:	Battle Hospital	**Samples received on:**	18/06/2021
Your job number:	CRM 1265 007	**Samples instructed on/ Analysis started on:**	18/06/2021
Your order number:	CRM 1265 007	**Analysis completed by:**	24/06/2021
Report Issue Number:	1	**Report issued on:**	24/06/2021
Samples Analysed:	1 soil sample		

Signed: Karolina Marek

Karolina Marek
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

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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-81969
Project / Site name: Battle Hospital
Your Order No: CRM 1265 007

Lab Sample Number				1908504
Sample Reference				HP5
Sample Number				None Supplied
Depth (m)				0.00-0.45
Date Sampled				17/06/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	8.3
Total mass of sample received	kg	0.001	NONE	1.5
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.2

Speciated PAHs

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

Total PAH

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

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	21
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	52
Copper (aqua regia extractable)	mg/kg	1	MCERTS	2.4
Lead (aqua regia extractable)	mg/kg	1	MCERTS	8.3
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	31

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-81969
Project / Site name: Battle Hospital
Your Order No: CRM 1265 007

Lab Sample Number				1908504
Sample Reference				HP5
Sample Number				None Supplied
Depth (m)				0.00-0.45
Date Sampled				17/06/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Petroleum Hydrocarbons				
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10
TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0
TPH (C35 - C44)	mg/kg	10	NONE	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 21-81969
Project / Site name: Battle Hospital

* 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 *
1908504	HP5	None Supplied	0.00-0.45	Light brown sand with gravel.

Analytical Report Number : 21-81969
Project / Site name: Battle Hospital

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
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
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
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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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	NONE

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.

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.

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The Byre, Woodend Lane
Cromhall, Gloucestershire GL12 8AA

Tel: 01454 269237
www.enzygo.com

Jack Johnson
Bellway Homes Ltd
Pacific House,
Imperial Way,
Reading,
RG2 0TD
Bicester, OX27 8TG

Our Ref: CRM.1265.007.GE.L.007.A

8th July 2021

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH – HP6

Background

Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 400mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 7th July 2021 Enzygo Geo Environmental Limited undertook a site inspection to excavate a hand pit (HP6) to confirm the presence of a Geotextile no-dig barrier beneath 400mm minimum clean materials. The location of the Hand Pit is shown on drawing CRM.1265.007.GE.D.001 in Appendix B.

Cover Soils

Hand Pit confirmed the presence of 400mm minimum of cover soils over a Geotextile no dig barrier, meeting the required depth for communal gardens and open space areas. Photographs of the hand pit are included in Appendix A. Samples were recovered from the Hand Pit, and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

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Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pit were collected in appropriate containers provided by the analytical laboratory. Samples were stored in a cool box prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples were sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D.

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils within Hand Pit HP6 are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo

Richard Reece
Senior Technician

Enzygo Geoenvironmental Limited
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APPENDIX A – PHOTOGRAPHS

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HP6



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APPENDIX B – DRAWINGS



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

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APPENDIX C – IMPORTED SOIL CERTIFICATES

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Jonathan Bourne
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

31st January 2020
Our Ref: TOHA/20/9380/SS
Your Ref: see below

Bourne Amenity Ltd

Dear Sirs

Subsoil Analysis Report: Nuffield Subsoil

We have completed the analysis of the soil sample recently submitted, referenced *Nuffield Subsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

This report presents the results of analysis for the sample submitted, and it should be considered 'indicative' of the subsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, especially after the subsoil has left the Bourne Amenity Ltd site.

SAMPLE EXAMINATION

The sample was described as a yellowish brown (Munsell Colour 10YR 5/6), slightly moist, friable, non-calcareous SAND with a single grain structure*. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-75mm, >75mm);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- organic matter content;
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cr(VI), Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C44 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *sand* texture class and would be described as light in texture. Such soils typically have good aeration and drainage properties, but can possess poor water retention capacities. As a consequence they often have a greater risk of drought, particularly during prolonged dry periods, and additional irrigation should be considered.

Further detailed particle size analysis revealed the sample to have a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm) and *coarse sand* (0.50-1.0mm). This is acceptable for subsoil in general landscape applications as porosity levels are maintained in a compacted state and the risk of particle interpacking is minimised. The subsoil represented by this sample would be described as 'free-draining'.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for use as subsoil in general landscape purposes.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity result (64 mm/hr) recorded for the sample indicates that the material would demonstrate satisfactory drainage performance for subsoil in general landscape applications.

pH and Electrical Conductivity Values

The sample was acid in reaction (pH 5.7), with a pH value that would be suitable as subsoil for general landscape purposes providing species with a wide pH tolerance or those known to prefer acid soils are selected for planting.

The electrical conductivity (salinity) value (water extract) was very low, which indicates that soluble salts were not present at levels that would be harmful to plants.

Organic Matter Content

The organic matter content was low (0.7%) and compliant with *BS8601:2013 – Table 1*.

Bourne Amenity Ltd

Potential Contaminants

With reference to *BS8601:2013 – Section 4.2: Note 2*, there is a recommendation to confirm levels of potential contaminants in relation to the subsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations of selected potential contaminants that affect human health have been assessed for the concentrations that affect human health have been assessed for *residential* end-use against the Suitable For Use Levels (S4ULs) presented in the LQM/CIEH S4ULs for Human Health Risk Assessment (2015) and the DEFRA SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (2014).

Of the potential contaminants determined, none exceeded their respective guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS8601:2013 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

From the soil examination and subsequent laboratory analysis, the sample was described as an acid, non-saline, non-calcareous sand with a single grain structure and low stone content. The organic matter content was low and consistent with subsoil. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the soil represented by this sample would be considered suitable as subsoil for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer acid soils are selected and the physical condition of the soil is satisfactory.

The sample was largely compliant with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil)* with the exception of the high sand content (92%) which exceeded the maximum specified sand content.

On this occasion, this non-compliance is considered minor and insignificant when reviewed in the context of all the other results and considering the proposed end-use of this soil.

Soil Handling Recommendations

Reference should be made to Section 6.0 of *BS8601:2013* with regard to the handling and management of the subsoil:

"Soils generally lose strength and become less resistant to damage as they become wetter; therefore, it is essential that they are stripped, handled and trafficked only in the appropriate conditions of weather and soil moisture, and with suitable machinery. If sustained heavy rainfall (e.g. >10 mm in 24 h) occurs during soil stripping operations, work should be suspended and not restarted until the ground has had at least one dry day or until a suitable moisture content has been reached. A soil can be considered to have a suitable moisture content for stripping and handling if the whole thickness of the subsoil layer being stripped and/or handled is at a moisture content below the plastic limit as determined in accordance with BS 1377-2:1990 (incorporating Amendment No. 1).

Machinery should be selected and routed to minimise soil compaction."

Further guidance is provided in Clauses 6.1–6.5.

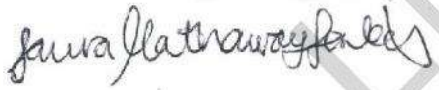
Bourne Amenity Ltd

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



Matthew Heins
BSc (Hons)
Soil Scientist



Laura Hathaway-Jenkins
BSc MSc EngD MISoilSci
Senior Associate

Bourne Amenity Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Ltd**
Project:	**Nuffield Subsoil**
Job:	**Subsoil Analysis (BS8601:2013)**
Date:	**31/01/2020**
Job Ref No:	**TOHA/20/9380/SS**

Sample Reference			**Nuffield Subsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	6
Silt (0.002-0.05mm)	%	UKAS	2
Very Fine Sand (0.05-0.15mm)	%	UKAS	7
Fine Sand (0.15-0.25mm)	%	UKAS	15
Medium Sand (0.25-0.50mm)	%	UKAS	35
Coarse Sand (0.50-1.0mm)	%	UKAS	31
Very Coarse Sand (1.0-2.0mm)	%	UKAS	4
Total Sand (0.002 - 2.0mm)	%	UKAS	92
Texture Class (UK Classification)	--	UKAS	S
Stones (2-20mm)	% DW	GLP	2
Stones (20-75mm)	% DW	GLP	0
Stones (>75mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	5.7
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	93
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2053
Exchangeable Sodium Percentage	%	UKAS	1.0
Organic Matter (LOI)	%	UKAS	0.7
Saturated Hydraulic Conductivity	mm/hr	A2LA	64
Total Antimony (Sb)	mg/kg	MCERTS	1.4
Total Arsenic (As)	mg/kg	MCERTS	12
Total Barium (Ba)	mg/kg	MCERTS	15
Total Beryllium (Be)	mg/kg	MCERTS	0.6
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	26
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	< 1.0
Total Lead (Pb)	mg/kg	MCERTS	3.9
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	16
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	52
Total Zinc (Zn)	mg/kg	MCERTS	18
Water Soluble Boron (B)	mg/kg	MCERTS	0.3
Total Cyanide (CN)	mg/kg	MCERTS	< 1
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur	mg/kg	MCERTS	< 5.0
Acid Volatile Sulphide	mg/kg	MCERTS	< 1.0
Water Soluble Sulphate (SO_4)	g/l	MCERTS	0.14
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C35 - C44	mg/kg	MCERTS	< 8.4
Aliphatic TPH (C5 - C44)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH >C35 - C44	mg/kg	MCERTS	< 8.4
Aromatic TPH (C5 - C44)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos Screen	ND/D	ISO 17025	Not-detected

S = SAND

Visual Examination

The sample was described as a yellowish brown (Munsell Colour 10YR 5/6), slightly moist, friable, non-calcareous SAND with a single grain structure. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Matthew Heins
BSc (Hons)
Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

The contents of this certificate shall not be reproduced without the express written permission of Tim O'Hare Associates LLP.

Bourne Amenity Ltd

Material: Subsoil
Source: Bourne Amenity Ltd
Date Tested: 31/01/2020
Tested Against: BS8601:2013
Tested By: Tim O'Hare Associates (Report ID TOHA/20/9380/SS)

Parameter	Unit	BS8601:2013 Range	Result	Compliance
Texture:				
Clay (<0.002mm)	% w/w	5 - 30%	6	*Yes*
Silt (0.002 - 0.05mm)	% w/w	0 - 65%	2	*Yes*
Sand (0.063 - 2.0mm)	% w/w	20 - 90%	92	*No*
Textual Class:	**Sand**			
Stones (2 - 20mm)	% w/w DW	40%	2	*Yes*
Stones (20-75mm)	% w/w DW	20%	0	*Yes*
Stones (>75mm)	% w/w DW	0%	0	*Yes*
Sand Fraction (USGA Sieve Sizes):				
Very Fine Sand (0.05 - 0.15mm)	% w/w	n/a	7	--
Fine Sand (0.15 - 0.25mm)	% w/w	n/a	15	--
Medium Sand (0.25 - 0.50mm)	% w/w	n/a	35	--
Coarse Sand (0.50 - 1.0mm)	% w/w	n/a	31	--
Very Coarse Sand (1.0 - 2.0mm)	% w/w	n/a	4	--
Organic Matter (LOI)	% w/w	0.0 - 2.0	0.7	*Yes*
Ph		5.5 - 8.5	5.7	*Yes*
Exchangeable Sodium Percentage	%	< 15%	1.0	*Yes*
Phytotoxic Contaminants:				
Total Zinc	mg/kg	0 - 200	18	*Yes*
Total Copper	mg/kg	0 - 135	<1.0	*Yes*
Total Nickel	mg/kg	0 - 75	16	*Yes*
Additional Analysis:				
Electrical Conductivity (1:2:5 water extract)	µS/cm	n/a	93	--
Electrical Conductivity (CaSO4 extract)	µS/cm	n/a	2053	--
Saturated Hydraulic Conductivity	mm/hr	n/a	64	--
Visible Contaminants:				
>2.0mm	% w/w	< 0.5	0.0	*Yes*
Plastics	% w/w	< 0.25	0.0	*Yes*
Sharps	% w/w	0.0	0.0	*Yes*

Bourne Amenity Ltd

Parameter	Unit	Guidelines	Value	Result	Compliance
Heavy Metals and Hydrocarbons					
Total Antimony (Sb)	mg/kg	S4UL	<500	1.4	*Yes*
Total Arsenic (As)	mg/kg	S4UL	<37	12	*Yes*
Total Barium (Ba)	mg/kg	S4UL	<1300	15	*Yes*
Total Beryllium (Be)	mg/kg	S4UL	<1.7	0.6	*Yes*
Total Cadmium (Cd)	mg/kg	S4UL	<11	<0.2	*Yes*
Total Chromium III (Cr)	mg/kg	S4UL	<910	26	*Yes*
Hexavalent Chromium (Cr Vi)	mg/kg	S4UL	<6	<4.0	*Yes*
Total Cyanide (Cn)	mg/kg	Dutch Action Value (DAV)	<20	<1	*Yes*
Total Lead (Pb)	mg/kg	SP1010 (Defra Category 4)	<200	3.9	*Yes*
Total Mercury (Hg)	mg/kg	S4UL	<1.2	<0.3	*Yes*
Total (mono) Phenols	mg/kg	S4UL^	<550	<1.0	*Yes*
Total Selenium (Se)	mg/kg	S4UL	<250	<1.0	*Yes*
Total Vanadium (V)	mg/kg	S4UL	<410	52	*Yes*
Water Soluble Boron (B)	mg/kg	S4UL	<290	0.3	*Yes*
Water Soluble Sulphate (SO4)	g/l	BRE Special Digest 1:2005 (BRE)	<1.2	0.14	*Yes*
Acenaphthylene	mg/kg	S4UL^	<420	<0.05	*Yes*
Acenaphthene	mg/kg	S4UL^	<510	<0.05	*Yes*
Anthracene	mg/kg	S4UL^	<5400	<0.05	*Yes*
Benzo (a) Anthracene	mg/kg	S4UL^	<11	<0.05	*Yes*
Benzo (a) Pyrene	mg/kg	S4UL^	<2.7	<0.05	*Yes*
Benzo (b) Fluoranthene	mg/kg	S4UL^	<3.3	<0.05	*Yes*
Benzo (g,h,i) Perylene	mg/kg	S4UL^	<340	<0.05	*Yes*
Benzo (k) Fluoranthene	mg/kg	S4UL^	<93	<0.05	*Yes*
Chrysene	mg/kg	S4UL^	<22	<0.05	*Yes*
Dibenzo (a,h) Anthracene	mg/kg	S4UL^	<0.28	<0.05	*Yes*
Fluoranthene	mg/kg	S4UL^	<560	<0.05	*Yes*
Fluorene	mg/kg	S4UL^	<400	<0.05	*Yes*
Indeno (1,2,3-cd) Pyrene	mg/kg	S4UL^	<36	<0.05	*Yes*
Naphthalene	mg/kg	S4UL^	<5.6	<0.05	*Yes*
Phenanthrene	mg/kg	S4UL^	<220	<0.05	*Yes*
Pyrene	mg/kg	S4UL^	<1200	<0.05	*Yes*
Aliphatic TPH (C5 - C6)	mg/kg	S4UL^	<78	<0.001	*Yes*
Aliphatic TPH (C6 - C8)	mg/kg	S4UL^	<230	<0.001	*Yes*
Aliphatic TPH (C8 - C10)	mg/kg	S4UL^	<65	<0.001	*Yes*
Aliphatic TPH (C10 - C12)	mg/kg	S4UL^	<330	<1.0	*Yes*
Aliphatic TPH (C12 - C16)	mg/kg	S4UL^	<2400	<2.0	*Yes*
Aliphatic TPH (C16 - C21)	mg/kg	S4UL^	<92000	<8.0	*Yes*
Aliphatic TPH (C21 - C35)	mg/kg	S4UL^		<8.0	*Yes*
Aliphatic TPH (C35 - C44)	mg/kg	S4UL^	<92000	<8.4	*Yes*
Aromatic TPH (C5 - C7)	mg/kg	S4UL^	<140	<0.001	*Yes*
Aromatic TPH (C7 - C8)	mg/kg	S4UL^	<290	<0.001	*Yes*
Aromatic TPH (C8 - C10)	mg/kg	S4UL^	<83	<0.001	*Yes*
Aromatic TPH (C10 - C12)	mg/kg	S4UL^	<180	<1.0	*Yes*
Aromatic TPH (C12 - C16)	mg/kg	S4UL^	<330	<2.0	*Yes*
Aromatic TPH (C16 - C21)	mg/kg	S4UL^	<540	<10	*Yes*
Aromatic TPH (C21 - C35)	mg/kg	S4UL^	<1500	<10	*Yes*
Aromatic TPH (C35 - C44)	mg/kg	S4UL^	<1500	>8.4	*Yes*
Benzene	mg/kg	S4UL^	<0.17	<0.001	*Yes*
Toluene	mg/kg	S4UL^	<290	<0.001	*Yes*
Ethylbenzene	mg/kg	S4UL^	<110	<0.001	*Yes*
O-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
M-xylene	mg/kg	S4UL^	<140	<0.001	*Yes*
P-xylene	mg/kg	S4UL^	<130		*Yes*
MTBE	mg/kg	Sail Guideline Values	<470	<0.001	*Yes*
Asbestos	mg/kg	Control of Asbestos Regulations 2006	Absent	Absent	*Yes*

**All reports originate from samples collected in accordance with the guidelines laid out in the BS3882:2015 standard. Tests of this material are carried out a minimum of every 6 months.*

Bourne Amenity Ltd

Bourne Amenity Ltd, The Wharf, Rye Road, Newenden, Kent TN18 5QG
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MCM
020 8339 9909
Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Freeland
HORTICULTURE LIMITED

Attention: Philippa Lambourne

Our Ref: 816-SA

16 January 2020

Dear Philippa

Topsoil Analysis Report : Beenham Topsoil –January 2020

We have completed the analysis of the topsoil sample recently taken from the above site and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes.

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, slightly moist, friable *loamy sand* with a well developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
- major plant nutrients (N, P, K, Mg) & organic matter content;
- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).
- Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Freeland 01322 619161

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in reaction (pH 8.5) with a pH value that would be suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1395/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

Particle Size Distribution & Stone Content

The sample contained 85% sand and fell into the *loamy sand* texture class. Suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding. As such, we would not consider this sand level to be problematic.

The sample was free from stones of 20 mm and upwards in diameter and only contained a slight fraction of smaller stones (4.4%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil so the following comments are based on the Soil Guideline Values (SGVs) for residential end-use presented in the Contaminated Land Exposure Assessment (CLEA) Model (EA/DEFRA:2002). The SGVs currently only consider a limited range of parameters so where a potential contaminant is not covered by the CLEA Model other relevant schedules for contamination assessment, such as the Dutch Guidelines, and professional judgement have been used.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined and the sand content would not be considered problematic. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland 01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1395
Neutralising Value ($CaCO_3$ equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.312
Carbon:Nitrogen Ratio	:1	10
Available Phosphorus	mg/l	76.0
Available Potassium	mg/l	1162
Available Magnesium	mg/l	140
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	[illegible]
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	95
Texture Class	UK Class	Sand
Stones 2-20mm	% by DW	1.3
Stones 20-50mm	% by DW	1.1
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	3.7
Total Cadmium (Cd)	mg/kg	0.23
Total Chromium (Cr)	mg/kg	<10
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	11.9
Total Lead (Pb)	mg/kg	20.1
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	<10
Total Selenium (Se)	mg/kg	<0.09
Total Zinc (Zn)	mg/kg	51.4
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.6
Total Vanadium (V)	mg/kg	<10
Hot Water Soluble Boron (B)	mg/kg	2.0
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.8
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	70.2
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

MCM

020 8339 9909

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	16 January 2020

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	0.2
Pyrene	mg/kg	0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	9.1
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12
Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	12.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2
Total Petroleum Hydrocarbons (C_6-C_{44})	mg/kg	21.1

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

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APPENDIX D – LABORATORY TEST RESULTS

Steve Rhodes
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GL12 8AA

e: steve.rhodes@enzygo.com

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

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

Analytical Report Number : 21-84586

Project / Site name:	Battle Hospital	**Samples received on:**	02/07/2021
Your job number:	CRM.1265.007	**Samples instructed on/ Analysis started on:**	02/07/2021
Your order number:	CRM.1265.007	**Analysis completed by:**	08/07/2021
Report Issue Number:	1	**Report issued on:**	08/07/2021
Samples Analysed:	1 soil sample		

Signed:

Joanna Wawrzeczko
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.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-84586
Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1924374
Sample Reference				HP6
Sample Number				None Supplied
Depth (m)				0.00-0.40
Date Sampled				01/07/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	10
Total mass of sample received	kg	0.001	NONE	1.5
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.1

Speciated PAHs

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

Total PAH

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

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	20
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	37
Copper (aqua regia extractable)	mg/kg	1	MCERTS	8.5
Lead (aqua regia extractable)	mg/kg	1	MCERTS	24
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	45

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-84586
Project / Site name: Battle Hospital
Your Order No: CRM.1265.007

Lab Sample Number				1924374
Sample Reference				HP6
Sample Number				None Supplied
Depth (m)				0.00-0.40
Date Sampled				01/07/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Petroleum Hydrocarbons				
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10
TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0
TPH (C35 - C44)	mg/kg	10	NONE	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 21-84586
Project / Site name: Battle Hospital

* 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 *
1924374	HP6	None Supplied	0.00-0.40	Brown clay and sand.

Analytical Report Number : 21-84586
Project / Site name: Battle Hospital

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
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
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
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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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	NONE

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.

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.

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Jack Johnson
Bellway Homes Ltd
Pacific House,
Imperial Way,
Reading,
RG2 0TD
Bicester,
OX27 8TG

Our Ref: CRM.1265.007.GE.L.008.A

12th January 2022

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH – HPA & HPB

Background

Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 400mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 7th January 2021 Enzygo Geo Environmental Limited undertook a site inspection to excavate two hand pits (HPA and HPB) to confirm the presence of a Geotextile no-dig barrier beneath 600mm clean materials. The locations of the Hand Pits are shown on drawing CRM.1265.007.GE.D.001 in Appendix B.

Cover Soils

Hand Pits confirmed the presence of 600mm of cover soils over a Geotextile no dig barrier, meeting the required depth for private garden areas. Photographs of the hand pits are included in Appendix A. Samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

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Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pits were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples were sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils within Hand Pits HA3 and HPB are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo



Richard Reece
Senior Technician

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APPENDIX A – PHOTOGRAPHS

Enzygo Geoenvironmental Limited
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HPA



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HPB



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APPENDIX B – DRAWINGS



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

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APPENDIX C – IMPORTED SOIL CERTIFICATES

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Drew Wetherell
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

18th October 2021
Our Ref: TOHA/21/7189/2/SS
Your Ref: PO 77955

Bourne Amenity Ltd

Dear Sirs

Topsoil Analysis Report: Westerham TS6 Topsoil

We have completed the analysis of the soil sample recently received, referenced *Westerham TS6 Topsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil)*.

This report presents the results of analysis for the sample received, and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing or waste designation purposes, especially after the topsoil has left the Bourne Amenity site.

SAMPLE EXAMINATION

The sample was described as a brown (Munsell Colour 10YR 4/3), dry, friable, slightly calcareous LOAMY SAND with a single grain structure*. The sample was slightly stony and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample. Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- visible contaminants (>2mm);
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Detailed Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

Further detailed particle size analysis revealed the sample to have a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm), followed by *coarse sand* (0.50-1.0mm). This is usually ideal for topsoil in general landscape applications as reasonable porosity levels are generally maintained in a consolidated state and the risk of particle interpacking is reduced. The sample should therefore provide adequate drainage and aeration properties for general landscape applications.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for general landscape purposes.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity result (43mm/hr) recorded for the sample indicates that the material would demonstrate a moderately high drainage performance for a general landscape topsoil.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.3). This pH value would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by $CaSO_4$ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

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Organic Matter and Fertility Status

The sample was adequate to well supplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to *BS3882:2015 - Table 1*: Notes 3 and 4, there is a requirement to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with homegrown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) *for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, slightly calcareous loamy sand with a single grain structure and low stone content. The sample contained sufficient reserves of organic matter and plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory. This topsoil may not be ideal for plant species that specifically demand moisture retentive topsoil, unless additional moisture inputs are provided, especially in dry periods.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil)*.

RECOMMENDATIONS

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

Further details on soil handling are provided in Annex A of *BS3882:2015.*

Bourne Amenity Ltd

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully

Tilly Kimble-Wilde
BSc MSc
Graduate Soil Scientist

Ceri Spears
BSc MSc MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

Bourne Amenity Ltd

Client:	**Bourne Amenity Ltd**
Project:	**Westerham TS6 Topsoil**
Job:	**Topsoil Analysis (BS3882:2015)**
Date:	**18/10/2021**
Job Ref No:	**TOHA/21/7189/1/SS**

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Sample Reference			**Westerham TS6 Topsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	8
Silt (0.002-0.05mm)	%	UKAS	7
Very Fine Sand (0.05-0.15mm)	%	UKAS	12
Fine Sand (0.15-0.25mm)	%	UKAS	10
Medium Sand (0.25-0.50mm)	%	UKAS	35
Coarse Sand (0.50-1.0mm)	%	UKAS	19
Very Coarse Sand (1.0-2.0mm)	%	UKAS	9
Total Sand (0.5 - 2.0mm)	%	UKAS	85
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	4
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0
Saturated Hydraulic Conductivity	mm/hr	A2LA	43
pH Value (1:2.5 water extract)	units	UKAS	8.3
Calcium Carbonate	%	UKAS	< 1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	979
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	3089
Exchangeable Sodium Percentage	%	UKAS	3.5
Organic Matter (LOI)	%	UKAS	5.7
Total Nitrogen (Dumas)	%	UKAS	0.25
C : N Ratio	ratio	UKAS	13
Extractable Phosphorus	mg/l	UKAS	55
Extractable Potassium	mg/l	UKAS	1212
Extractable Magnesium	mg/l	UKAS	117
Total Antimony (Sb)	mg/kg	MCERTS	3
Total Arsenic (As)	mg/kg	MCERTS	9
Total Barium (Ba)	mg/kg	MCERTS	27
Total Beryllium (Be)	mg/kg	MCERTS	0.42
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	14
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	13
Total Lead (Pb)	mg/kg	MCERTS	17
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	12
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	30
Total Zinc (Zn)	mg/kg	MCERTS	46
Water Soluble Boron (B)	mg/kg	MCERTS	0.5
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur	mg/kg	MCERTS	< 5.0
Acid Volatile Sulphide	mg/kg	MCERTS	< 1.0
Water Soluble Sulphate (SO_4)	g/l	MCERTS	0.028
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos Screen	ND/D	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a brown (Munsell Colour 10YR 4/3), dry, friable, slightly calcareous LOAMY SAND with a single grain structure. The sample was slightly stony and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

mkimble-Wilde

Tilly Kimble-Wilde
BSc MSc
Graduate Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

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Bourne Amenity Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Drew Wetherell
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

11th January 2021
Our Ref: TOHA/21/9769/2/SS
Your Ref: PO 65568

Dear Sirs

Subsoil Analysis Report: Nutfield Subsoil

We have completed the analysis of the soil sample recently submitted, referenced *Nutfield Subsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

This report presents the results of analysis for the sample submitted, and it should be considered 'indicative' of the subsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, especially after the subsoil has left the Bourne Amenity Ltd site.

SAMPLE EXAMINATION

The sample was described as a yellowish brown (Munsell Colour 10YR 5/4), moist, friable, non-calcareous LOAMY SAND with a weakly developed, fine granular structure*. The sample was slightly stony and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Bourne Amenity Ltd

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- visible contaminants (>2mm);
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cr(VI), Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class. Further detailed particle size analysis revealed the sample to have a relatively narrow particle size distribution and large proportion of sand falling into the *medium sand* (0.25-0.50mm) class, and smaller proportions falling into the *fine sand* (0.15-0.25mm) and *coarse sand* (0.50-1.0mm) classes. This would be considered suitable for subsoil in general landscape applications.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for use as subsoil in general landscape purposes.

Saturated Hydraulic Conductivity

The sample had a saturated hydraulic conductivity value of 13.6 mm/hr, which would be considered suitable for a general landscape subsoil.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.4). This pH value would be considered suitable as subsoil for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was very low, which indicates that soluble salts were not present at levels that would be harmful to plants.

Organic Matter Content

The organic matter content was low (0.8%) and compliant with *BS8601:2013 – Table 1*.

Bourne Amenity Ltd

Potential Contaminants

With reference to *BS8601:2013 – Section 4.2: Note 2*, there is a recommendation to confirm levels of potential contaminants in relation to the subsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations of selected potential contaminants that affect human health have been assessed for the concentrations that affect human health have been assessed for *residential* end-use against the Suitable For Use Levels (S4ULs) presented in the LQM/CIEH S4ULs for Human Health Risk Assessment (2015) and the DEFRA SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (2014).

Of the potential contaminants determined, none exceeded their respective guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS8601:2013 – Table 1.*

CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, non-calcareous loamy sand with a weakly developed structure and low stone content. The organic matter content was low and consistent with subsoil. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the soil represented by this sample would be considered suitable as subsoil for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory.

The sample was also fully compliant with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil).*

Soil Handling Recommendations

Reference should be made to Section 6.0 of *BS8601:2013* with regard to the handling and management of the subsoil:

"Soils generally lose strength and become less resistant to damage as they become wetter; therefore, it is essential that they are stripped, handled and trafficked only in the appropriate conditions of weather and soil moisture, and with suitable machinery. If sustained heavy rainfall (e.g. >10 mm in 24 h) occurs during soil stripping operations, work should be suspended and not restarted until the ground has had at least one dry day or until a suitable moisture content has been reached. A soil can be considered to have a suitable moisture content for stripping and handling if the whole thickness of the subsoil layer being stripped and/or handled is at a moisture content below the plastic limit as determined in accordance with BS 1377-2:1990 (incorporating Amendment No. 1).

Machinery should be selected and routed to minimise soil compaction."

Further guidance is provided in Clauses 6.1–6.5.

Bourne Amenity Ltd

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully

Tilly Kimble-Wilde
BSc MSc
Graduate Soil Scientist

Helen Stanley
BSc MSc MISoilSci CSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

Bourne Amenity Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Ltd**
Project:	**Nutfield Subsoil**
Job:	**Subsoil Analysis (BS8601:2013)**
Date:	**11/01/2020**
Job Ref No:	**TOHA/21/9769/2/SS**

Sample Reference			**Nutfield Subsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	10
Silt (0.002-0.05mm)	%	UKAS	4
Very Fine Sand (0.05-0.15mm)	%	UKAS	10
Fine Sand (0.15-0.25mm)	%	UKAS	22
Medium Sand (0.25-0.50mm)	%	UKAS	28
Coarse Sand (0.50-1.0mm)	%	UKAS	19
Very Coarse Sand (1.0-2.0mm)	%	UKAS	7
Total Sand (0.002 - 2.0mm)	%	UKAS	86
Texture Class (UK Classification)	–	UKAS	LS
Stones (2-20mm)	% DW	GLP	2
Stones (20-50mm)	% DW	GLP	1
Stones (>50mm)	% DW	GLP	0
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0
Saturated Hydraulic Conductivity	mm/hr	A2LA	13.6
pH Value (1:2.5 water extract)	units	UKAS	8.4
Calcium Carbonate	%	UKAS	<1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	134
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2035
Exchangeable Sodium Percentage	%	UKAS	0.6
Organic Matter (LOI)	%	UKAS	0.8
Total Nitrogen (Dumas)	%	UKAS	<0.02
C : N Ratio	ratio	UKAS	23
Extractable Phosphorus	mg/l	UKAS	15
Extractable Potassium	mg/l	UKAS	48
Extractable Magnesium	mg/l	UKAS	18
Total Antimony (Sb)	mg/kg	MCERTS	3
Total Arsenic (As)	mg/kg	MCERTS	25
Total Barium (Ba)	mg/kg	MCERTS	10
Total Beryllium (Be)	mg/kg	MCERTS	1.6
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	65
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	2.7
Total Lead (Pb)	mg/kg	MCERTS	9.2
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	25
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	120
Total Zinc (Zn)	mg/kg	MCERTS	30
Water Soluble Boron (B)	mg/kg	MCERTS	0.3
Total Cyanide (CN)	mg/kg	MCERTS	< 1
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur	mg/kg	MCERTS	< 5.0
Acid Volatile Sulphide	mg/kg	MCERTS	< 1.0
Water Soluble Sulphate (SO_4)	g/l	MCERTS	0.04
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos Screen	ND/D	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a yellowish brown (Munsell Colour 10YR 5/4), moist, friable, non-calcareous LOAMY SAND with a weakly developed, fine granular structure. The sample was slightly stony and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

mtkimble-wilde

Tilly Kimble-Wilde
BSc MSc
Graduate Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

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Bourne Amenity Ltd

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APPENDIX D – LABORATORY TEST RESULTS

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e: reception@i2analytical.com

Analytical Report Number : 22-31777

Project / Site name:	Battle Hospital Reading	**Samples received on:**	10/01/2022
Your job number:	CRM.1265.007	**Samples instructed on/ Analysis started on:**	10/01/2022
Your order number:		**Analysis completed by:**	12/01/2022
Report Issue Number:	1	**Report issued on:**	12/01/2022
Samples Analysed:	2 soil samples		

Signed: Karolina Marek

Karolina Marek
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

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.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 22-31777
Project / Site name: Battle Hospital Reading

Lab Sample Number				2131455	2131456
Sample Reference				HPA	HPB
Sample Number				None Supplied	None Supplied
Depth (m)				0.00-0.60	0.00-6.00
Date Sampled				07/01/2022	07/01/2022
Time Taken				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	%	0.01	NONE	16	18
Total mass of sample received	kg	0.001	NONE	1.4	1.4

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	8.4
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.8	2.3

Speciated PAHs

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

Total PAH

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

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	13
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	1.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	14	15
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	38	38

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 22-31777
Project / Site name: Battle Hospital Reading

Lab Sample Number				2131455	2131456
Sample Reference				HPA	HPB
Sample Number				None Supplied	None Supplied
Depth (m)				0.00-0.60	0.00-6.00
Date Sampled				07/01/2022	07/01/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Petroleum Hydrocarbons					
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44 $_{EH\_CU\_1D\_AL}$	mg/kg	8.4	NONE	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44) $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44 $_{EH\_CU\_1D\_AR}$	mg/kg	8.4	NONE	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44) $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	< 10	< 10
TPH (>C5 - C7) $_{HS\_1D\_TOTAL}$	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (>C7 - C8) $_{HS\_1D\_TOTAL}$	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C8 - C10) $_{HS\_1D\_TOTAL}$	mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH (C10 - C12) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH (C12 - C16) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	4	MCERTS	< 4.0	< 4.0
TPH (C16 - C21) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C21 - C35) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C35 - C44) $_{EH\_CU\_1D\_TOTAL}$	mg/kg	10	NONE	< 10	< 10
TPH Total C5 - C44 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	NONE	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-31777
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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 *
2131455	HPA	None Supplied	0.00-0.60	Brown loam and sand with gravel.
2131456	HPB	None Supplied	0.00-6.00	Brown loam and sand with gravel.

Analytical Report Number : 22-31777
Project / Site name: Battle Hospital Reading

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
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
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 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
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
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
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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	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	NONE

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.
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.

Analytical Report Number : 22-31777
Project / Site name: Battle Hospital Reading

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

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

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Jack Johnson
Bellway Homes Ltd
Pacific House,
Imperial Way,
Reading,
RG2 0TD
Bicester,
OX27 8TG

Our Ref: CRM.1265.007.GE.L.009.A

31st January 2022

Sent via email (jack.johnson@bellway.co.uk)

Dear Jack

Battle Hospital, Portman Way, Reading, RG30 1AH – HP1, HP2 & HP8

Background

Phase I Desk Study and Subsequent Phase II Intrusive Ground Investigation were undertaken at the above-named site by RSK Environmental Limited in March 2017. Visual and olfactory evidence of contamination by hydrocarbons, solvents and a sulphurous odour were noted during the site investigation. Chemical analysis showed exceedance of the reference values for Lead, Polycyclic Aromatic Hydrocarbons (PAH) Hydrocarbons within Made Ground. Asbestos fibres were also detected.

As the site is being re-developed for residential apartments with communal garden areas and private housing, remediation to areas of soft landscaping was proposed. This would comprise 400mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private gardens. This was submitted to Reading Borough Council in Remedial Methodology Strategy – CRM.1265.007.GE.R.002.A. and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 26th January 2022 Enzygo Geo Environmental Limited undertook a site inspection to excavate three hand pits (HP1, HP2 and HP8) to confirm the presence of a Geotextile no-dig barrier beneath 600mm clean materials. The locations of the Hand Pits are shown on drawing CRM.1265.007.GE.D.001 in Appendix B.

Cover Soils

Hand Pits confirmed the presence of 400mm of cover soils over a Geotextile no dig barrier, meeting the required depth for public open space. Photographs of the hand pits are included in Appendix A. Samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing.

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Chemical Analysis

Chemical analysis reports have been supplied by the client prior to the materials being imported to site. These certificates meet the GAC values for residential use with plant uptake. No asbestos was detected. These are included in Appendix C.

Soil samples from the validation pits were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples were sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH CWG) and asbestos screen.

Results show the materials used meet the GAC values for residential use with plant uptake. These are shown in Appendix D

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the cover soils within Hand Pits HP1, HP2 and HP8 are in accordance with the approved Remedial Methodology.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo



Richard Reece
Senior Technician

Enzygo Geoenvironmental Limited
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APPENDIX A – PHOTOGRAPHS

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HP1



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HP2



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HP8



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APPENDIX B – DRAWINGS



Key

- SIte Boundary
- Verification Pits in Communal Areas (HP) (HP1 - HP8)
- Verification Pits in Gardens (HP) (HPA - HPL)

enzygo environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bellway Homes Limited (Thames Valley)

SCALE: 1:1,000@A3

PROJECT REF: CRM.1265.007

DRAWN: NP

CHECKED: SR

DATE: July 2018

PROJECT: Portman Way, Reading

TITLE: Site Location Plan

FIGURE NO: CRM.1265.007.GE.D.001

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APPENDIX C – IMPORTED SOIL CERTIFICATES

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Drew Wetherell
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

18th October 2021
Our Ref: TOHA/21/7189/2/SS
Your Ref: PO 77955

Bourne Amenity Ltd

Dear Sirs

Topsoil Analysis Report: Westerham TS6 Topsoil

We have completed the analysis of the soil sample recently received, referenced *Westerham TS6 Topsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

This report presents the results of analysis for the sample received, and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing or waste designation purposes, especially after the topsoil has left the Bourne Amenity site.

SAMPLE EXAMINATION

The sample was described as a brown (Munsell Colour 10YR 4/3), dry, friable, slightly calcareous LOAMY SAND with a single grain structure*. The sample was slightly stony and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample. Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- visible contaminants (>2mm);
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Detailed Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

Further detailed particle size analysis revealed the sample to have a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm), followed by *coarse sand* (0.50-1.0mm). This is usually ideal for topsoil in general landscape applications as reasonable porosity levels are generally maintained in a consolidated state and the risk of particle interpacking is reduced. The sample should therefore provide adequate drainage and aeration properties for general landscape applications.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for general landscape purposes.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity result (43mm/hr) recorded for the sample indicates that the material would demonstrate a moderately high drainage performance for a general landscape topsoil.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.3). This pH value would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by $CaSO_4$ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Bourne Amenity Ltd

Organic Matter and Fertility Status

The sample was adequate to well supplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to *BS3882:2015 - Table 1*: Notes 3 and 4, there is a requirement to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with homegrown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) *for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, slightly calcareous loamy sand with a single grain structure and low stone content. The sample contained sufficient reserves of organic matter and plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory. This topsoil may not be ideal for plant species that specifically demand moisture retentive topsoil, unless additional moisture inputs are provided, especially in dry periods.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil)*.

RECOMMENDATIONS

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

Further details on soil handling are provided in Annex A of *BS3882:2015.*

Bourne Amenity Ltd

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully





Tilly Kimble-Wilde
BSc MSc
Graduate Soil Scientist

Ceri Spears
BSc MSc MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

Bourne Amenity Ltd

Client:	**Bourne Amenity Ltd**
Project:	**Westerham TS6 Topsoil**
Job:	**Topsoil Analysis (BS3882:2015)**
Date:	**18/10/2021**
Job Ref No:	**TOHA/21/7189/1/SS**

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Sample Reference			**Westerham TS6 Topsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	8
Silt (0.002-0.05mm)	%	UKAS	7
Very Fine Sand (0.05-0.15mm)	%	UKAS	12
Fine Sand (0.15-0.25mm)	%	UKAS	10
Medium Sand (0.25-0.50mm)	%	UKAS	35
Coarse Sand (0.50-1.0mm)	%	UKAS	19
Very Coarse Sand (1.0-2.0mm)	%	UKAS	9
Total Sand (0.5 - 2.0mm)	%	UKAS	85
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	4
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0
Saturated Hydraulic Conductivity	mm/hr	A2LA	43
pH Value (1:2.5 water extract)	units	UKAS	8.3
Calcium Carbonate	%	UKAS	< 1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	979
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	3089
Exchangeable Sodium Percentage	%	UKAS	3.5
Organic Matter (LOI)	%	UKAS	5.7
Total Nitrogen (Dumas)	%	UKAS	0.25
C : N Ratio	ratio	UKAS	13
Extractable Phosphorus	mg/l	UKAS	55
Extractable Potassium	mg/l	UKAS	1212
Extractable Magnesium	mg/l	UKAS	117
Total Antimony (Sb)	mg/kg	MCERTS	3
Total Arsenic (As)	mg/kg	MCERTS	9
Total Barium (Ba)	mg/kg	MCERTS	27
Total Beryllium (Be)	mg/kg	MCERTS	0.42
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	14
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 4.0
Total Copper (Cu)	mg/kg	MCERTS	13
Total Lead (Pb)	mg/kg	MCERTS	17
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	12
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	30
Total Zinc (Zn)	mg/kg	MCERTS	46
Water Soluble Boron (B)	mg/kg	MCERTS	0.5
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur	mg/kg	MCERTS	< 5.0
Acid Volatile Sulphide	mg/kg	MCERTS	< 1.0
Water Soluble Sulphate (SO_4)	g/l	MCERTS	0.028
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos Screen	ND/D	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a brown (Munsell Colour 10YR 4/3), dry, friable, slightly calcareous LOAMY SAND with a single grain structure. The sample was slightly stony and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

mkimble-wilde

Tilly Kimble-Wilde
BSc MSc
Graduate Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

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Bourne Amenity Ltd

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Drew Wetherell
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

11th January 2021
Our Ref: TOHA/21/9769/2/SS
Your Ref: PO 65568

Bourne Amenity Ltd

Dear Sirs

Subsoil Analysis Report: Nutfield Subsoil

We have completed the analysis of the soil sample recently submitted, referenced *Nutfield Subsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil),* including analysis of potential contaminants.

This report presents the results of analysis for the sample submitted, and it should be considered 'indicative' of the subsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, especially after the subsoil has left the Bourne Amenity Ltd site.

SAMPLE EXAMINATION

The sample was described as a yellowish brown (Munsell Colour 10YR 5/4), moist, friable, non-calcareous LOAMY SAND with a weakly developed, fine granular structure*. The sample was slightly stony and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.