

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

pH Value & Salinity

pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	$\mu\text{S/cm}$	1395
Neutralising Value (CaCO_3 equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6

Composite sample

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)	%	
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.



Freeland
HORTICULTURE LIMITED

Client
Job Name
Site
020 8339 9909

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	18 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
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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

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

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 [^]	<92000	<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	<0.001	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, The Wharf, Rye Road, Newenden, Kent TN18 5QG

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APPENDIX D LABORATORY TEST RESULTS



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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
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.

Iss No 20-88966-1 Battle Hospital CRM.1265.007

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

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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					
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			
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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			
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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			

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			



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.

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.

Jack Johnson
Bellway Homes Ltd
Pacific House,
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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.

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

APPENDIX A – PHOTOGRAPHS

HPG



HPH



APPENDIX B – DRAWING



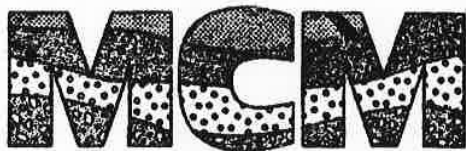
Key	
	Site Boundary
	Verification Pits in Communal Areas (HP) (HP1 - HP8)
	Verification Pits in Gardens (HP) (HPA - HPJ)



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	

APPENDIX C IMPORTED SOILS CHEMICAL ANALYSIS



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 (C₆-C₃₅).
- ✦ Asbestos

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

Phone: 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.

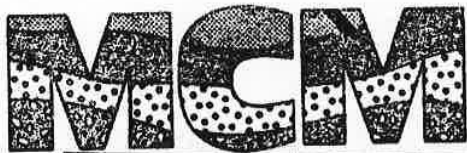
CONCLUSION

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, sandy 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
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

pH Value & Salinity

pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	$\mu\text{S/cm}$	1395
Neutralising Value (CaCO_3 equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6

Composite sample

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)	%	
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.



Freeland
HORTICULTURE LIMITED

Client
Job Name
Site
020 8339 9909

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	18 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
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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

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

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 [^]	<92000	<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	<0.001	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, 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

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 : 20-15058

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
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.

Iss No 20-15058-1 Battle Hospital CRM.1265.007

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: 20-15058

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			
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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			
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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			

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			



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.

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 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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/cleanup.	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.

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.

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

APPENDIX A – PHOTOGRAPHS

HPE



HPF



APPENDIX B – DRAWINGS



Key	
	Site Boundary
	Verification Pits in Communal Areas (HP) (HP1 - HP8)
	Verification Pits in Gardens (HP) (HPA - HPJ)



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	

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.

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
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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
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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



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



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.



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

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

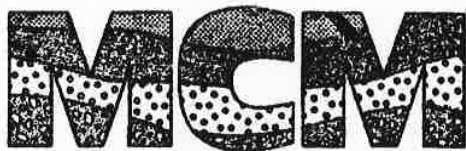
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination 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.

APPENDIX D – IMPORTED SOIL CERTIFICATES



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 (C₆-C₃₅).
- ✦ Asbestos

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

Phone: 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.

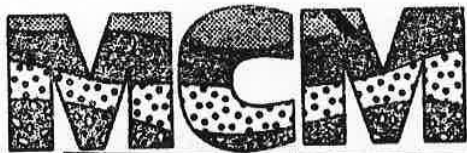
CONCLUSION

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, sandy 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
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

pH Value & Salinity

pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	$\mu\text{S/cm}$	1395
Neutralising Value (CaCO_3 equivalent)	%	2.9
Neutralising Value (CaO equivalent)	%	1.6

Composite sample

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)	%	
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.



Freeland
HORTICULTURE LIMITED

Client
Job Name
Site
020 8339 9909

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Beenham, Berkshire
Month/Year	January 20
Our Ref	0816-SA
Date	18 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
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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

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.

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

APPENDICES
