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Ref: 11-813
Date: 21st December 2022

Steve Weir
Rowlinson Construction
London House
London Road South
Poynton
Stockport
SK12 1YP

BY email

Dear Steve,

COVER SYSTEM VALIDATION – HAPPI BLOCK

An E3P engineer attended the above site to validate the thickness of the cover system that had been placed within the rear public open space areas of the Happi block at Bowes Street, Manchester.

In total 2 No. hand excavated trial pits were advanced with the resulting strata detailed to the rear of this letter.

All trial pits were completed to highlight the required cover system of 300 mm (150 mm topsoil and at least 150 mm subsoil).

E3P can confirm that our independent validation demonstrates that the landscaped areas have been installed with at least 300 mm of certified topsoil and subsoil in accordance with the NHBC requirements for a site of this nature.

TOPSOIL

E3P attended site on 4th February 2020 to obtain three samples of the stockpiled topsoil deposits and again on the 15th July 2020 which were analysed in accordance with the E3P Remediation Strategy. Chemical analysis confirmed that these topsoil deposits were chemically suitable for use within the proposed soft landscaping areas.

Chemical analysis results are included within lab reports 20-84975 – 20-19767 (attached to this letter).



SUBSOIL

Subsoil was imported as a horticultural sand from Tarmac Crown Farm in Northwich.

Three samples of subsoil were analysed in accordance with the regulatory approved Remediation Strategy. Chemical analysis identified no contaminant exceedances; therefore, it has been determined that the subsoil would be suitable for utilisation within the proposed landscaped areas.

Laboratory certificate 19-55101 provides analysis of the imported subsoil.

I trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

For and on behalf of E3P Ltd

Rob Horseman
Associate Director



Site: Bowes Street

Date: 21-12-2022	Project Number: 11-813
Project Manager: R. Horseman	E3P Engineer: T. Newall
Plot Numbers Validated: Happi Block	

Chemical Laboratory Analysis

Analysis for topsoil and subsoil undertaken by I2 Analytical Laboratory using UKAS accredited methods where applicable.

Chemical analysis suite comprises heavy metals, sulphates, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAHs), speciated and total Petroleum Hydrocarbons (TPH) and asbestos.

Sampling frequency in accordance with the agreed Remediation Strategy. Laboratory analysis certificates attached to this validation certificate.

	Topsoil	Subsoil
<i>Chemical analysis confirmed materials suitable?</i>	Pass	Pass
<i>Further Comments</i>	N/A	N/A



Garden Cover System Validation

Complete

Score	100%
Site Name	Bowes street
Location	Princess parkway
Project Number	11813
Project Manager	Rob Horseman
Conducted By	Tobey Newall
Date of visit	21 Dec 2022 9:03 AM GMT



Plot Validation - 100%

100%

Plot Validation - 100%

100%

Plot Validation 1 - 100%

100%

Plot Number

1,2

Is Plot Ready

Yes

Installation Standard

Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole)

0.3

Depth of Topsoil (mm)

150

Depth of Subsoil (mm)

150

Depth of Cover System at Ground Level (Photo)

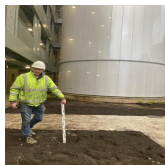


Photo 1

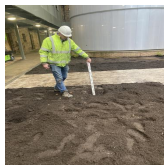


Photo 2



Photo 3



Photo 4



Photo 5

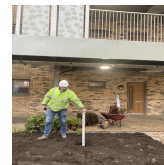


Photo 6



Photo 7



Photo 8



Photo 9

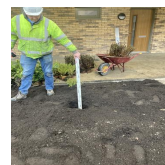


Photo 10



Photo 11



Photo 12



Photo 13



Photo 14



Photo 15



Photo 16



Photo 17



Photo 18

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo)



Soil suitable

Yes

Geotextile membrane present

N/A

Site Manager or Representative



Name

N/a

Signature

21 Dec 2022 9:07 AM GMT



Appendix



Photo 1



Photo 2



Photo 3



Photo 4





Photo 5



Photo 6



Photo 7



Photo 8





Photo 9



Photo 10



Photo 11



Photo 12





Photo 13



Photo 14



Photo 15



Photo 16





Photo 17



Photo 18



**Rob Horseman**

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e: Rhorseman@e3p.co.uk

Analytical Report Number : 20-19767

Project / Site name:	Bowes St.	Samples received on:	16/07/2020
Your job number:		Sample instructed/ Analysis started on:	16/07/2020
Your order number:		Analysis completed by:	22/07/2020
Report Issue Number:	1	Report issued on:	22/07/2020
Samples Analysed:	3 soil samples		

Signed: Caroline Harel

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 20-19767-1 Bowes St..XLS

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.

Page 1 of 5

Analytical Report Number: 20-19767

Project / Site name: Bowes St.

Lab Sample Number				1564595	1564596	1564597		
Sample Reference				TS101	TS102	TS103		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				None Supplied	None Supplied	None Supplied		
Date Sampled				15/07/2020	15/07/2020	15/07/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Stone Content				%	0.1	NONE	< 0.1	< 0.1
Moisture Content				%	N/A	NONE	10	13
Total mass of sample received				kg	0.001	NONE	0.50	0.50

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

pH - Automated	pH Units	N/A	MCERTS	8.0	6.7	7.1		
Total Cyanide	mg/kg	1	MCERTS	3	1	2		
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1900	1800	1900		
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.20	0.19	0.22		
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	410	380	440		
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	204	189	222		
Sulphide	mg/kg	1	MCERTS	1.1	7.3	2.9		
Total Sulphur	mg/kg	50	MCERTS	1100	1200	1200		

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	0.29	0.23	0.95		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.65		
Phenanthrene	mg/kg	0.05	MCERTS	2.3	1.8	5.2		
Anthracene	mg/kg	0.05	MCERTS	0.39	0.47	1.1		
Fluoranthene	mg/kg	0.05	MCERTS	3.3	4.1	7.0		
Pyrene	mg/kg	0.05	MCERTS	3.2	3.8	6.4		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.0	2.4	4.8		
Chrysene	mg/kg	0.05	MCERTS	1.4	2.0	2.8		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.9	2.4	3.7		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.94	0.95	1.5		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.7	1.8	3.5		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.71	0.85	1.4		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.37		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.83	0.94	1.5		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	19.0	21.7	40.9		
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	28	29	39		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.6	0.6	0.7		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	31	27	29		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	66	68	75		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	470	260	350		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.7	0.7	0.8		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	22	22		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.2	2.1	2.1		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	150	170		



Analytical Report Number: 20-19767

Project / Site name: Bowes St.

Lab Sample Number				1564595	1564596	1564597		
Sample Reference				TS101	TS102	TS103		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				None Supplied	None Supplied	None Supplied		
Date Sampled				15/07/2020	15/07/2020	15/07/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0		
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1		
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	< 4.0	< 4.0	< 4.0		
TPH (C16 - C21)	mg/kg	1	MCERTS	8.3	8.9	24		
TPH (C21 - C35)	mg/kg	1	MCERTS	25	42	74		
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10		
TPH Total C5 - C40	mg/kg	10	MCERTS	36	53	99		



Analytical Report Number : 20-19767

Project / Site name: Bowes St.

* 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 *
1564595	TS101	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
1564596	TS102	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
1564597	TS103	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 20-19767

Project / Site name: Bowes St.

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
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

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

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



Rob Horseman

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Analytical Report Number : 20-84975

Project / Site name: Bow St

Samples received on: 04/02/2020

Your job number: 11813

Samples instructed on: 04/02/2020

Your order number:

Analysis completed by: 11/02/2020

Report Issue Number: 1

Report issued on: 11/02/2020

Samples Analysed: 3 soil samples

Signed: *Karolina Marek*

Karolina Marek
Technical Reviewer (Reporting Team)

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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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.

Iss No 20-84975-1 Bow St 11813

Analytical Report Number: 20-84975

Project / Site name: Bow St

Lab Sample Number				1432702	1432703	1432704		
Sample Reference				TS101	TS102	TS103		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				None Supplied	None Supplied	None Supplied		
Date Sampled				03/02/2020	03/02/2020	03/02/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	10	11	14		
Total mass of sample received	kg	0.001	NONE	0.48	0.54	0.54		

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

pH - Automated	pH Units	N/A	MCERTS	7.7	7.8	7.9		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Total Sulphate as SO ₄	mg/kg	50	MCERTS	400	490	540		
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	63	59	120		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.032	0.029	0.061		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	31.6	29.4	60.5		
Sulphide	mg/kg	1	MCERTS	< 1.0	1.0	< 1.0		
Total Sulphur	mg/kg	50	MCERTS	320	340	390		

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.1		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.25		
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.31	0.97		
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.31	0.95		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.65		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.63		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.66		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.28		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.58		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.27		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.35		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	6.66		
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.3	6.2	6.2		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	18	16		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	16	17		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30	29	33		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	13	13		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	57	55	72		

Analytical Report Number: 20-84975

Project / Site name: Bow St

Lab Sample Number	1432702	1432703	1432704		
Sample Reference	TS101	TS102	TS103		
Sample Number	None Supplied	None Supplied	None Supplied		
Depth (m)	None Supplied	None Supplied	None Supplied		
Date Sampled	03/02/2020	03/02/2020	03/02/2020		
Time Taken	None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0		
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1		
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	< 4.0	< 4.0	9.3		
TPH (C16 - C21)	mg/kg	1	MCERTS	6.7	< 1.0	18		
TPH (C21 - C35)	mg/kg	1	MCERTS	50	< 1.0	21		
TPH (C35 - C40)	mg/kg	10	MCERTS	24	< 10	< 10		
TPH Total C5 - C40	mg/kg	10	MCERTS	83	< 10	50		



Analytical Report Number : 20-84975

Project / Site name: Bow St

* 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 *
1432702	TS101	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
1432703	TS102	None Supplied	None Supplied	Brown clay and sand with gravel.
1432704	TS103	None Supplied	None Supplied	Brown clay and sand with gravel.

Analytical Report Number : 20-84975

Project / Site name: Bow St

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
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

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

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



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Analytical Report Number : 19-55101

Project / Site name: Bowes Street

Samples received on: 16/08/2019

Your job number:

Samples instructed on: 16/08/2019

Your order number:

Analysis completed by: 23/08/2019

Report Issue Number: 1

Report issued on: 23/08/2019

Samples Analysed: 6 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

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

Analytical Report Number: 19-55101

Project / Site name: Bowes Street

Lab Sample Number				1293738	1293739	1293740	1293741	1293742
Sample Reference				TS101	TS102	TS103	SS101	SS102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				15/08/2019	15/08/2019	15/08/2019	15/08/2019	15/08/2019
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	17	18	18	19	17
Total mass of sample received	kg	0.001	NONE	0.48	0.49	0.50	0.40	0.52

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

pH - Automated	pH Units	N/A	MCERTS	7.7	7.7	7.7	7.8	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	530	460	620	510	500
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	100	120	99	120	110
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.051	0.061	0.050	0.059	0.053
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	50.9	60.9	49.7	58.5	53.2
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	350	360	380	360	380

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.63	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.34	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.3	1.0	0.75	2.5	0.83
Anthracene	mg/kg	0.05	MCERTS	0.28	0.17	0.17	0.43	0.18
Fluoranthene	mg/kg	0.05	MCERTS	2.2	2.0	1.4	2.6	1.6
Pyrene	mg/kg	0.05	MCERTS	2.0	1.9	1.4	2.3	1.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.0	1.1	0.73	1.2	0.81
Chrysene	mg/kg	0.05	MCERTS	0.98	0.84	0.73	1.2	0.73
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.3	1.1	0.89	1.3	0.99
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.40	0.44	0.25	0.51	0.22
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.98	0.84	0.68	1.0	0.70
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.44	0.43	0.34	0.48	0.34
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.59	0.52	0.40	0.70	0.44

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	11.4	10.4	7.75	15.2	8.24
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Analytical Report Number: 19-55101

Project / Site name: Bowes Street

Lab Sample Number	1293738	1293739	1293740	1293741	1293742
Sample Reference	TS101	TS102	TS103	SS101	SS102
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	15/08/2019	15/08/2019	15/08/2019	15/08/2019	15/08/2019
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	16	16	14	17
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.5	0.6	0.4	0.6
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22	17	16	17	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	61	54	62	58	63
Lead (aqua regia extractable)	mg/kg	1	MCERTS	85	76	85	73	80
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.3	0.6	< 0.3	0.7	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	17	18	15	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.8	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	88	73	100	86	85

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
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	< 4.0	< 4.0	5.7	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	12	16	11	19	6.8
TPH (C21 - C35)	mg/kg	1	MCERTS	49	29	36	43	10
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	63	47	49	70	19

Analytical Report Number: 19-55101

Project / Site name: Bowes Street

Lab Sample Number				1293743				
Sample Reference				SS103				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				15/08/2019				
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	18				
Total mass of sample received	kg	0.001	NONE	0.52				

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

pH - Automated	pH Units	N/A	MCERTS	7.8				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Total Sulphate as SO ₄	mg/kg	50	MCERTS	510				
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	120				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.060				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	59.8				
Sulphide	mg/kg	1	MCERTS	< 1.0				
Total Sulphur	mg/kg	50	MCERTS	410				

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
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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	0.89				
Anthracene	mg/kg	0.05	MCERTS	0.22				
Fluoranthene	mg/kg	0.05	MCERTS	1.7				
Pyrene	mg/kg	0.05	MCERTS	1.6				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.79				
Chrysene	mg/kg	0.05	MCERTS	0.77				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.87				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.41				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.72				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.35				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.48				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	8.76				
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Analytical Report Number: 19-55101

Project / Site name: Bowes Street

Lab Sample Number				1293743				
Sample Reference				SS103				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				15/08/2019				
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	16				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.6				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	70				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	90				
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	93				

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0				
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1				
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	5.8				
TPH (C21 - C35)	mg/kg	1	MCERTS	25				
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10				
TPH Total C5 - C40	mg/kg	10	MCERTS	33				

Analytical Report Number : 19-55101

Project / Site name: Bowes Street

* 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 *
1293738	TS101	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
1293739	TS102	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
1293740	TS103	None Supplied	None Supplied	Brown clay and sand with gravel.
1293741	SS101	None Supplied	None Supplied	Brown clay and sand with gravel.
1293742	SS102	None Supplied	None Supplied	Brown clay and sand with gravel.
1293743	SS103	None Supplied	None Supplied	Brown loam and clay with vegetation and gravel

Analytical Report Number : 19-55101

Project / Site name: Bowes Street

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
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.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

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

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 300C.