

GeoInvestigations Ltd
Greenlands Business Centre
Studley Road
Redditch
WORCS
B98 7HD

07419 327 307
paul@geoinvestigations.co.uk



Validation Report For Remedial Cover System

Plots 1 & 2 William Street Littleborough

REPORT PREPARED ON BEHALF OF Dimora Construction

Paul Palgrave BSc (Hons) ARSM MSc C.Geol FGS
23rd November 2023
Report Ref. 687-R-01

Contents	Page No
1. Introduction	1
2. Hand Dug Pit Records.....	1
3. Verification Sample Chemical Test Results	12
4. Conclusions.....	13

Drawings

687-D-01: Plots 1 & 2: Cover System Verification Inspection Pit Locations

Appendices

Appendix 1: Invoice for topsoil delivery

Appendix 2: Laboratory test certificates

1. Introduction

GeoInvestigations Ltd have been instructed by Dimora Construction (the 'Client') to prepare a remediation cover system verification report for their residential development site on William Street, Littleborough.

The site had been subject to an intrusive ground investigation by GeoInvestigations Ltd and the findings were presented in report referenced 591-R-01, dated March 2022.

The investigation identified the presence of made ground beneath the site containing elevated concentrations of heavy metals and polycyclic aromatic hydrocarbons, likely to be related to ash within the made ground.

It was concluded that a 0.6 metre deep remedial cover of sub-soil and topsoil was required within the garden areas to minimise exposure of future residents to the contaminants in the made ground beneath.

This report presents the findings of site inspections by GeoInvestigations Ltd to sample the imported subsoil/fill and topsoil beneath the garden areas of Plots 1 and 2 initially. The remaining plots are to be inspected and reported on when the cover system placement is complete.

The appended site layout plan shows the location of the verification hand dug pits (HDP1 to HDP5) excavated through the cover system soils (Drawings 687-D-01).

2. Hand Dug Pit Records

Hand dug pits (HDP1 to HDP5) were extended to the base of the sub-soil and topsoil cover to the at the locations shown on the appended site layout drawing (687-D-01).

The thickness of the topsoil and sub-soil cover was also measured in each of the hand dug pits. With the exception of hand dug pit HDP4 on Plot 2, the soils were found be 0.55m deep, but at the time of the site visit, the turf had not been placed. This has subsequently been undertaken, increasing the total cover to 0.60m.

The remedial cover in HDP4, Plot 2, was proven to be 0.60m deep without the addition of turf.

Photographs of the hand dug pits and completed gardens are presented below.



Hand dug pit HDP1 (Plot 1).



Geotextile membrane at the base of hand dug pit HDP1.



View looking south across the garden of Plot, HDP 1 is in the foreground.



Hand dug pit HDP2 (Plot 1).



Hand dug pit HDP3, Plot 1.



Geotextile at the base of HDP3.



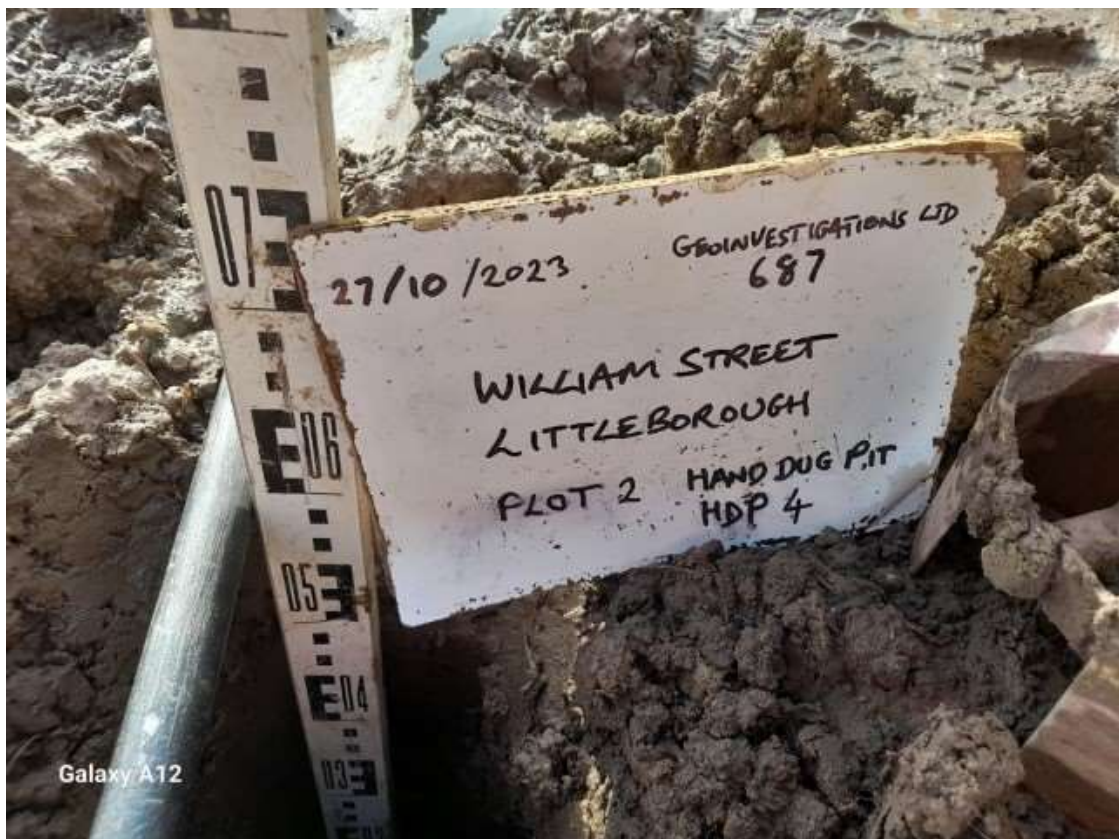
View north-west across Plot 1 garden. HDP3 in foreground.



View west along southern boundary of Plot 1.



Rear garden of Plot 2.



Hand dug pit HDP4, Plot 2, showing 0.60m of sub-soil and topsoil.



As previous picture, showing base of hand dug pit.



View south-west across Plot 1 garden area following placement of turf.



Plot 1 rear garden area, looking south east.



Plot 1, looking south across the garden area.



View north-west across the garden area of Plot 2, following placement of turf.

3. Verification Sample Chemical Test Results

The topsoil and subsoil material to raise level were both obtained from Marchington Stone Ltd, 105 Buxton Road, High Lane, Stockport, SK6 8DX. A copy of the invoice for the topsoil is presented in Appendix 1.

The topsoil comprises an organic rich dark brown sandy loam with a little fine to medium gravel of sandstone. The subsoil comprises a slightly lighter mid brown clayey loam with a little more fine to medium gravel.

Two samples of the topsoil, and two of the sub-soil, were selected for confirmatory chemical laboratory analysis.

The samples were subject to laboratory analysis in accordance with a general contamination screening suite (i2 Analytical Standard Spectrum Suite) selected from asbestos, pH, total and water soluble sulphate, total cyanide, soil organic matter, toxic heavy metals, total monophydric phenols, polyaromatic hydrocarbons (PAHs) and petroleum hydrocarbons (carbon banded with aromatic/aliphatic split).

The chemical test certificates are presented within Appendix 2.

The chemical test data for the soils have been compared against published 'Tier 1' generic assessment criteria (GAC), for a 'residential with home grown produce' end-use.

The Tier 1 GAC's adopted comprise the LQM/CIEH S4ULs (Suitable For Use Screening Levels) for Human Health Risk Assessment (Copyright Land Quality Management Limited reproduced with permission; Publication No. S4UL3429. All rights reserved, 2015).

The S4ULs currently exclude Lead, hence the Defra approved Category 4 Screening Level¹ (C4SL) of 200 mg/kg has been adopted. A peer-reviewed in house derived assessment criteria of 40 mg/kg has been derived for total cyanide.

With respect to the proposed residential development, none of the determinands for which testing was undertaken exceed their respective Tier 1 GAC, hence it is concluded that the sub-soil and topsoil beneath the gardens are suitable for the proposed use.

Samples of the topsoil and subsoil were also submitted for analysis to confirm compliance with the British Standard Specifications for subsoil (BS8601:2013) and topsoil (BS3882:2015). The test certificates are also presented within Appendix 1.

¹ Defra. SP1010. 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document'. December 2012.

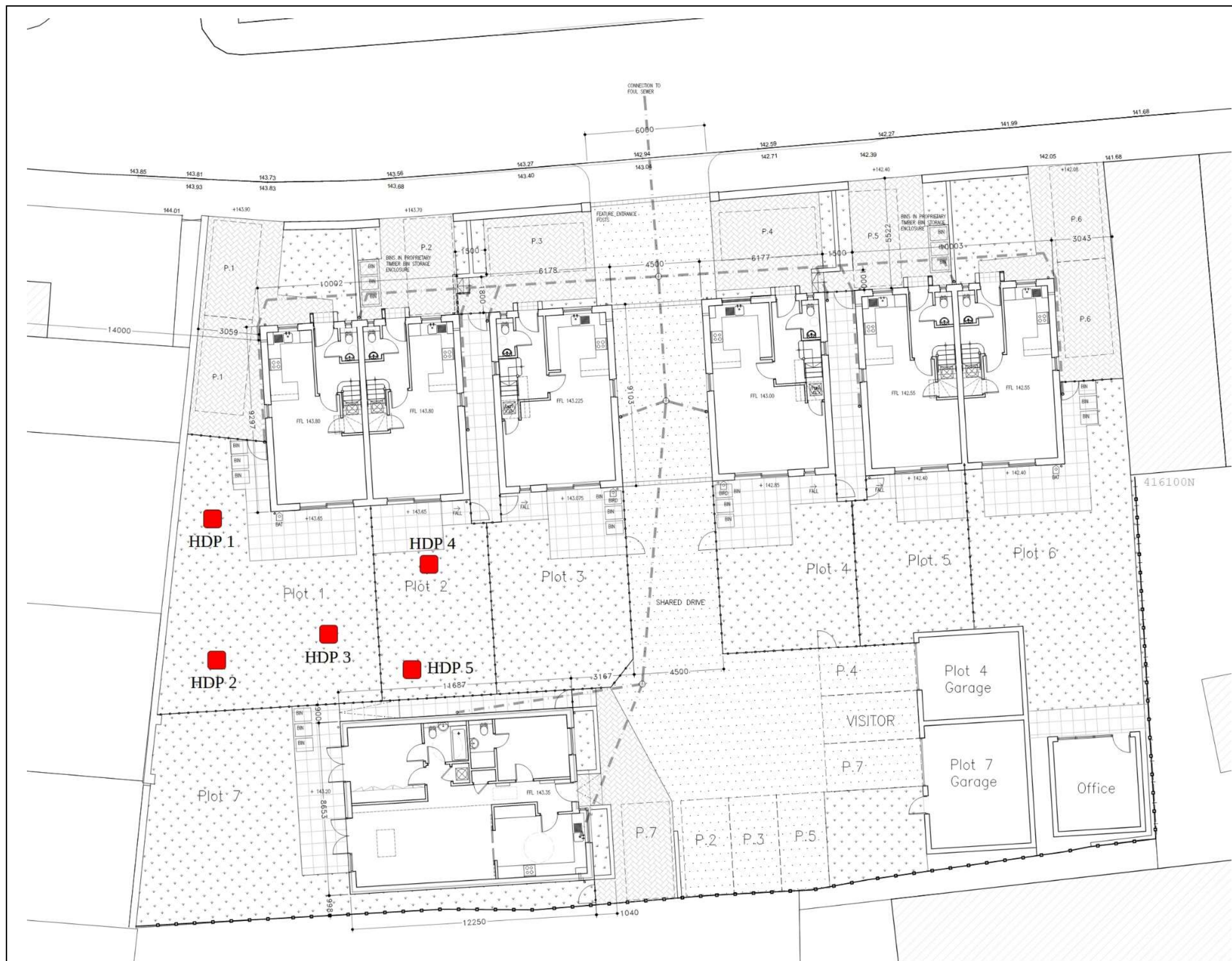
The results show the topsoil is compliant with the British Standard Specification, but the sub-soil is slightly elevated with respect to organic matter, with 2.4% mass loss on ignition. The limit is 2.0% for sub-soil. However, this is not considered to warrant any remedial action.

The material supplier's laboratory test certificates are also included within Appendix 1.

4. Conclusions

The inspection and chemical testing undertaken confirms that the imported topsoil and subsoil material is of sufficient thickness and are acceptable for use within a residential garden setting.

Drawings



Notes

© This drawing is copyright and may not be reproduced or used except with written permission

KEY



HDP1 to HDP5

Hand Dug Verification
Inspection Pits
GeoInvestigations Ltd 27th
October 2023.

REV	DATE	AMENDMENT	BY

GeoInvestigations Ltd
07419 327 307
paul@geoinvestigations.co.uk



CLIENT

CLIENT

Dimora Construction
PROJECT

William Street, Littleborough

TITLE

Plots 1 & 2: Cover System
Verification Inspection Pit
Locations

Date November 2023		Drawn by: PJP	
Scale as shown	Size	Checked PJP	Apprvd PJP

DRAWING No. 687-D-01	Rev
-------------------------	-----

Appendix 1:

Invoice for Imported Soils



Parr Rochdale Ltd
Timber and Builders Merchants

Lomax Street
Rochdale
Lancs
OL12 0DN
01706 656980



Hardware
Power tools
Handtools
Fixings and fasteners
Architectural ironmongery
Key cutting
Workwear and PPE

Invoice

Invoice Number
1401/04003705

Invoice For:-
DIMORA CONSTRUCTION LTD
UNIT 2 DOCTOR FOLD LANE
HEYWOOD
LANCASHIRE
OL102QE

Collected By:-
DIMORA CONSTRUCTION LTD
WILLIAM STREET
LITTLEBOROUGH

Email: dimoraconst@btconnect.com

Account	Our Operator	Phone	Taxpoint Date	Time	Order Number
DI0030	Michael Harwood		21/11/2023	11:30	10112
Your Contact	Advice No	Your Reference	Page		
JOHN PESSAGNO		JOHN	1		

Line	Quantity	Product	Price	Total	V
Supplier: MA1500					
1	2.00 EA	tested as dug soil per 8 wheeler load S/000926	Doc: 293912/465725 437.00 EA	874.00	S

Items marked FSC® are FSC Mix 70% (INT-COC-815257),
Items marked PEFC are 70% PEFC certified (CATG-PEFC-105)

Rate	Goods	VAT	Total Goods	874.00
S 20.00	874.00	174.80	Total VAT	174.80
Please pay via the below A/C				
Sort Code: 40-12-26				
Acc No: 81565028				
Invoice Total				1048.80
All prices are in Sterling				
GBP Sterling				

Appendix 2:

Chemical Laboratory Test Certificates

Paul Palgrave
GeoInvestigations Ltd
1st Floor,
2 Woodberry Grove
Finchley
London
N120DR

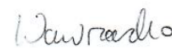
e: paul@geoinvestigations.co.uk

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 : 23-66151

Project / Site name:	Wiliam Street	Samples received on:	31/10/2023
Your job number:	687	Samples instructed on/ Analysis started on:	01/11/2023
Your order number:	1664	Analysis completed by:	15/11/2023
Report Issue Number:	1	Report issued on:	15/11/2023
Samples Analysed:	4 soil samples		



Signed:

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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: 23-66151
Project / Site name: William Street
Your Order No: 1664

Lab Sample Number				2864601	2864602	2864603	2864604
Sample Reference				Plot1/HDP1	Plot1/HDP1	Plot1/HDP3	Plot2/HDP5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.35	0.35-0.55	0.30-0.55	0.00-0.20
Date Sampled				27/10/2023	27/10/2023	27/10/2023	27/10/2023
Time Taken				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
Moisture Content	%	0.01	NONE	18	13	12	16
Total mass of sample received	kg	0.001	NONE	0.8	0.2	0.9	0.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSO	DSO	DSO	DSO

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7	7.1	7.2	7.1
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	380	170	280	440
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0123	0.029	0.049	0.0617
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.4	0.7	0.6	1.2

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.2	< 0.05	0.07	0.17
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.21	< 0.05	0.15	0.22
Pyrene	mg/kg	0.05	MCERTS	0.2	< 0.05	0.11	0.18
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.1	< 0.05	0.07	0.11
Chrysene	mg/kg	0.05	MCERTS	0.11	< 0.05	0.06	0.12
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.11	< 0.05	< 0.05	0.13
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	0.07
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.11	< 0.05	< 0.05	0.12
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.06	< 0.05	< 0.05	0.07
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.06	< 0.05	< 0.05	0.09

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	1.16	< 0.80	< 0.80	1.28
-----------------------------	-------	-----	-----------	------	--------	--------	------

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	4.4	5.3	13
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.2	0.4	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.3	0.4
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	24	23	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	34	21	20	37
Lead (aqua regia extractable)	mg/kg	1	MCERTS	51	21	22	57
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	24	23	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	71	71	71

Analytical Report Number: 23-66151
Project / Site name: William Street
Your Order No: 1664

Lab Sample Number	2864601	2864602	2864603	2864604
Sample Reference	Plot1/HDP1	Plot1/HDP1	Plot1/HDP3	Plot2/HDP5
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.00-0.35	0.35-0.55	0.30-0.55	0.00-0.20
Date Sampled	27/10/2023	27/10/2023	27/10/2023	27/10/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH C10 - C40 EH_CU_ID_TOTAL	mg/kg	10	MCERTS	< 10	39	< 10	< 10
------------------------------	-------	----	--------	------	----	------	------

TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.02	NONE	< 0.020	< 0.020	< 0.020	< 0.020
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	3.5	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	18	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	NONE	< 10	28	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.01	NONE	< 0.010	< 0.010	< 0.010	< 0.010
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.05	NONE	< 0.050	< 0.050	< 0.050	< 0.050
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-66151
Project / Site name: Wiliam 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 *
2864601	Plot1/HDP1	None Supplied	0.00-0.35	Brown sandy clay with vegetation.
2864602	Plot1/HDP1	None Supplied	0.35-0.55	Brown sandy clay with gravel.
2864603	Plot1/HDP3	None Supplied	0.30-0.55	Brown clay and sand with gravel and vegetation.
2864604	Plot2/HDP5	None Supplied	0.00-0.20	Brown clay and sand with gravel and vegetation.

Analytical Report Number : 23-66151
Project / Site name: Wiliam Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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 dispersion 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
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
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. Refer to CoA for analyte specific accreditation.	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
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 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
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 cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260. Refer to CoA for analyte specific accreditation	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID. Refer to CoA for band specific accreditation.	In-house method with silica gel split/clean up.	L088/76-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

Analytical Report Number : 23-66151
Project / Site name: Wiliam Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser.	L080-PL	W	NONE
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' 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 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

TEST CERTIFICATE

SPECIFICATION FOR TOPSOIL
Tested in Accordance with: BS 3882: 2015

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



Client: GeolInvestigations Ltd
Client Address: 1st Floor,, 2 Woodberry Grove,
Finchley, London,
N120DR

Contact: Paul Palgrave
Site Address: Wiliam Street

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

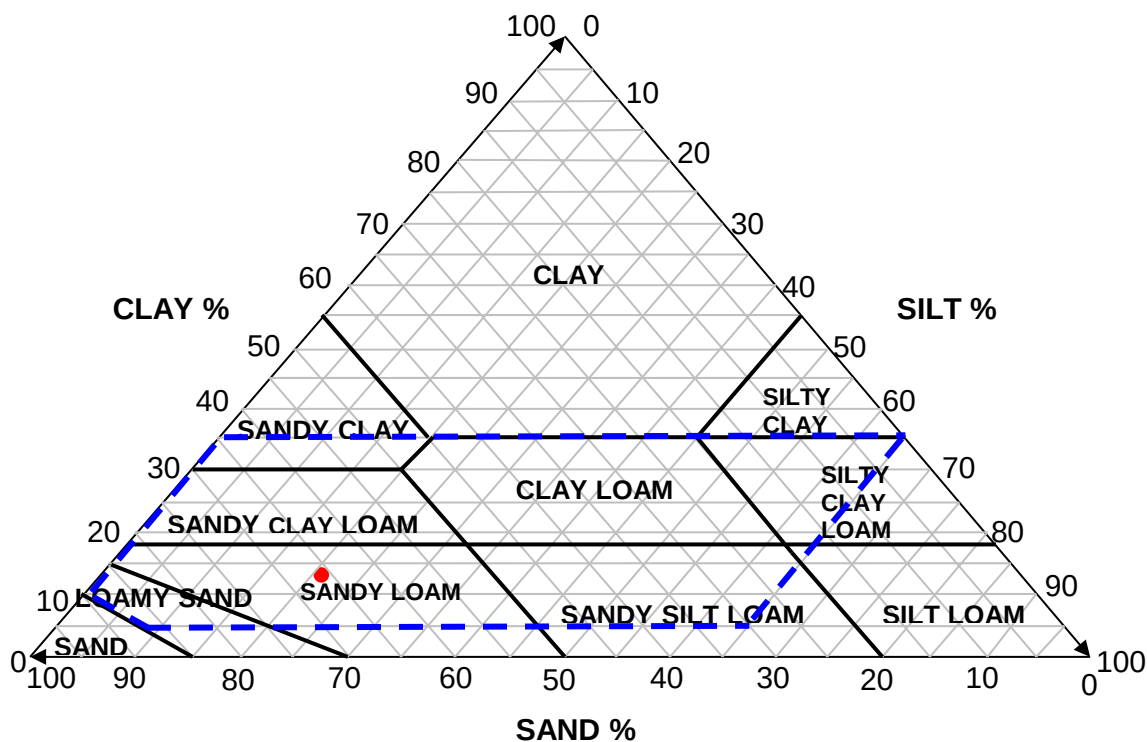
Client Reference: 687
Job Number: 23-66155-1
Date Sampled: 27/10/2023
Date Received: 31/10/2023
Date Tested: 07/11/2023
Sampled By: Not Given

Test Results:

Laboratory Reference: 2864616
Hole No.: Plot1/HDP1
Sample Reference: Not Given
Sample Description: SANDY LOAM

Depth Top [m]: 0.00
Depth Base [m]: 0.35
Sample Type: B

Soil Texture Triangle



Sample Proportion	% dry mass
Sand	66.5
Silt	19.3
Clay	14.2

Texture within acceptable area (Y/N)

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Monika Janoszek
PL Environmental & Geotechnical Lab Production Specialist
for and on behalf of i2 Analytical Ltd

Paul Palgrave

GeoInvestigations Ltd
1st Floor,
2 Woodberry Grove
Finchley
London
N120DR

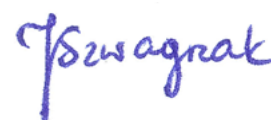
e: paul@geoinvestigations.co.uk

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 : 23-66155

Project / Site name:	Wiliam Street	Samples received on:	31/10/2023
Your job number:	687	Samples instructed on/ Analysis started on:	01/11/2023
Your order number:	1664	Analysis completed by:	09/11/2023
Report Issue Number:	1	Report issued on:	09/11/2023
Samples Analysed:	1 soil sample		



Signed:

Joanna Szwagrzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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.

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Certificate of Analysis									
BS 3882:2015 Specification For Topsoil									
	Pass BS 3882 for Multipurpose Topsoil;							client	
Report No:	23-66155						GeoInvestigations Ltd		
Location	Wiliam Street								
Lab Reference (Sample Number)	2864616								
Sampling Date	27/10/2023								
Sample ID	Plot1/HDP1								
Depth (m)	0.00-0.35			Compliant with range (Y/N)					
		unit	Result	Multi-P	Acid	Calc	Low-F	Low-F(a)	Low-F(c)
Soil texture	<2mm fraction	%m/m	SANDY LOAM	Y	Y	Y	Y	Y	Y
Maximum coarse fragment content:	>2mm	%m/m	18.00	Y	Y	Y	Y	Y	Y
	>20mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
	>50mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
Mass loss on ignition		%	3.00						
	Clay 5-20%		Y	Y	Y	Y	Y	Y	Y
	Clay 20-35%		-	-	-	-	-	-	-
Soil pH:		pH	7.10	Y	N	N	Y	N	N
Carbonate:		%m/m	3.80	-	-	Y	-	-	Y
Available plant nutrients	Nitrogen	%m/m	0.17	Y	Y	Y	-	-	-
	Extractable Phosphate (as P)	mg/l	61.00	Y	Y	Y	N	N	N
	Extractable Potassium	mg/l	237.00	Y	Y	Y	-	-	-
	Extractable Magnesium	mg/l	130.00	Y	Y	Y	-	-	-
Carbon: Nitrogen Ratio:		:1	10.00	Y	Y	Y	Y	Y	Y
Conductivity		us/cm	1600.00	Y	-	-	-	-	-
Phytotoxic contaminants:	** Total Zinc	mg/kg	72.00	Y	Y	Y	Y	Y	Y
	** Total Copper	mg/kg	38.00	Y	Y	Y	Y	Y	Y
	** Total Nickel	mg/kg	12.00	Y	Y	Y	Y	Y	Y
Visible contaminants:	>2mm	%m/m	0.00	Y	Y	Y	Y	Y	Y
	Plastics	%m/m	0.00	Y	Y	Y	Y	Y	Y
	Sharps	no. in 1 kg	0.00	Y	Y	Y	Y	Y	Y
Compliancy:				Pass	Fail	Fail	Fail	Fail	Fail
Results are expressed on a dry weight basis, after correction for moisture content where applicable Stated limits are for guidance only and I2 cannot be held responsible for any discrepancies with current legislation									

** = MCERTS accredited



Analytical Report Number : 23-66155
Project / Site name: Wiliam 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 *
2864616	Plot1/HDP1	None Supplied	0.00-0.35	Brown sandy clay with vegetation.

Analytical Report Number : 23-66155

Project / Site name: Wiliam Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Geotechnical Testing in Soil	See attached geotechnical report	See attached geotechnical report		W	NONE
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
Textural Classification Diagram	Textural classification Diagram	BS3882:2015		D	NONE
Carbon to Nitrogen Ratio (Topsoil - BS3882:2015)	Carbon to Nitrogen ratio (:1) calculated using Loss on Ignition.	BS3882:2015	L01TS2015	W	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Kjeldahl nitrogen in soil	Determination of total nitrogen using the Kjeldahl-digestion method and colorimetric determination.	In house method based on BS 7755-3.7:1995 &	L087-PL	D	NONE
Topsoil		BS 3882: 2015	PL		NONE
Mass loss on ignition (Topsoil - BS3882)	Determination of Loss on Ignition as per BS 3882:2015.	BS3882:2015	L047-PL	D	NONE
Carbonate (Topsoil - BS3882)	Determination of Carbonate as per BS 3882:2015.	BS3882:2015	L034-PL	D	NONE
Phosphorus as PO ₄ (BS3882/BS8601)	Determination of the extractable phosphorus in soil, in accordance with BS3882:2007 methodology.	BS3882:2015 & BS8601:2013	L048-PL	D	NONE
Coarse Fragment and Contaminant Analysis	Determination of >2mm contaminants	BS3882:2007 & BS8601:2013 & PAS 100:2005	L01TS	D	NONE
Nitrogen (TKN)	Determination of total nitrogen by Kjeldahl method.	BS3882:2007	L087-PL	D	NONE
Conductivity (BS3882/BS8601)	Determination of the conductivity of soil in accordance with BS 3882:2007 methodology	BS3882:2007 & BS8601:2013	L099-PL	D	NONE
pH (BS3882/BS8601)	Determination of the pH of soil in accordance with BS 3882:2007 methodology	BS3882:2007 & BS8601:2013	L099-PL	D	NONE
Extractable/Available Metals (BS3882/BS8601)	Determination of the extractable metals in soil, in accordance with BS3882:2007 methodology.	BS3882:2007 & BS8601:2013	L038-PL	D	NONE
Sodium (exchangeable %)	Determination of exchangeable sodium (%) by calculation, in accordance with BS3882:2007 methodology.	BS3882:2007	L038-PL	D	NONE



Analytical Report Number : 23-66155
Project / Site name: Wiliam Street

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Textural Classification	Determination of the textural classification of soil following BS3882:2015 methodology.	BS3882:2015 & BS8601:2013	L01TS	D	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

TEST CERTIFICATE

SPECIFICATION FOR SUBSOIL
Tested in Accordance with: BS 8601: 2013

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



Client: GeolInvestigations Ltd
Client Address: 1st Floor,, 2 Woodberry Grove,
Finchley, London,
N120DR

Contact: Paul Palgrave
Site Address: Wiliam Street

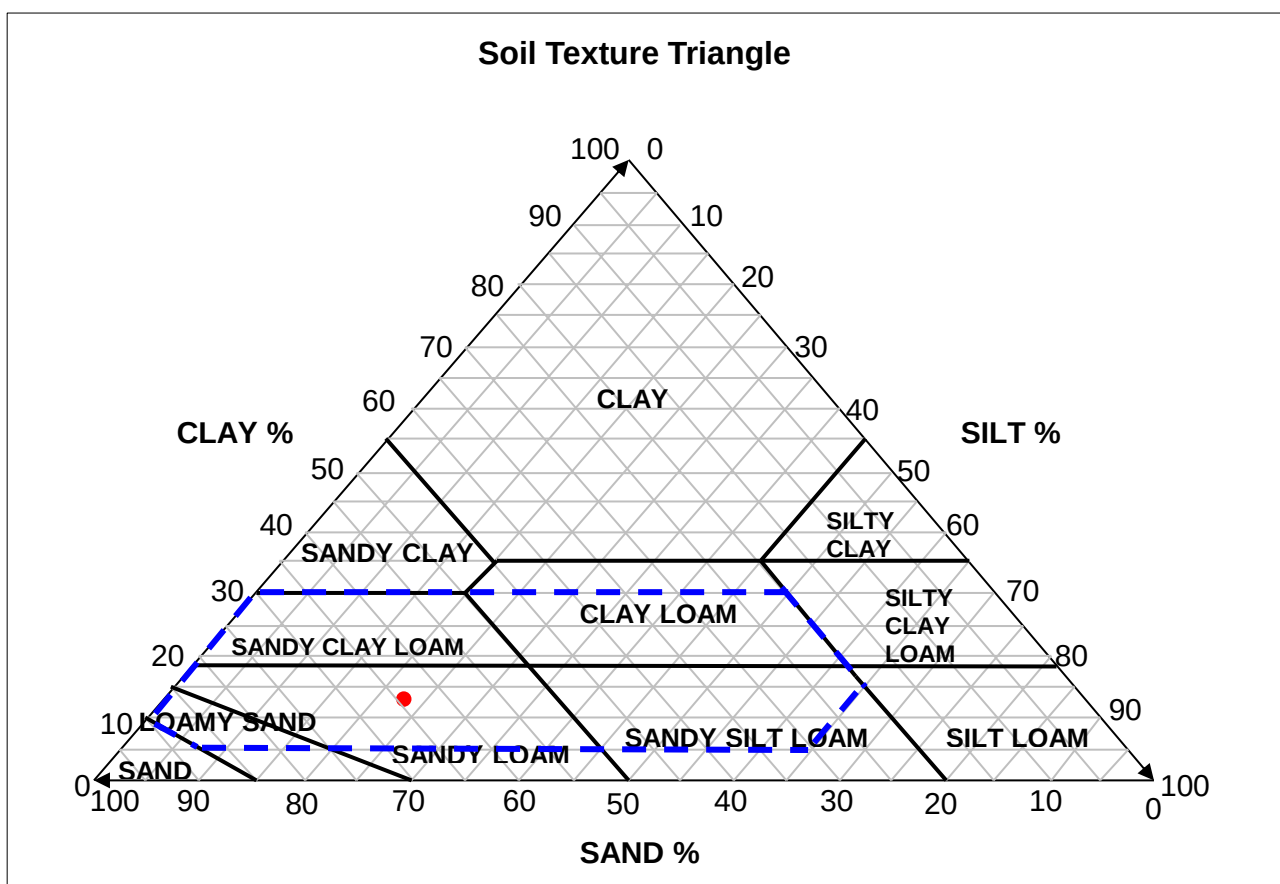
Client Reference: 687
Job Number: 23-66158-1
Date Sampled: 27/10/2023
Date Received: 31/10/2023
Date Tested: 07/11/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2864623
Hole No.: Plot1/HDP3
Sample Reference: Not Given
Sample Description: SANDY LOAM

Depth Top [m]: 0.30
Depth Base [m]: 0.55
Sample Type: B



Sample Proportion	% dry mass
Sand	64.8
Silt	21.1
Clay	14.1

Texture within acceptable area (Y/N)

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Monika Janoszek
PL Environmental & Geotechnical Lab Production Specialist
for and on behalf of i2 Analytical Ltd

Paul Palgrave
GeoInvestigations Ltd
1st Floor,
2 Woodberry Grove
Finchley
London
N120DR

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

e: paul@geoinvestigations.co.uk

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

Analytical Report Number : 23-66158

Project / Site name:	Wiliam Street	Samples received on:	31/10/2023
Your job number:	687	Samples instructed on/ Analysis started on:	01/11/2023
Your order number:	1664	Analysis completed by:	10/11/2023
Report Issue Number:	1	Report issued on:	10/11/2023
Samples Analysed:	1 soil sample		

Signed:



Joanna Szwarzak
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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.

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404

Fax: 01923 237404

email:reception@i2analytical.com

Certificate of Analysis						
BS 8601:2013 Specification For Subsoil						
Report No:	23-66158			GeolInvestigations Ltd 1st Floor, 2 Woodberry Grove Finchley London N120DR		
Location	Wiliam Street					
Lab Reference (Sample Number)	2864623					
Sampling Date	27/10/2023					
Sample ID	Plot1/HDP3					
Depth (m)	0.30-0.55					
		unit	Result			
Texture	Clay	%w/w	14.10	Compliant with range (Y/N)		
	Silt	%w/w	21.10	Multipurpose subsoil	Specific purpose subsoil	
	Sand	%w/w	64.8		Acidic	Calcareous
	Texture Class			SANDY LOAM	Y	Y
Mass Loss on Ignition		%	2.40	N	N	N
Coarse fragment content	>2mm	%w/w	18.00	Y	Y	Y
	>20mm	%w/w	0.00	Y	Y	Y
	>75mm	%w/w	0.00	Y	Y	Y
Soil pH		pH	6.70	Y	N	N
Carbonate		%	2.80	-	-	Y
Exchangable Sodium Percentage		%	1.90	Y	Y	Y
Phytotoxic contaminants	Total Zinc	mg/kg	65.00	Y	Y	Y
	Total Copper	mg/kg	15.00	Y	Y	Y
	Total Nickel	mg/kg	24.00	Y	Y	Y
Visible contaminants	>2mm	%w/w	0.00	Y	Y	Y
	Plastics	%w/w	0.00	Y	Y	Y
	Sharps	%w/w	0.00	Y	Y	Y
Available plant nutrients	Phosphorus	mg/l	24.00			
	Potassium	mg/l	82.60			
	Magnesium	mg/l	330.00			
Additional analysis	Available Sodium	mg/l	35.00			
	Available Calcium	mg/l	990.00			
	Conductivity	uS/cm	1800.00			
	Conductivity CaSO4 Adj.	uS/cm	< 10			
Compliance				Fail	Fail	Fail
Fail BS 8601						

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

*= UKAS accredited

** = MCERTS accredited

Analytical Report Number : 23-66158

Project / Site name: Wiliam 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 *
2864623	Plot1/HDP3	None Supplied	0.30-0.55	Brown clay and sand with gravel and vegetation.

Analytical Report Number : 23-66158

Project / Site name: Wiliam Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Geotechnical Testing in Soil	See attached geotechnical report	See attached geotechnical report		W	NONE
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
75 mm Coarse Fraction - BS8601 Subsoil	Determination of > 75 mm fraction by gravimetry.	BS8601:2013		D	NONE
Carbonate - BS8601 Subsoil	Determination of soil carbonate content	BS8601:2013	L034-PL	D	NONE
Loss on Ignition - BS8601	Determination of Loss on Ignition as defined in BS8601	BS8601:2013		D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Subsoil		BS 8601: 2013	PL		NONE
Textural Classification Diagram	-	BS8601:2013		D	NONE
Conductivity (BS3882/BS8601)	Determination of the conductivity of soil in accordance with BS 3882:2007 methodology	BS3882:2007 & BS8601:2013	L099-PL	D	NONE
pH (BS3882/BS8601)	Determination of the pH of soil in accordance with BS 3882:2007 methodology	BS3882:2007 & BS8601:2013	L099-PL	D	NONE
Phosphorus (BS3882/BS8601)	Determination of the extractable phosphorus in soil, in accordance with BS3882:2007 methodology.	BS3882:2007 & BS8601:2013	L048-PL	D	NONE
Extractable/Available Metals (BS3882/BS8601)	Determination of the extractable metals in soil, in accordance with BS3882:2007 methodology.	BS3882:2007 & BS8601:2013	L038-PL	D	NONE
Sodium (exchangeable %)	Determination of exchangeable sodium (%) by calculation, in accordance with BS3882:2007 methodology.	BS3882:2007	L038-PL	D	NONE

Analytical Report Number : 23-66158

Project / Site name: Wiliam Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Textural Classification	Determination of the textural classification of soil following BS3882:2015 methodology.	BS3882:2015 & BS8601:2013	L01TS	D	NONE
Coarse Fragment and Contaminant Analysis	Determination of >2mm contaminants	BS3882:2007 & BS8601:2013 & PAS 100:2005	L01TS	D	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

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

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.