

BY EMAIL ONLY

25th August 2023

Our Ref: LS7087

Your Ref:

Greenplan Designer Homes Ltd.
The Barn
Randolphs Farm
Bedlam Street
Hurstpierpoint
West Sussex BN6 9EL

FAO: Ed Cookson

RE: CASTELMER FRUIT FARM, KINGSTON, NR LEWES BN7 3JZ

Land Science was instructed to undertake a supplementary Phase II Contamination Assessment in relation to the proposed redevelopment at Land to the rear of Castelmer Fruit Farm, Kingston, Nr Lewes, BN7 3JZ.

Previous assessments

A Combined Geotechnical and Ground Contamination Risk Assessment was undertaken by Ashdown Site Investigation Limited in relation to planning Condition 8 i).

The report did not identify any significant levels in terms of Human Health Risks, soft landscaping or building materials. However, the investigation recommended that the soils below the former workshops be investigated before any remediation recommendations are given and that a Discovery Strategy should be followed during the development.

Land Science were instructed to carry out some further investigation within and immediately around the workshop buildings to address Planning Conditions 8 ii) and iii).

Scope

The scope of works included:

- An intrusive investigation comprised 4No. hand dug trial pits to a depth of 1.50m,
- Preliminary chemical testing of selected soil in the field and laboratory

The fieldwork was conducted on 4th August 2023, under the supervision of Land Science. The positions were undertaken in and around the workshops that were still present.

Ground conditions

A summary of the encountered conditions is presented below.

Strata	Base Depth m				Description
	HP01	HP02	HP03	HP04	
Hardstanding	0.12	0.10	0.08	0.15	Concrete
Made Ground	-	-	0.30	0.30	Dark grey clayey Gravel. Gravels were clinker and brick fragments. Occasional roots noted
Head Deposits	1.30+	1.40+	1.50+	1.50+	Light brown gravelly, silty, CLAY / clayey SILT with flint and chalk gravel



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The shallow ground conditions were similar to those encountered during the Ashdown Site Investigation report.

Field Testing

All soil samples were screened for VOC's in headspace broadly in accordance with the methodology set-out in CIRIA C682. Due to interference from humidity and other factors, Land Science adopts a method detection limit of 1.0ppm to avoid reporting false positive readings. None of the samples exhibited VOC's above the detection limit, with the exception of the following tests.

Position	Strata	Result
HP03	Head Deposits	0.50m (1.80ppm),

Scheduled Testing

Samples were selected for geochemical (contamination) analysis, based on the following rationale:

Very slight elevated PID readings were detected at 0.50m within HP03; the sample was tested for speciated Hydrocarbons (TPH7) and Volatile suites to assess any potential risk from vapours.

In addition, based on the previous use of the workshops, two selected shallow samples from HP02 (inside) and HP04 (adjacent to a former waste oil and fuel storage area) were also screen for speciated Hydrocarbons (TPH7) and Volatile suites to assess any potential risk from vapours.

Shallow soils at the site may contain a wide range of contaminants based on the previous use of the site. A selected shallow sample from within the proposed garden areas was tested for a routine screening suite (LS1) and were screened for Asbestos.

Sample	Strata	LS1	Asbestos	TPH7	Volatiles
HP01 0.50m	Head Deposits	X	X	-	-
HP02 0.20m				X	X
HP03 0.50m				X	X
HP04 0.20m	Made Ground			X	X

The relevant screening suites are defined below. Where duplicate analysis exists between suites, each test is performed only once:

Suite	Definition
LS1 (soil)	Screening suite: pH, fraction of organic carbon, Metals and Non Metals, water soluble Sulphate, Sulphide, total Cyanide, total Phenols, speciated PAH's.
Asbestos	Asbestos screen: Laboratory screening for fibres and Asbestos Containing Materials; identification where identified. Using polarising light and dispersion staining as described in HSG 248, HSE Contract Research Report No 83/1996 and in Davies et al, 1996.
TPH7	Speciated TPH: Total petroleum hydrocarbons CWG banding incl. aliphatic and aromatic split plus BTEX and MTBE.
Volatiles	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GCMS. Determination of volatile organic compounds in soil by headspace GC-MS.

The results are discussed below.

Human Health Screening

As the basis of a generic tier 1 screening assessment, the results have been compared directly against published standards for human health.

Several different partly overlapping schemes are currently in use in the UK, based on the Environment Agency's CLEA Model but with differing toxicological parameters. For this report, these schemes have and have been applied in the following hierarchy:

- Suitable For Use levels (S4UL) recently published by LQM in association with the CIEH.
- Category 4 Screening Levels (C4SL) recently published by the DEFRA and CL:AIRE.

Whilst other standards exist, such as the LQM Generic Assessment Criterion and the Environment Agency's Soil Guideline Values, these are deemed superseded by the above documents.

The soil chemical analysis results have been compared against respective screening values for residential land uses with plant uptake (i.e. residential properties with private gardens, where homegrown produce could form a proportion of dietary intake).

For contaminants where the respective screening value is dependent on Soil Organic Matter (SOM), the corresponding value for 1.0% was used (the arithmetic mean SOM value for the Made Ground was 1.7%).

Where no standard exists, the contaminant is either not considered a priority in terms of human health (at least in the scenario being considered), or no screening value has been published.

None of the results exceeded the screening criteria.

The risks from TPH's are assessed differently from other contaminants. The ratio of an individual group of carbon bands to the respective GAC is calculated (a Hazard Quotient) and these are totalled to derive a sample specific Hazard Index. A Hazard Index exceeding 1.0 suggests a potential significant risk to human health in the exposure scenario considered. The calculated Hazard Indexes are summarised below.

Sample	Total TPH	Hazard Index	Notes
HP02 0.20m	100mg/kg	0.10	No significant risk identified
HP03 0.50m	<10mg/kg	0.0	
HP04 0.20m	48mg/kg	0.16	

A single sample of Made Ground was tested for Asbestos but none was found to be present.
Soft Landscaping

A number of documents include guidance on screening levels of phytotoxic contaminants within soils, including:

- BS3882:2015 "Specification for topsoil and requirements for use" (although stipulated as not to be used in contaminated land risk assessment).
- ICRC in publication 70/90 1990 'Notes on the Restoration and Aftercare of Metalliferous Mining Sites for Pasture and Grazing' (although indirectly withdrawn) (where marked *).
- Code of Practice for Agricultural Use of Sewage Sludge (England and Wales 1996) for arable use (as opposed to grazing) and relating to priority phytotoxic elements only.

The results of the chemical analysis for determinands known to pose a potential phytotoxic risk to plant growth are summarised on the following table, together with the respective adopted screening values for plant growth. The results of the chemical analysis were evaluated singularly without the use of statistical tools.

Element	Phytotoxicity Value (mg/kg)			Arable (grassland)	Results exceeding screening value
	pH <6.0	pH 6.0-7.0	pH >7.0	pH >5.2	
Zinc	200	200	300	300 (300)	No exceedances
Copper	100	135	200	200 (330)	
Nickel	60	75	110	110 (180)	
Cadmium	50*			3.0 (3.0)	
Arsenic	1,000*			50 (50)	

Water Supply Pipework

The risk of chemical attack on water supply pipework has been assessed following the general Principals set out in the joint Water UK/HBF Contaminated Land Assessment Guidance dated January 2014. A summary of the main chemical criteria is reproduced below.

Test group (in mg/kg)	Poly-ethylene (PE)	Polyvinyl Chloride (PVC)	Metal or Barrier pipe	Results exceeding
VOC's	0.5	0.125	No limit	No exceedances
VOC's + BTEX & MTBE	0.1	0.03	No limit	
SVOC's (excl. PAH's etc.)	2.0	1.4	No limit	
SVOC's + Phenols	2.0	0.4	No limit	
SVOC's + Cresols & Chlorinated Phenols	2.0	0.04	No limit	
Mineral oil EC11-20	10	No limit	No limit	TP04 0.50m (20.3mg/kg)
Mineral oil EC21-40	500	No limit	No limit	No exceedances

Redox potential and conductivity should be checked where metal pipework is to be installed. aluminium barrier pipework is acceptable.

Soil Contamination Assessment

The preliminary conceptual site model within the Ashdown Site Investigation Report identified end users to comprise residential houses with private gardens with a variety of exposure pathways from soil.

None of the chemical results exceeded human health screening values. In the absence of a source, no source-pathway-receptor linkage can exist. On this basis, no requirements for remediation or further testing have been identified.

However, slightly elevated hydrocarbons were noted at HP04, if new water supply pipework is to be laid in the vicinity of HP04, the Made Ground should be removed from the vicinity of HP04 or new water supply pipework will need to be upgraded Polyvinyl Chloride (PVC), metal or Barrier pipe.

It is also recommended that a Discovery Strategy is followed during the development.

A suitably qualified Environmental Consultant should prepare a full *Implementation, Verification Monitoring and Maintenance Plan*. An appropriate level of supervision and testing will be required, to form part of a formal *Verification Report*.



MICHAEL ROSE M.Sc., B.Sc., FGS, AIEMA
Principal Geo-Environmental Consultant


Enclosed

Figure,

Test results








	Title: Site Location		Reference: LS7087
	Project: CASTELMER FRUIT FARM, KINGSTON, NR LEWES		Figure: 1
	Client: Greenplan Designer Homes Ltd.		Date: 04/08/2023
	Prepared by: MW	Checked by: MR	Version: 1



Legend

-  Site Boundary
-  Hand Pits

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	Title: Exploratory Hole Location Plan		Reference: LS7087
	Project: CASTELMER FRUIT FARM, KINGSTON, NR LEWES		Figure: 2
	Client: Greenplan Designer Homes Ltd.		Date: 04/08/2023
	Prepared by: MW	Checked by: MR	Version: 1

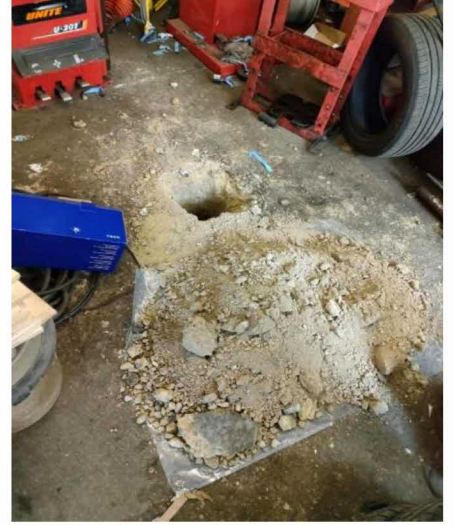
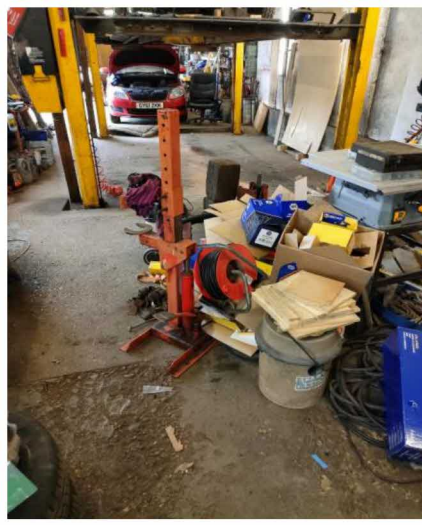
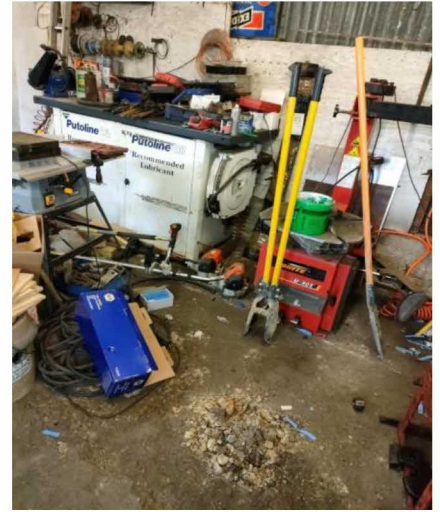
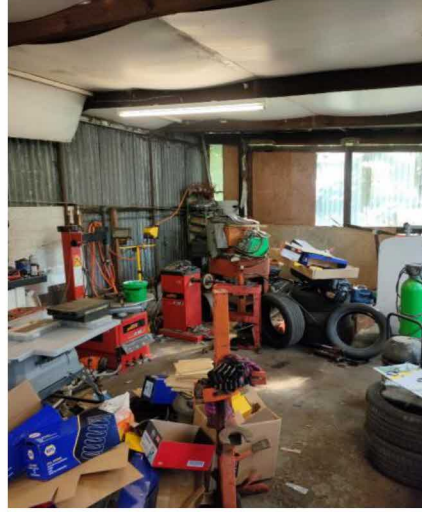



Legend

- Site Boundary
- Hand Pits


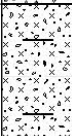
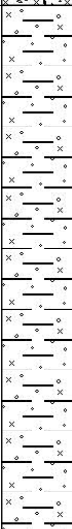
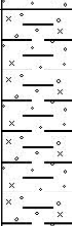

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	Title: Proposed Development Layout		Reference: LS7087
	Project: CASTELMER FRUIT FARM, KINGSTON, NR LEWES		Figure: 3
	Client: Greenplan Designer Homes Ltd.		Date: 04/08/2023
	Prepared by: MW	Checked by: MR	Version: 1




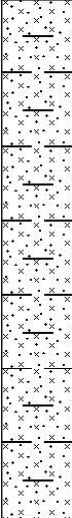
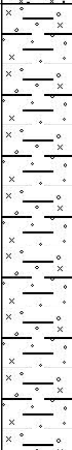

	TITLE: Site Photos			REF: ls7087
	PROJECT: Castlemer Fruit Farm, Kingston			Photos 1 to 6
	CLIENT: Greenplan Developments			DATE: 17/08/2023
	CHECK: MR	CHECK: ET	VERSION V1	SHEET: 1 OF 1

Excavation Method Drive-in Windowless Sampler	Dimensions		Ground Level (mOD)	Client	Job Number LS7087
	Location		Dates 04/08/2023	Engineer Land Science	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D		PID < 1.00		0.12	Fine gravel concrete with no rebar (HARDSTANDING)		
					0.18	Dark brown, slightly gravelly, slightly clayey, slightly sandy, SILT. Gravel- fine (HEAD DEPOSIT)		
0.50	D		PID < 1.00		0.30	Light brown slightly gravelly, slightly silty, friable CLAY with fine gravels and chalk fragments. (HEAD DEPOSIT)		
					(0.70)			
1.00	D		PID < 1.00		1.00	Light brown slightly gravelly, slightly silty, friable CLAY with fine gravels, chalk fragments and subrounded flints. (HEAD DEPOSIT)		
					(0.30)			
1.30	D		PID < 1.00		1.30	Complete at 1.30m		



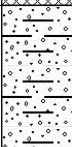

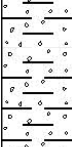
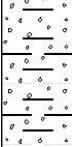
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	Figure No. LS7087.HP01	

Excavation Method Drive-in Windowless Sampler	Dimensions		Ground Level (mOD)	Client	Job Number LS7087
	Location		Dates 04/08/2023	Engineer Land Science	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D		PID < 1.00		(0.10) 0.10	Sandy and fine gravel supported CONCRETE with no rebar (HARDSTANDING)		
0.50	D		PID < 1.00		(0.70)	Gravelly, slightly clayey SILT with subrounded flints and gravels. (HEAD DEPOSIT)		
1.00	D		PID < 1.00		(0.60)	Brown slightly gravelly, silty, friable CLAY. (HEAD DEPOSIT)		
1.30	D		PID < 1.00		1.40	Complete at 1.40m		

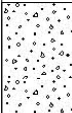
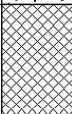
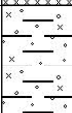

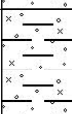
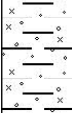
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Excavation Method Drive-in Windowless Sampler	Dimensions		Ground Level (mOD)	Client	Job Number LS7087
	Location		Dates 04/08/2023	Engineer Land Science	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D		PID < 1.00		(0.08)	Thick pour medium gravel CONCRETE with no rebar. (HARDSTANDING)		
					0.08	Dark grey sandy, very clayey, GRAVEL. Gravels- clinker and red brick, occasional rootlets. (MADE GROUND)		
0.50	D		PID = 1.80		(0.22)	Dark brown, grey, gravelly, sandy, CLAY. Sand is yellow in colour. (HEAD DEPOSIT)		
					0.30			
1.00	D		PID < 1.00		(0.20)	Light brown gravelly, CLAY. Gravels- medium in size with angular flints and chalk fragments. (HEAD DEPOSIT)		
					0.50			
1.50	D		PID < 1.00		(0.60)	Light brown slightly gravelly, slightly silty, CLAY. Gravels are chalk fragments with occasional flints (HEAD DEPOSIT)		
					1.10			
					1.50	Complete at 1.50m		

Remarks	Scale (approx)	Logged By
	1:10	CJ
	Figure No. LS7087.HP03	

Excavation Method Drive-in Windowless Sampler	Dimensions		Ground Level (mOD)	Client	Job Number LS7087
	Location		Dates 04/08/2023	Engineer Land Science	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D		PID < 1.00		0.15	Large gravel CONCRETE with no rebar. (HARDSTANDING)		
					0.15	Dark brown gravelly, slightly silty, CLAY. Gravels of with redbrick and klinker (MADE GROUND)		
0.50	D		PID < 1.00		0.30	Light brown slightly gravelly, slightly silty, CLAY. Occasional rootlets (HEAD DEPOSIT)		
					0.60	Light brown, slightly gravelly, slightly silty, CLAY. Gravels-medium. Occasional yellow sand bands are present. (HEAD DEPOSIT)		
1.00	D		PID < 1.00		0.90			
1.50	D		PID < 1.00		1.50	Complete at 1.50m		

Remarks	Scale (approx)	Logged By
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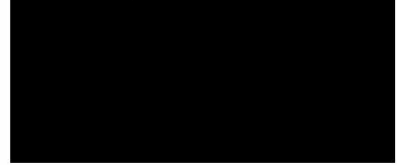


Environmental Science

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7 Woodshots Meadow,
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Watford,
Herts,

e: Mike.rose@land



Analytical Report Number : 23-49991

Project / Site name:	castlemere Fruit Farm	Samples received on:	09/08/2023
Your job number:	LS7087	Samples instructed on/ Analysis started on:	09/08/2023
Your order number:		Analysis completed by:	16/08/2023
Report Issue Number:	1	Report issued on:	16/08/2023
Samples Analysed:	4 soil samples		



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

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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

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: 23-49991
Project / Site name: castlemere Fruit Farm

Lab Sample Number	2775996			2775997			2775998			2775999		
Sample Reference	HP01			HP02			HP03			HP04		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	0.50			0.20			0.50			0.20		
Date Sampled	04/08/2023			04/08/2023			04/08/2023			04/08/2023		
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	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	0.01	NONE	13	11	17	20					
Total mass of sample received	kg	0.001	NONE	0.8	0.7	0.7	0.9					

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	-	-	-
Total Cyanide	mg/kg	1	MCERTS	< 1.0	-	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0794	-	-	-
Sulphide	mg/kg	1	MCERTS	< 1.0	-	-	-
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.01	-	-	-

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	< 0.05	-	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	0.11	-	-	-
Pyrene	mg/kg	0.05	MCERTS	0.09	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.09	-	-	-
Chrysene	mg/kg	0.05	MCERTS	0.1	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.16	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.07	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.11	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.08	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.08	-	-	-
Coronene	mg/kg	0.05	NONE	< 0.05	-	-	-

Total PAH

Total WAC-17 PAHs	mg/kg	0.85	NONE	0.89	-	-	-
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Analytical Report Number: 23-49991
Project / Site name: castlemere Fruit Farm

Lab Sample Number				2775996	2775997	2775998	2775999
Sample Reference				HP01	HP02	HP03	HP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.20	0.50	0.20
Date Sampled				04/08/2023	04/08/2023	04/08/2023	04/08/2023
Time Taken				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	5.9	-	-	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	36	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.4	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	3.7	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	-	-	-
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.9	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	13	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	21	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.7	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	12	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	46	-	-	-

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.1	NONE	-	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.1	NONE	-	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.1	NONE	-	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	-	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	-	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	-	95	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	-	98	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.1	NONE	-	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.1	NONE	-	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.1	NONE	-	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	-	< 2.0	< 2.0	5.3
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	-	< 10	< 10	15
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	-	12	< 10	28
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	-	12	< 10	48

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Lab Sample Number				2775996	2775997	2775998	2775999
Sample Reference				HP01	HP02	HP03	HP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.20	0.50	0.20
Date Sampled				04/08/2023	04/08/2023	04/08/2023	04/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

VOCs

Compound	Units	Limit of detection	Accreditation Status	2775996	2775997	2775998	2775999
Chloromethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
1,1-dichloroethene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
Trans 1,2-dichloroethylene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
1,1-dichloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Chloroform	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
1,2-dichloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0
Carbontetrachloride	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
1,2-dichloropropane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Bromoform	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	-	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	-	< 5.0#	< 5.0#	< 5.0#
1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
N-Propylbenzene	µg/kg	5	ISO 17025	-	< 5.0#	< 5.0#	< 5.0#
2-Chlorotoluene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Tert-Butylbenzene	µg/kg	5	ISO 17025	-	< 5.0#	< 5.0#	< 5.0#
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Sec-Butylbenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
1,3-dichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
P-Isopropyltoluene	µg/kg	5	ISO 17025	-	< 5.0#	< 5.0#	< 5.0#
1,4-dichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
1,2-dichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0

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Lab Sample Number				2775996	2775997	2775998	2775999
Sample Reference				HP01	HP02	HP03	HP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.20	0.50	0.20
Date Sampled				04/08/2023	04/08/2023	04/08/2023	04/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Butylbenzene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0

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Project / Site name: castlemere Fruit Farm

Lab Sample Number				2775996	2775997	2775998	2775999
Sample Reference				HP01	HP02	HP03	HP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.20	0.50	0.20
Date Sampled				04/08/2023	04/08/2023	04/08/2023	04/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

SVOCs

Compound	Units	Limit of detection	Accreditation Status	2775996	2775997	2775998	2775999
Aniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	ISO 17025	-	< 0.05	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.08
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.08
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.13
2,4-Dinitrotoluene	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.13
Azobenzene	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	0.11	2.4
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.55
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	0.15	0.27	6.1
Pyrene	mg/kg	0.05	MCERTS	-	0.14	0.24	5.5
Butyl benzyl phthalate	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.1	0.14	2.8
Chrysene	mg/kg	0.05	MCERTS	-	0.08	0.18	2.7
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	-	0.13	0.19	3.4
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	0.07	0.1	1.4

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 Project / Site name: castlemere Fruit Farm

Lab Sample Number				2775996	2775997	2775998	2775999
Sample Reference				HP01	HP02	HP03	HP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.20	0.50	0.20
Date Sampled				04/08/2023	04/08/2023	04/08/2023	04/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	0.09	0.13	2.6
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	0.09	1.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.31
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	0.12	1.5

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



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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2775996	HP01	None Supplied	0.5	Brown sand with gravel.
2775997	HP02	None Supplied	0.2	Brown sand with gravel.
2775998	HP03	None Supplied	0.5	Brown clay with gravel.
2775999	HP04	None Supplied	0.2	Brown clay with gravel.

Analytical Report Number : 23-49991

Project / Site name: castlemere Fruit Farm

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 WAC-17 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
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
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
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-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
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	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	L073B-PL	W	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
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS

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Project / Site name: castlemere Fruit Farm

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	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 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.

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

- Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.