



Report
Title:

Geo-Environmental Site Investigation

Project
Name:

Land at Arlesey Road, Ickleford



Report
Reference:

BRD4359-OR2-A

Date:

February 2024

BRD Environmental Ltd

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SUMMARY REPORT - GENERAL INFORMATION

SUBJECT	COMMENTS
CURRENT SITE CONDITION	The site currently comprises two grass paddocks with some disused portable hen houses present in the north west of the site.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed as a residential housing estate comprising 8No. detached and semi-detached houses with associated private gardens, driveways and garages built around an estate road linking up to Duncots Close to the south west of the site.
HISTORICAL SUMMARY	The earliest available Ordnance Survey map from 1881 shows the site as an orchard. The 1922 map shows a small possible barn to present on the western site boundary, which is no longer present by the 1978 map. The aerial photograph from 1999 shows the site as a paddock with some trees present in the north surrounded by further trees. The 2016 map shows the site to have been split into two smaller paddocks and it remains this way to the present day.
PUBLISHED GEOLOGY	The site is shown to be underlain by superficial deposits within a buried sediment filled glacial channel comprising Glaciofluvial Deposits overlying a mixture of the following: The Lowestoft Formation, Oadby Member and Glaciolacustrine Deposits. Alluvium and River Terrace Deposits are also shown within close proximity to the site. The shallowest bedrock unit is shown to be West Melbury Marly Chalk Formation.
ACTUAL GROUND CONDITIONS	The investigation has proved a thin cover of Topsoil or Made Ground Topsoil was overlying Alluvium. Glaciofluvial Deposits were encountered underlying the Alluvium, which in turn were underlain by the Lowestoft Formation in the centre and west of the site. The West Melbury Marly Chalk Formation was encountered underlying the Glaciofluvial Deposits in the east of the site and the Lowestoft Formation in most of the rest of the site.
HYDROGEOLOGY	The superficial Glaciofluvial Deposits and the Glaciolacustrine Deposits are designated Secondary A aquifers. The superficial Lowestoft Formation and the Oadby Member are designated Secondary Undifferentiated Aquifers. The underlying West Melbury Marly Chalk Formation bedrock geology is designated a Principal Aquifer. The site is not located within a groundwater Source Protection Zone.
HYDROLOGY	The closest surface water feature to the site is the pond and the ditch bounding the site to the south east and east. The closest river to the site is the River Hiz located approximately 80m to the east of the site. The site is not in an area indicated to be at risk of flooding.
PREVIOUS GROUND REPORTS	BRD is not aware of any previous ground investigations having been conducted at the site. However, BRD has undertaken geo-environmental desk study research and this has been reported separately.

SUMMARY REPORT - CONTAMINATION ISSUES

SUBJECT	COMMENTS
SOIL RISKS TO HUMAN HEALTH	No unacceptable contamination in respect of human health have been identified by this investigation.
LANDFILL GAS	No plausible sources of landfill gas have been identified.
RADON GAS	Radon gas protection measures are not required.
RISKS TO THE WATER ENVIRONMENT	No unacceptable contamination risks to water resources have been identified by this investigation.
RISKS TO BUILDING MATERIALS AND SERVICES	No unacceptable contamination risks to building materials and services have been identified by this investigation.
REMEDIATION	No remedial works are considered necessary to facilitate the development at this stage.
ASBESTOS	No asbestos has been detected in the soil samples tested. No suspected asbestos containing materials has been observed in the soils inspected.
WASTE SOIL DISPOSAL	It is considered that the topsoil present at the site is unlikely to constitute 'inert waste' due to its high organic matter content. It is considered that the natural sub-soils disposed of from the site would be classified as 'non-hazardous waste' and would be characterised for disposal to landfill as 'inert waste'.

4. GROUND CONDITIONS

4.1. OVERVIEW

The ground conditions encountered differed slightly from the published geology maps. A thin cover of Topsoil or Made Ground Topsoil was present overlying Alluvium to depths of between 0.80m below ground level (m bgl) and 1.30m bgl. Glaciofluvial Deposits were encountered underlying the Alluvium to depths of between 1.50m bgl and 3.00m bgl, which in turn were underlain by the Lowestoft Formation in the centre and west of the site to depths of between 2.00m bgl and in excess of 5.45m bgl.

The bedrock identified as the West Melbury Marly Chalk Formation was encountered underlying the Glaciofluvial Deposits in the east of the site and the Lowestoft Formation in most of the rest of the site.

Details of the various stratigraphic units are given in the following sections.

4.2. TOPSOIL AND MADE GROUND TOPSOIL

Topsoil and Made Ground Topsoil were encountered across the site to depths of between 0.30m bgl and 0.60m bgl. The Topsoil was typically described as moist, dark brown, very silty, clay with many rootlets and occasional flint gravel. The Made Ground Topsoil was typically described as dark brown, slightly gravelly, very silty, clay with many rootlets, rare brick fragments, flint and quartzite gravel.

4.3. SUPERFICIAL DEPOSITS

4.3.1. Alluvium

The Alluvium was encountered across the whole of the site underlying the Topsoil and Made Ground Topsoil to depths of between 0.80m bgl and 1.30m bgl.

The deposits were characteristic by the organic content and dark brown colour and were recorded as slightly gravelly, very clayey silt or silt clay with occasional rootlets and gravel of flint, occasional chalk and rare sandstone.

4.3.2. Glaciofluvial Deposits

Glaciofluvial Deposits were encountered across the whole of the site underlying the Alluvium to depths of between 1.50m bgl and 3.00m bgl. This stratum was typically recorded comprising gravel beds described as orange brown, some beige, slightly silty, slightly clayey to clayey, sandy to very sandy gravel which in turn were intercalated by clay/silt sand beds of about 0.5m thickness recorded as follows:

- Stiff, light beige to light grey, gravelly clayey silt with gravel of flint, chalk and rare sandstone.
- Medium dense, light orange brown with some beige and cream, slightly silty, slightly sandy, very clayey gravel of flint, chalk and rare other lithologies.
- Loose, light brown, medium sand with occasional flint gravel.

4.3.3. Lowestoft Formation

The Lowestoft Formation was encountered in the centre and west of the site (boreholes WS01, WS04 and WS05) underlying the Glaciofluvial Deposits to depths of between 2.00m bgl and in excess of 5.45m bgl. The Lowestoft Formation was typically described as either stiff, grey brown mottled orange brown, gravelly silty clay with gravel of flint, chalk and rare other lithologies or stiff, grey, slightly silty, gravelly clay with gravel of chalk and rare other lithologies.

4.4. **BEDROCK**

4.4.1. West Melbury Marly Chalk Formation

The West Melbury Marly Chalk Formation was encountered across most of the site in all boreholes except WS04 (south western site section). It was encountered underlying the Glaciofluvial Deposits in the east of the site and the Lowestoft Formation in most of the rest of the site and was proven to a maximum depth of 5.45m bgl.

In boreholes WS01 and WS05, the West Melbury Marly Chalk Formation was initially encountered as a structureless Chalk to about 3.7m depth, and recovered as stiff, cream with dark orange brown weathering, slightly clayey, slightly gravelly silt (CIRIA Grade Dm). Beneath, structured Chalk was recorded and recovered as very weak to weak, light grey, slightly clayey, silty gravel (CIRIA Grade A-C Undifferentiated). Structured Chalk was recorded below the Glaciofluvial Deposits in borehole WS02.

4.5. **GEOTECHNICAL COMMENTS**

The ground conditions varied throughout the site with the variable thicknesses of the gravelly soils of the Glaciofluvial Deposits. Whilst the thicker deposits of granular soils were more prevalent at about the eastern half of the site, towards the centre and west the granular beds were less consistent. It should be noted that any changes in ground conditions over short distances will have an effect on the foundation design.

4.6. **CONTAMINATION OBSERVATIONS**

No visual or olfactory evidence of contamination was noted during the forwarding of exploratory holes.

4.7. **GROUNDWATER BEHAVIOUR**

During the progressing of exploratory holes, the following general observations of groundwater behaviour were made.

Groundwater was encountered in boreholes WS02 and WS03, located in the east of the site, within the Glaciofluvial Deposits at a depth of 1.00m bgl.

Additionally, groundwater was also encountered in the West Melbury Marly Chalk Formation in borehole WS01, located in the north west of the site, at a depth of 3.40m bgl.

4.8. GROUNDWATER MONITORING

DATE	RESTING GROUNDWATER RANGE	COMMENTS
20/12/23	From 0.05m to 4.35m bgl.	Groundwater was recorded in all 4No. installed boreholes with the shallowest groundwater recorded in the east of the site in boreholes WS02 and WS03 and the deepest groundwater recorded in borehole WS04 in the south west of the site. Boreholes WS01, WS02 and WS03 all recorded shallow groundwater at depths of between 0.05m bgl and 1.16m bgl. The monitoring visit followed a period of relatively wet weather.

7. RISK ESTIMATION - SOILS

7.1. HUMAN HEALTH

The Generic Assessment Criteria (GAC) employed below are for residential land use as this is appropriate to the proposed form of development.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
Arsenic	mg/kg	5	10	37	0
Cadmium	mg/kg	5	0.3	22	0
Chromium (total)	mg/kg	5	9	910	0
Chromium (hexavalent)	mg/kg	5	<2	21	0
Copper	mg/kg	5	25	2,400	0
Lead	mg/kg	5	80	200	0
Mercury	mg/kg	5	<1	11	0
Nickel	mg/kg	5	11	180	0
Selenium	mg/kg	5	<2	250	0
Zinc	mg/kg	5	106	3,700	0
pH	Units	11	8.4	<5-10>	0
Naphthalene	mg/kg	5	<0.1	2.3	0
Acenaphthylene	mg/kg	5	<0.1	170	0
Acenaphthene	mg/kg	5	<0.1	210	0
Fluorene	mg/kg	5	<0.1	170	0
Phenanthrene	mg/kg	5	0.17	95	0
Anthracene	mg/kg	5	<0.1	2,400	0
Fluoranthene	mg/kg	5	0.49	280	0
Pyrene	mg/kg	5	0.47	620	0
Benzo(a)anthracene	mg/kg	5	0.29	7.2	0
Chrysene	mg/kg	5	0.29	15	0
Benzo(b)fluoranthene	mg/kg	5	0.30	2.6	0
Benzo(k)fluoranthene	mg/kg	5	0.12	77	0
Benzo(a)pyrene	mg/kg	5	0.26	2.2	0
Indeno(1,2,3-cd)pyrene	mg/kg	5	0.15	27	0
Dibenzo(a,h)anthracene	mg/kg	5	<0.1	0.24	0
Benzo(ghi)perylene	mg/kg	5	0.14	320	0
TPH Aliphatic C5-C6	mg/kg	2	<0.01	42	0
TPH Aliphatic C6-C8	mg/kg	2	<0.05	100	0
TPH Aliphatic C8-C10	mg/kg	2	<2	27	0
TPH Aliphatic C10-C12	mg/kg	2	<2	130	0
TPH Aliphatic C12-C16	mg/kg	2	<3	1,100	0
TPH Aliphatic C16-C35	mg/kg	2	<10	65,000	0
TPH Aliphatic C35-C44	mg/kg	2	<10	65,000	0

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
TPH Aromatic C5-C7	mg/kg	2	<0.01	70	0
TPH Aromatic C7-C8	mg/kg	2	<0.05	130	0
TPH Aromatic C8-C10	mg/kg	2	<2	34	0
TPH Aromatic C10-C12	mg/kg	2	<2	74	0
TPH Aromatic C12-C16	mg/kg	2	<2	140	0
TPH Aromatic C16-C21	mg/kg	2	<3	260	0
TPH Aromatic C21-C35	mg/kg	2	<10	1,100	0
TPH Aromatic C35-C44	mg/kg	2	<10	1,100	0
Benzene	mg/kg	2	<0.002	0.87	0
Toluene	mg/kg	2	<0.005	130	0
Ethylbenzene	mg/kg	2	<0.002	47	0
Xylene (total of all types)	mg/kg	2	<0.004	56	0
Methyl Tert Butyl Ether (MTBE)	mg/kg	2	<0.005	49	0
Semi-Volatile Organic Compounds (SVOCs)	mg/kg	1	None Detected	LOD*	0
Asbestos	Presence	2	>0.001	Fibres Present	0
Notes: *Limit of detection: Given the large amount of compounds in this group, coupled with the lack of GAC for certain compounds, any concentrations above the limit of detection will be highlighted in the first instance.					

None of the samples record any contaminants at concentrations exceeding their respective assessment criteria.

7.2. WATER ENVIRONMENT

It is not appropriate to consider human health assessment criteria for human health in relation to the risk to the water environment, but currently there are no generic soil assessment criteria in respect of the water environment. In the absence of any groundwater sampling data, the soil results are assessed on the basis of professional judgement.

The contaminant concentrations recorded in the soils at the site are not considered to be at such levels that they would present any significant risk to the underlying water environment.

7.3. BUILDING MATERIALS

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
pH	units	11	7.6	<5.5	0
Sulphate (w/s)	mg/l	11	1860	500	1
Sum of SVOC + Aliphatic TPH >C5-C10 + Aromatic TPH >C5-C10 above detection limits	mg/kg	1	None Detected	2	0
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	mg/kg	2	None Detected	10	0
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	mg/kg	2	None Detected	500	0
Sum of BTEX + MTBE above detection limits	mg/kg	2	None Detected	0.1	0
Phenols	mg/kg	1	None Detected	2	0
Cresols and chlorinated phenols	mg/kg	1	None Detected	2	0
Naphthalene	mg/kg	5	>0.1	0.5	0
Benzo(a)pyrene	mg/kg	5	0.26	0.5	0

RESULTS EXCEEDING BUILDING MATERIALS ASSESSMENT CRITERIA

WATER SOLUBLE SULPHATE	Concentrations of water soluble sulphate are such that they could detrimentally impact sub-surface concrete. The impact on concrete mix design is a geotechnical issue that is considered separately and so no further comment is made on these results within this contamination assessment.
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8. RISK EVALUATION

8.1. REVISED CONCEPTUAL MODEL

The revised conceptual site model plan is presented in the Appendices.

ADDITIONAL POLLUTANT LINKAGES	During the ground investigation, no additional sources of contamination were identified.
INVALID POLLUTANT LINKAGES	No significant contamination has been recorded at the site. As such all of the potential pollutant linkages identified at the start of the ground investigation have been proven to be invalid.
LIMITATIONS AND UNCERTAINTIES	All of the potential contamination sources have been targeted by the exploratory holes and therefore it is considered that a sufficient number of exploratory points have been completed for contamination assessment purposes.

8.2. UPDATED CONTAMINATION RISK ASSESSMENT

The pollutant linkages identified in the revised conceptual site model will now be evaluated as to their severity:

SOURCES AND CONTAMINANTS	PATHWAYS (REFERENCE FROM MODEL)	RECEPTORS	POTENTIAL RISK
Off-site former builder's yard - Petroleum hydrocarbons (diesel). Asbestos containing materials (e.g. cement asbestos building products).	Ingestion	Residents	Negligible Risk
	Inhalation		
	Consumption of home grown produce		
	Inhalation of fibres	Water Supply Pipes	Negligible Risk
	Direct Contact		

The contamination risks that are presented to the various receptor groups are discussed further in the following sections:

RISK TO HUMAN HEALTH
No significant risks identified.

RISK TO WATER ENVIRONMENT
No significant risks identified.

RISK TO BUILDING MATERIALS AND SERVICES

No significant risks identified.

8.3. RISK MANAGEMENT

8.3.1. Introduction

No significant contamination risks have been identified and as such the site can be considered suitable for its proposed use.

It is recommended that this report is submitted to the planning department of the Local Authority, the organisation undertaking the Building Control function and warranty providers to confirm that the investigation completed to date is satisfactory.

8.3.2. Further Contamination Assessment

It is considered that no further ground investigation is required for contamination assessment purposes.

8.3.3. Outline Remediation Strategy

Due to the absence of contamination risks, no remediation is considered necessary.

8.4. WASTE SOIL DISPOSAL

Topsoil should be viewed as a resource rather than a waste. As the topsoil is suitable for residential garden use in terms contamination, the topsoil at the site should be stripped and the surplus reused on other developments. It should be noted that topsoil, even if uncontaminated, is unlikely to constitute 'inert waste' due to its high organic matter content.

It is considered that the natural sub-soils disposed of from the site would be classified as 'non-hazardous waste' and would be characterised for disposal to landfill as 'inert waste'. However, the chemical results should be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils. Waste Acceptance Criteria (WAC) testing of the soils will also be required where the soil is to be disposed of at a landfill permitted to accept inert waste. Such WAC testing has been completed and the results are in the Appendices which confirm the soil tested complies with the inert waste limits. The waste code from the European Waste Catalogue (EWC) 2002 for the soils would be 17 05 04 'Soil and Stones, not containing dangerous substances'.



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Derwentside Environmental Testing Services Ltd
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DETS Report No: 23-15493

Site Reference: Land at Arlesey Road, Ickleford

Project / Job Ref: BRD4359

Order No: None Supplied

Sample Receipt Date: 20/12/2023

Sample Scheduled Date: 20/12/2023

Report Issue Number: 1

Reporting Date: 03/01/2024

Authorised by:



Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.



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Soil Analysis Certificate						
DETS Report No: 23-15493	Date Sampled	18/12/23	18/12/23	18/12/23	18/12/23	18/12/23
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land at Arlesey Road, Ickleford	TP / BH No	WS01	WS02	WS02	WS03	WS04
Project / Job Ref: BRD4359	Additional Refs	J1	J1	J2	J1	J1
Order No: None Supplied	Depth (m)	0.10	0.20	0.70	0.20	0.10
Reporting Date: 03/01/2024	DETS Sample No	691532	691533	691534	691535	691536

Determinand	Unit	RL	Accreditation				
Asbestos Quantification ^(S)	%	< 0.001	ISO17025	< 0.001			< 0.001
pH	pH Units	N/a	MCERTS	8.0	7.9		8.0
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS				
Total Sulphate as SO ₄	%	< 0.02	MCERTS				
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	< 10	13	< 10	< 10
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	< 0.01	0.01	< 0.01	< 0.01
Total Sulphur	%	< 0.02	NONE				
Organic Matter (SOM)	%	< 0.1	MCERTS	5.2	6.9	5.5	7.5
Arsenic (As)	mg/kg	< 2	MCERTS	10	10	10	9
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.3
Chromium (Cr)	mg/kg	< 2	MCERTS	8	9	9	9
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	20	24	25	25
Lead (Pb)	mg/kg	< 3	MCERTS	62	54	39	80
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	11	11	11	11
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2
Zinc (Zn)	mg/kg	< 3	MCERTS	56	46	46	106

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation



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Soil Analysis Certificate						
DETS Report No: 23-15493	Date Sampled	18/12/23	18/12/23	18/12/23	18/12/23	18/12/23
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land at Arlesey Road, Ickleford	TP / BH No	WS04	WS05	WS05	WS02	WS04
Project / Job Ref: BRD4359	Additional Refs	J2	D1	D3	D2	D3
Order No: None Supplied	Depth (m)	0.70	0.80	1.80	2.70	2.90
Reporting Date: 03/01/2024	DETS Sample No	691537	691538	691539	691540	691541

Determinand	Unit	RL	Accreditation					
Asbestos Quantification ^(S)	%	< 0.001	ISO17025					
pH	pH Units	N/a	MCERTS	8.1	8.4	7.7	7.6	7.9
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS		732	369	508	6754
Total Sulphate as SO ₄	%	< 0.02	MCERTS		0.07	0.04	0.05	0.68
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	16	< 10	10	20	1860
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.02	< 0.01	0.01	0.02	1.86
Total Sulphur	%	< 0.02	NONE		0.03	< 0.02	< 0.02	0.65
Organic Matter (SOM)	%	< 0.1	MCERTS	3.6				
Arsenic (As)	mg/kg	< 2	MCERTS	5				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2				
Chromium (Cr)	mg/kg	< 2	MCERTS	5				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	17				
Lead (Pb)	mg/kg	< 3	MCERTS	20				
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1				
Nickel (Ni)	mg/kg	< 3	MCERTS	10				
Selenium (Se)	mg/kg	< 2	MCERTS	< 2				
Zinc (Zn)	mg/kg	< 3	MCERTS	29				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)



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Soil Analysis Certificate						
DETS Report No: 23-15493	Date Sampled	18/12/23	18/12/23			
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Land at Arlesey Road, Ickleford	TP / BH No	WS01	WS02			
Project / Job Ref: BRD4359	Additional Refs	B1	B1			
Order No: None Supplied	Depth (m)	1.50	1.00			
Reporting Date: 03/01/2024	DETS Sample No	691542	691543			

Determinand	Unit	RL	Accreditation	(n)			
Asbestos Quantification ^(S)	%	< 0.001	ISO17025				
pH	pH Units	N/a	MCERTS	8.2	8.3		
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	581	281		
Total Sulphate as SO ₄	%	< 0.02	MCERTS	0.06	0.03		
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	124	29		
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.12	0.03		
Total Sulphur	%	< 0.02	NONE	0.02	< 0.02		
Organic Matter (SOM)	%	< 0.1	MCERTS				
Arsenic (As)	mg/kg	< 2	MCERTS				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS				
Chromium (Cr)	mg/kg	< 2	MCERTS				
Chromium (hexavalent)	mg/kg	< 2	NONE				
Copper (Cu)	mg/kg	< 4	MCERTS				
Lead (Pb)	mg/kg	< 3	MCERTS				
Mercury (Hg)	mg/kg	< 1	MCERTS				
Nickel (Ni)	mg/kg	< 3	MCERTS				
Selenium (Se)	mg/kg	< 2	MCERTS				
Zinc (Zn)	mg/kg	< 3	MCERTS				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-15493	Date Sampled	18/12/23	18/12/23	18/12/23	18/12/23	18/12/23
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Land at Arlesey Road, Ickleford	TP / BH No	WS01	WS02	WS03	WS04	WS04
Project / Job Ref: BRD4359	Additional Refs	J1	J1	J1	J1	J2
Order No: None Supplied	Depth (m)	0.10	0.20	0.20	0.10	0.70
Reporting Date: 03/01/2024	DETS Sample No	691532	691533	691535	691536	691537

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.17	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.28	< 0.1	0.13	0.49	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	0.26	< 0.1	< 0.1	0.47	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.16	< 0.1	< 0.1	0.29	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	0.16	< 0.1	< 0.1	0.29	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.18	< 0.1	< 0.1	0.30	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.12	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.16	< 0.1	< 0.1	0.26	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.15	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.14	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	2.7	< 1.6



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Soil Analysis Certificate - TPH LQM Banded

DETS Report No: 23-15493	Date Sampled	18/12/23	18/12/23			
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Land at Arlesey Road, Ickleford	TP / BH No	WS03	WS04			
Project / Job Ref: BRD4359	Additional Refs	J1	J2			
Order No: None Supplied	Depth (m)	0.20	0.70			
Reporting Date: 03/01/2024	DETS Sample No	691535	691537			

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C16 - C35 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10			
Aliphatic >C35 - C44 : EH_CU_1D_AL	mg/kg	< 10	NONE	< 10	< 10			
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 30	NONE	< 30	< 30			
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	< 3	< 3			
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	< 10	< 10			
Aromatic >C35 - C44 : EH_CU_1D_AR	mg/kg	< 10	NONE	< 10	< 10			
Aromatic (>C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 30	NONE	< 30	< 30			
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 60	NONE	< 60	< 60			



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-15493	Date Sampled	18/12/23	18/12/23			
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Land at Arlesey Road, Ickleford	TP / BH No	WS03	WS04			
Project / Job Ref: BRD4359	Additional Refs	J1	J2			
Order No: None Supplied	Depth (m)	0.20	0.70			
Reporting Date: 03/01/2024	DETS Sample No	691535	691537			

Determinand	Unit	RL	Accreditation				
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2		
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5		
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2		
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2		
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2		
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5		



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Soil Analysis Certificate - Semi Volatile Organic Compounds (SVOC)						
DETS Report No: 23-15493	Date Sampled	18/12/23				
BRD Environmental Ltd	Time Sampled	None Supplied				
Site Reference: Land at Arlesey Road, Ickleford	TP / BH No	WS04				
Project / Job Ref: BRD4359	Additional Refs	J2				
Order No: None Supplied	Depth (m)	0.70				
Reporting Date: 03/01/2024	DETS Sample No	691537				

Determinand	Unit	RL	Accreditation				
Phenol	mg/kg	< 0.1	NONE	< 0.1			
1,2,4-Trichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1			
2-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1			
Nitrobenzene	mg/kg	< 0.1	MCERTS	< 0.1			
0-Cresol	mg/kg	< 0.1	NONE	< 0.1			
bis(2-chloroethoxy)methane	mg/kg	< 0.1	MCERTS	< 0.1			
bis(2-chloroethyl)ether	mg/kg	< 0.1	MCERTS	< 0.1			
2,4-Dichlorophenol	mg/kg	< 0.1	MCERTS	< 0.1			
2-Chlorophenol	mg/kg	< 0.1	ISO17025	< 0.1			
1,3-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1			
1,4-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1			
1,2-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1			
2,4-Dimethylphenol	mg/kg	< 0.15	ISO17025	< 0.15			
Isophorone	mg/kg	< 0.1	NONE	< 0.1			
Hexachloroethane	mg/kg	< 0.1	MCERTS	< 0.1			
p-Cresol	mg/kg	< 0.15	MCERTS	< 0.15			
2,4,6-Trichlorophenol	mg/kg	< 0.1	MCERTS	< 0.1			
2,4,5-Trichlorophenol	mg/kg	< 0.15	MCERTS	< 0.15			
2-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1			
4-Chloro-3-methylphenol	mg/kg	< 0.1	NONE	< 0.1			
2-Methylnaphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Hexachlorocyclopentadiene	mg/kg	< 0.1	NONE	< 0.1			
Hexachlorobutadiene	mg/kg	< 0.1	ISO17025	< 0.1			
2,6-Dinitrotoluene	mg/kg	< 0.1	MCERTS	< 0.1			
Dimethyl phthalate	mg/kg	< 0.1	NONE	< 0.1			
2-Chloronaphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
4-Chloroaniline	mg/kg	< 0.15	NONE	< 0.15			
4-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1			
4-Chlorophenyl phenyl ether	mg/kg	< 0.1	MCERTS	< 0.1			
3-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1			
4-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1			
4-Bromophenyl phenyl ether	mg/kg	< 0.1	MCERTS	< 0.1			
Hexachlorobenzene	mg/kg	< 0.1	MCERTS	< 0.1			
2,4-Dinitrotoluene	mg/kg	< 0.1	MCERTS	< 0.1			
Diethyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenzofuran	mg/kg	< 0.1	MCERTS	< 0.1			
Azobenzene	mg/kg	< 0.1	NONE	< 0.1			
Dibutyl phthalate	mg/kg	< 0.1	ISO17025	< 0.1			
Carbazole	mg/kg	< 0.1	ISO17025	< 0.1			
bis(2-ethylhexyl)phthalate	mg/kg	< 0.15	ISO17025	< 0.15			
Benzyl butyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1			
Di-n-octyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1			



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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 23-15493	
BRD Environmental Ltd	
Site Reference: Land at Arlesey Road, Ickleford	
Project / Job Ref: BRD4359	
Order No: None Supplied	
Reporting Date: 03/01/2024	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
691532	WS01	J1	0.10	18.3	Brown sandy clay with stones
691533	WS02	J1	0.20	26.5	Brown sandy clay with stones
691534	WS02	J2	0.70	24	Brown clay
691535	WS03	J1	0.20	20.3	Brown sandy clay with vegetation
691536	WS04	J1	0.10	19.7	Brown loamy sand with stones and vegetation
691537	WS04	J2	0.70	18.5	Brown sandy clay
691538	WS05	D1	0.80	25.6	Grey sandy clay
691539	WS05	D3	1.80	12.5	Orange sandy clay with stones
691540	WS02	D2	2.70	15.2	Grey clay
691541	WS04	D3	2.90	9.1	Brown sandy clay with stones and chalk
691542	WS01	B1	1.50	6	Light brown sandy clay with stones and chalk
691543	WS02	B1	1.00	7.3	Brown sandy gravel with stones and chalk

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{u/s}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-15493

BRD Environmental Ltd

Site Reference: Land at Arlesey Road, Ickleford

Project / Job Ref: BRD4359

Order No: None Supplied

Reporting Date: 03/01/2024

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCS	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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Water Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-15493

BRD Environmental Ltd

Site Reference: Land at Arlesey Road, Ickleford

Project / Job Ref: BRD4359

Order No: None Supplied

Reporting Date: 03/01/2024

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO ₄)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered



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List of HWOL Acronyms and Operators

DETS Report No: 23-15493

BRD Environmental Ltd

Site Reference: Land at Arlesey Road, Ickleford

Project / Job Ref: BRD4359

Order No: None Supplied

Reporting Date: 03/01/2024

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym

Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
Mineral Oil (C10 - C40) (BS EN 12457-3) - EH_CU_1D_AL
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH LQM - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH LQM - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH LQM - Aliphatic >C16 - C35 - EH_CU_1D_AL
TPH LQM - Aliphatic >C35 - C44 - EH_CU_1D_AL
TPH LQM - Aliphatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AL
TPH LQM - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH LQM - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH LQM - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH LQM - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH LQM - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH LQM - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH LQM - Aromatic >C35 - C44 - EH_CU_1D_AR
TPH LQM - Aromatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AR
TPH LQM - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH LQM - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH LQM - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH LQM - Total >C5 - C44 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
Total BTEX (BS EN 12457-3) - HS_1D_MS_Total
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	10.4	%
Loss on Ignition	Soil	BS EN 12457	16.9	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	21.1	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	17.9	%
pH	Soil	BS EN 12457	0.282	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	19.5	%
Barium	Leachate	BS EN 12457	12.2	%
Cadmium	Leachate	BS EN 12457	17.2	%
Chromium	Leachate	BS EN 12457	20.7	%
Copper	Leachate	BS EN 12457	14.1	%
Mercury	Leachate	BS EN 12457	16.7	%
Molybdenum	Leachate	BS EN 12457	13.3	%
Nickel	Leachate	BS EN 12457	14.0	%
Lead	Leachate	BS EN 12457	12.1	%
Antimony	Leachate	BS EN 12457	16.1	%
Selenium	Leachate	BS EN 12457	15.5	%
Zinc	Leachate	BS EN 12457	14.0	%
Chloride	Leachate	BS EN 12457	15.7	%
Fluoride	Leachate	BS EN 12457	19.1	%
Sulphate	Leachate	BS EN 12457	27.6	%
TDS	Leachate	BS EN 12457	10.0	%
Phenol Index	Leachate	BS EN 12457	12.9	%
DOC	Leachate	BS EN 12457	20.4	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	16.9	%
pH	Soil	BS 3882: 2015	0.282	Units
Carbonate	Soil	BS 3882: 2015	12.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	19.8	%
Copper	Soil	BS 3882: 2015	23.2	%
Nickel	Soil	BS 3882: 2015	32.6	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%



Rob Davies
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OX16 5HT

Derwentside Environmental Testing Services Ltd
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Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-15656

Site Reference: Land at Arlesey Road, Ickleford

Project / Job Ref: BRD4359

Order No: None Supplied

Sample Receipt Date: 27/12/2023

Sample Scheduled Date: 27/12/2023

Report Issue Number: 1

Reporting Date: 05/01/2024

Authorised by:



Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



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Water Analysis Certificate						
DETS Report No: 23-15656	Date Sampled	20/12/23	20/12/23			
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Land at Arlesey Road, Ickleford	TP / BH No	WS02	WS03			
Project / Job Ref: BRD4359	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.05	4.35			
Reporting Date: 05/01/2024	DETS Sample No	692359	692360			

Determinand	Unit	RL	Accreditation				
pH	pH Units	N/a	ISO17025	7.1	7.0		
Sulphate as SO ₄	mg/l	< 1	ISO17025	94	879		

Subcontracted analysis ^(S)

Insufficient sample ^{I/S}

Unsuitable Sample ^{U/S}



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Water Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-15656

BRD Environmental Ltd

Site Reference: Land at Arlesey Road, Ickleford

Project / Job Ref: BRD4359

Order No: None Supplied

Reporting Date: 05/01/2024

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered



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List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 11/01/2024



Contract	Arlesey Road, Ickleford		
Serial No.	43952_1		
Client:		<i>Soil Property Testing Ltd</i>	
BRD Environmental Ltd BRD Environmental Ltd Hawthorne Villa 1 Old Parr Road Banbury Oxfordshire OX16 5HT		15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG Tel: 01480 455579 Email: enquiries@soilpropertytesting.com Website: www.soilpropertytesting.com	
Samples Submitted By: BRD Environmental Ltd		Approved Signatories:	
Samples Labelled: Arlesey Road, Ickleford		☒ J.C. Garner B.Eng (Hons) FGS Technical Director & Quality Manager ☐ W. Johnstone Materials Lab Manager 	
Date Received: 20/12/2023		Samples Tested Between: 20/12/2023 and 11/01/2024	
Remarks: For the attention of Rob Davies Your Reference No: BRD4359			
Notes:	1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary. 2 Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. 3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory. 4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory. 5 The results within this report only relate to the items tested or sampled.		



TEST REPORT
ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 11/01/2024



Contract			Arlesey Road, Ickleford																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Bore Hole No.	Type	Sample Ref.	Top Depth	Water Content (BS EN) Liquid/Plastic Limits Wet Sieve Preparation Particle Size Distribution (BS1377)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 11/01/2024



Contract	Arlesey Road, Ickleford
Serial No.	43952_1

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index	Sample Preparation				Description	Class
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
WS01	1.10	D	2	15.1	25	14	11	0.10	Wet Sieved	18 (M)	18.4*	24	Firm light olive brown slightly gravelly slightly sandy silty CLAY with rare recently active roots. Gravel is fine to medium angular to sub rounded chert and chalk.	CL
WS01	2.30	D	3	20.7	38	15	23	0.25	Wet Sieved	5 (M)	21.8*	24	Soft olive slightly gravelly slightly sandy silty CLAY with occasional orange staining. Gravel is fine to medium angular to sub rounded chert and chalk.	CI
WS01	2.70	D	4	22.0	35	18	17	0.24	From Natural	0 (A)		26	Pale yellow and light grey marly CHALK with occasional orange staining and rare decayed roots.	CL/CI
WS04	0.90	D	1	28.6	37	27	10	0.16	Wet Sieved	22 (M)	36.6*	24	Dark brownish grey slightly gravelly slightly sandy CLAY/SILT with occasional shell debris. Gravel is fine to medium angular to sub rounded chert and chalk.	MI
WS04	1.80	D	2	23.2	36	17	19	0.33	From Natural	<1% (A)		26	Soft mottled grey and orange silty CLAY with rare fine chalk gravel and rare decayed roots.	CI
WS05	2.70	D	4	16.7	32	16	16	0.04	From Natural	0 (A)		26	Mottled pale olive and light grey marly CHALK with rare decayed roots.	CL

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2
Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4
Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments: *Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990 Clause 3 Note 1.
Table Notation: Ret'd 0.425mm: (A) = Assumed, (M) = Measured



TEST REPORT

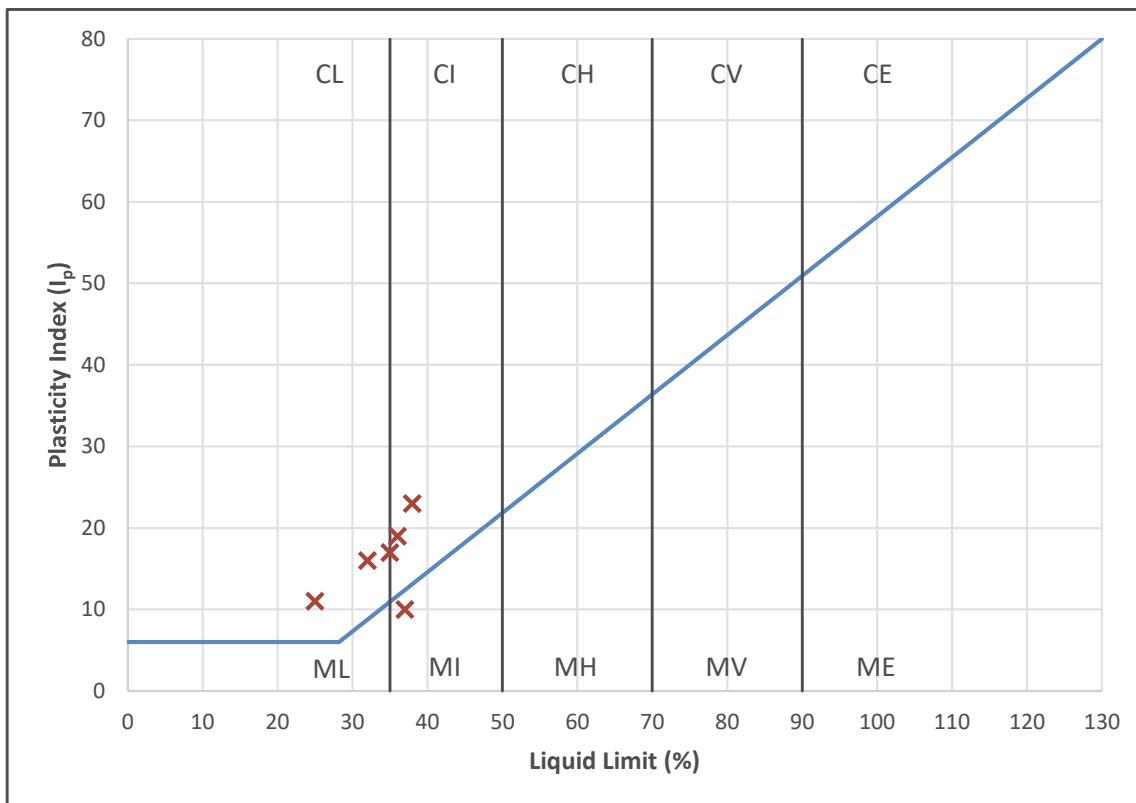
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DATE ISSUED: 11/01/2024



Contract	Arlesey Road, Ickleford
Serial No.	43952_1

PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High



Plasticity Chart BS5930: 2015: Figure 8

High	NHBC Volume Change Potential
Medium	
Low	

Method of Preparation:	BS 1377: Part 2: 1990: 4.2
Method of Test:	BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index