



Certificate of Analysis

Certificate Number 17-14144

01-Nov-17

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 17-14144

Client Reference PSL17/5217

Order No (not supplied)

Contract Title Land at Catherins Walk, Barnsley

Description 7 Soil samples.

Date Received 28-Oct-17

Date Started 28-Oct-17

Date Completed 01-Nov-17

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By

Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 17-14144

Client Ref PSL17/5217

Contract Title Land at Catherins Walk, Barnsley

Lab No	1249784	1249785	1249786	1249787	1249788	1249789	1249790
Sample ID	TP1	TP3	TP6	TP7	WS4	WS8	WS10
Depth	2.40-2.50	4.00-4.10	1.00-1.20	1.00-1.20	0.90-1.00	0.50-0.70	1.60-1.80
Other ID							
Sample Type	D	D	D	D	D	D	D
Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units							
Inorganics										
pH	DETSC 2008#			8.1	8.1	5.5	5.5	5.8	7.2	7.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	25	37	32	27	40	20	140

Information in Support of the Analytical Results

Our Ref 17-14144
 Client Ref PSL17/5217
 Contract Land at Catherins Walk, Barnsley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1249784	TP1 2.40-2.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1249785	TP3 4.00-4.10 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1249786	TP6 1.00-1.20 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1249787	TP7 1.00-1.20 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1249788	WS4 0.90-1.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1249789	WS8 0.50-0.70 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1249790	WS10 1.60-1.80 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



Certificate of Analysis

Certificate Number 17-13946

31-Oct-17

Client ARP Geotechnical
5/6 Northwest Business Park
Servia Hill
Leeds
LS6 2QH

Our Reference 17-13946

Client Reference LYH/01

Order No (not supplied)

Contract Title Land at Catherines Walk, Barnsley

Description 2 Soil samples.

Date Received 26-Oct-17

Date Started 26-Oct-17

Date Completed 31-Oct-17

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By

Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 17-13946

Client Ref LYH/01

Contract Title Land at Catherines Walk, Barnsley

Lab No	1248834	1248835
Sample ID	TP4	TP8
Depth	1.00-1.20	2.80-2.90
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	19/10/17	19/10/17
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Inorganics					
pH	DETSC 2008#			7.4	6.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	20

Information in Support of the Analytical Results

Our Ref 17-13946
 Client Ref LYH/01
 Contract Land at Catherines Walk, Barnsley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1248834	TP4 1.00-1.20 SOIL	19/10/17	GJ 60ml, PG		
1248835	TP8 2.80-2.90 SOIL	19/10/17	GJ 60ml, PG		

Key: G-Glass P-Plastic J-Jar G-Bag

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APPENDIX F

RISK CATEGORISATION TABLES

Severity of Consequence

Severe	Short term (acute) risks to human health, likely to result in significant harm. Major pollution of (watercourses or groundwater)
Medium	Long-term (Chronic) damage (significant harm) to human health. Pollution of sensitive water resources.
Mild	Pollution of non-sensitive water resources.
Minor	Non-permanent health effects easily prevented by use of personal protective equipment during site works.

Probability of Risk Event Occurring

High Likelihood	There is a pollutant linkage and an event that either appears very likely in the short term, almost inevitable in the long term, or there is evidence of harm or pollution at the receptor.
Likely	There is a pollution linkage and all the elements are present and in the right place, so that a risk event is possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which a risk event could occur. However, it is not certain that such an event would take place even over a longer period, and even less likely in the short term.
unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

Comparison of Probability Against Severity of Consequence

		Severity of Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/ Low Risk
	Likely	High Risk	Moderate Risk	Moderate/ Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/ Low Risk	Low Risk	Very Low Risk	Very Low Risk

Risk Categories - Definitions

Very High Risk	High probability that severe harm could arise to a receptor, or there is evidence that severe harm is already occurring. Urgent investigation is required and urgent remediation is likely to be required.
High Risk	Harm is likely to arise to a receptor. Urgent investigation is required and remediation may be necessary in the short term and likely over the longer term.
Moderate Risk	Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Investigation normally required to clarify risk. Some remedial works may be required in the long-term.
Moderate/ Low Risk	Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as mild. Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent.
Low Risk	Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild.
Very Low Risk	Low possibility that harm could arise to a receptor. Such harm is unlikely to be any worse than mild.

A P P E N D I X G

CONTAMINATION REMEDIATION STATEMENT



CONTAMINATION REMEDIATION STATEMENT

**FOR
CATHERINE'S WALK
BARNLEY**

**ON BEHALF OF
LEEDS AND YORKSHIRE
HOUSING ASSOCIATION**

ARP GEOTECHNICAL LTD

CHARTERED CONSULTING ENGINEERS

Northwest House 5/6 Northwest Business Park Servia Hill Leeds LS6 2QH

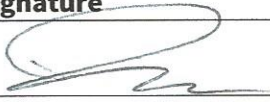
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CLIENT: LEEDS AND YORKSHIRE HOUSING ASSOCIATION
JOB NUMBER: LYH/01
PROJECT: CATHERINE'S WALK, BARNSELEY
REPORT TYPE: CONTAMINATION REMEDIATION STATEMENT
REPORT REFERENCE: LYH/01r2rem

	Name	Signature
Prepared By:	J Race BSc CGeol FGS EurGeol	
Authorised By:	A Radcliffe BEng (Hons) CEng MStructE	

ISSUE	DATE	STATUS
1	24th NOVEMBER 2017	V1 FINAL

LEEDS AND YORKSHIRE HOUSING ASSOCIATION**CATHERINE'S WALK, BARNLEY****CONTAMINATION REMEDIATION STATEMENT****1.0 Introduction**

- 1.1 This document has been prepared to provide information for the Client and other interested parties, such as the Regulatory Authorities, outlining how contamination encountered on the site will be managed to ensure that the site is environmentally suitable for the intended residential use. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities, usually the local Planning Authority and NHBC or other building control provider.

2.0 The Site

- 2.1 The ARP Geotechnical Ltd Stage 2 Geo-environmental Report, dated November 2017 under reference LYH/01r2, makes an assessment of contamination, along with other aspects.
- 2.2 The conceptual site model is for a residential development, including private gardens and communal landscaping.
- 2.3 At the time of the investigation, the northwest of the site comprised a rectangular area of undeveloped land, partially covered with hardstanding (typically concrete flags), and vegetated with weeds/bushes and sporadic trees. The rest of the site comprises well-kept grass, generally used as playing fields. A series of manhole covers, slightly raised above the grassed surface, crossed the site from the north to the southwest, crossing where the northwest of the site joins the with the main site area. A low, but raised (0.5m high), mound of earth was present, running just inside the eastern site boundary.
- 2.4 The site slopes down gently to the northwest. There is one large tree on the northwest of the site, and occasional sporadic trees just outside the boundaries elsewhere
- 2.5 Geological maps show the site to be covered by diamicton (cohesive glacial deposit) of Mid Pleistocene age. The remaining areas of the site show no drift cover. The bedrock across the site comprises sandstone of the Wooley Edge Rock Formation. A fault is indicated just beyond (approximately 3m outside) the northwestern boundary of the site.
- 2.6 The site is known to be underlain by coal workings. It is, concluded from assessment of the abandonment plans that the majority of the site will have sufficient cover to any workings present, with the possible exception of the southern end of the site, where workings in the Meltonfield Coal may be sufficiently shallow to pose a risk to ground stability.

- 2.7 There is a risk that unrecorded mine entries may be present on the site. If any suspect features are identified during site preparation or development works, these should be inspected by a Geotechnical Engineer.
- 2.8 The solid strata beneath the site comprise a 'Secondary A' aquifer.
- 2.9 The nearest downslope surface water is an unnamed stream or open drain 351m to the southwest. There are no surface water abstractions within 1km of the site.
- 2.10 At least part of the site is within an area where radon protective measures are stated to be necessary for new dwellings on the site. Unless a site-specific radon report is obtained, which indicates otherwise, it would be prudent to install basic protection to all proposed properties on the site. This is normally achieved by incorporating a radon barrier within a solid floor system, and extending the barrier through the cavity wall.
- 2.11 There are no landfills within 500m of the site. Therefore, the risk from landfill gases is negligible. However, there may be a potential risk of harmful gases from any shallow coal workings on the south of the site. If coal seams/workings are encountered at shallow depth then gas monitoring wells should be installed, and monitored on six occasions.
- 2.12 Ordnance Survey archive maps show that most of the site has remained undeveloped, with the exception of the northwestern rectangular portion which, formed landscaping and hardstanding to part of a Junior School complex from 1959 until sometime after 2000.
- 2.13 The ground investigation revealed a surface cover of topsoil, and locally made ground topsoil, up to 0.45m thick, across the main site area. In the northwest of the site, a surface cover of made ground, up to 0.5m thick, including thin layers of engineering materials, and including ash and clinker, was present. Made ground was also present, locally, on the northern tip of the site (TP8), and locally in the southwest of the site (TP5), between 0.3m and 0.7m in thickness. Natural cohesive glacial deposits were present underlying the majority of the site, whilst in the southeast, the glacial clays were absent, revealing the underlying Woolley Edge Rock sandstone, which is completely weathered to residual granular and cohesive subsoils in the upper few metres.
- 2.14 The trial pits and boreholes generally remained stable for the short period of exposure, with the exception of the trial pits at TP8 and TP9, where slight instability of the pit sides was noted from the surface to 1m and 0.4m depth, respectively, associated with the made ground. No groundwater entries were recorded during the excavations, and in boreholes the strata appeared dry.

- 2.15 The contamination testing revealed the made ground including clinker, on the formerly developed northwestern rectangle of the site (TP1, WS1, TP9 and WS10), to contain elevated arsenic, up to 70mg/kg. Remedial action is required to prevent excess risks to future occupants of the site.

3.0 Remediation Strategy

- 3.1 Where any garden or landscape areas overlie the existing contaminated made ground on the formerly developed northwestern rectangle of the site (TP1, WS1, TP9 and WS10), a minimum 600mm thickness of uncontaminated soils (topsoil and subsoil) should be provided. In areas of hardstanding or building footprints, the cover blanket is not required. The cover blanket must be clean and uncontaminated, and at least 0.6m thick. Details are provided below.

Thickness mm	Description
Minimum 100	Topsoil
Minimum 500	Subsoil

- 3.2 Alternatively, the affected made ground can be removed off site and taken to a suitably licensed landfill. The waste receiver may require Waste Acceptance Criteria Testing (WAC).
- 3.2 Following removal of the affected made ground from the site (if this option is selected), validation inspection will be required, to demonstrate that the unsuitable soil has been successfully removed.

4.0 Validation

- 4.1 To satisfy the Regulatory Authorities, verification that the above measures have been successfully implemented needs to be independently confirmed, in accordance with the guidance supplied in the document produced by the Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG): "Guidance on the Verification Requirements for Cover Systems". The measures described below will be required to ensure compliance with the document.

Uncontaminated Soil Cover Blanket – Northwestern Rectangle of the Site

- 4.2 The contaminated material affects approximately 16No. proposed plots on the northwest of the site. If the contaminated made ground is retained on site in this area, then it will be necessary to excavate inspection pits on one in every two plots, to confirm the required 600mm cover of uncontaminated material has been placed. The trial pits will be photographed, to include a reference scale, and the photographs included within any report to enable the location on site to be identified.

Off - Site Disposal of Contaminated Made Ground from Northwestern Rectangle of the Site

- 4.3 If the contaminated made ground in the northwest is removed from site, then the surface will need to be inspected by an Engineer, and sampled and tested on a maximum 25m spacing to confirm its uncontaminated status. The area will be photographed and all the details included within a Validation Letter Report. The disposal/transfer documents should be retained for inclusion in the Validation Report.

5.0 Materials Testing

- 5.1 For any imported subsoil and topsoil used, or any uncontaminated soil to be re-used on the site, the source will need to be confirmed, and the material tested for the attached suite of contaminants, to comply with the maximum screening values listed. The frequency of testing is given on the table below. Any samples already tested in the site investigation carried out to date can be considered part of the overall total required.

Material Type	Number of Samples
Topsoil or subsoil from greenfield site	Minimum 3No. or 1 per 250m ³ (whichever is greater)
Topsoil or subsoil from brownfield site	Minimum 6No. or 1 per 100m ³ (whichever is greater)

- 5.2 The material should be placed in quarantined stockpiles and once a stockpile has been approved by the Engineer, no further material should be added to the stockpile, and any further import should be stockpiled separately. Any cross contamination of materials should be avoided, and further testing carried out where any cross contamination is suspected to have occurred.
- 5.3 If space is insufficient on the site to store quarantined stockpiles, topsoil/subsoil can be placed directly into the appropriate gardens/landscape areas, but samples of each material would need to be tested by means of a validation trial pits on one per three plots.
- 5.4 The results of all the laboratory analysis, excavation logs, plans, photographs, and import documents will form part of the Remediation Validation Report.
- 5.5 In order to enable the scheme to progress and sales of properties to continue throughout the construction of the development, interim Validation Reports may be prepared for specific plots, if required, showing how the contamination has been dealt with. This will enable enquiries during the sales of the properties to be satisfied. On completion of the development, the discharge of any associated planning condition may be achieved by submission of all the interim validation letters, or issuing the information as a single combined Validation Report.

6.0 Unexpected Contamination

- 6.1 Any unexpected contamination uncovered during the works shall be inspected, sampled and analysed in laboratory for the suite of determinands appended to this Remediation Statement, and compared to the maximum concentration levels listed on the enclosure. Works on the affected materials shall cease until the appraisal is complete and, if necessary, a revised Remediation Statement is to be prepared and approved by the Planning Authority before work is recommenced.



ARP GEOTECHNICAL LIMITED
SOIL CONTAMINANT SCREENING VALUES
RESIDENTIAL WITH HOME-GROWN PRODUCE

Determinand	S4UL (mg/kg)			C4SL (mg/kg)		
Arsenic	37			37		
Cadmium	11			22		
Chromium (trivalent)	910					
Chromium (hexavalent)	6			21		
Lead				200		
Inorganic Mercury	40					
Selenium	250					
Copper	2400					
Nickel	130					
Zinc	3700					
Acidity (pH)	*Should be Greater Than 5			*Should be Greater Than 5		
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM
Acenaphthene	210	510	1,100			
Acenaphthylene	170	420	920			
Anthracene	2,400	5,400	11,000			
Benzo(a)anthracene	7.2	11	13			
Benzo(a)pyrene	2.2	2.7	3			5
Benzo(b)fluoranthene	2.6	3.3	3.7			
Benzo(g,h,i)perylene	320	340	350			
Benzo(k)fluoranthene	77	93	100			
Chrysene	15	22	27			
Dibenzo(a,h)anthracene	0.24	0.28	0.3			
Fluoranthene	280	560	890			
Fluorene	170	400	860			
Indeno(1,2,3-cd)pyrene	27	36	41			
Naphthalene	2.3	5.6	13			
Phenanthrene	95	220	440			
Pyrene	620	1,200	2,000			
Phenols	120	200	380			
Total TPH	*Above 500, speciate and compare with values below:					
C5 to C6 Aliphatic	42	78	160			
C6 to C8 Aliphatic	100	230	530			
C8 to C10 Aliphatic	27	65	150			
C10 to C12 Aliphatic	130	480	760			
C12 to C16 Aliphatic	1100	2,400	4,300			
C16 to C35 Aliphatic	65,000	92,000	110,000			
C35 TO C44 Aliphatic	65,000	92,000	110,000			
C5 to C7 Aromatic (Benzene)	70	140	300			
C7 to C8 Aromatic (Toluene)	130	290	660			
C8 to C10 Aromatic	34	83	190			
C10 to C12 Aromatic	74	180	380			
C12 to C16 Aromatic	140	330	660			
C16 to C21 Aromatic	260	540	930			
C21 TO C35 Aromatic	1100	1,500	1,700			
C35 TO C44 Aromatic	1100	1,500	1,700			
Asbestos	*Should be None Detected			*Should be None Detected		

* In House Value/Approach S4UL = Suitable 4 Use Level, CIEH/LQM 2014 C4SL = Cat 4 Screening Level, DEFRA, 2014

Blank cell indicates no published value or in-house value. Some values presented are above saturation limits.

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