

Briefing Note

Response to Environment Agency minutes

SOIL AND STRUCTURES

Site name	Sladen Mill, Littleborough	Job number	20403
Briefing note purpose	Quick reference responses to Environment Agency (EA) meeting minutes dated 03 September 2024 (ref. ENVPAC/1/GMC/00524)		
Date issued	18 November 2024 (V01)	Prepared by	Russell Bowman (Soil and Structures)
	22 November 2024 (V02)		
	26 November 2024 (V03)		

IMPORTANT UPDATE:

The analysis results from Spring 1 (groundwater; TOP Assay) were made available on 22 November 2024.

In overview, these results confirm a pre-oxidation concentration of 1.2 µg/l for PFOA and a post-oxidation concentration of 3.0 µg/l within this water sample.

A copy of the finalised testing certificate is appended to this Briefing Note and included within the latest version of the Controlled Waters Risk Assessment.

Bedrock aquifer investigation:

- The logic of this request is understood, if and where PFAS compounds are present within the Site soils or shallow groundwater, they may pose an unacceptable risk to the deeper groundwater body beneath the Site.
- **Response:** deeper drilling and/or other investigation techniques are not considered necessary given the spring-water both serves as a source of direct groundwater (bedrock aquifer) sampling and is identified as the primary source of PFAS compounds flowing onto Site. Testing of the Site soils indicates that they do not represent a source of PFAS (below detection).

Further testing of PFAS:

- The logic of this request is understood, PFAS compounds have been detected within the shallow groundwater across the Site and, whilst there are multiple lines of evidence indicating that these have not arisen from the Site itself, testing of the soils on Site (Made Ground deposits) would serve as an additional, compelling line of evidence to support (or refute) this existing body of evidence.
- **Response:** soil sampling and TOP Assay analysis has been completed in 6 discrete locations (at two depths in 5 locations) across the Site (as illustrated within the Controlled Waters Risk Assessment).

Further testing of PFAS 'parent products' (compounds that PFOA and PFOS originated from):

- The logic of this request is understood, PFAS compounds represent an extensive family of chemicals of which PFOA and PFOS only represent a small faction.
- **Response:** additional soil, surface water and groundwater sampling (and analysis) for the wider range of PFAS compounds has been completed and discussed within the Controlled Waters Risk Assessment

Remedial Targets Methodology:

- The logic of this request is understood, maximum concentrations need to be considered as a first-pass within analytical modelling.

- **Response:** further refinement and/or analytical modelling is not considered necessary given remedial works are already recommended (one of the main decision outputs from RTM P20 modelling – remediation required or not?) with the availability of surface water quality data (3 rounds) serving as site-specific remedial targets against which the recommended remedial works can be measured/validated. The maximum concentration of PFAS detected within the groundwater lies adjacent to Castle Brook with the original source of that PFAS demonstrated, via multiple lines of evidence, to be an off-Site source.

Earth movements:

- The logic of this request is understood, materials (and any potentially polluting material contained within them) may have been moved from its original location.
- **Response:** a diary of earth movements was provided within the earlier Tim J Booth Associates reporting with no other earthworks noted having taken place since this reporting was issued. It is noted that earthworks were completed as part of non-native invasive species treatment plans and, separately, to support additional sampling and analysis requested by the EA and reported on as part of this earlier reporting. All arisings were disposed of off Site to a suitably licensed facility with waste transfer notes available for review on request.

DETAILED MINUTES - responses:**Investigation**

1. The catchment dynamics are key as to why deeper borehole drilling hasn't been completed or considered necessary. The primary source of PFAS (the main contaminant of concern) lies off Site with sampling and analysis of this same water body available via spring points on the eastern edge of the Site.
2. The M series boreholes were advanced using percussive drilling techniques and appear to have terminated close to or at the bedrock surface, with some embedment possible in select locations. More recent trial pitting confirmed that the bedrock deposits were at least 'weak' and therefore only practically drillable using rotary drilling techniques (or large diameter shell and auger). In any case, the advancement of monitoring wells deeper into the bedrock aquifer is not considered necessary given the groundwater regime – 'flashy', lateral velocity dominated catchment.
3. Some boreholes 'embed' into more weathered bedrock – please refer to Note 2 above.

Source-pathway-receptor

4. The River Roch is exposed to high concentrations of PFAS compounds that are arising within the wider Castle Brook or Lydgate Brook catchments. Apart from groundwater impacted by PFAS containing spring water, there are no sources of PFAS on the Site and so, as far as the assessment of risk relating to the proposed development is concerned, we agree, the River Roch is not a receptor.
5. 'Block' sampling of the bedrock was completed as part of the most recent trial pitting exercise but otherwise, please refer to Note 2 above.
6. The 'likely source {of PFAS}' in the unsaturated zone is unlikely for various reasons with the most direct line of evidence being the findings of the additional soil sampling results presented within the Controlled Waters Risk Assessment (V04). The shallow groundwater is a source – please refer to Note 4 above.
7. Regarding appropriate target concentrations - please refer to Section 6.5 of the Controlled Waters Risk Assessment (V04).
8. PFAS is a POP – noted

PFAS

9. High concentrations of PFOA/PFOS can arise from exclusively off-site sources.
10. Expanded testing suites are useful for forensic analysis but in this complex groundwater regime, it is considered more useful to obtain a greater amount of 'screening' data points (PFOA dominating the profile) compared to a lesser amount of 'higher resolution' data points (DWI 47 testing).
11. 'Likelihood of on-site source' - is not supported by the available data - it was plausible that PFAS related compounds may have been present on Site (as part of Alderburgh Ltd's tenure) with the available lines of evidence submitted as part of earlier reporting not commented on confirming a significant, off-Site source.
12. High concentrations of PFOA/PFOS can arise from exclusively off-site sources.

PFAS source

13. Alderburgh owner confirmed only mechanical processes on the Site (LDPE extrusion) – all liquid based compounds were wholesaled. The owner is happy to provide a signed testimony to this effect if necessary.
14. There was no fire during Alderburgh's tenure of the Site.
15. Alderburgh's use of the Site makes on Site source plausible with further enquiry summarised in Note 13 confirming this is unlikely.
16. Please clarify what 'other contaminants of concern' infers? The testing completed to date is considered sufficient to assess risk to controlled waters, human health and inform suitable risk management strategies.

RTM / P20

17. The use of RTM / P20 is not considered to add value in this hydrogeological setting - please refer to Note 2 above.

Remediation

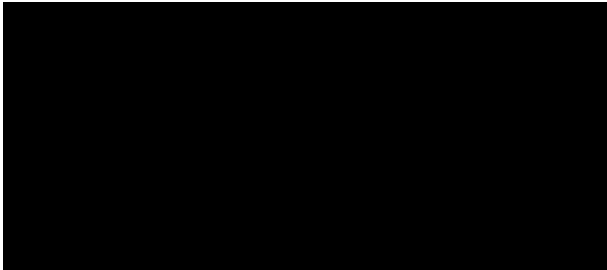
18. The use of clean capping to reduce infiltration has never, to our knowledge, been successfully applied (and not had undesired, secondary impacts, e.g. surface water flooding). It is not considered further.
19. PFAS remediation is, within the UK, only cost-effective via pathway intervention and, even if the Site soils were found to be a source of PFAS (and therefore requiring additional levels of risk mitigation) the efficacy of pathway intervention in this hydrogeological setting would be impractical/ineffectual.
20. The remedial measures set out within the Remediation Strategy (V03) are Site-specific.
21. A specialist laboratory was approached for help and have repeatedly miscommunicated and misdirected our work.

Identified pipes

22. Please confirm which pipes are being referred to?

Materials Management

23. Whilst demolition related earthworks have been completed under a separate approved planning application, soil movement since has been completed to facilitate access to monitoring positions with all arisings disposed of off-Site to a suitably licensed facility. Materials management planning is therefore not considered necessary in this scenario – the material was disposed of.



Soil and Structures Ltd
89 Moorhead Lane
Shipley
West Yorkshire
BD18 4JW

Attention: Russell Bowman

CERTIFICATE OF ANALYSIS

Date of report Generation: 22 November 2024
Customer: Soil and Structures Ltd
Sample Delivery Group (SDG): 241012-71
Your Reference:
Location: Sladen Mill
Report No: 747601
Order Number:

We received 13 samples on Saturday October 12, 2024 and 13 of these samples were scheduled for analysis which was completed on Thursday November 21, 2024. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

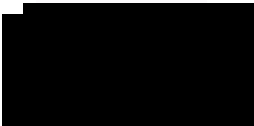
Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

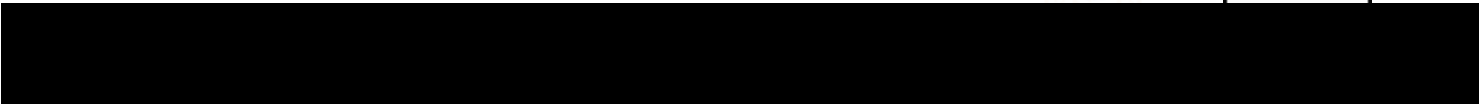
Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:



General Manager Western Europe Environmental





CERTIFICATE OF ANALYSIS

Validated

SDG: 241012-71
Client Ref.:

Report Number: 747601
Location: Sladen Mill

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
30510932	SPRING 1			10/10/2024
30510933	TB			10/10/2024
30510934	TP201		1.50	10/10/2024
30510935	TP201		3.00	10/10/2024
30510936	TP202		1.50	10/10/2024
30510938	TP202		2.00	10/10/2024
30510940	TP203		0.75	10/10/2024
30510941	TP204		1.50	10/10/2024
30510942	TP204		2.50	10/10/2024
30510943	TP205		1.00	10/10/2024
30510945	TP205		2.20	10/10/2024
30510946	TP206		1.00	10/10/2024
30510947	TP206		2.60	10/10/2024

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 241012-71

Report Number: 747601

Superseded Report:

Client Ref.:

Location: Sladen Mill

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
			30510947	TP206		2.60	1kg TUB with Handle (ALE260)	S
			30510946	TP206		1.00	1kg TUB with Handle (ALE260)	S
			30510945	TP205		2.20	1kg TUB with Handle (ALE260)	S
			30510943	TP205		1.00	1kg TUB with Handle (ALE260)	S
			30510942	TP204		2.50	1kg TUB with Handle (ALE260)	S
			30510941	TP204		1.50	1kg TUB with Handle (ALE260)	S
			30510940	TP203		0.75	1kg TUB with Handle (ALE260)	S
			30510938	TP202		2.00	1kg TUB with Handle (ALE260)	S
			30510936	TP202		1.50	1kg TUB with Handle (ALE260)	S
			30510935	TP201		3.00	1kg TUB with Handle (ALE260)	S
			30510934	TP201		1.50	1kg TUB with Handle (ALE260)	S
			30510933	TB			1kg TUB with Handle (ALE260)	S
			30510932	SPRING 1			Digitube for PFAS analysis.	GW
PFAS (Post Ox.) Liquids	All	NDPs: 0 Tests: 1	X					
PFAS (Post Ox.) Solids	All	NDPs: 0 Tests: 11		X	X	X	X	X
PFAS Liquids (Full Suite)	All	NDPs: 0 Tests: 1	X					
PFAS Solids	All	NDPs: 0 Tests: 12		X	X	X	X	X
Sample description	All	NDPs: 0 Tests: 12		X	X	X	X	X



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SDG: 241012-71
Client Ref.:

Report Number: 747601
Location: Sladen Mill

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
30510933	TB		Cream	Sand	None	None
30510934	TP201	1.50	Dark Brown	Sandy Clay Loam	Stones	Vegetation
30510935	TP201	3.00	Dark Brown	Loamy Sand	Stones	Vegetation
30510936	TP202	1.50	Dark Brown	Sandy Clay Loam	Stones	Brick
30510938	TP202	2.00	Light Brown	Sandy Clay Loam	Stones	None
30510940	TP203	0.75	Light Brown	Loamy Sand	Stones	None
30510941	TP204	1.50	Dark Brown	Sandy Clay Loam	Stones	Brick
30510942	TP204	2.50	Dark Brown	Sandy Clay Loam	Stones	None
30510943	TP205	1.00	Dark Brown	Sand	Stones	None
30510945	TP205	2.20	Light Brown	Sand	Stones	None
30510946	TP206	1.00	Black	Sand	Stones	Crushed Brick
30510947	TP206	2.60	Light Brown	Sand	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



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Validated

SDG: 241012-71
Client Ref.:

Report Number: 747601
Location: Sladen Mill

Superseded Report:

Results Legend			Customer Sample Ref.	SPRING 1	TB	TP201	TP201	TP202	TP202
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4* Sample deviation (see appendix)	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference			Ground Water (GW) 10/10/2024 12/10/2024 241012-71 30510932	Soil/Solid (S) 10/10/2024 12/10/2024 241012-71 30510933	1.50 Soil/Solid (S) 10/10/2024 12/10/2024 241012-71 30510934	3.00 Soil/Solid (S) 10/10/2024 12/10/2024 241012-71 30510935	1.50 Soil/Solid (S) 10/10/2024 12/10/2024 241012-71 30510936	2.00 Soil/Solid (S) 10/10/2024 12/10/2024 241012-71 30510938
Component	LOD/Units	Method							
PFBA (Post Ox.) (375-22-4)	<4 ng/l	TM405		<20					
PFPA (Post Ox.) (2706-90-3)	<2 ng/l	TM405		<10					
PFHxA (Post Ox.) (307-24-4)	<2 ng/l	TM405		37					
PFBS (Post Ox.) (375-73-5)	<2 ng/l	TM405		<10					
PFHpA (Post Ox.) (375-85-9)	<2 ng/l	TM405		68					
6:2 FTS (Post Ox.) (27619-97-2)	<2 ng/l	TM405		<10					
PFOA (Post Ox.) (335-67-1)	<2 ng/l	TM405		3010					
PFHxS (Post Ox.) (355-46-4)	<2 ng/l	TM405	<10						
PFNA (Post Ox.) (375-95-1)	<2 ng/l	TM405	<10						
PFHpS (Post Ox.) (375-92-8)	<2 ng/l	TM405	<10						
PFDA (Post Ox.) (335-76-2)	<2 ng/l	TM405	<10						
Linear PFOS (Post Ox.) (1763-23-1)	<2 ng/l	TM405	<10						
Branched PFOS (Post Ox.)	<2 ng/l	TM405	<10						
PFUnA (Post Ox.) (2058-94-8)	<2 ng/l	TM405	<10						
PFDoA (Post Ox.) (307-55-1)	<2 ng/l	TM405	<10						
PFOSA (Post Ox.) (754-91-6)	<4 ng/l	TM405	<20						
PFDS (Post Ox.) (335-77-3)	<2 ng/l	TM405	<10						
PFPeS (Post Ox.) (2706-91-4)	<2 ng/l	TM405	<10						
Total PFOS (Post Ox.)	<2 ng/l	TM405	<10						
PFBA (375-22-4)	<2 ng/l	TM434	4.63	@ #					
PFPA (2706-90-3)	<1 ng/l	TM434	5.32	@ #					
PFBS (375-73-5)	<1 ng/l	TM434	1.6	@ #					
PFHxA (307-24-4)	<1 ng/l	TM434	30.5	@ #					
PFHpA (375-85-9)	<1 ng/l	TM434	58.6	@ #					
PFPeS (2706-91-4)	<1 ng/l	TM434	<1	@ #					
6:2 FTS (27619-97-2)	<1 ng/l	TM434	<1	@ #					
PFOA (335-67-1)	<0.65 ng/l	TM434	1190	@ #					
PFHxS (355-46-4)	<1 ng/l	TM434	1.15	@ #					
PFNA (375-95-1)	<1 ng/l	TM434	<1	@ #					
PFHpS (375-92-8)	<1 ng/l	TM434	<1	@ #					
PFDA (335-76-2)	<2 ng/l	TM434	<2	@ #					
Linear PFOS (1763-23-1)	<0.65 ng/l	TM434	1.59	@ #					
Branched PFOS	<0.65 ng/l	TM434	2.09	@ #					



CERTIFICATE OF ANALYSIS

Validated

SDG: 241012-71
Client Ref.:

Report Number: 747601
Location: Sladen Mill

Superseded Report:

Results Legend			Customer Sample Ref.		SPRING 1	TB	TP201	TP201	TP202	TP202
# ISO17025 accredited.	m	mCERTS accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	TM434	Ground Water (GW)	Soil/Solid (S)	1.50 Soil/Solid (S)	3.00 Soil/Solid (S)	1.50 Soil/Solid (S)	2.00 Soil/Solid (S)
aq Aqueous / settled sample.					10/10/2024	10/10/2024	10/10/2024	10/10/2024	10/10/2024	10/10/2024
diss.filt Dissolved / filtered sample.										
tot.unfilt Total / unfiltered sample.										
* Subcontracted - refer to subcontractor report for accreditation status.										
** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery					12/10/2024	12/10/2024	12/10/2024	12/10/2024	12/10/2024	12/10/2024
(F) Trigger breach confirmed					241012-71	241012-71	241012-71	241012-71	241012-71	241012-71
1-4% Sample deviation (see appendix)					30510932	30510933	30510934	30510935	30510936	30510938
Component	LOD/Units	Method								
PFUnA (2058-94-8)	<2 ng/l	TM434			<2	@ #				
PFDoA (307-55-1)	<2 ng/l	TM434			<2	@ #				
PFDS (335-77-3)	<2 ng/l	TM434			<2	@ #				
PFOSA (754-91-6)	<2 ng/l	TM434			<2	@ #				
Total PFOS	<0.65 ng/l	TM434			3.68	@ #				
Moisture Content Ratio (% of as received sample)	%	PM024				0	9.4	17	17	15
PFBA (375-22-4) Perfluoro-n-butanoic acid	<3 µg/kg	TM338				<3	<3	<3	<3	<3
PFPA (2706-90-3) Perfluoro-n-pentanoic acid	<3 µg/kg	TM338				<3	<3	<3	<3	<3
PFHxA (307-24-4) Perfluoro-n-hexanoic acid	<2 µg/kg	TM338				<2	<2	<2	<2	<2
PFBS (375-73-5) Perfluoro-1-butanesulfonate	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFHpA (375-85-9) Perfluoro-n-heptanoic acid	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFOA (335-67-1) Perfluoro-n-octanoic acid	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFHxS (355-46-4) Perfluoro-1-hexanesulfonate	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFNA (375-95-1) Perfluoro-n-nonanoic acid	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFHpS (375-92-8) Perfluoro-1-heptanesulfonate	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFDA (335-76-2) Perfluoro-n-decanoic acid	<1 µg/kg	TM338				<1	<1	<1	<1	<1
Linear PFOS(1763-23-1) Perfluoro-1-octanesulfonate	<1 µg/kg	TM338				<1	<1	<1	<1	<1
Branched PFOS	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFUnA (2058-94-8) Perfluoro-n-undecanoic acid	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFDoA (307-55-1) Perfluoro-n-dodecanoic acid	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFOSA (754-91-6) Perfluoro-octanesulfonamide	<1 µg/kg	TM338				<1	<1	<1	<1	<1
6:2-FTS (27619-97-2)	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFDS (335-73-3) Perfluoro-1-decanesulfonate	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFPeS (2706-91-4) Perfluoro-1-pentanesulfonate	<1 µg/kg	TM338				<1	<1	<1	<1	<1
Total PFOS	<1 µg/kg	TM338				<1	<1	<1	<1	<1
PFBA (Post Ox.) Perfluoro-n-butanoic acid	<3 µg/kg	TM428				<3	<3	<3	<3	
PFPA (Post Ox.) Perfluoro-n-pentanoic acid	<3 µg/kg	TM428				<3	<3	<3	<3	
PFHxA (Post Ox.) Perfluoro-n-hexanoic acid	<2 µg/kg	TM428				<2	<2	<2	<2	
PFBS (Post Ox.) Perfluoro-1-butanesulfonate	<1 µg/kg	TM428				<1	<1	<1	<1	
PFHpA (Post Ox.) Perfluoro-n-heptanoic acid	<1 µg/kg	TM428				<1	<1	<1	<1	
6:2 FTS (Post Ox.) Perfluoro-octane sulfonate 6:2	<1 µg/kg	TM428				<1	<1	<1	<1	
PFOA (Post Ox.) Perfluoro-n-octanoic acid	<1 µg/kg	TM428				<1	<1	<1	<1	
PFHxS (Post Ox.) Perfluoro-1-hexanesulfonate	<1 µg/kg	TM428				<1	<1	<1	<1	



CERTIFICATE OF ANALYSIS

Validated

SDG: 241012-71
Client Ref.:

Report Number: 747601
Location: Sladen Mill

Superseded Report:

Results Legend			Customer Sample Ref.	TP203	TP204	TP204	TP205	TP205	TP206
# ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference			0.75	1.50	2.50	1.00	2.20	1.00
M mCERTS accredited.				Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
aq Aqueous / settled sample.				10/10/2024	10/10/2024	10/10/2024	10/10/2024	10/10/2024	10/10/2024
diss.filt Dissolved / filtered sample.				.	.	.	.	.	.
tot.unfiltTotal / unfiltered sample.				12/10/2024	12/10/2024	12/10/2024	12/10/2024	12/10/2024	12/10/2024
* Subcontracted - refer to subcontractor report for accreditation status.				241012-71	241012-71	241012-71	241012-71	241012-71	241012-71
** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery				30510940	30510941	30510942	30510943	30510945	30510946
(F) Trigger breach confirmed									
1-4*§@ Sample deviation (see appendix)									
Component	LOD/Units	Method							
Moisture Content Ratio (% of as received sample)	%	PM024	10	13	11	10	16	21	
PFBA (375-22-4) Perfluoro-n-butanoic acid	<3 µg/kg	TM338	<3	<3	<3	<3	<3	<3	
PFPA (2706-90-3) Perfluoro-n-pentanoic acid	<3 µg/kg	TM338	<3	<3	<3	<3	<3	<3	
PFHxA (307-24-4) Perfluoro-n-hexanoic acid	<2 µg/kg	TM338	<2	<2	<2	<2	<2	<2	
PFBS (375-73-5) Perfluoro-1-butanefulfonate	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFHpA (375-85-9) Perfluoro-n-heptanoic acid	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFOA (335-67-1) Perfluoro-n-octanoic acid	<1 µg/kg	TM338	<1	<1	<1	<1	<1	27.5	
PFHxS (355-46-4) Perfluoro-1-hexanesulfonate	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFNA (375-95-1) Perfluoro-n-nonanoic acid	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFHpS (375-92-8) Perfluoro-1-heptanesulfonate	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFDA (335-76-2) Perfluoro-n-decanoic acid	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
Linear PFOS(1763-23-1) Perfluoro-1-octanesulfonate	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
Branched PFOS	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFUnA (2058-94-8) Perfluoro-n-undecanoic acid	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFDoA (307-55-1) Perfluoro-n-dodecanoic acid	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFOSA (754-91-6) Perfluoro-octanesulfonamide	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
6:2-FTS (27619-97-2)	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFDS (335-73-3) Perfluoro-1-decanesulfonate	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFPeS (2706-91-4) Perfluoro-1-pentanesulfonate	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
Total PFOS	<1 µg/kg	TM338	<1	<1	<1	<1	<1	<1	
PFBA (Post Ox.) Perfluoro-n-butanoic acid	<3 µg/kg	TM428	<3	<3	<3	<3	<3	<3	
PFPA (Post Ox.) Perfluoro-n-pentanoic acid	<3 µg/kg	TM428	<3	<3	<3	<3	<3	<3	
PFHxA (Post Ox.) Perfluoro-n-hexanoic acid	<2 µg/kg	TM428	<2	<2	<2	<2	<2	<2	
PFBS (Post Ox.) Perfluoro-1-butanefulfonate	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
PFHpA (Post Ox.) Perfluoro-n-heptanoic acid	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
6:2 FTS (Post Ox.) Perfluoro-octane sulfonate 6:2	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
PFOA (Post Ox.) Perfluoro-n-octanoic acid	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
PFHxS (Post Ox.) Perfluoro-1-hexanesulfonate	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
PFNA (Post Ox.) Perfluoro-n-nonanoic acid	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
PFHpS (Post Ox.) Perfluoro-1-heptanesulfonate	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
PFDA (Post Ox.) Perfluoro-n-decanoic acid	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
Linear PFOS (Post Ox.) Perfluoro-1-octanesulfonate	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	
Branched PFOS (Post Ox.)	<1 µg/kg	TM428	<1	<1	<1	<1	<1	<1	



CERTIFICATE OF ANALYSIS

Validated

SDG: 241012-71
Client Ref.:

Report Number: 747601
Location: Sladen Mill

Superseded Report:

Results Legend		Customer Sample Ref.	TP206				
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4\$@ Sample deviation (see appendix)	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	11				
PFBA (375-22-4) Perfluoro-n-butanoic acid	<3 µg/kg	TM338	<3				
PFPA (2706-90-3) Perfluoro-n-pentanoic acid	<3 µg/kg	TM338	<3				
PFHxA (307-24-4) Perfluoro-n-hexanoic acid	<2 µg/kg	TM338	<2				
PFBS (375-73-5) Perfluoro-1-butanedisulfonate	<1 µg/kg	TM338	<1				
PFHpA (375-85-9) Perfluoro-n-heptanoic acid	<1 µg/kg	TM338	<1				
PFOA (335-67-1) Perfluoro-n-octanoic acid	<1 µg/kg	TM338	<1				
PFHxS (355-46-4) Perfluoro-1-hexanedisulfonate	<1 µg/kg	TM338	<1				
PFNA (375-95-1) Perfluoro-n-nonanoic acid	<1 µg/kg	TM338	<1				
PFHpS (375-92-8) Perfluoro-1-heptanedisulfonate	<1 µg/kg	TM338	<1				
PFDA (335-76-2) Perfluoro-n-decanoic acid	<1 µg/kg	TM338	<1				
Linear PFOS(1763-23-1) Perfluoro-1-octanedisulfonate	<1 µg/kg	TM338	<1				
Branched PFOS	<1 µg/kg	TM338	<1				
PFUnA (2058-94-8) Perfluoro-n-undecanoic acid	<1 µg/kg	TM338	<1				
PFDoA (307-55-1) Perfluoro-n-dodecanoic acid	<1 µg/kg	TM338	<1				
PFOSA (754-91-6) Perfluoro-octanedisulfonamide	<1 µg/kg	TM338	<1				
6:2-FTS (27619-97-2)	<1 µg/kg	TM338	<1				
PFDS (335-73-3) Perfluoro-1-decanedisulfonate	<1 µg/kg	TM338	<1				
PFPeS (2706-91-4) Perfluoro-1-pentanedisulfonate	<1 µg/kg	TM338	<1				
Total PFOS	<1 µg/kg	TM338	<1				
PFBA (Post Ox.) Perfluoro-n-butanoic acid	<3 µg/kg	TM428	<3				
PFPA (Post Ox.) Perfluoro-n-pentanoic acid	<3 µg/kg	TM428	<3				
PFHxA (Post Ox.) Perfluoro-n-hexanoic acid	<2 µg/kg	TM428	<2				
PFBS (Post Ox.) Perfluoro-1-butanedisulfonate	<1 µg/kg	TM428	<1				
PFHpA (Post Ox.) Perfluoro-n-heptanoic acid	<1 µg/kg	TM428	<1				
6:2 FTS (Post Ox.) Perfluoro-octane sulfonate 6:2	<1 µg/kg	TM428	<1				
PFOA (Post Ox.) Perfluoro-n-octanoic acid	<1 µg/kg	TM428	<1				
PFHxS (Post Ox.) Perfluoro-1-hexanedisulfonate	<1 µg/kg	TM428	<1				
PFNA (Post Ox.) Perfluoro-n-nonanoic acid	<1 µg/kg	TM428	<1				
PFHpS (Post Ox.) Perfluoro-1-heptanedisulfonate	<1 µg/kg	TM428	<1				
PFDA (Post Ox.) Perfluoro-n-decanoic acid	<1 µg/kg	TM428	<1				
Linear PFOS (Post Ox.) Perfluoro-1-octanedisulfonate	<1 µg/kg	TM428	<1				
Branched PFOS (Post Ox.)	<1 µg/kg	TM428	<1				



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Table of Results - Appendix

Method No	Description
PM024	Soil preparation including homogenisation, moisture, screens of soils for Asbestos Containing Material
TM405	Analysis of perfluoroalkylsulfonates and perfluorocarboxylic acids - Total Oxidizable Precursor Assay
TM338	Analysis of perfluoroalkylsulfonates and perfluorocarboxylic acids in Solids
TM434	Analysis of PFAS
TM428	Analysis of perfluoroalkylsulfonates and perfluorocarboxylic acids - Total Oxidizable Precursor Assay

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).



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Test Completion Dates

Lab Sample No(s)	30510932	30510933	30510934	30510935	30510936	30510938	30510940	30510941	30510942	30510943
Customer Sample Ref.	SPRING 1	TB	TP201	TP201	TP202	TP202	TP203	TP204	TP204	TP205
AGS Ref.										
Depth			1.50	3.00	1.50	2.00	0.75	1.50	2.50	1.00
Type	Ground Water	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
PFAS (Post Ox.) Liquids	07-Nov-2024									
PFAS (Post Ox.) Solids		24-Oct-2024	24-Oct-2024	24-Oct-2024	24-Oct-2024		24-Oct-2024	24-Oct-2024	03-Nov-2024	24-Oct-2024
PFAS Liquids (Full Suite)	21-Nov-2024									
PFAS Solids		24-Oct-2024	24-Oct-2024	24-Oct-2024	24-Oct-2024	24-Oct-2024	24-Oct-2024	24-Oct-2024	24-Oct-2024	24-Oct-2024
Sample description		17-Oct-2024	17-Oct-2024	17-Oct-2024	17-Oct-2024	16-Oct-2024	16-Oct-2024	16-Oct-2024	17-Oct-2024	17-Oct-2024

Lab Sample No(s)	30510945	30510946	30510947
Customer Sample Ref.	TP205	TP206	TP206
AGS Ref.			
Depth	2.20	1.00	2.60
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
PFAS (Post Ox.) Solids	24-Oct-2024	06-Nov-2024	24-Oct-2024
PFAS Solids	24-Oct-2024	30-Oct-2024	24-Oct-2024
Sample description	17-Oct-2024	17-Oct-2024	17-Oct-2024



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Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

General

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.