

**Bevis Green Works (Tetrosyl)
Mill Road, Bury, BL9 6RE**

Vapour Risk Assessment (Plot 48)

For: Barratt Homes Ltd.

May 2023

Report Ref: R2174-R13-v1

DOCUMENT CONTROL SHEET

Report Title: Bevis Green Works (Tetrosyl),
Vapour Risk Assessment Report (Plot 48)

Client: Barratt Homes Manchester

Report Reference Number: R2174-R13

Report Status: Final

Version: v1

Report Date: 31st May 2023

Signed For Smith Grant LLP

	Name	Position	Signature	Date
Author	D Wayland BSc MSc AssocMCIWM MCIWEM C.WEM	Partner		31.05.23
Reviewer	S D Miller BSc MCIWEM	Senior Consultant		31.05.23

Document Revision Record:

Version	Report Status	Date	
v1	Final	31.05.23	Issue to client and Local Authority

This report has been prepared by Smith Grant LLP for the sole and exclusive use of Barratt Homes Manchester. All reasonable skill, care and diligence has been exercised within the terms of the contract with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report may be relied upon or transferred to any other parties only with the express written authorisation of Smith Grant LLP, such consent not to be unreasonably withheld or delayed. If any Third Party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty or care of skill.

Smith Grant LLP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

Contents

- 1 Introduction
- 2 Methodology
- 3 Results
- 4 Conclusions

Appendices

- | | |
|---|----------------------------------|
| A | Plot 48 Gas Membrane Certificate |
| B | Photographic Record |
| C | Laboratory Analysis Certificate |

1. Introduction

- 1.1. Remediation works to prepare Phase 1 of the former Bevis Green Works, Bury have been undertaken by Urban Regen Ltd. (URL) on behalf of Barratt Homes Manchester (BM). Remedial works were completed in accordance with the approved Outline Remediation Strategy (ref. R2174-R01-v2) and were detailed within the Phase 1 Earthworks Completion Report (ref. R2174c-R04-v2).
- 1.2. Upon completion of the preparatory works, a Phase 1 Developer-Stage Remediation Strategy (R2174-R07-v5) was produced to finalise the remedial measures to be implemented by the developer. These measures included a phase wide requirement for the application of a 600mm clean soil cover system within all private gardens and the installation of gas protection measures.
- 1.3. Two types of gas protection measures were required within Phase 1 with Plots 39-57 & 143-146 required to have a hydrocarbon VOC resistant membrane whilst the rest of the plots were to have basic protection measures based on CIRIA CS2 / NHBC-Amber 1 conditions.
- 1.4. The requirement for an upgraded VOC membrane within selected plots was based on the recommendation made within the Phase 1 Supplementary Site Investigation Report (ref. R2174-R02-v1) which was produced to allow additional characterisation of the phase and to confirm that the Outline Remedial Strategy remained applicable. Elevated hydrocarbon vapours were reported within a hotspot area (HS12 – Former AST) within monitoring well WS311 and so the recommendation was made. Remedial works to remove impacted soils within this location were subsequently completed, however post-remediation vapour monitoring was not undertaken and so the requirement for VOC measures within the selected plots remained.
- 1.5. It was also acknowledged by the Contaminated Land Officer that there is potential for the migration of VOCs from the adjacent Phase 2 area which may only be remediated after Phase 1 was constructed and so the requirement for VOC membranes within plots in the east of Phase 1 remained valid.
- 1.6. The Phase 1 Developer-Stage Strategy detailed that a suitable membrane resistant to the ingress of VOCs will be installed within Plots 39-57 & 143-146 and that these will be subject to a high-level of verification which will include a visual inspection of each plot and air lance testing, this is compliant with CIRIA C735¹.
- 1.7. BM commissioned the supply and installation of the VOC membranes within the selected plots to PRS Manchester, specialists in the installation of gas protection measures. Smith Grant LLP

¹ CIRIA (C735) Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases.

(SGP) were appointed by BM to carry out the validation works which was then sub-contracted to GeoEngineer, specialists in the verification of gas protection measures.

- 1.8. Following the submission of verification certificates to the CLO, it was identified that basic gas protection measures compliant to CIRIA CS2 had been installed (and validated) in Plot 48 rather than a specific VOC resistant membrane. A copy of the validation report produced is provided in Appendix A.
- 1.9. It was therefore determined that further information and risk assessment was required to confirm that the installed protection measures are sufficient to mitigate against the risk of VOC ingress.

2. Description of Works

- 2.1. Prior to the commencement of additional works, SGP produced a proposed Scope of Works and Methodology for the assessment (ref. R2174-L20221026) and a multiple lines of evidence approach was recommended utilising in-situ vapour monitoring. The proposal was duly presented by GeoEnginSeer to Bury Council (BC) on 13.10.22 with a response received on 18.10.22 generally confirming approval of the scope but advising that actual data from Plot 48 would be preferable.
- 2.2. The following scope was therefore adopted and implemented:
- 2.3. Monitoring of target VOC concentrations within the sub-floor void of Plot 68 (Phase 2)
- 2.3.1. As foundations within the neighbouring Phase 2A area (located adjacent to Plot 48) were under construction, it was proposed to install a vapour monitoring probe within the sub-floor void of Plot 68. The purpose of this was to assess VOC concentrations within the sub-floor void of a plot located closer to the remaining VOC source within Phase 2B. If concentrations of VOCs were found to be below the assessment criteria in a plot located closer to the source, it is therefore reasonable to assume that VOC concentrations would also be below the assessment criteria within the void space of Plot 48.
- 2.3.2. The monitoring of VOCs within the sub-floor void followed the methodology outlined in CL:AIRE TB16² where possible. A slit trench approximately 0.5m deep was excavated down the side of the plot (rear of Plot 68) and a 25mm core drilled through the brickwork below ground level to allow access into the sub-floor void. A diffusion tube supplied by Element laboratories (see Section 2.6) was secured by cable tie to a steel rod and inserted into the void space. The hole around the brickwork was then sealed with hydrated bentonite to provide an air-tight seal. The probe was then left in-situ for a period of 3 weeks before collection.
- 2.4. Monitoring of target VOC concentrations within the sub-floor void of Plot 48
- 2.4.1. To support and allow a comparison of the sub-floor void concentrations within Plot 68, monitoring of VOC concentrations within Plot 48 was also completed. As the plot was finished and occupied it was not possible to adopt the same method of probe installation and so an alternative method was adopted.
- 2.4.2. The front cover of an airbrick along the gable end of the property was partially removed and a diffusion tube secured to a copper wire was inserted through the airbrick and down the telescopic vent. It is acknowledged that there are limitations to this method, as outlined within CL:AIRE TB16, in that the angle of the venting typically limits any monitoring device from entering into the void

² CL:AIRE Technical Bulletin 16 – Complete Continuous Monitoring in Underfloor Voids

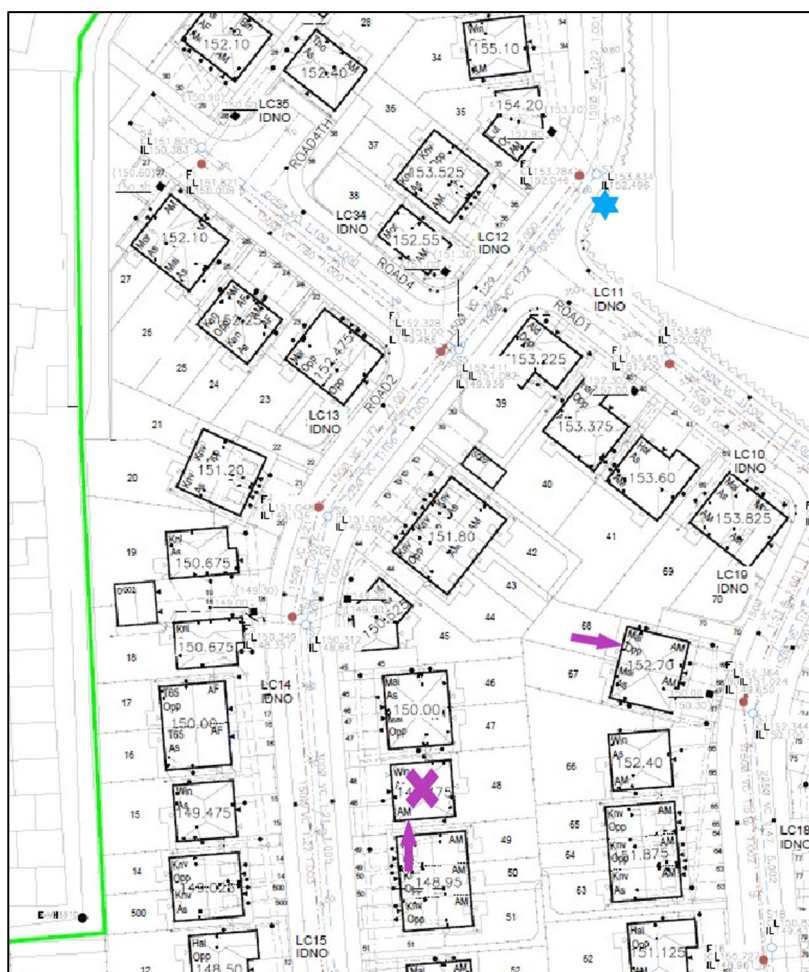
space. Whilst the limitations of this approach are noted, it does provide useful data for comparison to support the other monitoring methods.

2.5. Monitoring of target VOC concentrations within Plot 48

2.5.1. BM had notified the resident of the proposed works and it was determined that a diffusion tube should also be installed within Plot 48. To allow for a conservative yet appropriate assessment, the diffusion tube was installed within a downstairs closet underneath the stairs, this can readily be expected where the greatest number of VOCs may accumulate as it is the smallest space with limited ventilation.

2.5.2. Whilst monitoring within Plot 48 will provide the most robust assessment, the limitations of monitoring within an occupied plot are also acknowledged, particularly where resident activities could result in cross-contamination such as through smoking indoors or use of paints and solvents. During deployment, GeoEnginSeer confirmed that the occupant was not a smoker and there was no intention to use paints or solvents during the monitoring period.

Figure 1. Monitoring Location Plan



Blue Star = Environmental / Background
Purple Cross = Indoor (Plot 48)
Purple Arrow = Subfloor Void Monitoring Locations

2.6. VOC Sampling

2.6.1. It was determined through review of previous vapour monitoring reporting that monitoring should be completed for target VOCs where previous exceedances had been reported, these were determined as benzene, toluene, ethylbenzene, xylenes (BTEX), aliphatic and aromatic <C12 hydrocarbons and trichloroethene (TCE).

2.6.2. There are typically two methods of VOC sampling: grab-samples which utilise bottlevacacs of silocans which collect a sample at that given moment in time, or diffusion samples which collect samples over a designated time. The latter method was proposed as this allows sample collection over diurnal changes and is more likely to record concentrations over pressure and temperature changes when VOC generation may be greatest.

2.6.3. Diffusion tubes (tenax) were provided by Element Laboratories, Deeside. These were deployed by GeoEnginSeer on 19.01.23 and were left in-situ for 3 weeks before collection on 10.02.23. Analysis was scheduled for a VOC target list which included the key VOCs as listed in Section 2.6.1. In total 5 diffusion tubes were deployed, 3 as part of the VOC assessment, 1 to determine the environmental background concentrations and 1 travel blank. These are summarised in the table below and are cross-referenced to GeoEnginSeer's labelling.

Table 2.1 Summary of diffusion tube locations

Location	Diffusion Tube Label
Sub-Floor Void of Plot 68	Plot 68 SFV
Sub-Flood Void (via Airbrick) of Plot 48	Bury Plot 45*
Indoor Plot 48	Internal House
Environmental Blank	Atmospheric Sample (Fence Line)
Travel Blank	Control

**Incorrectly labelled on laboratory chain of custody as should be Plot 48*

2.6.4. The Environmental Sample (Atmospheric Sample – Fence Line) was located on the northern boundary of the site and was secured to the site fencing. This was to obtain background concentrations for the site. A travel blank (Control) was also utilised, this is a diffusion tube which remains unopened and remains with the sampler to identify any potential cross-contamination. GeoEnginSeer confirmed that the control tube was left within the vehicle during the monitoring period, however a leak from a portable fuel can within the vehicle occurred resulting in cross-contamination of the blank, as evident from the presence of VOCs. As such the concentrations from the travel blank have been discounted from this assessment and are not discussed further.

2.6.5. Representative photographs taken by GeoEnginSeer during the deployment of the diffusion tubes are presented in Appendix B.

3. Analysis Results

- 3.1. The methodology for deriving assessment screening criteria for health impacts from VOCs at the receptor is set out in Appendix 9 of the VOC handbook³. Tolerable Daily Soil Intake values or Index Doses (for non-carcinogens and carcinogens respectively) are multiplied by the body weight (13.3 kg) and divided by the inhalation rate (8.8 m³/day) of a child receptor as defined in the most recent published UK guidance (DEFRA C4SL). Most of the substances under consideration have toxicological inhalation data published in the “LQM/CIEH S4ULs for Human Health Risk Assessment” (S4UL) - *Copyright Land Quality Management Limited reproduced with Permission* or CL:AIRE “Soil Generic Assessment Criteria for Human Health Risk Assessment”.
- 3.2. The assessment criteria are inherently conservative as they assume long-term, constant exposure of residents over 24 hr periods, 365 days a year and a continuous source which does not diminish over time. However, for the most vulnerable receptors, infants and small children, significant amounts of time spent within dwellings may be anticipated. The exception is benzene for which an air quality standard is available (5 µg/m³).
- 3.3. The methodology in the derivation of inhalation criteria values is consistent with those implemented as part of previous vapour risk assessments on the site.
- 3.4. The full laboratory analysis certificate (lab ref. 23-2091) is included within Appendix C. The range of results from the diffusion of the contaminants detected are provided in the following table with comparison to the derived screening criteria. Only VOCs where concentrations are above analytical detection limits have been listed.

Table 3.1 Summary of VOC results

Contaminant	Inhalation Health Critical Value (µg/kg.bw.day ⁻¹)	Assessment Criteria (µg/m ³)	Concentration Range (µg/m ³)	Exceedances
Benzene	1.4 (S4UL)	5	0.86-1.73	None
Toluene	1400 (S4UL)	2,115.91	1.28-11.03	None
Ethylbenzene	74.3 (S4UL)	112.29	1.02	None
m/p-xylene	60 (S4UL)	90.68	0.75-4.11	None
o-xylene	60 (S4UL)	90.68	1.59	None
1,2,4-Trimethylbenzene	2 (CL:AIRE GAC)	3.02	0.39-1.37	None
Hexane [#] (Aliphatic C6)	5000 (S4UL)	7556.82	5.50	None
4-Isopropyltoluene	-	-	0.39-1.37	-
Styrene	240	362.73	6.27	

³ CIRIA C682: The VOCs Handbook: Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination 2009

Contaminant	Inhalation Health Critical Value ($\mu\text{g/kg.bw.day}^{-1}$)	Assessment Criteria ($\mu\text{g/m}^3$)	Concentration Range ($\mu\text{g/m}^3$)	Exceedances
Naphthalene	0.86 (S4UL)	1.30	0.33	None
Aliphatic C6-C8	5000 (S4UL)	7556.82	17.05-17.44	None
Aliphatic C8-C10	290 (S4UL)	438.30	26.86	None
Aliphatic C10-C12	290 (S4UL)	438.30	55.99	None
Aliphatic C12-C16	290 (S4UL)	438.30	225.86	None
Aromatic C5-C7	As per benzene			
Aromatic C7-C8	As per toluene			
Aromatic C8-C10	60 (S4UL)	90.68	2.12-26.70	None
Aromatic C10-C12	60 (S4UL)	90.68	13.51	None

3.5. Concentrations of VOCs reported above detection limit were below the derived inhalation criteria in all instances.

4. Conclusions

- 4.1. Indoor vapour monitoring within Plot 48 has demonstrated that VOCs are not migrating into the dwelling and that there is no risk to human health in this regard.
- 4.2. No elevated VOCs were reported within the telescopic vent of Plot 48 which would suggest the efficiency of the dilution and dispersion which occurs within the void-space. This is further demonstrated in the results of the subfloor void of Plot 68 where no elevated concentrations were reported.
- 4.3. It is also important to acknowledge the type of membrane which has been installed within Plot 48 and its high-level of installation and verification. A Visqueen proprietary membrane (Visqueen Gas Barrier) was installed which includes an aluminium core, the aluminium being impermeable to VOCs. Industry testing of proprietary products emersed in VOC product have demonstrated that delamination can occur, however in this instance there is no free product, and the membrane is installed above a ventilated void space. A comparative proprietary product (JUTA GP1) states that where the product is not in direct contact with the ground, and where a clear void of >150mm is provided, then the GP1 product may be suitable for use as a VOC barrier.
- 4.4. The membrane was installed by qualified professionals and the membrane was verified by an independent specialist who also conducted air lance testing and noted no failures.
- 4.5. In the totality of the evidence provided, it is demonstrated that there is no risk of ingress of VOCs into Plot 48.
- 4.6. SGP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.
- 4.7. This report has been prepared by Smith Grant LLP, for the sole and exclusive use of Barratt Homes Manchester, the benefit of this report may not be assigned to any third party without the prior agreement in writing of Smith Grant LLP. Reasonable skill, care and diligence has been exercised within the timescale and budget available, and in accordance with the technical requirements of the brief. Notwithstanding the efforts made by the professional team in undertaking the assessment and preparing this report, it is possible that other ground conditions and contamination as yet undetected may exist. Reliance on the findings of this report must therefore be limited accordingly. Such reliance must be based on the whole report and not on extracts which may lead to incomplete or incorrect conclusions when taken out of context.

APPENDIX A

Plot 48 Gas Membrane Certificate

GeoEnginSeer Ltd: Air Lance Integrity Testing Certification

**Project: Barratt Homes; Waldmer's Wood, Walmersley Gardens
Bury BL9 6SB HBC1221
Building Type: Low Rise Residential Properties,
Plot 48 (One foot print)**

Date: 6th October 2021

Inspection and Integrity Details:

On the 6th October 2021 from 12:30 to 13:30 the installation of Visqueen Gas Barrier Proprietary Membrane on plot 48 (Detached) was inspected and found to be in an excellent condition. 100% Air-Lancing of the plot was conducted.

The Air Lance integrity test of the laid membrane taped on site was conducted. No repairs to the plots was required.

Where the following conclusion indicates a pass the follow on construction activities may proceed to suitable protection measures of the membrane being applied in accordance with manufacturer's recommendations.

CONCLUSION OF INTEGRITY AIR LANCE TEST: PASS

If you have any questions regarding the above, please do not hesitate to contact me.

Yours sincerely



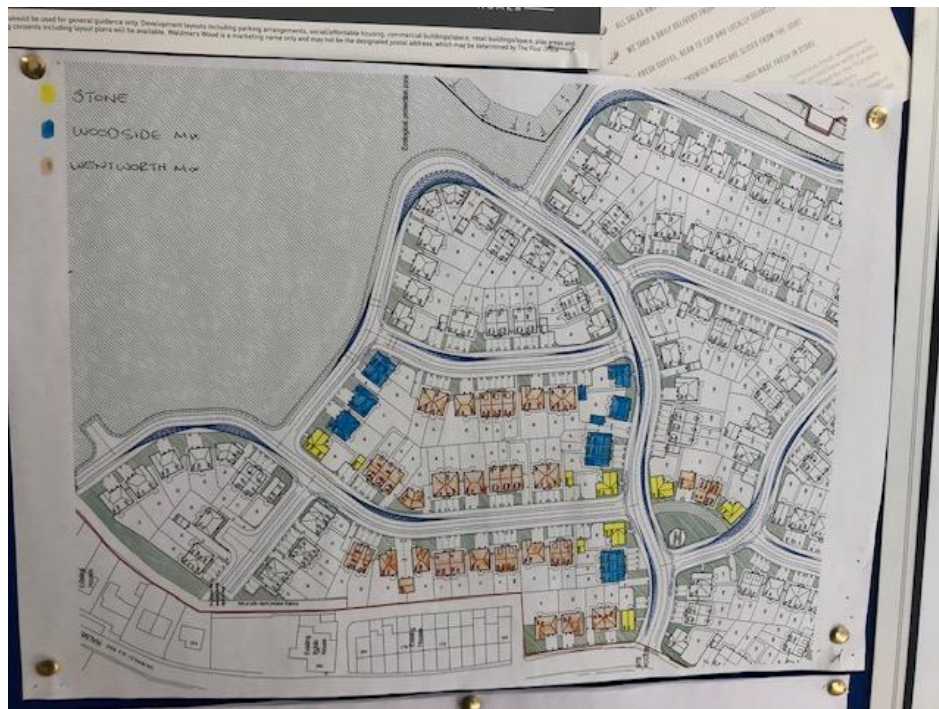
Ben Crowther B.Sc, M.Sc, PGCE, FGS, CIEH, PCA-QT, SGPV

For and on behalf of GeoEnginSeer Ltd.

geoenginseer@gmail.com 07817 108 921

www.GeoEnginSeerLtd.com

Barratt Bury Photograph 1: Plan of the Site.



Barratt Bury Photograph 2: VISQUEEN GAS BARRIER Membrane:



ON BEHALF OF SMITH GRANT PARTNERSHIP LLP

job number	R2174	design source/ref:	BM-SD02-13-01	specification source/ref:	R2174-R07-v3	documents attached	✕	
site name / location	Waldmer's Wood, Bury	building use:	residential	commercial	other (describe)			
plot number	48	building description:	no. of storeys =	2	Detached	semi-detached	terrace	apartment block
compiled by:	Ben Crowther (BC)	gas protection type:	active / passive		foundation type:	block and beam / raft / other		

Ventilated sub-floor (if present)	inspection date/time:	6.10.2021 (airbricks only) Plots 42,43,44 and future plots show >150mm	inspected by:	BC	photographed:	✓
-----------------------------------	-----------------------	--	---------------	----	---------------	---

	✓ / ✗	notes (see overleaf)
void former type	✗	1. N/A
height of void space	✗	2. >150mm, not inspected, however building control minimum is confirmed by client and on design detail and anemometer used in conjunction with leaf blower to prove continuity of air flow under the building. No reduction in air flow of the sub floor void was respected.
gravel type	✗	3. N/A (void clear)
pipe size and spacing	✗	4. N/A

external wall airbricks	✓	5. Plots: All : 5 airbricks provided in total to sidewall of dwelling: all clear and free from blockages. Sleeper voids noted in plots with beam and block coverings
internal sleeper walls	✗	6. N/A
external vent trenches / ducts	✗	7. N/A

Gas barrier	inspection date/time:	6.10.21	inspected by:	BC	photographed:	✓
membrane type	✓	8. Visqueen Gas Barrier				
extent of coverage	✓	9. 100% of building footprint.				
slab/membrane condition	✓	10. Good condition, minimal traffic marks and no stress points observed during inspection.				
laps and joints	✓	11. Laps >150mm with taped seam seals.				
damp-proof course	✓	12. Membrane extends beyond external walls; no DPC installed at time of inspection.				
service entries and seals	✓	13. 5 service entries per plot sealed to membrane using adhesive membrane patches; good seals achieved throughout.				
Integrity testing	✓	14. Integrity testing was undertaken on site by Ben Crowther, Geoengineer, with and air lance on 6 th October 2021				

Guide notes:

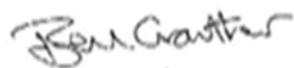
1	void former type	proprietary type - manufacturer and specification, in accordance with design? Installed properly without damage?
2	height of void space	height of proprietary former or constructed ventilation space below suspended floor - note any debris on void / obstructions to air flow, note formation surface soil type (e.g. crushed concrete/brick), any evidence of flooding
3	gravel type	gravel type, if used (limestone / granite etc.) and any specification (e.g. 6F2), typical particle dimensions (mm), apparent fines content (low/high), compaction (loose/dense), waterlogging / contamination by clay, organic matter, other debris
4	pipe size and spacing	diameter in mm; material type (e.g. PVC); slotted or perforated; positioning and spacing / separation and jointing as on design drawing - if not sketch arrangement - do pipes connect with external (telescopic / swan-neck) vents?
5	external wall airbricks	check numbers, size and positions as design drawing (if not shown, make sketch; check for blockage, e.g. by mortar, or soil / pavings etc.
6	internal sleeper walls	check for ventilation holes - e.g. honeycombe brickwork or pipe crossings - note size, spacing and location - in accordance with design?
7	external vent trenches / ducts	check whether located and constructed in accordance with design drawings; if open-topped gravel, note gravel type and presence of fines / contamination; if pipe or other vents - check positions and construction for functionality and absence of blockages - vents may be built over
8	membrane type	note manufacturer and product specification, including batch / roll numbers if present - in accordance with specification? check stock storage arrangements - protected from dirt and damage?
9	extent of coverage	if membrane is incomplete, further inspection will be required - note areas completed / incomplete - is membrane fully visible or have internal walls been constructed over membrane / screed placed?
10	slab/membrane condition	record presence of debris / rough surfaces, in particular sharp projections, below or above membrane; record locations of all punctures or repairs, note arrangements to protect membrane surface from traffic / tools and equipment / materials, and temporary weighting down of membrane, e.g. use of boards - record evidence of footprints / tracks on membrane surface, creases or water/wind damage

11	laps and joints	check the all joints are lapped and sealed in accordance with manufacturer's requirements / specification, particularly where creases/folds are present (usually minimum 150mm laps with double-sided tape between sheets, and single-sided tape on top surface; note size of sheets and frequency of edge seals
12	damp-proof course	record DPC manufacturer and product code - usually integrated with the membrane; measure the DPC projection from external wall in mm; check laps and seals between membrane and DPC - note any potential stress points and tension between the two; check for damage to DPC
13	service entries and seals	note number, position and diameter of service entries - check top hat seal arrangements in accordance with design / specification (laps and seals between top hat and floor membrane, pipe upstand is usually a minimum 150mm) check, with jubilee clips to secure top hat seal to pipe - note presence of clips and tightness of connections
14	Integrity testing	Has integrity testing been undertaken on this plot? If yes, who undertook the testing (company name) and what type of test did they use (air lancing/other test)? Append a copy of the testing certificate to this report.

Visual inspection has been completed by specialist sub-contractor Ben Crowther of GeoEnginSeer Ltd on behalf of Smith Gant LLP with the inspection completed concurrently with integrity testing.

These buildings have **PASSED** inspection.

An additional inspection IS NOT required for these plots.



Inspection by: Ben Crowther

Signed: 6th October 2021

APPENDIX B

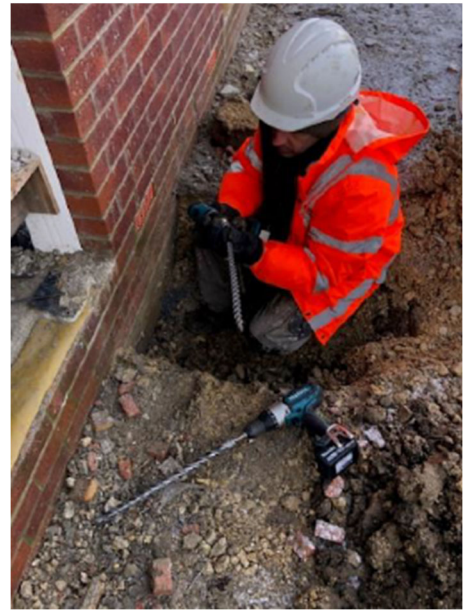
Site Photographs

1.



Plot 48 sub-floor void monitoring.

2.



Excavation of slit trench adjacent to Plot 68 and drilling through brickwork into void

3.



Installation of diffusion tube attached to metal rod into void space. Rope secured for recovery

4.



Monitoring location temporarily backfilled to avoid destruction during site works

APPENDIX C

Laboratory Analysis Certificates

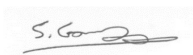
GeoEngineer Ltd
738 Burnley Road
Todmorden
OL14 8LF



Attention : Ben Crowther
Date : 21st February 2023
Your reference :
Our reference : 23/2091
Location : Bury
Date samples received : 10th February 2023
Status : Final Report
Issue : 1

5 samples were received for analysis on 10th February 2023 of which 5 were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

Authorised By:



Simon Gomery BSc
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: GeoEngineer Ltd

Reference:

Location: Bury

Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Plot 68 SFV

Volume Sampled by Client -

EMT Job No: 23/2091

EMT Sample No: 1

Matrix: Tenax Tube

Method: VOCs by Thermal Desorption (GC-MS)

Volume Sampled by Client: Passive Sample

Sample Start Time 19/01/2023 10:15 Date:Hours:Mins

Sample Stop Time 10/02/2023 11:45 Date:Hours:Mins

Sample Duration 31,770 Total Minutes

Tube Serial number: 771375

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria

>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit

ISO 17025 (UKAS) accredited

(NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate* ng/ppm/min	RESULT ng/tube	Concentration in Air ppb	MDL ng/tube	MDL ppb	Concentration ug/m ³	MDL ug/m ³
60-29-7	Diethyl ether [#]		2	<5	<0.08	<5	<0.08		
156-60-5	trans-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
1634-04-4	MTBE		2	<90	<1.42	<90	<1.42		
110-54-3	Hexane [#]		2	<10	<0.16	<10	<0.16		
126-98-7	Methyl acrylonitrile		2	<90	<1.42	<90	<1.42		
156-59-2	cis-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
594-20-7	2,2-Dichloropropane		2	<90	<1.42	<90	<1.42		
67-66-3	Chloroform		2	<90	<1.42	<90	<1.42		
109-99-9	Tetrahydrofuran		2	<90	<1.42	<90	<1.42		
71-55-6	1,1,1-Trichloroethane		2	<90	<1.42	<90	<1.42		
109-69-3	1-Chlorobutane [#]		2	<5	<0.08	<5	<0.08		
71-43-2	Benzene [#]		0.7	7	0.31	<5	<0.22	1.01	<0.72
563-58-6	1,1-Dichloropropene [#]		2	<5	<0.08	<5	<0.08		
56-23-5	Carbon Tetrachloride		2	<90	<1.42	<90	<1.42		
107-14-2	Chloroacetonitrile [#]		2	<90	<1.42	<90	<1.42		
79-01-6	Trichloroethene [#] (TCE)		2	<5	<0.08	<5	<0.08		
74-95-3	Dibromomethane [#]		2	<5	<0.08	<5	<0.08		
80-62-6	Methyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
75-27-4	Bromodichloromethane [#]		2	<5	<0.08	<5	<0.08		
10061-01-5	cis-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
108-88-3	Toluene [#]		1.03	11	0.34	<5	<0.15	1.28	<0.58
10061-02-6	trans-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
79-00-5	1,1,2-Trichloroethane [#]		2	<5	<0.08	<5	<0.08		
142-28-9	1,3-Dichloropropane [#]		2	<5	<0.08	<5	<0.08		
97-63-2	Ethyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
124-48-1	Dibromochloromethane [#]		2	<5	<0.08	<5	<0.08		
106-93-4	1,2-Dibromoethane [#]		2	<10	<0.16	<10	<0.16		
127-18-4	Tetrachloroethene [#] (PCE)		2.8	<5	<0.06	<5	<0.06		
108-90-7	Chlorobenzene [#]		2	<5	<0.08	<5	<0.08		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Element Materials Technology

Client Name: GeoEngineer Ltd
Reference:
Location: Bury
Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Plot 68 SFV
Volume Sampled by Client: -
EMT Job No: 23/2091
EMT Sample No: 1
Matrix: Tenax Tube
Method: VOCs by Thermal Desorption (GC-MS)

Volume Sampled by Client: Passive Sample

Sample Start Time 19/01/2023 10:15 Date:Hours:Mins
Sample Stop Time 10/02/2023 11:45 Date:Hours:Mins
Sample Duration 31,770 Total Minutes

Tube Serial number: 771375

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria
>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit
ISO 17025 (UKAS) accredited
 (NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate*	RESULT	Concentration in Air	MDL ng/tube	MDL ppb	Concentration ug/m ³	MDL ug/m ³
			ng/ppm/min		ppb				
630-20-6	1,1,1,2-tetrachloroethane [#]		2	<5	<0.08	<5	<0.08		
100-41-4	Ethylbenzene [#]		2	<5	<0.08	<5	<0.08		
179601-23-1	M/Pxylene [#]		1.46	11	0.24	<5	<0.11	1.03	<0.47
75-25-2	Bromoform [#]		2	<5	<0.08	<5	<0.08		
100-42-5	Styrene [#]		2.4	<5	<0.07	<5	<0.07		
95-47-6	o-Xylene [#]		1.46	<5	<0.11	<5	<0.11		
79-34-5	1,1,2,2-Tetrachloroethane [#]		2	<5	<0.08	<5	<0.08		
96-18-4	1,2,3-Trichloropropane [#]		2	<5	<0.08	<5	<0.08		
98-82-8	Isopropylbenzene [#]		2.5	<5	<0.06	<5	<0.06		
110-57-6	trans-1,4-dichloro-2-butene [#]		2	<10	<0.16	<10	<0.16		
108-86-1	Bromobenzene [#]		3.31	<5	<0.05	<5	<0.05		
95-49-8	2-Chlorotoluene [#]		2	<5	<0.08	<5	<0.08		
103-65-1	Propyl benzene [#]		2.37	<5	<0.07	<5	<0.07		
106-43-4	4-Chlorotoluene [#]		2	<5	<0.08	<5	<0.08		
108-67-8	1,3,5-Trimethylbenzene [#]		2.37	<5	<0.07	<5	<0.07		
98-06-6	tert-Butyl benzene [#]		2	<5	<0.08	<5	<0.08		
95-63-6	1,2,4-Trimethylbenzene [#]		2.37	<5	<0.07	<5	<0.07		
541-73-1	1,3-Dichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
135-98-8	sec-Butylbenzene [#]		2	<5	<0.08	<5	<0.08		
106-46-7	1,4-Dichlorobenzene [#]		3.23	<5	<0.05	<5	<0.05		
99-87-6	4-Isopropyltoluene [#]		2	<5	<0.08	<5	<0.08		
95-50-1	1,2-Dichlorobenzene [#]		3.23	<5	<0.05	<5	<0.05		
104-51-8	n-butyl benzene [#]		2	<5	<0.08	<5	<0.08		
67-72-1	Hexachloroethane [#]		2	<5	<0.08	<5	<0.08		
96-12-8	1,2-dibromo-3-chloropropane [#]		2	<10	<0.16	<10	<0.16		
98-95-3	Nitrobenzene [#]		2	<10	<0.16	<10	<0.16		
120-82-1	1,2,4-Trichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
91-20-3	Naphthalene [#]		2.55	<5	<0.06	<5	<0.06		
87-61-6	1,2,3-Trichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
87-68-3	Hexachlorobutadiene [#]		3.5	<5	<0.04	<5	<0.04		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Client Name:	GeoEngineer Ltd
Reference:	
Location:	Bury
Contact:	Ben Crowther
Sample ID:	Plot 68 SFV
EMT Job No:	23/2091
EMT Sample No:	1
Matrix:	Tenax Tube
Tube Serial number:	771375
Method:	VOCs by Thermal Desorption (GC-MS)

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Date:Hours:Mins
Date:Hours:Mins
Total Minutes

SV Indicates surrogate recovery outside performance criteria
>> Indicates value exceeds calibration range

MDL	Method Detection Limit
#	ISO 17025 (UKAS) accredited

[illegible]

ns=Not Specified

Element Materials Technology

Client Name: GeoEngineer Ltd

Reference:

Location: Bury

Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Bury Plot 45
Volume Sampled by Client: -
EMT Job No: 23/2091
EMT Sample No: 2
Matrix: Tenax Tube
Method: VOCs by Thermal Desorption (GC-MS)
Tube Serial number: 776585

Volume Sampled by Client: Passive Sample
Sample Start Time: 19/01/2023 10:20
Sample Stop Time: 10/02/2023 11:50
Sample Duration: 31,770

Date:Hours:Mins

Date:Hours:Mins

Total Minutes

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria
>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit
ISO 17025 (UKAS) accredited
 (NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate* ng/ppm/min	RESULT ng/tube	Concentration in Air ppb	MDL ng/tube	MDL ppb	Concentration ug/m ³	MDL ug/m ³
60-29-7	Diethyl ether [#]		2	<5	<0.08	<5	<0.08		
156-60-5	trans-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
1634-04-4	MTBE		2	<90	<1.42	<90	<1.42		
110-54-3	Hexane [#]		2	<10	<0.16	<10	<0.16		
126-98-7	Methyl acrylonitrile		2	<90	<1.42	<90	<1.42		
156-59-2	cis-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
594-20-7	2,2-Dichloropropane		2	<90	<1.42	<90	<1.42		
67-66-3	Chloroform		2	<90	<1.42	<90	<1.42		
109-99-9	Tetrahydrofuran		2	<90	<1.42	<90	<1.42		
71-55-6	1,1,1-Trichloroethane		2	<90	<1.42	<90	<1.42		
109-69-3	1-Chlorobutane [#]		2	<5	<0.08	<5	<0.08		
71-43-2	Benzene [#]		0.7	<5	<0.22	<5	<0.22		
563-58-6	1,1-Dichloropropene [#]		2	<5	<0.08	<5	<0.08		
56-23-5	Carbon Tetrachloride		2	<90	<1.42	<90	<1.42		
107-14-2	Chloroacetonitrile [#]		2	<90	<1.42	<90	<1.42		
79-01-6	Trichloroethene [#] (TCE)		2	<5	<0.08	<5	<0.08		
74-95-3	Dibromomethane [#]		2	<5	<0.08	<5	<0.08		
80-62-6	Methyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
75-27-4	Bromodichloromethane [#]		2	<5	<0.08	<5	<0.08		
10061-01-5	cis-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
108-88-3	Toluene [#]		1.03	13	0.40	<5	<0.15	1.51	<0.58
10061-02-6	trans-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
79-00-5	1,1,2-Trichloroethane [#]		2	<5	<0.08	<5	<0.08		
142-28-9	1,3-Dichloropropane [#]		2	<5	<0.08	<5	<0.08		
97-63-2	Ethyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
124-48-1	Dibromochloromethane [#]		2	<5	<0.08	<5	<0.08		
106-93-4	1,2-Dibromoethane [#]		2	<10	<0.16	<10	<0.16		
127-18-4	Tetrachloroethene [#] (PCE)		2.8	<5	<0.06	<5	<0.06		
108-90-7	Chlorobenzene [#]		2	<5	<0.08	<5	<0.08		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Client Name:	GeoEngineeer Ltd
Reference:	
Location:	Bury
Contact:	Ben Crowther
Sample ID:	Bury Plot 45
EMT Job No:	23/2091
EMT Sample No:	2
Matrix:	Tenax Tube
Tube Serial number:	776585
Method:	VOCs by Thermal Desorption (GC-MS)

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Volume Sampled by Client: Passive Sample		
Sample Start Time	19/01/2023 10:20	Date:Hours:Mins
Sample Stop Time	10/02/2023 11:50	Date:Hours:Mins
Sample Duration	31,770	Total Minutes

SV Indicates surrogate recovery outside performance criteria
>> Indicates value exceeds calibration range

MDL	Method Detection Limit
#	ISO 17025 (UKAS) accredited

[illegible]

ns= Not Specified

Element Materials Technology

Client Name: GeoEngineer Ltd

Reference:

Location: Bury

Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Internal House

Volume Sampled by Client -

EMT Job No: 23/2091

EMT Sample No: 3

Matrix: Tenax Tube

Method: VOCs by Thermal Desorption (GC-MS)

Volume Sampled by Client: Passive Sample

Sample Start Time 19/01/2023 10:25 Date:Hours:Mins

Sample Stop Time 10/02/2023 11:55 Date:Hours:Mins

Sample Duration 31,770 Total Minutes

Tube Serial number: 776586

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria

>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit

ISO 17025 (UKAS) accredited

(NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate* ng/ppm/min	RESULT ng/tube	Concentration in Air ppb	MDL ng/tube	MDL ppb	Concentration ug/m ³	MDL ug/m ³
60-29-7	Diethyl ether [#]		2	<5	<0.08	<5	<0.08		
156-60-5	trans-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
1634-04-4	MTBE		2	<90	<1.42	<90	<1.42		
110-54-3	Hexane [#]		2	99	1.56	<10	<0.16	5.50	<0.56
126-98-7	Methyl acrylonitrile		2	<90	<1.42	<90	<1.42		
156-59-2	cis-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
594-20-7	2,2-Dichloropropane		2	<90	<1.42	<90	<1.42		
67-66-3	Chloroform		2	<90	<1.42	<90	<1.42		
109-99-9	Tetrahydrofuran		2	<90	<1.42	<90	<1.42		
71-55-6	1,1,1-Trichloroethane		2	<90	<1.42	<90	<1.42		
109-69-3	1-Chlorobutane [#]		2	<5	<0.08	<5	<0.08		
71-43-2	Benzene [#]		0.7	12	0.54	<5	<0.22	1.73	<0.72
563-58-6	1,1-Dichloropropene [#]		2	<5	<0.08	<5	<0.08		
56-23-5	Carbon Tetrachloride		2	<90	<1.42	<90	<1.42		
107-14-2	Chloroacetonitrile [#]		2	<90	<1.42	<90	<1.42		
79-01-6	Trichloroethene [#] (TCE)		2	<5	<0.08	<5	<0.08		
74-95-3	Dibromomethane [#]		2	<5	<0.08	<5	<0.08		
80-62-6	Methyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
75-27-4	Bromodichloromethane [#]		2	<5	<0.08	<5	<0.08		
10061-01-5	cis-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
108-88-3	Toluene [#]		1.03	95	2.90	<5	<0.15	11.03	<0.58
10061-02-6	trans-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
79-00-5	1,1,2-Trichloroethane [#]		2	<5	<0.08	<5	<0.08		
142-28-9	1,3-Dichloropropane [#]		2	<5	<0.08	<5	<0.08		
97-63-2	Ethyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
124-48-1	Dibromochloromethane [#]		2	<5	<0.08	<5	<0.08		
106-93-4	1,2-Dibromoethane [#]		2	<10	<0.16	<10	<0.16		
127-18-4	Tetrachloroethene [#] (PCE)		2.8	<5	<0.06	<5	<0.06		
108-90-7	Chlorobenzene [#]		2	<5	<0.08	<5	<0.08		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Element Materials Technology

Client Name: GeoEngineer Ltd
Reference:
Location: Bury
Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Internal House
Volume Sampled by Client: -
EMT Job No: 23/2091
EMT Sample No: 3
Matrix: Tenax Tube
Method: VOCs by Thermal Desorption (GC-MS)

Volume Sampled by Client: Passive Sample

Sample Start Time 19/01/2023 10:25 Date:Hours:Mins
Sample Stop Time 10/02/2023 11:55 Date:Hours:Mins
Sample Duration 31,770 Total Minutes

Tube Serial number: 776586

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria
>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit
ISO 17025 (UKAS) accredited
(NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate*	RESULT	Concentration in Air	MDL ng/tube	MDL ppb	Concentration ug/m ³	MDL ug/m ³
			ng/ppm/min		ppb				
630-20-6	1,1,1,2-tetrachloroethane [#]		2	<5	<0.08	<5	<0.08		
100-41-4	Ethylbenzene [#]		2	15	0.24	<5	<0.08	1.02	<0.34
179601-23-1	M/Pxylene [#]		1.46	44	0.95	<5	<0.11	4.11	<0.47
75-25-2	Bromoform [#]		2	<5	<0.08	<5	<0.08		
100-42-5	Styrene [#]		2.4	112	1.47	<5	<0.07	6.27	<0.28
95-47-6	o-Xylene [#]		1.46	17	0.37	<5	<0.11	1.59	<0.47
79-34-5	1,1,2,2-Tetrachloroethane [#]		2	<5	<0.08	<5	<0.08		
96-18-4	1,2,3-Trichloropropane [#]		2	<5	<0.08	<5	<0.08		
98-82-8	Isopropylbenzene [#]		2.5	<5	<0.06	<5	<0.06		
110-57-6	trans-1,4-dichloro-2-butene [#]		2	<10	<0.16	<10	<0.16		
108-86-1	Bromobenzene [#]		3.31	<5	<0.05	<5	<0.05		
95-49-8	2-Chlorotoluene [#]		2	<5	<0.08	<5	<0.08		
103-65-1	Propyl benzene [#]		2.37	<5	<0.07	<5	<0.07		
106-43-4	4-Chlorotoluene [#]		2	<5	<0.08	<5	<0.08		
108-67-8	1,3,5-Trimethylbenzene [#]		2.37	<5	<0.07	<5	<0.07		
98-06-6	tert-Butyl benzene [#]		2	<5	<0.08	<5	<0.08		
95-63-6	1,2,4-Trimethylbenzene [#]		2.37	21	0.28	<5	<0.07	1.37	<0.33
541-73-1	1,3-Dichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
135-98-8	sec-Butylbenzene [#]		2	<5	<0.08	<5	<0.08		
106-46-7	1,4-Dichlorobenzene [#]		3.23	<5	<0.05	<5	<0.05		
99-87-6	4-Isopropyltoluene [#]		2	25	0.39	<5	<0.08	2.20	<0.44
95-50-1	1,2-Dichlorobenzene [#]		3.23	<5	<0.05	<5	<0.05		
104-51-8	n-butyl benzene [#]		2	<5	<0.08	<5	<0.08		
67-72-1	Hexachloroethane [#]		2	<5	<0.08	<5	<0.08		
96-12-8	1,2-dibromo-3-chloropropane [#]		2	<10	<0.16	<10	<0.16		
98-95-3	Nitrobenzene [#]		2	<10	<0.16	<10	<0.16		
120-82-1	1,2,4-Trichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
91-20-3	Naphthalene [#]		2.55	5	0.06	<5	<0.06	0.33	<0.33
87-61-6	1,2,3-Trichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
87-68-3	Hexachlorobutadiene [#]		3.5	<5	<0.04	<5	<0.04		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Element Materials Technology

Client Name: GeoEngineer Ltd

Reference:

Location: Bury

Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Control

Volume Sampled by Client

EMT Job No: 23/2091

EMT Sample No: 4

Matrix: Tenax Tube

Method: VOCs by Thermal Desorption (GC-MS)

Volume Sampled by Client: Passive Sample

Sample Start Time 19/01/2023 10:15 Date:Hours:Mins

Sample Stop Time 10/02/2023 12:00 Date:Hours:Mins

Sample Duration 31,785 Total Minutes

Tube Serial number: 246821

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria

>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit

ISO 17025 (UKAS) accredited

(NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate* ng/ppm/min	RESULT ng/tube	Concentration in Air ppb	MDL ng/tube	MDL ppb	Concentration ug/m ³	MDL ug/m ³
60-29-7	Diethyl ether [#]		2	<5	<0.08	<5	<0.08		
156-60-5	trans-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
1634-04-4	MTBE		2	<90	<1.42	<90	<1.42		
110-54-3	Hexane [#]		2	707	11.12	<10	<0.16	39.26	<0.56
126-98-7	Methyl acrylonitrile		2	<90	<1.42	<90	<1.42		
156-59-2	cis-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
594-20-7	2,2-Dichloropropane		2	<90	<1.42	<90	<1.42		
67-66-3	Chloroform		2	<90	<1.42	<90	<1.42		
109-99-9	Tetrahydrofuran		2	<90	<1.42	<90	<1.42		
71-55-6	1,1,1-Trichloroethane		2	<90	<1.42	<90	<1.42		
109-69-3	1-Chlorobutane [#]		2	<5	<0.08	<5	<0.08		
71-43-2	Benzene [#]		0.7	571	25.66	<5	<0.22	82.12	<0.72
563-58-6	1,1-Dichloropropene [#]		2	<5	<0.08	<5	<0.08		
56-23-5	Carbon Tetrachloride		2	<90	<1.42	<90	<1.42		
107-14-2	Chloroacetonitrile [#]		2	<90	<1.42	<90	<1.42		
79-01-6	Trichloroethene [#] (TCE)		2	<5	<0.08	<5	<0.08		
74-95-3	Dibromomethane [#]		2	<5	<0.08	<5	<0.08		
80-62-6	Methyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
75-27-4	Bromodichloromethane [#]		2	<5	<0.08	<5	<0.08		
10061-01-5	cis-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
108-88-3	Toluene [#]	>>	1.03	4887	149.27	<5	<0.15	567.24	<0.58
10061-02-6	trans-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
79-00-5	1,1,2-Trichloroethane [#]		2	<5	<0.08	<5	<0.08		
142-28-9	1,3-Dichloropropane [#]		2	<5	<0.08	<5	<0.08		
97-63-2	Ethyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
124-48-1	Dibromochloromethane [#]		2	<5	<0.08	<5	<0.08		
106-93-4	1,2-Dibromoethane [#]		2	<10	<0.16	<10	<0.16		
127-18-4	Tetrachloroethene [#] (PCE)		2.8	<5	<0.06	<5	<0.06		
108-90-7	Chlorobenzene [#]		2	<5	<0.08	<5	<0.08		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Element Materials Technology

Client Name: GeoEngineer Ltd
Reference:

Location: Bury

Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Control
Volume Sampled by Client: -
EMT Job No: 23/2091
EMT Sample No: 4
Matrix: Tenax Tube
Method: VOCs by Thermal Desorption (GC-MS)

Volume Sampled by Client: Passive Sample

Sample Start Time 19/01/2023 10:15 Date:Hours:Mins
Sample Stop Time 10/02/2023 12:00 Date:Hours:Mins
Sample Duration 31,785 Total Minutes

Tube Serial number: 246821

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria
>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit
ISO 17025 (UKAS) accredited
(NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate*	RESULT	Concentration in Air	MDL	MDL	Concentration	MDL
			ng/ppm/min		ppb			ug/m ³	
630-20-6	1,1,1,2-tetrachloroethane [#]		2	<5	<0.08	<5	<0.08		
100-41-4	Ethylbenzene [#]	>>	2	1975	31.07	<5	<0.08	134.52	<0.34
179601-23-1	M/Pxylene [#]	>>	1.46	6628	142.83	<5	<0.11	618.44	<0.47
75-25-2	Bromoform [#]		2	<5	<0.08	<5	<0.08		
100-42-5	Styrene [#]		2.4	18	0.24	<5	<0.07	1.01	<0.28
95-47-6	o-Xylene [#]	>>	1.46	3194	68.83	<5	<0.11	298.02	<0.47
79-34-5	1,1,2,2-Tetrachloroethane [#]		2	<5	<0.08	<5	<0.08		
96-18-4	1,2,3-Trichloropropane [#]		2	<5	<0.08	<5	<0.08		
98-82-8	Isopropylbenzene [#]		2.5	311	3.91	<5	<0.06	19.57	<0.31
110-57-6	trans-1,4-dichloro-2-butene [#]		2	<10	<0.16	<10	<0.16		
108-86-1	Bromobenzene [#]		3.31	<5	<0.05	<5	<0.05		
95-49-8	2-Chlorotoluene [#]		2	<5	<0.08	<5	<0.08		
103-65-1	Propyl benzene [#]	>>	2.37	1059	14.06	<5	<0.07	70.29	<0.33
106-43-4	4-Chlorotoluene [#]		2	<5	<0.08	<5	<0.08		
108-67-8	1,3,5-Trimethylbenzene [#]	>>	2.37	1611	21.39	<5	<0.07	104.79	<0.33
98-06-6	tert-Butyl benzene [#]		2	<5	<0.08	<5	<0.08		
95-63-6	1,2,4-Trimethylbenzene [#]	>>	2.37	5177	68.72	<5	<0.07	336.75	<0.33
541-73-1	1,3-Dichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
135-98-8	sec-Butylbenzene [#]		2	61	0.96	<5	<0.08	5.35	<0.44
106-46-7	1,4-Dichlorobenzene [#]		3.23	<5	<0.05	<5	<0.05		
99-87-6	4-Isopropyltoluene [#]		2	<5	<0.08	<5	<0.08		
95-50-1	1,2-Dichlorobenzene [#]		3.23	<5	<0.05	<5	<0.05		
104-51-8	n-butyl benzene [#]		2	148	2.33	<5	<0.08	12.99	<0.44
67-72-1	Hexachloroethane [#]		2	<5	<0.08	<5	<0.08		
96-12-8	1,2-dibromo-3-chloropropane [#]		2	<10	<0.16	<10	<0.16		
98-95-3	Nitrobenzene [#]		2	<10	<0.16	<10	<0.16		
120-82-1	1,2,4-Trichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
91-20-3	Naphthalene [#]		2.55	103	1.27	<5	<0.06	6.75	<0.33
87-61-6	1,2,3-Trichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
87-68-3	Hexachlorobutadiene [#]		3.5	<5	<0.04	<5	<0.04		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Element Materials Technology

Client Name: GeoEngineer Ltd

Reference:

Location: Bury

Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Atmospheric Sample (Fence Line)

Volume Sampled by Client

EMT Job No: 23/2091

EMT Sample No: 5

Matrix: Tenax Tube

Method: VOCs by Thermal Desorption (GC-MS)

Volume Sampled by Client: Passive Sample

Sample Start Time 19/01/2023 10:30 Date:Hours:Mins

Sample Stop Time 10/02/2023 12:00 Date:Hours:Mins

Sample Duration 31,770 Total Minutes

Tube Serial number: 435928

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria

>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit

ISO 17025 (UKAS) accredited

(NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate* ng/ppm/min	RESULT ng/tube	Concentration in Air ppb	MDL ng/tube	MDL ppb	Concentration ug/m ³	MDL ug/m ³
60-29-7	Diethyl ether [#]		2	<5	<0.08	<5	<0.08		
156-60-5	trans-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
1634-04-4	MTBE		2	<90	<1.42	<90	<1.42		
110-54-3	Hexane [#]		2	<10	<0.16	<10	<0.16		
126-98-7	Methyl acrylonitrile		2	<90	<1.42	<90	<1.42		
156-59-2	cis-1,2-dichloroethene		2	<90	<1.42	<90	<1.42		
594-20-7	2,2-Dichloropropane		2	<90	<1.42	<90	<1.42		
67-66-3	Chloroform		2	<90	<1.42	<90	<1.42		
109-99-9	Tetrahydrofuran		2	<90	<1.42	<90	<1.42		
71-55-6	1,1,1-Trichloroethane		2	<90	<1.42	<90	<1.42		
109-69-3	1-Chlorobutane [#]		2	<5	<0.08	<5	<0.08		
71-43-2	Benzene [#]		0.7	6	0.27	<5	<0.22	0.86	<0.72
563-58-6	1,1-Dichloropropene [#]		2	<5	<0.08	<5	<0.08		
56-23-5	Carbon Tetrachloride		2	<90	<1.42	<90	<1.42		
107-14-2	Chloroacetonitrile [#]		2	<90	<1.42	<90	<1.42		
79-01-6	Trichloroethene [#] (TCE)		2	<5	<0.08	<5	<0.08		
74-95-3	Dibromomethane [#]		2	<5	<0.08	<5	<0.08		
80-62-6	Methyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
75-27-4	Bromodichloromethane [#]		2	<5	<0.08	<5	<0.08		
10061-01-5	cis-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
108-88-3	Toluene [#]		1.03	18	0.55	<5	<0.15	2.09	<0.58
10061-02-6	trans-1,3-dichloropropene [#]		2	<5	<0.08	<5	<0.08		
79-00-5	1,1,2-Trichloroethane [#]		2	<5	<0.08	<5	<0.08		
142-28-9	1,3-Dichloropropane [#]		2	<5	<0.08	<5	<0.08		
97-63-2	Ethyl methacrylate [#]		2	<5	<0.08	<5	<0.08		
124-48-1	Dibromochloromethane [#]		2	<5	<0.08	<5	<0.08		
106-93-4	1,2-Dibromoethane [#]		2	<10	<0.16	<10	<0.16		
127-18-4	Tetrachloroethene [#] (PCE)		2.8	<5	<0.06	<5	<0.06		
108-90-7	Chlorobenzene [#]		2	<5	<0.08	<5	<0.08		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Element Materials Technology

Client Name: GeoEngineer Ltd
Reference:
Location: Bury
Contact: Ben Crowther

Date of Receipt: 10/02/23

Date Analysed: 17/02/23

Uptake Rate Key

	Rate from Markes Application Note 001 based on nearest exposure time to actual
	Rate based on 8 hour exposure time from Markes Application Note 001
	No uptake rate available for this compound - Approximate rate used

Sample ID: Atmospheric Sample (Fence Line)
Volume Sampled by Client: -
EMT Job No: 23/2091
EMT Sample No: 5
Matrix: Tenax Tube
Method: VOCs by Thermal Desorption (GC-MS)

Volume Sampled by Client: Passive Sample

Sample Start Time 19/01/2023 10:30 Date:Hours:Mins
Sample Stop Time 10/02/2023 12:00 Date:Hours:Mins
Sample Duration 31,770 Total Minutes

Tube Serial number: 435928

Q* - Qualifiers

SV Indicates surrogate recovery outside performance criteria
>> Indicates value exceeds calibration range

Key

MDL Method Detection Limit
ISO 17025 (UKAS) accredited
 (NB - accreditation only applies to ng/tube concentrations)

CAS No	Compound	Q*	Passive Uptake Rate*	RESULT	Concentration in Air	MDL	MDL	Concentration	MDL
			ng/ppm/min		ppb				
630-20-6	1,1,1,2-tetrachloroethane [#]		2	<5	<0.08	<5	<0.08	1.21	<0.47
100-41-4	Ethylbenzene [#]		2	<5	<0.08	<5	<0.08		
179601-23-1	M/Pxylene [#]		1.46	13	0.28	<5	<0.11		
75-25-2	Bromoform [#]		2	<5	<0.08	<5	<0.08		
100-42-5	Styrene [#]		2.4	<5	<0.07	<5	<0.07		
95-47-6	o-Xylene [#]		1.46	<5	<0.11	<5	<0.11		
79-34-5	1,1,2,2-Tetrachloroethane [#]		2	<5	<0.08	<5	<0.08	0.39	<0.33
96-18-4	1,2,3-Trichloropropane [#]		2	<5	<0.08	<5	<0.08		
98-82-8	Isopropylbenzene [#]		2.5	<5	<0.06	<5	<0.06		
110-57-6	trans-1,4-dichloro-2-butene [#]		2	<10	<0.16	<10	<0.16		
108-86-1	Bromobenzene [#]		3.31	<5	<0.05	<5	<0.05		
95-49-8	2-Chlorotoluene [#]		2	<5	<0.08	<5	<0.08		
103-65-1	Propyl benzene [#]		2.37	<5	<0.07	<5	<0.07		
106-43-4	4-Chlorotoluene [#]		2	<5	<0.08	<5	<0.08		
108-67-8	1,3,5-Trimethylbenzene [#]		2.37	<5	<0.07	<5	<0.07		
98-06-6	tert-Butyl benzene [#]		2	<5	<0.08	<5	<0.08		
95-63-6	1,2,4-Trimethylbenzene [#]		2.37	6	0.08	<5	<0.07		
541-73-1	1,3-Dichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
135-98-8	sec-Butylbenzene [#]		2	<5	<0.08	<5	<0.08		
106-46-7	1,4-Dichlorobenzene [#]		3.23	<5	<0.05	<5	<0.05		
99-87-6	4-Isopropyltoluene [#]		2	<5	<0.08	<5	<0.08		
95-50-1	1,2-Dichlorobenzene [#]		3.23	<5	<0.05	<5	<0.05		
104-51-8	n-butyl benzene [#]		2	<5	<0.08	<5	<0.08		
67-72-1	Hexachloroethane [#]		2	<5	<0.08	<5	<0.08		
96-12-8	1,2-dibromo-3-chloropropane [#]		2	<10	<0.16	<10	<0.16		
98-95-3	Nitrobenzene [#]		2	<10	<0.16	<10	<0.16		
120-82-1	1,2,4-Trichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
91-20-3	Naphthalene [#]		2.55	<5	<0.06	<5	<0.06		
87-61-6	1,2,3-Trichlorobenzene [#]		2	<5	<0.08	<5	<0.08		
87-68-3	Hexachlorobutadiene [#]		3.5	<5	<0.04	<5	<0.04		

*Taken from Application Note 001: Uptake rates for tube-type axial diffusive samplers, Markes International, March 2015. Where more than 1 uptake rate is published the uptake rate closest to the sample duration has been chosen.

ns=Not Specified

Client Name: GeoEnginseer Ltd

Reference: Bury

Location:

Contact: Ben Crowther

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/2091

SOILS

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.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 23/2091

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM197	VOCs by GCMS-TD			N			