



## **APPENDIX H**

# **CHEMICAL ANALYSIS RESULTS**



# DETS

## Certificate of Analysis

*Certificate Number* 21-24024

*Issued:* 18-Nov-21

*Client* Geo Environmental Group  
GEG House  
17 Graham Road  
Malvern  
WR14 2HR

*Our Reference* 21-24024

*Client Reference* GEG-21-706

*Order No* 4176

*Contract Title* Edward Street Hospital

*Description* 4 Soil samples, 1 Leachate sample.

*Date Received* 10-Nov-21

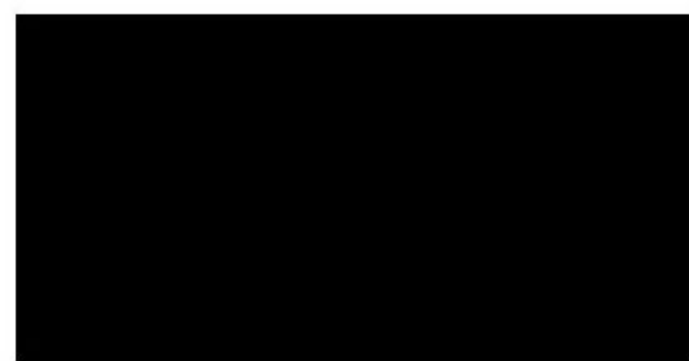
*Date Started* 10-Nov-21

*Date Completed* 18-Nov-21

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

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

*Approved By*



Adam Fenwick  
Contracts Manager



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## Summary of Chemical Analysis Soil Samples

Our Ref 21-24024

Client Ref GEG-21-706

Contract Title Edward Street Hospital

Lab No	1932451	1932452	1932453
Sample ID	TP01	TP03	WS01
Depth	0.40	0.50	0.20
Other ID			
Sample Type	SOIL	SOIL	SOIL
Sampling Date	08/11/2021	08/11/2021	08/11/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>Metals</b>						
Arsenic	DETSC 2301#	0.2	mg/kg	6.4	3.5	8.5
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	0.2	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.3	0.4
Chromium	DETSC 2301#	0.15	mg/kg	16	23	7.1
Chromium III	DETSC 2301*	0.15	mg/kg	16	23	7.1
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	58	41	64
Lead	DETSC 2301#	0.3	mg/kg	31	8.9	63
Mercury	DETSC 2325#	0.05	mg/kg	0.14	< 0.05	0.23
Nickel	DETSC 2301#	1	mg/kg	14	19	9.1
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	100	70	110
<b>Inorganics</b>						
pH	DETSC 2008#		pH	10.0	8.8	7.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.3
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	1.4	0.2	3.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	150	46	11
Sulphide	DETSC 2024*	10	mg/kg	27	19	16
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.07	0.03	0.04
<b>Petroleum Hydrocarbons</b>						
EPH (C5-C8)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
EPH (C8-C10)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10	< 10
EPH (C12-C16)	DETSC 3311	10	mg/kg	38	25	< 10
EPH (C16-C21)	DETSC 3311	10	mg/kg	860	700	< 10
EPH (C21-C35)	DETSC 3311	10	mg/kg	1400	1200	< 10
EPH (C21-C40)	DETSC 3311	10	mg/kg	1400	1200	< 10
EPH (C6-C40)	DETSC 3311*	10	mg/kg	2300	1900	< 10



## Summary of Chemical Analysis

### Soil Samples

Our Ref 21-24024  
 Client Ref GEG-21-706  
 Contract Title Edward Street Hospital

Lab No	1932451	1932452	1932453
Sample ID	TP01	TP03	WS01
Depth	0.40	0.50	0.20
Other ID			
Sample Type	SOIL	SOIL	SOIL
Sampling Date	08/11/2021	08/11/2021	08/11/2021
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
<b>PAHs</b>						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.09	0.09	0.10
Pyrene	DETSC 3303#	0.03	mg/kg	0.09	0.24	0.10
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.04	0.03	0.05
Chrysene	DETSC 3303	0.03	mg/kg	0.04	0.06	0.06
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04	0.10	0.06
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.03	0.05	0.05
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	0.05	0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.30	0.65	0.46
<b>Phenols</b>						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	0.4



# WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-24024

Client Ref GEG-21-706

Contract Title Edward Street Hospital

Sample Id WS02 0.40

Sample Numbers 1932454 1932455

Date Analysed 18/11/2021

Test Results On Waste			WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	3.7	3	5	6
DETSC 2003# Loss On Ignition	%	6.0	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	1.8	100	n/a	n/a
DETSC2008# pH	pH Units		n/a	>6	n/a
DETS073* Acid Neutralisation Capacity (pH4)	mol/kg		n/a	TBE	TBE
DETS073* Acid Neutralisation Capacity (pH7)	mol/kg		n/a	TBE	TBE

Test Results On Leachate			WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l	Amount Leached* mg/kg	Inert Waste	SNRHW	Hazardous Waste
	10:1	LS10			
DETSC 2306 Arsenic as As	1.2	0.012	0.5	2	25
DETSC 2306 Barium as Ba	12	0.12	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.32	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.1	0.021	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	1.4	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.78	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.66	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	7.8	0.078	4	50	200
DETSC 2055 Chloride as Cl	570	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	410	4.1	10	150	500
DETSC 2055 Sulphate as SO4	830	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	13000	130	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 50	500	800	1000

Additional Information	
DETSC 2008 pH	7.4
DETSC 2009 Conductivity uS/cm	18.4
* Temperature*	18.0
Mass of Sample Kg*	0.110
Mass of dry Sample Kg*	0.094
Stage 1	
Volume of Leachant L2*	0.925
Volume of Eluate VE1*	0.884

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

\* DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.



## Summary of Asbestos Analysis

### Soil Samples

*Our Ref* 21-24024

*Client Ref* GEG-21-706

*Contract Title* Edward Street Hospital

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1932451	TP01 0.40	SOIL	NAD	none	Lee Kerridge
1932452	TP03 0.50	SOIL	NAD	none	Lee Kerridge
1932453	WS01 0.20	SOIL	NAD	none	Lee Kerridge

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: \* - not included in laboratory scope of accreditation.



## Information in Support of the Analytical Results

Our Ref 21-24024  
 Client Ref GEG-21-706  
 Contract Edward Street Hospital

### Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1932451	TP01 0.40 SOIL	08/11/21	GJ 250ml x2, PT 1L		
1932452	TP03 0.50 SOIL	08/11/21	GJ 250ml x2, PT 1L		
1932453	WS01 0.20 SOIL	08/11/21	GJ 250ml x2, PT 1L		
1932454	WS02 0.40 SOIL	08/11/21	GJ 250ml x2, PT 1L		
1932455	WS02 0.40 LEACHATE	08/11/21	GJ 250ml x2, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

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

### Soil Analysis Notes

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

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

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

### Disposal

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

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

End of Report



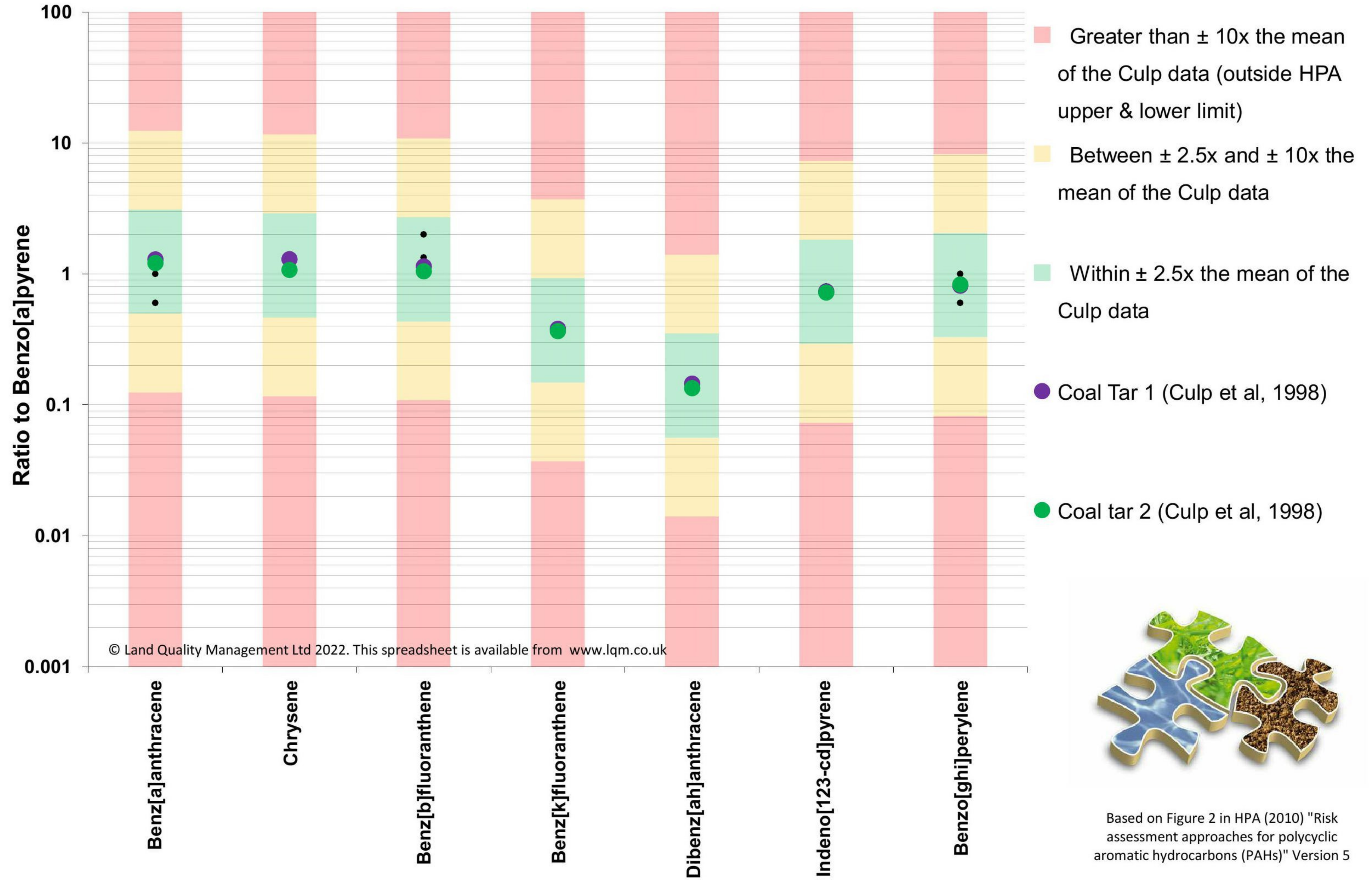
## **APPENDIX I**

### **PAH PROFILING**



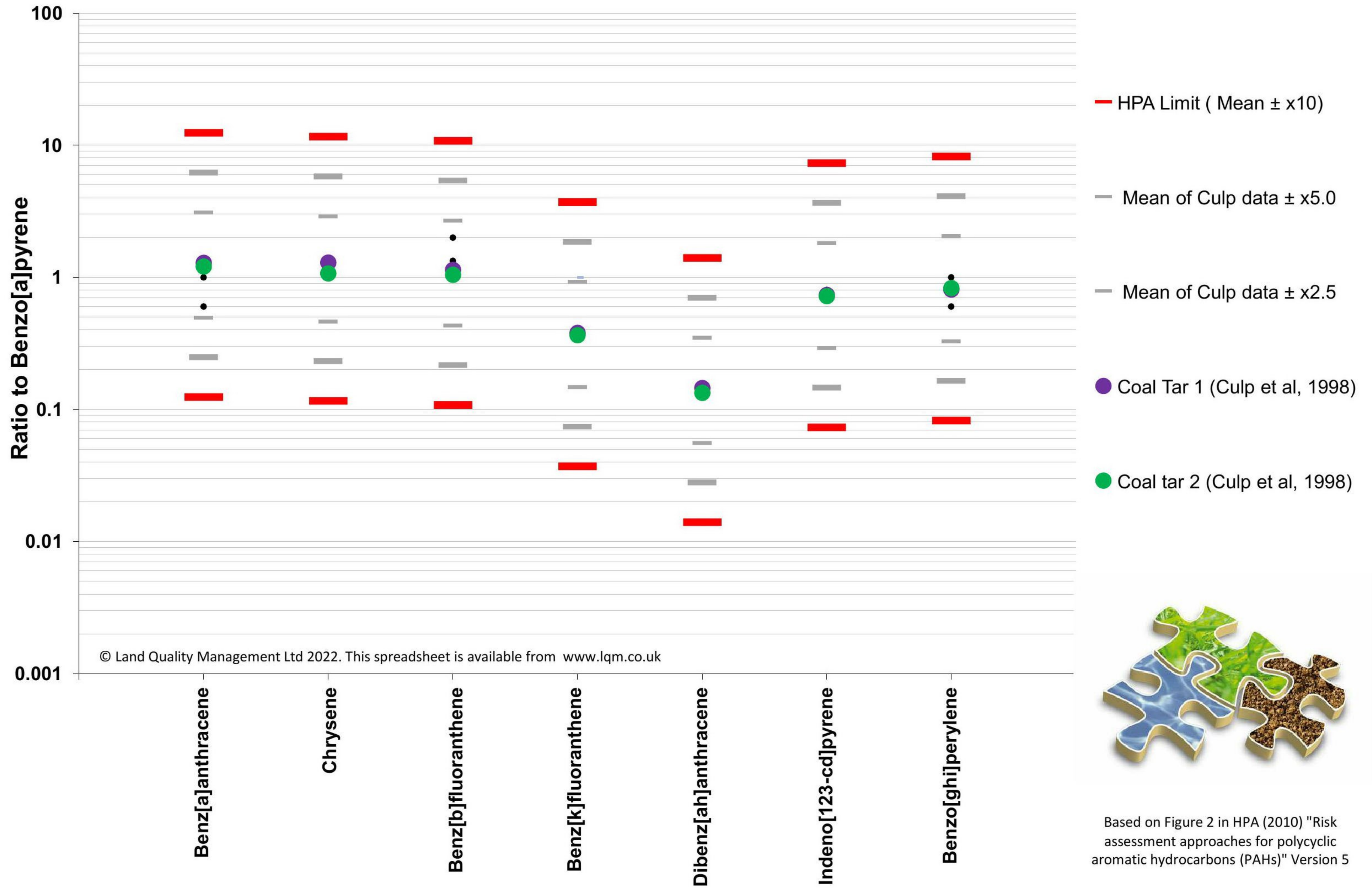






Based on Figure 2 in HPA (2010) "Risk assessment approaches for polycyclic aromatic hydrocarbons (PAHs)" Version 5










## **APPENDIX J**

# **CONTAMINATION ASSESSMENT TABLES**




**Table A: Direct Comparison with Critical Concentrations - Made Ground**

		GEG-21-706 / Edward Street Hospital, West Bromwich				
DETS Reference		1932451	1932452	1932453		
Sample Reference		TP01	TP03	WS01		
Depth (m)		0.40m	0.50m	0.20m		
Date Sampled		08/11/2021	08/11/2021	08/11/2021		
Determinand	Critical Concentration (Cc)	Units				No. of Samples Exceeding
<b>Metals, Semi Metals and Non-Metals</b>						
Arsenic	640	mg/kg	6.4	3.5	8.5	0 (3)
Boron	19200	mg/kg	0.4	0.2	0.3	0 (3)
Cadmium	410	mg/kg	0.2	0.3	0.4	0 (3)
Chromium (trivalent)	30400	mg/kg	16	23	7.1	0 (3)
Chromium VI	49	mg/kg	<1.0	<1.0	<1.0	0 (3)
Copper	71700	mg/kg	58	41	64	0 (3)
Lead	2300	mg/kg	31	8.9	63	0 (3)
Mercury	17	mg/kg	0.14	<0.05	0.23	0 (3)
Nickel	1800	mg/kg	14	19	9.1	0 (3)
Selenium	13000	mg/kg	<0.5	<0.5	<0.5	0 (3)
Zinc	665000	mg/kg	100	70	110	0 (3)
<b>Inorganics</b>						
Cyanide(Total)	31	mg/kg	<1.0	<1.0	0.3	0 (3)
Cyanide(free)	31	mg/kg	<1.0	<1.0	<1.0	0 (3)
<b>Petroleum Hydrocarbons</b>						
TPH (C6-C8)	1690	mg/kg	<1.0	<1.0	<1.0	0 (3)
TPH (C8-C10)	2849	mg/kg	<1.0	<1.0	<1.0	0 (3)
TPH (C10-C12)	12988	mg/kg	<10	<10	<10	0 (3)
TPH (C12-C16)	46234	mg/kg	38	25	<10	0 (3)
TPH (C16-C21)	52619	mg/kg	860	700	<10	0 (3)
TPH (C21-C35)	56803	mg/kg	1400	1200	<10	0 (3)
TPH (C35-C40)	56803	mg/kg	1400	1200	<10	0 (3)
TPH C6-C40 (Sum)	-	mg/kg	2300	1900	<10	-
<b>Polyaromatic Hydrocarbons</b>						
Benzo(a)Pyrene Surrogate Marker	77	mg/kg	0.03	0.05	0.05	0 (3)
<b>Others</b>						
Phenol	3200	mg/kg	<0.3	<0.3	0.4	0 (3)
pH	-	-	10.0	8.8	7.2	-
SOM	-	%	1.4	0.2	3.3	-



**Table B: PAH Inhalation Assessment**

		GEG-21-706 / Edward Street Hospital, West Bromwich				
<b>SAL Reference</b>			1932451	1932452	1932453	
<b>Sample Reference</b>			TP01	TP03	WS01	
<b>Depth (m)</b>			0.40m	0.50m	0.20m	
<b>Date Sampled</b>			08/11/2021	08/11/2021	08/11/2021	
Determinand	Inhalation Criteria (IC)	Units				No. of Samples Exceeding
<b>Polyaromatic Hydrocarbons</b>						
<i>Naphthalene</i>	108	mg/kg	<0.03	<0.03	<0.03	0 (3)
<i>Acenaphthylene</i>	246000	mg/kg	<0.03	<0.03	<0.03	0 (3)
<i>Acenaphthene</i>	240000	mg/kg	<0.03	<0.03	<0.03	0 (3)
<i>Fluorene</i>	346000	mg/kg	<0.03	<0.03	<0.03	0 (3)
<i>Phenanthrene</i>	510000	mg/kg	<0.03	<0.03	0.04	0 (3)
<i>Anthracene</i>	7410000	mg/kg	<0.03	<0.03	<0.03	0 (3)
<i>Fluoranthene</i>	1970000	mg/kg	0.09	0.09	0.1	0 (3)
<i>Pyrene</i>	4680000	mg/kg	0.09	0.24	0.1	0 (3)
<i>Benzo(a)Anthracene</i>	419	mg/kg	0.04	0.03	0.05	0 (3)
<i>Chrysene</i>	918	mg/kg	0.04	0.06	0.06	0 (3)
<i>Benzo(b)fluoranthene</i>	118	mg/kg	0.04	0.1	0.06	0 (3)
<i>Benzo(k)fluoranthene</i>	3170	mg/kg	<0.03	<0.03	<0.03	0 (3)
<i>Benzo(a)Pyrene</i>	209	mg/kg	0.03	0.05	0.05	0 (3)
<i>Indeno(123-cd)Pyrene</i>	1340	mg/kg	<0.03	0.04	<0.03	0 (3)
<i>Dibenzo(ah)Anthracene</i>	9.5	mg/kg	<0.03	<0.03	<0.03	0 (3)
<i>Benzo(ghi)Perylene</i>	10700	mg/kg	<0.03	0.05	0.03	0 (3)



