

21LPL083/SV/GC/01

27th July 2022

FAO Richard Sedden @ Lovell
(Via Email: richard.sedden@Lovell.co.uk)



Dear Richard,

Edge Lane, Openshaw – Soil Cover System Assessment – Plots 19 – 22 & 89 – 90

Please find below our clean-cover system validation data at the above-mentioned site / plots.

Overview

Betts Geo Ltd were instructed to validate the clean cover system applied within residential gardens at the above site as per the recommendations within the Remediation Statement undertaken by Betts Geo Ltd in May 2020 (Ref; 19YHG001/RS/REVD) and the Verification Report undertaken by Betts Geo Ltd in April 2021 (19YHG001/VR).

The report recommends;

- A 600mm cover system with no dig layer is required. This will comprise of:

150mm Topsoil (anticipated to be imported)
450mm Subsoil (anticipated to be imported)
Geotextile membrane

The cover system is likely to be made up using imported topsoil and subsoil.

Physical Suitability of the Topsoil and Subsoil

The composition of the topsoil and subsoil materials on site were visually inspected in-situ during sampling on 15th June 2022. Inspection confirms that the topsoil is debris free dark brown slightly sandy CLAY and subsoil material is brown sandy CLAY, both topsoil and subsoil are physically suitable for their proposed end use.

Topsoil Source – Handley Hill, Winsford CW7 1EW.

Subsoil Source – Goldfinch Close, Congleton CW12 3FB.

Cover System Depth Validation

Trial holes undertaken in the rear garden of plots 19-22 & 89-90 on 20th July 2022 confirm that the topsoil thickness was greater than 150mm; the subsoil was a typical thickness greater than 450mm and a geotextile membrane was in place completing the required 600mm clean cover system.



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Chemical Validation of Topsoil and Subsoil

The topsoil and subsoil were chemically tested in-situ (0.10mbgl topsoil and 0.40mbgl subsoil) in the rear garden area of plots 19, 21 & 89 on 15th June 2022 on a sample ratio of 1:3 garden basis in accordance with NHBC guidance.

Samples were taken in-situ at a sample rate of 1:3 garden areas per strata i.e. 6 samples were taken.

Analysis has been scheduled for the standard 'CLEA' Metals (including Chromium VI), speciated TPH to CWG and Speciated PAH's.

No visual or olfactory evidence of contamination was noted within any of the samples.

These results were screened against the same criteria i.e. EA/CIEH/LQM residential guidance for suitability.

All results fall below relevant standard guidance levels.

Summary

Betts Geo Environmental confirms that the soil is acceptable for use within gardens as such the capping requirements for plots 19-22 & 89-90 are complete.

We trust that this information is satisfactory for your further assessment to release the conditions.

Should you require any further clarification please do not hesitate in giving us a call.

Yours Sincerely,



Graham Clark
BETTS GEO ENVIRONMENTAL LIMITED

Encl –
Evidentiary Photographs
Topsoil & Subsoil testing data





Plot 19



Plot 20



Plot 21



Plot 22



Plot 89



Plot 90

SUMMARY OF CONTAMINATION ANALYSIS: METALS

Project Name Edge Lane, Openshaw
Project No 21LPL083
Date 15/06/2022

SOIL TYPE	TS	SS	TS	SS	TS	SS
SAMPLE LOCATION	Plot 19	Plot 19	Plot 21	Plot 21	Plot 89	Plot 89
DEPTH (m)	0.10	0.40	0.10	0.40	0.10	0.40
pH	7.76	8.05	7.95	7.81	7.65	8.05
Sulphate (water sol 2:1)	0.1	0.11	0.09	0.03	0.15	0.07
Organic matter	1.8	1.3	2.3	0.6	6.1	0.5
Arsenic	5	5	6	2	8	2
Cadmium	<0.5	0.7	<0.5	0.7	0.8	0.6
Copper	15	18	16	15	40	19
Chromium (hexavalent)	<1	<1	<1	<1	<1	<1
Lead	31	19	35	9	71	11
Mercury	0.33	0.26	0.47	<0.17	0.42	0.43
Nickel	9	21	11	25	18	24
Selenium	2	<1	2	<1	2	<1
Zinc	40	50	42	39	69	37
Asbestos in Soil	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos Matrix	N/A	N/A	N/A	N/A	N/A	N/A
Quantification	NAD	NAD	NAD	NAD	NAD	NAD
Organic matter	1.8	1.3	2.3	0.6	6.1	0.5

Metals	Mean Value Test *	Range		AtRisk 2017 (mg/kg)	AtRisk 2017 (mg/kg)	DEFRA C4SL 2017
	US ₉₅	Largest Value (mg/kg)	Smallest Value (mg/kg)	With Homegrown Produce (1% SOM)	With Homegrown Produce (6% SOM)	
pH	8.01	8.05	7.65			-
Sulphate (water sol 2:1)	0.12	0.15	0.03			-
Organic matter	3.81	6.10	0.50			
Arsenic	6.59	8.00	2.00	32	32	37
Cadmium	0.73	0.80	<0.5	10	10	22.1
Copper	28.47	40.00	15.00	4730	4790	-
Chromium (hexavalent)	1.00	<1	<1	3.62	3.63	20.5
Lead	48.19	71.00	9.00			200
Mercury	0.44	0.47	<0.17	8.81	15.8	-
Nickel	23.51	25.00	9.00	EA/AtRisk withdrawn Aug 2015		
Selenium	1.95	2.00	<1	375	375	-
Zinc	56.09	69.00	37.00	20000	20300	-

NOTE:

Any individual results and mean value tests above SGVs are shown RED highlighted.

Any outlier values which exceed relevant SGVs are shown in red

* - The calculations for the mean value test include outliers

** - Results for this determinand are assessed with no background levels taken into account

Results are expressed as mg/kg unless otherwise stated

Asbestos Quantification is expressed in %w/w.

ALL RESULTS PRESENTED ARE ASSESSED UNDER THE COMBINED CLEA ASSESSMENT CRITERION AS OUTLINED WITHIN SR4 ASSUMING NO FREE PRODUCT WAS OBSERVED DURING FIELDWORK- SEE 'GUIDANCE NOTES ON CONTAMINATION'.

SGVs are derived from the EA 2009 SGVs which are taken from AtRisk 2015. Category 4 screening levels have been adopted by the EA and have been included as new guidance.

Note: The SGV for elemental mercury has been used to assess total mercury concentrations at the site. The Environment Agency's Science Report SC050021/Mercury SGV states that 'for general surface contamination and to simplify the assessment the SGVs for inorganic mercury can normally be compared with chemical analysis for total mercury content...'. Based on the latter, SGV for elemental mercury (170mg/kg) in the soil assessment is used

NAD - NO ASBESTOS DETECTED

TS - Topsoil, MG - Made Ground and N - Natural Ground

SUMMARY OF CONTAMINATION ANALYSIS: TPH

Project Name Edge Lane, Openshaw
Project No 21LPL083
Date 15/06/2022

SOIL TYPE	TS	SS	TS	SS	TS	SS
SAMPLE LOCATION	Plot 19	Plot 19	Plot 21	Plot 21	Plot 89	Plot 89
DEPTH (m)	0.10	0.40	0.10	0.40	0.10	0.40
Ali >C5-C6	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ali >C6-C8	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ali >C8-C10	<1	<1	<1	<1	<1	<1
Ali >C10-C12	<1	<1	<1	<1	<1	<1
Ali >C12-C16	<1	<1	<1	<1	<1	<1
Ali >C16-C21	<1	<1	<1	<1	<1	<1
Ali >C21-C35	10	3	7	5	9	5
Total Aliphatics	10	3	7	5	9	5
Aro >C5-C7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aro >C7-C8	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aro >C8-C10	<1	<1	<1	<1	<1	<1
Aro >C10-C12	<1	<1	<1	<1	<1	<1
Aro >C12-C16	6	<1	2	<1	<1	<1
Aro >C16-C21	4	<1	3	<1	3	<1
Aro >C21-C35	10	1	12	<1	7	<1
Total Aromatics	20	1	17	<1	10	<1
TPH (Ali & Aro)	30	5	24	5	20	5
BTEX - Benzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - Toluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - Ethyl Benzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - m & p Xylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - o Xylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Organic Matter	1.8	1.3	2.3	0.6	6.1	0.5

TPH	Mean Value Test *	Range		AtRisk 2017 (mg/kg) Residential with Home Grown Produce	AtRisk 2017 (mg/kg) Residential with Home Grown Produce	DEFRA C4SL 2017
	US ₉₅	Largest Value (mg/kg)	Smallest Value (mg/kg)	1% SOM WITHOUT Free Product***	6% SOM WITHOUT Free Product***	6% SOM WITHOUT Free Product***
Ali >C5-C6	0.01	<0.01	<0.01	42.7	369	-
Ali >C6-C8	0.01	<0.01	<0.01	99.3	1240	-
Ali >C8-C10	1.00	<1	<1	13.9	204	-
Ali >C10-C12	1.00	<1	<1	81.7	1180	-
Ali >C12-C16	1.00	<1	<1	385	4130	-
Ali >C16-C21	1.00	<1	<1	210000	210100	-
Ali >C21-C35	8.69	10.00	3.00			
Total Aliphatics	8.69	10.00	3.00			
Aro >C5-C7	0.01	<0.01	<0.01	0.137	0.871	-
Aro >C7-C8	0.01	<0.01	<0.01	113	780	-
Aro >C8-C10	1.00	<1	<1	20.5	232	-
Aro >C10-C12	1.00	<1	<1	70	468	-
Aro >C12-C16	3.65	6.00	<1	165	830	-
Aro >C16-C21	3.26	4.00	<1	319	1040	-
Aro >C21-C35	9.45	12.00	<1	1120	1710	-
Total Aromatics	15.46	20.00	<1			
TPH (Ali & Aro)	24.07	30.00	5.00			
BTEX - Benzene	0.01	<0.01	<0.01	0.0493	0.33	0.871
BTEX - Toluene	0.01	<0.01	<0.01	113	780	-
BTEX - Ethyl Benzene	0.01	<0.01	<0.01	50.7	453	-
BTEX - m & p Xylene	0.01	<0.01	<0.01	24	312	-
BTEX - o Xylene	0.01	<0.01	<0.01	26.4	336	-
MTBE	0.01	<0.01	<0.01	27.6	220	

Results expressed as mg/kg air dried unless otherwise stated.

* - The calculations for the mean value test include outliers

*** THESE RESULTS PRESENTED ARE ASSESSED UNDER THE COMBINED CLEA ASSESSMENT CRITERION AS OUTLINED WITHIN SR4 ASSUMING NO FREE PRODUCT WAS OBSERVED DURING FIELDWORK- SEE 'GUIDANCE NOTES ON CONTAMINATION'.

NOTES:

For the Purpose of this investigation- results will be assessed against RESIDENTIAL GUIDELINES WITH HOMEGROWN PRODUCE WITH NO FREE PRODUCT.

UU Drinking Water Guidelines	
PE Threshold	
Total BTEX & MTBE	0.1
EC5-EC10 Ali-Aro	2
EC10-EC16 Ali-Aro	10
EC16-EC40 Ali-Aro	500

SUMMARY OF CONTAMINATION ANALYSIS: PAH

Project Name Edge Lane, Openshaw
Project No 21LPL083
Date 15/06/22

SOIL TYPE	TS	SS	TS	SS	TS	SS
SAMPLE LOCATION	Plot 19	Plot 19	Plot 21	Plot 21	Plot 89	Plot 89
DEPTH (m)	0.10	0.40	0.10	0.40	0.10	0.40
Acenaphthene	0.02	<0.01	<0.01	<0.01	0.09	0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	0.04	<0.02	0.02	<0.02	0.16	0.03
Benzo(a)anthracene	0.14	<0.04	0.08	<0.04	0.33	<0.04
Benzo(a)pyrene	0.15	<0.04	0.09	<0.04	0.29	<0.04
Benzo(b)fluoranthene	0.19	<0.05	0.12	<0.05	0.37	<0.05
Benzo(ghi)perylene	0.08	<0.05	0.05	<0.05	0.15	<0.05
Benzo(k)fluoranthene	<0.07	<0.07	<0.07	<0.07	0.15	<0.07
Chrysene	0.18	<0.06	0.11	<0.06	0.4	<0.06
Dibenzo(ah)anthracene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Fluoranthene	0.33	<0.08	0.2	<0.08	0.85	0.12
Fluorene	0.01	<0.01	<0.01	<0.01	0.06	0.01
Indeno(123-cd)pyrene	0.11	<0.03	0.08	<0.03	0.21	<0.03
Naphthalene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Phenanthrene	0.14	<0.03	0.07	<0.03	0.55	0.1
Pyrene	0.31	<0.07	0.18	<0.07	0.77	0.11
Organic Matter	1.8	1.3	2.3	0.6	6.1	0.5

PAH	Mean Value Test *	Range		AtRisk 2017 (mg/kg) Residential with Home Grown Produce	AtRisk 2017 (mg/kg) Residential with Home Grown Produce	DEFRA's C4SL 2017
	US ₉₅	Largest Value (mg/kg)	Smallest Value (mg/kg)	1% SOM WITHOUT Free Product***	6% SOM WITHOUT Free Product***	6% SOM WITHOUT Free Product***
Acenaphthene	0.05	0.09	<0.01	608	2760	-
Acenaphthylene	0.01	<0.01	<0.01			-
Anthracene	0.09	0.16	<0.02	10200	26200	-
Benzo(a)anthracene	0.21	0.33	<0.04	4.52	8.54	-
Benzo(a)pyrene	0.19	0.29	<0.04	1.51	2.05	4.95
Benzo(b)fluoranthene	0.24	0.37	<0.05	7.72	9.86	-
Benzo(ghi)perylene	0.10	0.15	<0.05	96.2	103	-
Benzo(k)fluoranthene	0.11	0.15	<0.07	84.4	100	-
Chrysene	0.25	0.40	<0.06	585	927	-
Dibenzo(ah)anthracene	0.04	<0.04	<0.04	0.838	1	-
Fluoranthene	0.52	0.85	<0.08	983	2980	-
Fluorene	0.04	0.06	<0.01	735	2610	-
Indeno(123-cd)pyrene	0.14	0.21	<0.03	7.31	9.75	-
Naphthalene	0.03	<0.03	<0.03	0.829	12.2	-
Phenanthrene	0.32	0.55	<0.03			-
Pyrene	0.47	0.77	<0.07	668	2120	-

Results expressed as mg/kg air dried unless otherwise stated.

* - The calculations for the mean value test include outliers

*** THESE RESULTS PRESENTED ARE ASSESSED UNDER THE COMBINED CLEA ASSESSMENT CRITERION AS OUTLINED WITHIN SR4 ASSUMING NO FREE PRODUCT WAS OBSERVED DURING FIELDWORK- SEE 'GUIDANCE NOTES ON CONTAMINATION'.

NOTES:

For the Purpose of this investigation- results will be assessed against **RESIDENTIAL GUIDELINES WITH HOMEGROWN PRODUCE WITH NO FREE PRODUCT.**