

6th October 2022

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



Dear Richard,

Edge Lane, Openshaw – Soil Cover System Assessment – Plots 154-159

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 28th September 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 154-159 on 28th September 2022 confirmed that the topsoil thickness was greater than 150mm; the subsoil was a typical thickness greater than 450mm and a geotextile membrane was in place at the base completing the required 600mm clean cover system.



Old Marsh Farm Barns
Welsh Road, Sealand
Flintshire CH5 2LY
Telephone: 01244 288179
www.betts-associates.co.uk

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 155 and 158 on 28th September 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. 4 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 154-159 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 154



Plot 155



Plot 156



Plot 157





Plot 158



Plot 159



SUMMARY OF CONTAMINATION ANALYSIS: SOIL

SUMMARY OF CONTAMINATION ANALYSIS: METALS

Project Name Edge Lane
 Project No 21LPL083
 Date 28/09/2022

SOIL TYPE	TS	SS	TS	SS
SAMPLE LOCATION	Plot 155	Plot 155	Plot 158	Plot 158
DEPTH (m)	0.10	0.40	0.10	0.40
pH	6.91	8.39	7.88	6.89
Sulphate (water sol 2:1)	0.04	0.08	0.03	0.03
Organic matter	9.7	0.7	0.4	9.1
Arsenic	21	3	3	22
Cadmium	0.8	<0.5	0.5	0.8
Copper	46	16	16	45
Chromium (hexavalent)	<1	<1	<1	<1
Lead	109	8	9	105
Mercury	<0.17	<0.17	<0.17	<0.17
Nickel	18	23	33	17
Selenium	<1	<1	<1	<1
Zinc	82	33	37	84
Asbestos in Soil	NAD	NAD	NAD	NAD
Asbestos Matrix	-	-	-	-
Quantification	-	-	-	-
Organic matter	9.7	0.7	0.4	9.1

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	-	8.39	6.89			-
Sulphate (water sol 2:1)	-	0.08	0.03			-
Organic matter	-	9.70	0.40			
Arsenic	-	22.00	3.00	32	32	37
Cadmium	-	0.80	<0.5	10	10	22.1
Copper	-	46.00	16.00	4730	4790	-
Chromium (hexavalent)	-	<1	<1	3.62	3.63	20.5
Lead	-	109.00	8.00			200
Mercury	-	<0.17	<0.17	8.81	15.8	-
Nickel	-	33.00	17.00	EA/AtRisk withdrawn Aug 2015		
Selenium	-	<1	<1	375	375	-
Zinc	-	84.00	33.00	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 SGV's 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 SGV's 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
Project No 21LPL083
Date 28/09/2022

SOIL TYPE	TS	SS	TS	SS
SAMPLE LOCATION	Plot 155	Plot 155	Plot 158	Plot 158
DEPTH (m)	0.10	0.40	0.10	0.40
Ali >C5-C6	<0.01	<0.01	<0.01	<0.01
Ali >C6-C8	<0.01	<0.01	<0.01	<0.01
Ali >C8-C10	<1	<1	<1	<1
Ali >C10-C12	<1	<1	<1	<1
Ali >C12-C16	<1	<1	<1	<1
Ali >C16-C21	3	<1	3	<1
Ali >C21-C35	21	<1	19	<1
Total Aliphatics	23	<1	22	<1
Aro >C5-C7	<0.01	<0.01	<0.01	<0.01
Aro >C7-C8	0.01	<0.01	<0.01	<0.01
Aro >C8-C10	1	<1	1	<1
Aro >C10-C12	<1	<1	<1	<1
Aro >C12-C16	10	<1	3	<1
Aro >C16-C21	32	<1	8	<1
Aro >C21-C35	61	<1	22	<1
Total Aromatics	105	<1	33	<1
TPH (Ali & Aro)	128	<1	55	<1
BTEX - Benzene	<0.01	<0.01	<0.01	<0.01
BTEX - Toluene	0.01	<0.01	<0.01	<0.01
BTEX - Ethyl Benzene	<0.01	<0.01	<0.01	<0.01
BTEX - m & p Xylene	<0.01	<0.01	<0.01	<0.01
BTEX - o Xylene	<0.01	<0.01	<0.01	<0.01
MTBE	<0.01	<0.01	<0.01	<0.01
Organic Matter	9.7	0.7	0.4	9.1

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	42.7	369	-
Ali >C6-C8	-	<0.01	<0.01	99.3	1240	-
Ali >C8-C10	-	<1	<1	13.9	204	-
Ali >C10-C12	-	<1	<1	81.7	1180	-
Ali >C12-C16	-	<1	<1	385	4130	-
Ali >C16-C21	-	3.00	<1	210000	210100	-
Ali >C21-C35	-	21.00	<1			
Total Aliphatics	-	23.00	<1			
Aro >C5-C7	-	<0.01	<0.01	0.137	0.871	-
Aro >C7-C8	-	0.01	<0.01	113	780	-
Aro >C8-C10	-	1.00	<1	20.5	232	-
Aro >C10-C12	-	<1	<1	70	468	-
Aro >C12-C16	-	10.00	<1	165	830	-
Aro >C16-C21	-	32.00	<1	319	1040	-
Aro >C21-C35	-	61.00	<1	1120	1710	-
Total Aromatics	-	105.00	<1			
TPH (Ali & Aro)	-	128.00	<1			
BTEX - Benzene	-	<0.01	<0.01	0.0493	0.33	0.871
BTEX - Toluene	-	0.01	<0.01	113	780	-
BTEX - Ethyl Benzene	-	<0.01	<0.01	50.7	453	-
BTEX - m & p Xylene	-	<0.01	<0.01	24	312	-
BTEX - o Xylene	-	<0.01	<0.01	26.4	336	-
MTBE	-	<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
 Project No 21LPL083
 Date 28/09/22

SOIL TYPE	TS	SS	TS	SS
SAMPLE LOCATION	Plot 155	Plot 155	Plot 158	Plot 158
DEPTH (m)	0.10	0.40	0.10	0.40
Acenaphthene	0.15	<0.01	0.06	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01
Anthracene	0.17	<0.02	0.1	<0.02
Benzo(a)anthracene	0.44	<0.04	0.36	<0.04
Benzo(a)pyrene	0.4	<0.04	0.35	<0.04
Benzo(b)fluoranthene	0.5	<0.05	0.46	<0.05
Benzo(ghi)perylene	0.21	<0.05	0.18	<0.05
Benzo(k)fluoranthene	0.18	<0.07	0.14	<0.07
Chrysene	0.5	<0.06	0.45	<0.06
Dibenzo(ah)anthracene	<0.04	<0.04	<0.04	<0.04
Fluoranthene	1.06	<0.08	0.86	<0.08
Fluorene	0.09	<0.01	0.04	<0.01
Indeno(123-cd)pyrene	0.23	<0.03	0.2	<0.03
Naphthalene	0.3	<0.03	<0.03	<0.03
Phenanthrene	0.85	<0.03	0.5	<0.03
Pyrene	0.95	<0.07	0.79	<0.07
Organic Matter	9.7	0.7	0.4	9.1

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	-	0.15	<0.01	608	2760	-
Acenaphthylene	-	<0.01	<0.01			-
Anthracene	-	0.17	<0.02	10200	26200	-
Benzo(a)anthracene	-	0.44	<0.04	4.52	8.54	-
Benzo(a)pyrene	-	0.40	<0.04	1.51	2.05	4.95
Benzo(b)fluoranthene	-	0.50	<0.05	7.72	9.86	-
Benzo(ghi)perylene	-	0.21	<0.05	96.2	103	-
Benzo(k)fluoranthene	-	0.18	<0.07	84.4	100	-
Chrysene	-	0.50	<0.06	585	927	-
Dibenzo(ah)anthracene	-	<0.04	<0.04	0.838	1	-
Fluoranthene	-	1.06	<0.08	983	2980	-
Fluorene	-	0.09	<0.01	735	2610	-
Indeno(123-cd)pyrene	-	0.23	<0.03	7.31	9.75	-
Naphthalene	-	0.30	<0.03	0.829	12.2	-
Phenanthrene	-	0.85	<0.03			-
Pyrene	-	0.95	<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.**