

19th August 2022

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



Dear Richard,

Edge Lane, Openshaw – Soil Cover System Assessment – Plots 91-101

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 10th August 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 91-101 on 10th August 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 92, 95, 98 & 101 on 10th August 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. 8 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 91-101 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 91



Plot 92



Plot 93





Plot 94



Plot 95



Plot 96



Plot 97



Plot 98



Plot 99



Plot 100



Plot 101

SUMMARY OF CONTAMINATION ANALYSIS: METALS

Project Name Edge Lane
Project No 21LPL083
Date 10/08/2022

SOIL TYPE	TS	SS	TS	SS	TS	SS	TS	SS
SAMPLE LOCATION	Plot 92	Plot 92	Plot 95	Plot 95	Plot 98	Plot 98	Plot 101	Plot 101
DEPTH (m)	0.10	0.40	0.10	0.40	0.10	0.40	0.10	0.40
pH	6.93	7.98	6.42	8.43	6.44	8.08	6.74	8.25
Sulphate (water sol 2:1)	0.03	0.07	0.02	0.08	0.03	0.07	0.02	0.07
Organic matter	10.9	1.5	10.8	0.5	11.5	0.4	9.8	0.7
Arsenic	17	<1	19	<1	18	<1	14	<1
Cadmium	1.3	1	1.5	0.8	1.4	0.8	1.3	0.8
Copper	49	18	48	13	47	15	44	17
Chromium (hexavalent)	<1	<1	<1	<1	<1	<1	<1	<1
Lead	114	12	113	7	113	10	102	15
Mercury	0.19	<0.17	<0.17	<0.17	<0.17	<0.17	0.24	<0.17
Nickel	21	26	22	21	21	23	19	23
Selenium	<1	<1	<1	<1	1	<1	<1	<1
Zinc	95	54	100	43	96	37	93	47
Asbestos in Soil	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos Matrix	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Quantification	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Organic matter	10.9	1.5	10.8	0.5	11.5	0.4	9.8	0.7

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	7.98	8.43	6.42			-
Sulphate (water sol 2:1)	0.07	0.08	0.02			-
Organic matter	9.35	11.50	0.40			
Arsenic	14.81	19.00	<1	32	32	37
Cadmium	1.31	1.50	0.80	10	10	22.1
Copper	42.65	49.00	13.00	4730	4790	-
Chromium (hexavalent)	1.00	<1	<1	3.62	3.63	20.5
Lead	96.49	114.00	7.00			200
Mercury	0.20	0.24	0.19	8.81	15.8	-
Nickel	23.39	26.00	<0.17	EA/AtRisk withdrawn Aug 2015		
Selenium	1.00	1.00	<1	375	375	-
Zinc	89.11	100.00	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 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 10/08/2022

SOIL TYPE	TS	SS	TS	SS	TS	SS	TS	SS
SAMPLE LOCATION	Plot 92	Plot 92	Plot 95	Plot 95	Plot 98	Plot 98	Plot 101	Plot 101
DEPTH (m)	0.10	0.40	0.10	0.40	0.10	0.40	0.10	0.40
Ali >C5-C6	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
Ali >C6-C8	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
Ali >C8-C10	<1	<1	<1	<1	<1	<1	<1	<1
Ali >C10-C12	<1	<1	<1	<1	<1	<1	<1	<1
Ali >C12-C16	<1	<1	1	<1	<1	<1	1	<1
Ali >C16-C21	3	<1	2	<1	3	<1	2	<1
Ali >C21-C35	32	2	30	3	22	<1	22	2
Total Aliphatics	27	2	27	3	19	<1	22	2
Aro >C5-C7	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
Aro >C7-C8	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
Aro >C8-C10	<1	<1	<1	<1	<1	<1	2	<1
Aro >C10-C12	<1	<1	<1	<1	<1	<1	1	<1
Aro >C12-C16	4	<1	4	<1	4	<1	5	<1
Aro >C16-C21	10	1	15	2	14	<1	13	<1
Aro >C21-C35	32	2	40	5	38	2	35	2
Total Aromatics	36	3	47	7	43	2	48	2
TPH (Ali & Aro)	63	5	74	10	62	2	70	4
BTEX - Benzene	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
BTEX - Toluene	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
BTEX - Ethyl Benzene	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
BTEX - m & p Xylene	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
BTEX - o Xylene	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
MTBE	<0.05	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
Organic Matter	10.9	1.5	10.8	0.5	11.5	0.4	9.8	0.7

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	0.03	<0.05	<0.01	42.7	369	-
Ali >C6-C8	0.03	<0.05	<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	1.00	<1	385	4130	-
Ali >C16-C21	2.34	3.00	<1	210000	210100	-
Ali >C21-C35	23.33	32.00	<1			
Total Aliphatics	20.86	27.00	<1			
Aro >C5-C7	0.03	<0.05	<0.01	0.137	0.871	-
Aro >C7-C8	0.03	<0.05	<0.01	113	780	-
Aro >C8-C10	1.36	2.00	<1	20.5	232	-
Aro >C10-C12	1.00	1.00	<1	70	468	-
Aro >C12-C16	3.81	5.00	<1	165	830	-
Aro >C16-C21	11.44	15.00	<1	319	1040	-
Aro >C21-C35	31.61	40.00	2.00	1120	1710	-
Total Aromatics	38.06	48.00	2.00			
TPH (Ali & Aro)	58.64	74.00	2.00			
BTEX - Benzene	0.03	<0.05	<0.01	0.0493	0.33	0.871
BTEX - Toluene	0.03	<0.05	<0.01	113	780	-
BTEX - Ethyl Benzene	0.03	<0.05	<0.01	50.7	453	-
BTEX - m & p Xylene	0.03	<0.05	<0.01	24	312	-
BTEX - o Xylene	0.03	<0.05	<0.01	26.4	336	-
MTBE	0.03	<0.05	<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 10/08/22

SOIL TYPE	TS	SS	TS	SS	TS	SS	TS	SS
SAMPLE LOCATION	Plot 92	Plot 92	Plot 95	Plot 95	Plot 98	Plot 98	Plot 101	Plot 101
DEPTH (m)	0.10	0.40	0.10	0.40	0.10	0.40	0.10	0.40
Acenaphthene	0.13	<0.01	0.04	0.07	0.05	<0.01	0.05	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	0.17	<0.02	0.05	0.13	0.09	<0.02	0.07	<0.02
Benzo(a)anthracene	0.55	<0.04	0.24	0.39	0.37	<0.04	0.28	<0.04
Benzo(a)pyrene	0.43	<0.04	0.24	0.4	0.37	<0.04	0.27	<0.04
Benzo(b)fluoranthene	0.56	<0.05	0.3	0.44	0.49	<0.05	0.35	<0.05
Benzo(ghi)perylene	0.23	<0.05	0.12	0.2	0.2	<0.05	0.15	<0.05
Benzo(k)fluoranthene	0.19	<0.07	0.1	0.15	0.16	<0.07	0.12	<0.07
Chrysene	0.62	<0.06	0.31	0.46	0.49	<0.06	0.36	<0.06
Dibenzo(ah)anthracene	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Fluoranthene	1.13	<0.08	0.49	0.86	0.8	<0.08	0.59	<0.08
Fluorene	0.09	<0.01	0.01	0.04	0.04	<0.01	0.02	<0.01
Indeno(123-cd)pyrene	0.28	<0.03	0.15	0.22	0.24	<0.03	0.16	<0.03
Naphthalene	0.27	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Phenanthrene	0.83	<0.03	0.25	0.54	0.42	<0.03	0.32	<0.03
Pyrene	1.02	<0.07	0.47	0.8	0.76	<0.07	0.57	<0.07
Organic Matter	10.9	1.5	10.8	0.5	11.5	0.4	9.8	0.7

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	0.07	0.13	<0.01	608	2760	-
Acenaphthylene	0.01	<0.01	<0.01			-
Anthracene	0.11	0.17	<0.02	10200	26200	-
Benzo(a)anthracene	0.37	0.55	<0.04	4.52	8.54	-
Benzo(a)pyrene	0.34	0.43	<0.04	1.51	2.05	4.95
Benzo(b)fluoranthene	0.43	0.56	<0.05	7.72	9.86	-
Benzo(ghi)perylene	0.18	0.23	<0.05	96.2	103	-
Benzo(k)fluoranthene	0.15	0.19	<0.07	84.4	100	-
Chrysene	0.45	0.62	<0.06	585	927	-
Dibenzo(ah)anthracene	0.04	0.05	<0.04	0.838	1	-
Fluoranthene	0.79	1.13	<0.08	983	2980	-
Fluorene	0.05	0.09	<0.01	735	2610	-
Indeno(123-cd)pyrene	0.21	0.28	<0.03	7.31	9.75	-
Naphthalene	0.12	0.27	<0.03	0.829	12.2	-
Phenanthrene	0.50	0.83	<0.03			-
Pyrene	0.73	1.02	<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.**