

APPENDIX 3

TOPSOIL TEST RESULTS

21LPL086/TM/SP01

03rd November 2021

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



Dear Richard,

Soil Sampling of Topsoil Stockpile – The Strand, Rochdale

Overview

Betts Geo Ltd was instructed to undertake soil sampling within a stockpile of imported material at the above site to assess suitability of the material for possible re-use as topsoil. Sampling was undertaken by a Geo-environmental Engineer on the 12th October 2021.

The stockpile was approximately 1000m³ and was imported from Balderstone Road, Rochdale.

Physical Suitability of the Stockpile

The stockpile appeared to be a dark brown clayey SAND with organics.

The topsoil encountered on site is deemed physically suitable for re-use.

It should be noted that excavations into the stockpile were not undertaken, details of stockpile composition are taken from surface only. Should any material other than topsoil be encountered, additional physical assessment by an engineer is required.

Chemical Validation of Stockpile

The topsoil is considered to be greenfield sourced therefore samples were taken at a rate of 1:150m³ or a minimum of 3 samples i.e. 7 samples were taken from the stockpile.

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 with the exception of a slightly elevated occurrence of lead in SP01B (205mg/kg v guidance value of 200mg/kg). As the U⁹⁵ means test value for the stockpile falls well below the 200mg/kg guidance value (U⁹⁵ value of 127.80mg/kg) this slight elevation can be discounted.



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

Summary

Betts Geo Environmental confirms that the soil is acceptable for re-use as topsoil.

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

Yours Sincerely,



Tommy McCormack
BETTS GEO ENVIRONMENTAL LIMITED

Encl –
Photograph of stockpile
Chemical Data of Topsoil





Photographs of Stockpile

SUMMARY OF CONTAMINATION ANALYSIS: METALS

Project Name The Strand
Project No 21LPL086
Date 12/10/2021

SOIL TYPE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAMPLE LOCATION	SP01 A	SP01 B	SP01 C	SP01 D	SP01 E	SP01 F	SP01 G
DEPTH (m)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
pH	8.21	8.09	8.1	8.12	8.13	7.9	7.76
Sulphate (water sol 2:1)	<0.01	<0.01	0.02	<0.01	<0.01	0.04	0.05
Organic matter	6.3	7.2	8.3	6.1	4.9	12.1	3.6
Arsenic	8	12	11	9	7	8	6
Cadmium	0.8	0.9	0.8	0.9	0.7	0.8	0.7
Copper	66	67	61	65	42	55	41
Chromium (hexavalent)	<1	<1	<1	<1	<1	<1	<1
Lead	83	205	75	79	61	70	56
Mercury	<0.17	0.19	<0.17	<0.17	<0.17	<0.17	<0.17
Nickel	15	18	15	16	14	14	13
Selenium	<1	<1	<1	<1	<1	<1	<1
Zinc	104	121	101	109	85	99	72
Asbestos in Soil	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos Matrix	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Quantification	0	0	0	0	0	0	0
Organic matter	6.3	7.2	8.3	6.1	4.9	12.1	3.6

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	8.16	8.21	7.76			-
Sulphate (water sol 2:1)	0.03	0.05	<0.01			-
Organic matter	8.94	12.10	3.60			
Arsenic	10.28	12.00	6.00	32	32	37
Cadmium	0.86	0.90	0.70	10	10	22.1
Copper	64.90	67.00	41.00	4730	4790	-
Chromium (hexavalent)	1.00	<1	<1	3.62	3.63	20.5
Lead	127.80	205.00	56.00			200
Mercury	0.18	0.19	<0.17	8.81	15.8	-
Nickel	16.20	18.00	13.00	EA/AtRisk withdrawn Aug 2015		
Selenium	1.00	<1	<1	375	375	-
Zinc	110.47	121.00	72.00	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

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 The Strand
Project No 21LPL086
Date 12/10/2021

SOIL TYPE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAMPLE LOCATION	SP01 A	SP01 B	SP01 C	SP01 D	SP01 E	SP01 F	SP01 G
DEPTH (m)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Ali >C5-C6	<0.01	<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	<0.01
Ali >C8-C10	<1	<1	<1	<1	<1	<1	<1
Ali >C10-C12	<1	<1	<1	<1	<1	<1	<1
Ali >C12-C16	<1	<1	<1	<1	<1	<1	1
Ali >C16-C21	2	1	2	1	<1	2	3
Ali >C21-C35	25	22	35	40	18	26	38
Total Aliphatics	28	23	37	41	19	28	42
Aro >C5-C7	<0.01	<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	<0.01
Aro >C8-C10	<1	<1	<1	<1	<1	<1	<1
Aro >C10-C12	<1	<1	<1	1	<1	<1	<1
Aro >C12-C16	3	2	2	7	3	4	6
Aro >C16-C21	10	13	11	20	9	18	23
Aro >C21-C35	59	59	77	87	48	81	84
Total Aromatics	73	74	91	115	60	104	113
TPH (Ali & Aro)	100	97	128	156	78	132	155
BTEX - Benzene	<0.01	<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	<0.01
BTEX - Ethyl Benzene	<0.01	<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	<0.01
BTEX - o Xylene	<0.01	<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	<0.01
Organic Matter	6.3	7.2	8.3	6.1	4.9	12.1	3.6

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	1.00	<1	385	4130	-
Ali >C16-C21	2.27	3.00	<1	210000	210100	-
Ali >C21-C35	35.38	40.00	18.00			
Total Aliphatics	37.73	42.00	19.00			
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	1.00	<1	70	468	-
Aro >C12-C16	5.29	7.00	2.00	165	830	-
Aro >C16-C21	18.87	23.00	9.00	319	1040	-
Aro >C21-C35	81.84	87.00	48.00	1120	1710	-
Total Aromatics	105.85	115.00	60.00			
TPH (Ali & Aro)	142.93	156.00	78.00			
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 The Strand
Project No 21LPL086
Date 12/10/21

SOIL TYPE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SAMPLE LOCATION	SP01 A	SP01 B	SP01 C	SP01 D	SP01 E	SP01 F	SP01 G
DEPTH (m)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Acenaphthene	0.8	0.07	0.08	0.08	0.07	0.56	0.16
Acenaphthylene	0.02	0.01	0.02	0.01	<0.01	0.02	0.01
Anthracene	0.81	0.14	0.2	0.15	0.11	0.72	0.23
Benzo(a)anthracene	1.45	0.74	1.12	0.83	0.54	1.25	0.63
Benzo(a)pyrene	1.37	0.79	1.17	0.88	0.53	1.05	0.59
Benzo(b)fluoranthene	1.51	0.96	1.28	1.04	0.6	1.18	0.72
Benzo(ghi)perylene	0.76	0.5	0.8	0.52	0.32	0.55	0.32
Benzo(k)fluoranthene	0.62	0.36	0.45	0.35	0.2	0.46	0.26
Chrysene	1.53	0.81	1.11	0.9	0.54	1.25	0.65
Dibenzo(ah)anthracene	0.16	0.1	0.15	0.12	0.07	0.12	0.07
Fluoranthene	3.53	1.34	1.97	1.56	1	2.91	1.26
Fluorene	0.46	0.03	0.06	0.05	0.04	0.35	0.11
Indeno(123-cd)pyrene	0.81	0.51	0.81	0.57	0.33	0.58	0.34
Naphthalene	0.18	<0.03	0.04	<0.03	<0.03	0.19	0.06
Phenanthrene	3.75	0.61	0.73	0.68	0.48	3.02	0.97
Pyrene	3.2	1.29	1.88	1.49	0.95	2.51	1.18
Organic Matter	6.3	7.2	8.3	6.1	4.9	12.1	3.6

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	0.48	0.80	0.07	608	2760	-
Acenaphthylene	0.02	0.02	<0.01			-
Anthracene	0.55	0.81	0.11	10200	26200	-
Benzo(a)anthracene	1.19	1.45	0.54	4.52	8.54	-
Benzo(a)pyrene	1.14	1.37	0.53	1.51	2.05	4.95
Benzo(b)fluoranthene	1.27	1.51	0.60	7.72	9.86	-
Benzo(ghi)perylene	0.68	0.80	0.32	96.2	103	-
Benzo(k)fluoranthene	0.49	0.62	0.20	84.4	100	-
Chrysene	1.23	1.53	0.54	585	927	-
Dibenzo(ah)anthracene	0.14	0.16	0.07	0.838	1	-
Fluoranthene	2.63	3.53	1.00	983	2980	-
Fluorene	0.29	0.46	0.03	735	2610	-
Indeno(123-cd)pyrene	0.71	0.81	0.33	7.31	9.75	-
Naphthalene	0.13	0.19	<0.03	0.829	12.2	-
Phenanthrene	2.45	3.75	0.48			-
Pyrene	2.38	3.20	0.95	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.**

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 21/11084
Issue Number: 1

Date: 22 October, 2021

Client: Betts Geo Environmental
Old Marsh Farm Barns
Welsh Road
Sealand
Flintshire
UK
CH5 2LY

Project Manager: Betts Geolab/Tommy McCormack
Project Name: The Strand
Project Ref: 21LPL086
Order No: BG4386
Date Samples Received: 12/10/21
Date Instructions Received: 13/10/21
Date Analysis Completed: 22/10/21

Prepared by:



Danielle Brierley
Deputy Client Services Supervisor

Approved by:



Sophie France
Client Service Manager

Envirolab Job Number: 21/11084

Client Project Name: The Strand

Client Project Ref: 21LPL086

Lab Sample ID	21/11084/1	21/11084/2	21/11084/3	21/11084/4	21/11084/5	21/11084/6	21/11084/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	SP01 A	SP01 B	SP01 C	SP01 D	SP01 E	SP01 F	SP01 G			
Depth to Top	0.20	0.20	0.20	0.20	0.20	0.20	0.20			
Depth To Bottom										
Date Sampled	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AE	6AE	6AE	6AE	6AE	6AE	6A			
% Stones >10mm _A	6.1	7.5	4.3	5.1	16.3	10.6	5.8	% w/w	0.1	A-T-044
pH _D ^{M#}	8.21	8.09	8.10	8.12	8.13	7.90	7.76	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	<0.01	<0.01	0.02	<0.01	<0.01	0.04	0.05	g/l	0.01	A-T-026s
Organic matter _D ^{M#}	6.3	7.2	8.3	6.1	4.9	12.1	3.6	% w/w	0.1	A-T-032 OM
Arsenic _D ^{M#}	8	12	11	9	7	8	6	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	0.8	0.9	0.8	0.9	0.7	0.8	0.7	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	66	67	61	65	42	55	41	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead _D ^{M#}	83	205	75	79	61	70	56	mg/kg	1	A-T-024s
Mercury _D	<0.17	0.19	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	15	18	15	16	14	14	13	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc _D ^{M#}	104	121	101	109	85	99	72	mg/kg	5	A-T-024s
VPH total (>C5-C10)	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	mg/kg	1	Calc- stone+mois

Envirolab Job Number: 21/11084

Client Project Name: The Strand

Client Project Ref: 21LPL086

Lab Sample ID	21/11084/1	21/11084/2	21/11084/3	21/11084/4	21/11084/5	21/11084/6	21/11084/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	SP01 A	SP01 B	SP01 C	SP01 D	SP01 E	SP01 F	SP01 G			
Depth to Top	0.20	0.20	0.20	0.20	0.20	0.20	0.20			
Depth To Bottom										
Date Sampled	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AE	6AE	6AE	6AE	6AE	6AE	6A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 21/11084

Client Project Name: The Strand

Client Project Ref: 21LPL086

Lab Sample ID	21/11084/1	21/11084/2	21/11084/3	21/11084/4	21/11084/5	21/11084/6	21/11084/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	SP01 A	SP01 B	SP01 C	SP01 D	SP01 E	SP01 F	SP01 G			
Depth to Top	0.20	0.20	0.20	0.20	0.20	0.20	0.20			
Depth To Bottom										
Date Sampled	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AE	6AE	6AE	6AE	6AE	6AE	6A			
PAH-16MS										
Acenaphthene _A ^{M#}	0.80	0.07	0.08	0.08	0.07	0.56	0.16	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	0.02	0.01	0.02	0.01	<0.01	0.02	0.01	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	0.81	0.14	0.20	0.15	0.11	0.72	0.23	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	1.45	0.74	1.12	0.83	0.54	1.25	0.63	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	1.37	0.79	1.17	0.88	0.53	1.05	0.59	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	1.51	0.96	1.28	1.04	0.60	1.18	0.72	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.76	0.50	0.80	0.52	0.32	0.55	0.32	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.62	0.36	0.45	0.35	0.20	0.46	0.26	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	1.53	0.81	1.11	0.90	0.54	1.25	0.65	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	0.16	0.10	0.15	0.12	0.07	0.12	0.07	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	3.53	1.34	1.97	1.56	1.00	2.91	1.26	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	0.46	0.03	0.06	0.05	0.04	0.35	0.11	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.81	0.51	0.81	0.57	0.33	0.58	0.34	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	0.18	<0.03	0.04	<0.03	<0.03	0.19	0.06	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	3.75	0.61	0.73	0.68	0.48	3.02	0.97	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	3.20	1.29	1.88	1.49	0.95	2.51	1.18	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	21	8.26	11.9	9.23	5.78	16.7	7.56	mg/kg	0.01	A-T-019s

Envirolab Job Number: 21/11084

Client Project Name: The Strand

Client Project Ref: 21LPL086

Lab Sample ID	21/11084/1	21/11084/2	21/11084/3	21/11084/4	21/11084/5	21/11084/6	21/11084/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	SP01 A	SP01 B	SP01 C	SP01 D	SP01 E	SP01 F	SP01 G			
Depth to Top	0.20	0.20	0.20	0.20	0.20	0.20	0.20			
Depth To Bottom										
Date Sampled	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21	12-Oct-21			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6AE	6AE	6AE	6AE	6AE	6AE	6A			
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	<1	<1	<1	<1	1	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	2	1	2	1	<1	2	3	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	25	22	35	40	18	26	38	mg/kg	1	A-T-055s
Total Aliphatics _A	28	23	37	41	19	28	42	mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	<1	<1	1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16 _A	3	2	2	7	3	4	6	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	10	13	11	20	9	18	23	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	59	59	77	87	48	81	84	mg/kg	1	A-T-055s
Total Aromatics _A	73	74	91	115	60	104	113	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	100	97	128	156	78	132	155	mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Betts Geo Environmental, Old Marsh Farm Barns, Welsh Road, Sealand,
Flintshire, UK, CH5 2LY

Project: The Strand

Clients Project No: 21LPL086

Project No: 21/11084

Date Received: 13/10/2021 (am)

Cool Box Temperatures (°C): 12.5

NO DEVIATIONS IDENTIFIED with respect to sampling dates or containers received.

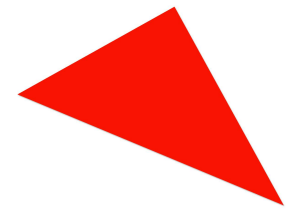
Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples $5 \pm 3^{\circ}\text{C}$), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	21/11084/1	21/11084/2	21/11084/3	21/11084/4	21/11084/5	21/11084/6	21/11084/7
Client Sample No							
Client Sample ID/Depth	SP01 A 0.20m	SP01 B 0.20m	SP01 C 0.20m	SP01 D 0.20m	SP01 E 0.20m	SP01 F 0.20m	SP01 G 0.20m
Date Sampled	12/10/21	12/10/21	12/10/21	12/10/21	12/10/21	12/10/21	12/10/21
A-T-019s	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021
A-T-022s	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021
A-T-024s	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021
A-T-026s	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021
A-T-031s	19/10/2021	19/10/2021	19/10/2021	19/10/2021	19/10/2021	19/10/2021	19/10/2021
A-T-032 OM	22/10/2021	22/10/2021	22/10/2021	22/10/2021	22/10/2021	22/10/2021	22/10/2021
A-T-040s	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021
A-T-044	19/10/2021	19/10/2021	19/10/2021	19/10/2021	19/10/2021	19/10/2021	19/10/2021
A-T-045	14/10/2021	14/10/2021	14/10/2021	14/10/2021	14/10/2021	14/10/2021	14/10/2021
A-T-055s	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021
Calc-stone+mois	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021	18/10/2021

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report



APPENDIX 4

GAS MEMBRANE VALIDATION REPORT

Principal: **D.J. Middleton BEng(Hons) CEng MStructE**
Company Number: **11006567**
Address **11 Bridgewater Road, Walkden, Worsley, Manchester M28 3JE**
VAT Number: **285 0439 91**

House Types: B2/B8
Construction Type: Beam and Block Precast Floor
Protection Anticipated: CS2 / Amber 1 – Telescopic Venting

Floor Type	1. Precast beam and block with minimal service penetrations.
Installation Quality	2. Good level of workmanship in line with good practice to CQA.
Testing Regime 1	3. Independent validation of all plots by Betts Geo Environmental Ltd.
Membrane type	4. Visqueen Low Permeability Gas Membrane - https://visqueen.com/products/low-permeability-gas-membrane-lpgm
Extent of coverage	5. All.
Underside of membrane	6. Onto block and beam
Slab/membrane condition	7. Precast beam and block with minimal service penetrations via sealed top hats. Membrane in V good condition
Laps and joints	8. Very good – Double seals top and bottom throughout.
Damp-proof course	9. Yes.
Service entries and seals	10. Good seals: Top-hats / taped.
Cavity inspection	11. Good.

These plots have PASSED inspection.

(Any proposed remedial works will be noted in the 'Remarks' column on this form).

An additional inspection visit IS NOT required for these plots.
Qualified Engineer: Marc Fawcett



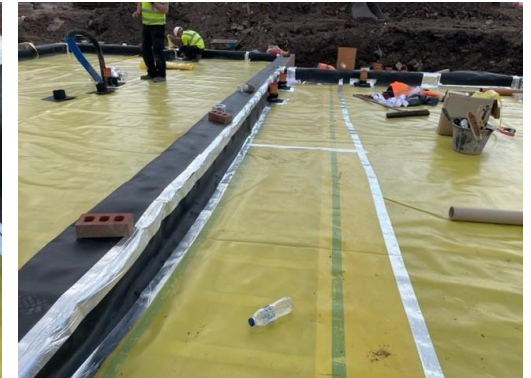
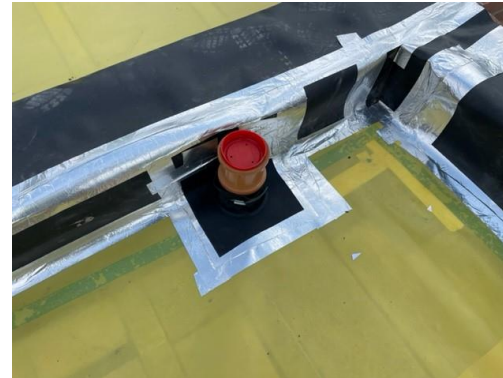
House Types: A4/D
Construction Type: Beam and Block Precast Floor
Protection Anticipated: CS2 / Amber 1 – Telescopic Venting

Floor Type	1. Precast beam and block with minimal service penetrations.
Installation Quality	2. Good level of workmanship in line with good practice to CQA.
Testing Regime 1	3. Independent validation of all plots by Betts Geo Environmental Ltd.
Membrane type	4. Visqueen Low Permeability Gas Membrane - https://visqueen.com/products/low-permeability-gas-membrane-lpgm
Extent of coverage	5. All.
Underside of membrane	6. Onto block and beam
Slab/membrane condition	7. Precast beam and block with minimal service penetrations via sealed top hats. Membrane in V good condition
Laps and joints	8. Very good – Double seals top and bottom throughout.
Damp-proof course	9. Yes.
Service entries and seals	10. Good seals: Top-hats / taped.
Cavity inspection	11. Good.

These plots have PASSED inspection.

(Any proposed remedial works will be noted in the 'Remarks' column on this form).

An additional inspection visit IS NOT required for these plots.
Qualified Engineer: Marc Fawcett



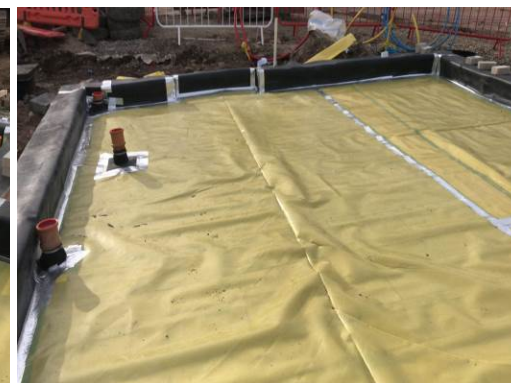
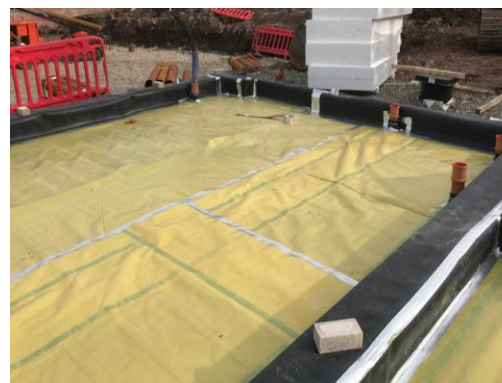
House Types: B7 & B2/B8
Construction Type: Beam and Block Precast Floor
Protection Anticipated: CS2 / Amber 1 – Telescopic Venting

Floor Type	1. Precast beam and block with minimal service penetrations.
Installation Quality	2. Good level of workmanship in line with good practice to CQA.
Testing Regime 1	3. Independent validation of all plots by Betts Geo Environmental Ltd.
Membrane type	4. Visqueen Low Permeability Gas Membrane - https://visqueen.com/products/low-permeability-gas-membrane-lpgm
Extent of coverage	5. All.
Underside of membrane	6. Onto block and beam
Slab/membrane condition	7. Precast beam and block with minimal service penetrations via sealed top hats. Membrane in V good condition
Laps and joints	8. Very good – Double seals top and bottom throughout.
Damp-proof course	9. Yes.
Service entries and seals	10. Good seals: Top-hats / taped.
Cavity inspection	11. Good.

These plots have PASSED inspection.

(Any proposed remedial works will be noted in the 'Remarks' column on this form).

An additional inspection visit IS NOT required for these plots.
Qualified Engineer: Rob Davies



House Types: B2/B8
Construction Type: Beam and Block Precast Floor
Protection Anticipated: CS2 / Amber 1 – Telescopic Venting

Floor Type	1. Precast beam and block with minimal service penetrations.
Installation Quality	2. Good level of workmanship in line with good practice to CQA.
Testing Regime 1	3. Independent validation of all plots by Betts Geo Environmental Ltd.
Membrane type	4. Visqueen Low Permeability Gas Membrane - https://visqueen.com/products/low-permeability-gas-membrane-lpgm
Extent of coverage	5. All.
Underside of membrane	6. Onto block and beam
Slab/membrane condition	7. Precast beam and block with minimal service penetrations via sealed top hats. Membrane in V good condition
Laps and joints	8. Very good – Double seals top and bottom throughout.
Damp-proof course	9. Yes.
Service entries and seals	10. Good seals: Top-hats / taped.
Cavity inspection	11. Good.

These plots have PASSED inspection.

(Any proposed remedial works will be noted in the 'Remarks' column on this form).

An additional inspection visit IS NOT required for these plots.
Qualified Engineer: Marc Fawcett



House Types: C2 & B2/B8
Construction Type: Beam and Block Precast Floor
Protection Anticipated: CS2 / Amber 1 – Telescopic Venting

Floor Type	1. Precast beam and block with minimal service penetrations.
Installation Quality	2. Good level of workmanship in line with good practice to CQA.
Testing Regime 1	3. Independent validation of all plots by Betts Geo Environmental Ltd.
Membrane type	4. Visqueen Low Permeability Gas Membrane - https://visqueen.com/products/low-permeability-gas-membrane-lpgm
Extent of coverage	5. All.
Underside of membrane	6. Onto block and beam
Slab/membrane condition	7. Precast beam and block with minimal service penetrations via sealed top hats. Membrane in V good condition
Laps and joints	8. Very good – Double seals top and bottom throughout.
Damp-proof course	9. Yes.
Service entries and seals	10. Good seals: Top-hats / taped.
Cavity inspection	11. Good.

These plots have PASSED inspection.

(Any proposed remedial works will be noted in the 'Remarks' column on this form).

An additional inspection visit IS NOT required for these plots.
Qualified Engineer: Marc Fawcett



House Types: B2/B8, A4 & E
Construction Type: Beam and Block Precast Floor
Protection Anticipated: CS2 / Amber 1 – Telescopic Venting

Floor Type	1. Precast beam and block with minimal service penetrations.
Installation Quality	2. Good level of workmanship in line with good practice to CQA.
Testing Regime 1	3. Independent validation of all plots by Betts Geo Environmental Ltd.
Membrane type	4. Visqueen Low Permeability Gas Membrane - https://visqueen.com/products/low-permeability-gas-membrane-lpgm
Extent of coverage	5. All.
Underside of membrane	6. Onto block and beam
Slab/membrane condition	7. Precast beam and block with minimal service penetrations via sealed top hats. Membrane in V good condition
Laps and joints	8. Very good – Double seals top and bottom throughout.
Damp-proof course	9. Yes.
Service entries and seals	10. Good seals: Top-hats / taped.
Cavity inspection	11. Good.

These plots have PASSED inspection.

(Any proposed remedial works will be noted in the 'Remarks' column on this form).

An additional inspection visit IS NOT required for these plots.
Qualified Engineer: Marc Fawcett

