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Ref: 22-1214-GV
Date: 24th July 2023

Andy Laurie
ALCC Limited
Unit 12,
Rake House Farm,
Rake Lane,
North Tyneside,
NE29 8EQ

BY Email

Dear Andy,

Garden Areas Validation – Suncroft, Warkworth

Introduction

ERGO understands that gardens have been completed within Plots 1 and 2 at the Suncroft, Warkworth site. in line with the previously completed and approved ERGO Remediation Strategy (Ref: 22-1214-REM, dated May 2022), plots were inspected to ensure the appropriate clean cover system.

A 600mm cover system is required where Made Ground remains at formation level within proposed garden areas, using certified material with appropriate validation within proposed garden areas.

The garden validation has been undertaken as per the specification detailed in the ERGO Remediation Strategy report.

ERGO were instructed by ALCC Limited to attend the site and inspect the depth of the clean cover later within garden plots.

Objectives

For the avoidance of doubt ERGO can confirm that our schedule of works will include the following key attributes:

- Attendance onsite by suitably qualified ERGO Engineers to inspect the thickness of the clean cover layer within the required plots; and,
- Production of a Letter Report detailing the findings of the inspection of the clean cover layer within the residential development gardens.

Validation Works

ERGO completed the works in accordance with the approved ERGO Remediation Strategy inspecting plots 1-2 and can confirm that the majority of plots generally comprised at least 150mm of grey sandy slightly gravelly topsoil overlying a firm brown sandy slightly gravelly clay with gravels of sandstone and mudstone to depths of 600mbgl.

Chemical Suitability

The chemical suitability of the materials has been assessed with chemical testing provided by the DP Builders Ltd.

ERGO understands the donor site to be a greenfield site located within Amble, no further details have been provided.

The results of the testing have been compared against the site-specific remediation targets summarised within the ERGO Remediation Strategy report. Sample descriptions are described above with copies of the chemical testing enclosed and results summarised within Table 1 below.

Table 1 Summary of Toxicity Assessment for a Private Garden

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATHWAY	ASSESSMENT
Asbestos Identification	-	Present	3	NFD	N/A	4	No Further Action
Arsenic	mg/kg	37	3	3.7	N/A	1	No Further Action
Cadmium	mg/kg	11	3	<0.2	N/A	1	No Further Action
Chromium (VI)	mg/kg	6.1	3	<4.0	N/A	1	No Further Action
Lead	mg/kg	200	3	35	N/A	1	No Further Action
Mercury	mg/kg	40	3	<0.3	N/A	2	No Further Action
Nickel	mg/kg	130	3	27	N/A	1	No Further Action
Selenium	mg/kg	250	3	<1.0	N/A	1	No Further Action
Copper	mg/kg	2400	3	46	N/A	1	No Further Action
Zinc	mg/kg	3700	3	72	N/A	1	No Further Action
Naphthalene	mg/kg	2.3	3	0.31	N/A	2	No Further Action
Acenaphthylene	mg/kg	170	3	<0.05	N/A	3	No Further Action
Acenaphthene	mg/kg	210	3	0.46	N/A	1	No Further Action
Fluorene	mg/kg	170	3	0.68	N/A	1	No Further Action
Phenanthrene	mg/kg	95	3	3.0	N/A	3	No Further Action
Anthracene	mg/kg	2400	3	0.83	N/A	3	No Further Action
Fluoranthene	mg/kg	280	3	2.6	N/A	3	No Further Action
Pyrene	mg/kg	620	3	2.0	N/A	3	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	3	1.1	N/A	3	No Further Action
Chrysene	mg/kg	15	3	1.1	N/A	3	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	3	0.96	N/A	3	No Further Action
Benzo(k)Fluoranthene	mg/kg	77	3	0.45	N/A	3	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	3	0.76	N/A	3	No Further Action
Indeno(123-cd)Pyrene	mg/kg	27	3	0.38	N/A	3	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	3	<0.05	N/A	3	No Further Action
Benzo(ghi)Perylene	mg/kg	320	3	0.38	N/A	3	No Further Action
TPH C5-C6 (aliphatic)	mg/kg	42	3	<0.001	N/A	2	No Further Action
TPH C6-C8 (aliphatic)	mg/kg	100	3	<0.001	N/A	2	No Further Action
TPH C8-C10 (aliphatic)	mg/kg	27	3	<0.001	N/A	2	No Further Action
TPH C10-C12 (aromatic)	mg/kg	74	3	<1.0	N/A	2	No Further Action
TPH C12-C16 (aromatic)	mg/kg	140	3	4.0	N/A	2	No Further Action
TPH C16-C21 (aromatic)	mg/kg	260	3	12	N/A	1	No Further Action
TPH C21-C35 (aromatic)	mg/kg	1100	3	17	N/A	1	No Further Action

Notes

Main Exposure Pathways: 1 = Soil Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation. Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance; NFD = No Fibres Detected

The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. ERGO has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C_5-C_{12}) and the Tier 1 values for aromatic compound for the non-volatile fractions (C_{12}-C_{35}). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

Based on the results above, no elevated concentrations of potential contaminants of concern have been identified within the sampled gardens when compared with Tier I GACs for a residential end use. Based on this assessment along with the visual soil description, the material placed within the plots has been deemed suitable for reuse within residential gardens with no significant potential unacceptable level of risk to human health for future residential end users and construction workers.

Conclusion

It is considered that within plots 1 and 2, the cover system has been installed in accordance with the agreed Remediation Strategy.

I trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

For and on behalf of ERGO Ltd

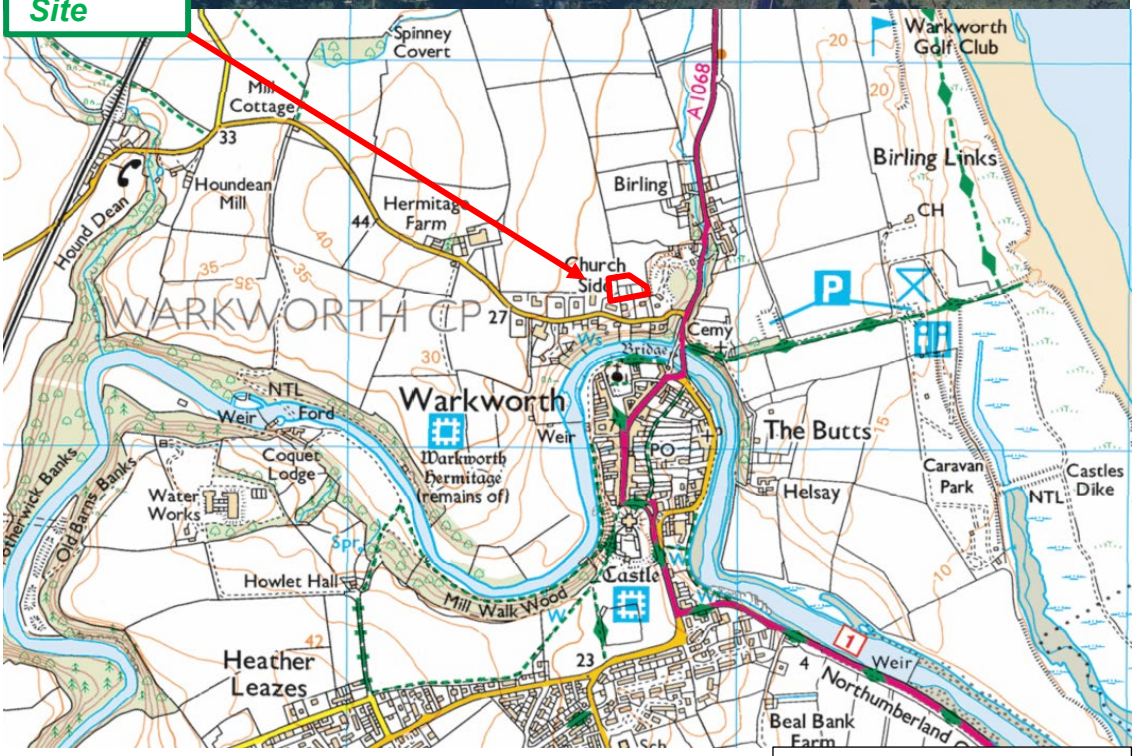
Phil Craigie
Geo-Environmental Consultant

Enclosed:

ERGO Drawings
Photographs
Chemical Testing

ERGO Drawings

Site



Drawing 22-1214-001
Site Location Plan

ERGO

Photographs

PLATE 1 – GENERAL PLACEMENT OF MATERIALS WITHIN PLOT 1

PLATE 2 – DEPTH VALIDATION IN REAR GARDEN OF PLOT 1

PLATE 3 – GENERAL PLACEMENT OF MATERIALS WITHIN PLOT 2

PLATE 4 – DEPTH VALIDATION IN REAR GARDEN OF PLOT 2

Chemical Testing Results

Analytical Report Number: 21-85389
Project / Site name: Amble

Lab Sample Number					1929328	1929329	1929330
Sample Reference					T.P.	T.P.	T.P.
Sample Number					T/S	S/S	BOTTOM
Depth (m)					0.30	0.60	1.50
Date Sampled					27/02/2023	27/02/2023	27/02/2023
Time Taken					None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	**HH GAC Houses with Gardens**			
Stone Content	%	0.1	NONE		< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE		11	10	6.2
Total mass of sample received	kg	0.001	NONE		0.30	0.30	0.30
Asbestos in Soil	Type	N/A	ISO 17025		Not-detected	Not-detected	Not-detected
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS		8.0	7.6	8.3
Organic Matter	%	0.1	MCERTS		3.7	2.6	0.7
Total Organic Carbon (TOC)	%	0.1	MCERTS		2.1	1.5	0.4
Loss on Ignition @ 450oC	%	0.2	MCERTS		6.6	4.7	2.2
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	5.6	< 0.05	0.31	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	420	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	510	< 0.05	0.46	< 0.05
Fluorene	mg/kg	0.05	MCERTS	400	< 0.05	0.68	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	220	0.41	3.0	0.36
Anthracene	mg/kg	0.05	MCERTS	5400	< 0.05	0.83	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	560	0.48	2.6	0.53
Pyrene	mg/kg	0.05	MCERTS	1200	0.38	2.0	0.43
Benzo(a)anthracene	mg/kg	0.05	MCERTS	11	< 0.05	1.1	0.29
Chrysene	mg/kg	0.05	MCERTS	22	< 0.05	1.1	0.22
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.3	< 0.05	0.96	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	93	< 0.05	0.45	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.7	< 0.05	0.76	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	36	< 0.05	0.38	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.28	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	340	< 0.05	0.38	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS		1.27	15.0	1.83
Heavy Metals / Metalloids							
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	550	2.8	3.7	2.5
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	37	9.7	6.6	7.8
Barium (aqua regia extractable)	mg/kg	1	MCERTS	625	170	100	74
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	11	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	6	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	910	31	27	35
Copper (aqua regia extractable)	mg/kg	1	MCERTS	200	46	29	31
Iron (aqua regia extractable)	mg/kg	40	MCERTS	80000	32000	39000	44000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	200	35	23	16
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	40	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	640	0.77	0.55	0.86
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	110	27	23	24
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	250	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	410	64	95	110
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	300	72	68	68

Analytical Report Number: 21-85389
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Sample Number					T/S	S/S	BOTTOM
Depth (m)					0.30	0.60	1.50
Date Sampled					27/02/2023	27/02/2023	27/02/2023
Time Taken					None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	**HH GAC Houses with Gardens**			
Monoaromatics & Oxygenates							
Benzene	µg/kg	1	MCERTS		< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	0.087	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	130	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	47	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	58	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	60	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons							
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	78	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	230	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	65	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	330	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	2400	< 2.0	< 2.0	9.7
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	9200	< 8.0	< 8.0	23
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	9200	< 8.0	< 8.0	41
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS		< 10	< 10	74
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	140	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	290	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	330	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	330	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	2400	< 2.0	4.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	540	< 10	12	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	1500	< 10	17	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS		< 10	33	< 10
PCBs by GC-MS							
PCB Congener 28	mg/kg	0.001	MCERTS		< 0.001	< 0.001	< 0.001
PCB Congener 52	mg/kg	0.001	MCERTS		< 0.001	< 0.001	< 0.001
PCB Congener 101	mg/kg	0.001	MCERTS		< 0.001	< 0.001	< 0.001
PCB Congener 118	mg/kg	0.001	MCERTS		< 0.001	< 0.001	< 0.001
PCB Congener 138	mg/kg	0.001	MCERTS		< 0.001	< 0.001	< 0.001
PCB Congener 153	mg/kg	0.001	MCERTS		< 0.001	< 0.001	< 0.001
PCB Congener 180	mg/kg	0.001	MCERTS		< 0.001	< 0.001	< 0.001
Total PCBs by GC-MS							
Total PCBs	mg/kg	0.007	MCERTS		< 0.007	< 0.007	< 0.007

U/S = Unsuitable Sample I/S = Insufficient Sample