



Rob Rodger Associates, Rivington, Church Lane, Farndon, Chester, CH3 6QD

Monday, 09 November 2020

Chris Gregory
PG Homes
11 Church Lane
Aldford
CH3 6JD

Dear Mr Gregory

Planning App P/2010/0374 – Discharge Condition 8
Land off Queens Street, Cefn Mawr: Remediation Strategy – Verification Report

Further to the above RAL (Robert Rodger Associates Ltd) have reviewed the Remediation Strategy to the above site with a view to confirming that the landscape works at the above site comply with the matters raised in the Remediation Strategy proposed at 4th July 2018 with a view to the discharge of Condition 8 of the above Planning Application.

The matters to be addressed (Verification) are listed in the Remediation Report (final page) as;

1. Submission of Remediation Strategy for approval
2. Removal of site topsoil down to weathered bedrock and careful segregation and stockpiling on site
3. Placement of recovered site topsoil within areas of soft landscaping to a minimum thickness of 300mm
4. Import of clean, chemically tested topsoil and placement to a minimum thickness of 200mm within the proposed garden areas
5. Independent validation (chemical testing of imported topsoil) and depth validation of soils within landscape and garden areas

The verification matters are addressed as follows:

1. Submission of Remediation Strategy for approval
Remediation Strategy Report submitted to Helen Bradshaw (Contaminated Land Officer at Wrexham City Council on 4th July 2018), acknowledged, and accepted in Memo of 12th July 2018
2. Removal of site topsoil down to weathered bedrock and careful segregation and stockpiling on site
Site topsoil has been carefully removed from the site of the garden areas (rear) for re-use to the soft landscape areas (frontage). This material has been used for soiling to the soft landscape areas (as 3 below) and as general fill to hard areas at the frontage of the site.
3. Placement of recovered site topsoil within areas of soft landscaping to a minimum thickness of 300mm
The areas of soft landscaping, to the fore of the site bordering Queen Street have been overlain with 300mm depth of recovered soils as above from the garden areas (rear). These are verified with reference to Pits P1 P2 and P3. See Drgs attached 1 & 2.

4. Import of clean, chemically tested topsoil and placement to minimum thickness of 200mm within proposed garden areas
The garden areas, to the rear of the dwellings along with the front lawn areas have been overlain with 200mm depth (that is a minimum) imported soil. These are verified with reference to Pits P4 P5 P6 and P7. See Drgs attached 1 & 2
5. Independent Validation (chemical testing of imported topsoil) and dept validation of soils within landscape and garden area
All the imported soils have been obtained from a greenfield development site at Holt Road Wrexham LL13 9SA. Test sheets are attached. These have been prepared by ELAB and extracted from the overall Geo-Environmental Report concerning the Holt Road site by Enzygo (Environmental Consultants). The chemical test results have been compared 'against the current General Acceptance Criteria (GAC) values and these all meet the acceptable values for residential use with plant up-take. As such soils may be retained or re-used in garden areas to domestic houses'. (See ELAB Soil Testing below and Email from Steve Rhodes)

The matters have not required exporting site won materials that have been re-used in cutting / filling during the works which are now complete.

Supporting Documentation

Letter to H Bradshaw 4th July 2018 Remediation Strategy by Smith Grant LLP (Environmental Consultants)
Memo from H Bradshaw 12th July 2018
Drawing 1 Location Plan of Soil Pits 1 – 7 inclusive
Drawing 2 Site Photographs of Soil Pits 1 – 7 inclusive
ELAB Soil Testing
Email from Steve Rhodes (Enzygo) 6th Nov 2020

Upon the basis of the above I should recommend that the above matters described along with the accompanying documentation, be forwarded to the Wrexham CBC with a view to requesting the discharging of Condition 8 of the Planning Consent.

Yours sincerely



Robert Rodger BSc MPhil CMLI
Robert Rodger Associates Ltd
Landscape Architects

Our Ref: R2470a-L01
Planning Ref: P/2010/0374

04th July 2018

Helen Bradshawe
Contaminated Land Officer
Environment and Planning Department
16 Lord Street
Wrexham
LL11 1LG

by email: Helen.Bradshawe@wrexham.gov.uk

Dear Helen,

**Land off Queens Street, Cefn Mawr
Remediation Strategy**

SGP have produced and submitted a Stage 1 (R2470a-R01) and Stage 2 Contamination Assessment (R2520-R02) to satisfy Condition 7 of the planning consent. In total, 11 soil samples were collected across the site between depths of 0.2m and 1.9m bgl with samples collected from topsoil, made ground and natural soil.

The resultant Conceptual Site Model indicates that topsoil present on the site (limited to the south/western part of future garden areas) is unsuitable for retention within private garden areas due to the potential elevated lead and which may be attributed to the general industrial history of the surrounds.

Low level TICs associated with rubber additives were recorded within the made ground soils within the site embankment (future drive/parking/landscape area) associated with the former Flexys site. These compounds are likely to be of low hazard but in the absence of site specific assessment, precautionary mitigation measures should be adopted.

1. Risk Assessment

Information provided within the assessment was used to produce a conceptual site model (CSM) to identify the sources of contamination, identify receptors and their vulnerability and identify the potential pathways of exposure. It was concluded that the main risk was to human health (site occupants) through the exposure of elevated lead concentrations within the site topsoil and low-level TICs within the raised embankment.

A summary of the significant pollutant linkages under residential land use is produced below:

Table 1.1 Summary of the pollutant linkages under development and residential use

Receptors	Pathways	Contaminant Sources
human health (construction workers)	direct contact / soil and dust ingestion / inhalation of soil and dust	Lead concentrations unlikely to pose an acute risk; low-level TICs within made ground
human health (future residents)	direct contact / soil and dust ingestion / inhalation of soil and dust	Metal concentrations within shallow garden soils (lead) and low-level TICs within made ground

2. Options Appraisal

Options for the remediation of the identified and potential contamination sources are summarised below:

Table 2.1 Remedial Options

Method	Advantages	Disadvantages
Removal of topsoil / made ground and replacement with clean imported material	Removal of all topsoil / made ground which contains elevated concentrations of lead and TICs	Disposal costs and costs for replacement soils and made ground fill.
Building up levels by an appropriate thickness of clean imported material	Does not require removal of materials as waste	May lead to unacceptable changes in levels; not necessary over weathered bedrock following removal of site topsoil
Stabilisation of garden soils to reduce the bio-availability of lead/TICs within the soil	No requirement to removal soils offsite	Trial-tests required, expensive due to machinery/plant required to facilitate. Not economically viable given the size of site and development
Placement of permanent hard-standing/paving/artificial grass over garden / made ground	Provides physical barrier to the underlying soils	Loss of green space, aesthetics, could be removed in the future, potential issue with drainage

The topsoil on the site contains concentrations of contaminants (lead) that, in the absence of mitigation could pose an unacceptable risk to the health of future site users. Similarly, given the absence of published toxicological information regarding the low-level TICs recorded with made ground soils, a precautionary mitigation approach to break the pollutant-receptor linkage should be adopted. The "do nothing" option, containing no specific measure to remediate ground contamination or deal and is therefore inappropriate and not acceptable.

A strategy involving removal of all made ground has the benefit of removing all soils with TICs, however this is unfeasible for made ground soils where significant (>3m) depths are present due to formation of a raised embankment to provide access to the site given the local topography. This option would require the use of significant resources in the form of replacement fill materials, large additional lorry movement numbers and a significant disposal cost.

Removal of topsoil from the proposed garden areas is considered a feasible option given the limited depth (0.5m bgl) overlying weathered bedrock. Whilst the concentrations of lead (219 mg/kg) within the topsoil precludes the use within garden soils (criteria of 200 mg/kg) it is considered suitable for reuse within areas of soft landscaping (criteria of 630 mg/kg) as proposed on the embankment.

Risks to future site users from direct exposure to contaminated soils can be managed by use of a barrier system. Use of a suitable thickness of a clean soil cover over areas where permanent hard-standing is not present would provide physical isolation and break relevant pollutant linkages.

3. Detailed Remedial Strategy

To reduce the identified risks to human health (site workers and occupants) the following recommendations for further remedial works are made.

Cover System Design

Due to reported concentrations of lead in excess of the C4SL criteria within a residential scenario and the reported TICs within made ground soils, the application of a cover system within areas absent from



permanent hardstanding (private gardens and areas of soft landscaping) is considered the most appropriate means of reducing the potential for exposure of future site users and occupants.

Soft Landscaping

Whilst the concentration of lead within the site topsoil renders it unsuitable for reuse in garden soils, it is significantly below the criteria for public open space soils within a residential scenario and is suitable for replacement within areas of soft landscaping. The site topsoil should be carefully stripped from future garden areas down to weathered bedrock and carefully segregated until placement within the areas of soft landscaping located on the embankment. Site topsoil should be placed to a minimum depth of 300mm within all areas of soft landscaping to provide a physical break layer to the underlying made ground. Should any surplus site topsoil remain following these works, it should be disposed of at a suitable waste accepting facility with copies of all waste transfer notes retained for inclusion within the validation completion report.

Garden Areas

Providing that the site topsoil is stripped down to weathered bedrock, the developer is required to place 200mm clean imported topsoil to provide a sufficient growing medium within all private garden areas. In the absence of the removal of site topsoil from garden areas, the placement of 600mm clean imported soils over retain soils with garden areas would be required.

4. Validation / Verification

Garden Soils

On-site validation of the chemical quality of imported soils prior to placement will be undertaken through the collection of soil samples and submission for chemical analysis to a suitably accredited laboratory. Validation will be undertaken based on the Welsh Land Contamination Working Group (WLCWG) report *Requirements for the Chemical Testing of Imported Materials for Various End Uses and Validation of Cover Systems*:

- 1 sample per imported 50m³ for each brownfield source; or
- 1 sample per 250m³ for each greenfield source;
- Minimum of 3 samples per single source.

Samples will be subject to analysis for pH, SOM, metals (As, Cd, CrIII, CrVI, Cu, Hg, Ni, Pb Se and Zn), PAH (speciated 16), fractionated hydrocarbons (TPHCWG) and asbestos fibre screen.

The results of the soil analysis will be compared to assessment criteria appropriate to the environmental setting and proposed future residential use as garden soils and are taken primarily from the LQM/CIEH 'Suitable for Use Levels' (S4UL)¹ and DEFRA Category 4 Screening Levels (C4SL). These criteria are generally derived using the CLEA v1.04 or 1.06 model under a standard default residential land-use scenario (sandy loam soil) with 1% organic matter:

Table 4.1: Garden Assessment Criteria

Determinant	Assessment Criteria (mg/kg or indicated)	Source
arsenic	37	LQM/CIEH S4UL
cadmium	11	LQM/CIEH S4UL
chromium (III)	910	LQM/CIEH S4UL
chromium (VI)	6	LQM/CIEH S4UL
copper	2400	LQM/CIEH S4UL

¹ Land Quality Management Ltd, The LQM / CIEH S4ULs for Human Health Risk Assessment, 2015



Determinant	Assessment Criteria (mg/kg or indicated)	Source
lead	200	C4SL
mercury (inorganic)	40	LQM/CIEH S4UL
nickel	180	LQM/CIEH S4UL
zinc	3700	LQM/CIEH S4UL
asbestos screen	0.001% by mass	-
naphthalene	2.4	LQM/CIEH S4UL
acenaphthene	210	LQM/CIEH S4UL
acenaphthylene	170	LQM/CIEH S4UL
fluorene	170	LQM/CIEH S4UL
phenanthrene	95	LQM/CIEH S4UL
anthracene	2400	LQM/CIEH S4UL
fluoranthene	280	LQM/CIEH S4UL
pyrene	620	LQM/CIEH S4UL
benzo(a)anthracene	7.2	LQM/CIEH S4UL
chrysene	15	LQM/CIEH S4UL
benzo(b)fluoranthene	2.6	LQM/CIEH S4UL
benzo(k)fluoranthene	77	LQM/CIEH S4UL
benzo(a) pyrene	2.2	LQM/CIEH S4UL
indeno(123cd) pyrene	27	LQM/CIEH S4UL
dibenzo(ah)anthracene	0.24	LQM/CIEH S4UL
benzo(ghi) perylene	320	LQM/CIEH S4UL
aliphatic C5-C6	42	LQM/CIEH S4UL
aliphatic C6-C8	100	LQM/CIEH S4UL
aliphatic C8-C10	27	LQM/CIEH S4UL
aliphatic C10-C12	130	LQM/CIEH S4UL
aliphatic C12-C16	1100	LQM/CIEH S4UL
aliphatic C16-C21	5000*	LQM/CIEH S4UL
aliphatic C21-C35	5000*	LQM/CIEH S4UL
aromatic C5-C7	70	LQM/CIEH S4UL
aromatic C7-C8	130	LQM/CIEH S4UL
aromatic C8-C10	34	LQM/CIEH S4UL
aromatic C10-C12	74	LQM/CIEH S4UL
aromatic C12-C16	140	LQM/CIEH S4UL
aromatic C16-C21	260	LQM/CIEH S4UL
aromatics C21-C35	1100	LQM/CIEH S4UL

* A maximum limit of 5000 mg/kg for any location is included for reasons of amenity

Independent inspection of the prescribed soil cover within the rear garden areas and areas of soft landscaping will be undertaken by a suitably qualified Environmental Consultant to confirm the provision of at least 300mm depth (landscape) and 200mm (private garden).

Surplus arisings generated during the excavation of current site soils are unlikely to be classed as hazardous waste. Copies of the laboratory test results should be provided in advance to a suitable waste accepting facility prior to soil removal and they may specify that further testing is required for classification/acceptance.

A validation report will be provided on completion of the remedial works. This will include details of all soil inspections, chemical testing, depth validation inspections and copies of waste transfer notes for any exported soils. Full photographic evidence will be provided.

In summary and for the benefit of the client, the following schedule of works to be completed to allow discharge of Condition 8 are as follows:



- Submission of Remediation Strategy for approval;
- Removal of site topsoil down to weathered bedrock and careful segregation and stockpiling on site;
- Placement of recovered site topsoil within areas of soft landscaping to a minimum thickness of 300mm;
- Import of clean, chemically tested topsoil and placement to a minimum thickness of 200mm within proposed garden areas;
- Independent validation (chemical testing of imported topsoil) and depth validation of soils within landscape and garden areas.

Please do not hesitate to contact us if you require any further information.

Yours sincerely
for: Smith Grant LLP

A handwritten signature in black ink, appearing to read 'D. Wayland', is positioned above the printed name.

D Wayland
Senior Consultant

MEMORANDUM



From: Helen Bradshawe Contaminated Land Officer	To: Kevin Hughes Senior Planning Officer
Our Ref: HB/P/2010/0374	Your Ref: P/2010/0374
Date: 12 July 2018	No. of Pages:

LAND OFF QUEEN STREET, CEFN MAWR, WREXHAM

The following report has been submitted in support of the above planning application. I previously provided comments on the Phase 2 Contamination Assessment in a memo to you dated 7th June 2018.

- Remediation Strategy Letter Report, Smith Grant, Ref: R2470a-L01, Dated 4th July 2018.

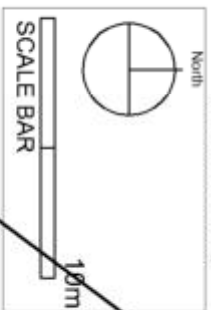
In relation to the report I can provide the following comments:

- I am in agreement with the remediation strategy for the site and I await further information in relation to the verification of the proposed remediation works.

Should you have any queries regarding this memo please do not hesitate to contact me on Ext 8774.

H. Bradshawe

Helen Bradshawe
Contaminated Land Officer



KEY

Pit		P2
Re-Use Soils 300mm Depth (from Garden Areas to Soft Landscape Areas)		
Imported Soils 200mm Depth		
Hard Areas		



Photo 1 Soft Landscaping (Front of properties)



Photo 2 Garden Areas (Rear of properties)

Drawing 1

**Soil Pit Locations 1 - 7 at:
Land off Queen Street, Cefn Mawr
at 5th Nov 2020**



P1



P2



P3



P4



P5



P6



P7

Drawing 2
Site Photographs
Soil Pits 1-7 at:
Land off Queen Street, Cefn Mawr
at 5th Nov 2020

Robert Rodger Associates Ltd
 Landscape Architecture * Landscape Planning * Urban Design
 'Rivington', Church Lane, Farndon, Chester CH3 6QD



Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY

Telephone: (01424) 718618

Facsimile: (01424) 729911

info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 14-00513

Issue: 1

Date of Issue: 26/09/2014

Contact: Richard Hamilton

Customer Details: Enzygo - Cromhall
The Granary
Woodend Lane
Cromhall
Gloucestershire

Quotation No: Q14-00007

Order No: CRM734

Customer Reference: CRM.413.106

Date Received: 11/09/2014

Date Approved: 26/09/2014

Details: Wrexham

Approved by:

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 14-00513

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
3320	WS1 0.20	04/09/2014	11/09/2014	Sandy silty loam	g
3321	WS2 0.20	03/09/2014	11/09/2014	Sandy silty loam	f
3322	WS3 0.15	04/09/2014	11/09/2014	Sandy silty loam	
3323	WS4 0.20	03/09/2014	11/09/2014	Sandy silty loam	f
3324	WS5 0.20	03/09/2014	11/09/2014	Sandy silty loam	f
3325	WS6 0.25	03/09/2014	11/09/2014	Sandy silty loam	f
3326	WS7 0.30	03/09/2014	11/09/2014	Sandy silty loam	fg
3327	WS8 0.30	03/09/2014	11/09/2014	Sandy silty loam	f
3328	TP1 0.20	04/09/2014	11/09/2014	Sandy silty loam	g



Results Summary

Report No.: 14-00513

ELAB Reference	3320	3321	3322	3323	3324	3325
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS2	WS3	WS4	WS5	WS6
Sample Depth (m)	0.20	0.20	0.15	0.20	0.20	0.25
Sampling Date	04/09/2014	03/09/2014	04/09/2014	03/09/2014	03/09/2014	03/09/2014

Determinand	Codes	Units	LOD						
Metals									
Arsenic	M	mg/kg	1	7.0	7.0	9.5	5.8	6.6	4.9
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5
Chromium	M	mg/kg	5	14.6	16.1	17.8	12.3	11.5	8.8
Copper	M	mg/kg	5	15.8	17.3	19.3	16.4	15.7	11.5
Lead	M	mg/kg	5	44.6	51.6	55.6	56.1	65.6	36.2
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	8.5	8.6	10.6	8.6	9.0	8.2
Selenium	M	mg/kg	1	0.8	0.7	0.7	1.5	1.4	0.7
Zinc	M	mg/kg	45	63.4	76.1	88.2	65.6	64.8	< 45.0
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Miscellaneous									
Acid Neutralisation Capacity	N	mol/kg	0.1	< 0.1	n/t	n/t	n/t	n/t	n/t
Loss Of Ignition (450°C)	N	%	0.01	4.3	n/t	n/t	n/t	n/t	n/t
Moisture Content	N	%	0.1	14.6	10.7	13.8	13.4	12.3	8.0
pH	M	units	0.1	6.4	n/t	n/t	n/t	n/t	n/t
Stones Content	N	%	0.1	4.6	6.5	4.0	13.0	20.0	35.0
Total Organic Carbon	N	%	0.01	1.4	1.9	2.4	1.7	1.7	1.1



Results Summary

Report No.: 14-00513

ELAB Reference	3320	3321	3322	3323	3324	3325
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS2	WS3	WS4	WS5	WS6
Sample Depth (m)	0.20	0.20	0.15	0.20	0.20	0.25
Sampling Date	04/09/2014	03/09/2014	04/09/2014	03/09/2014	03/09/2014	03/09/2014

Determinand	Codes	Units	LOD						
Organics									
>C8-C10 BCB Soil	N	mg/kg	1	< 1.0	f < 1.0	< 1.0	f < 1.0	f < 1.0	f < 1.0
>C10-C12 BCB Soil	N	mg/kg	1	< 1.0	f < 1.0	< 1.0	f < 1.0	f < 1.0	f < 1.0
>C12-C16 BCB Soil	N	mg/kg	1	< 1.0	f < 1.0	< 1.0	f < 1.0	f < 1.0	f < 1.0
>C16-C21 BCB Soil	N	mg/kg	1	< 1.0	f < 1.0	< 1.0	f < 1.0	f < 1.0	f < 1.0
>C21-C35 BCB Soil	N	mg/kg	1	3.6	f 1.9	< 1.0	f 4.2	f 9.5	f < 1.0
>C35-C40 BCB Soil	N	mg/kg	1	2.3	f 1.4	1.4	f 1.7	f 4.2	f < 1.0
Total (>C8-C40) BCB Soil	N	mg/kg	1	5.9	f 3.3	1.4	f 6.0	f 13.6	f < 1.0
Phenols									
Phenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1	< 1
M,P-Cresol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1	< 1
O-Cresol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1	< 1
3,4-Dimethylphenol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1	< 1
2,3-Dimethylphenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1	< 1
Trimethylphenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1	< 1
Total Monohydric Phenols	N	mg/kg	5	< 5	< 5	< 5	< 5	< 5	< 5
Polyaromatic hydrocarbons									
Naphthalene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5
Pyrene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo (a) anthracene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5
Benzo (b) fluoranthene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo (k) fluoranthene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	0.6
Benzo (a) pyrene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibenzo(a,h)anthracene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(ghi)perylene	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8
Total PAH(16) Speciated	M	mg/kg	2	< 2	< 2	< 2	< 2	4	4
Total PAH (Including Coronene)	N	mg/kg	2.1	< 2	n/t	n/t	n/t	n/t	n/t
BTEX									
Total BTEX	M	mg/kg	0.01	g < 0.01	n/t	n/t	n/t	n/t	n/t
Total Petroleum Hydrocarbons									
Mineral Oil	U	mg/kg	1	4	n/t	n/t	n/t	n/t	n/t
PCB (ICES 7 congeners)									
PCB (Total of 7 Congeners)	M	mg/kg	0.03	< 0.03	n/t	n/t	n/t	n/t	n/t



Results Summary

Report No.: 14-00513

ELAB Reference	3326	3327	3328
Customer Reference			
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	WS7	WS8	TP1
Sample Depth (m)	0.30	0.30	0.20
Sampling Date	03/09/2014	03/09/2014	04/09/2014

Determinand	Codes	Units	LOD			
Metals						
Arsenic	M	mg/kg	1	4.0	7.6	n/t
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	n/t
Chromium	M	mg/kg	5	10.9	13.3	n/t
Copper	M	mg/kg	5	9.3	18.6	n/t
Lead	M	mg/kg	5	21.3	93.2	n/t
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	n/t
Nickel	M	mg/kg	5	10.1	10.1	n/t
Selenium	M	mg/kg	1	0.5	1.4	n/t
Zinc	M	mg/kg	45	< 45.0	65.7	n/t
Inorganics						
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	n/t
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	n/t
Miscellaneous						
Acid Neutralisation Capacity	N	mol/kg	0.1	< 0.1	n/t	< 0.1
Loss Of Ignition (450°C)	N	%	0.01	2.2	n/t	4.7
Moisture Content	N	%	0.1	5.5	13.1	n/t
pH	M	units	0.1	6.1	n/t	6.2
Stones Content	N	%	0.1	41.8	15.0	n/t
Total Organic Carbon	N	%	0.01	1.0	2.5	1.9



Results Summary

Report No.: 14-00513

ELAB Reference	3326	3327	3328
Customer Reference			
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	WS7	WS8	TP1
Sample Depth (m)	0.30	0.30	0.20
Sampling Date	03/09/2014	03/09/2014	04/09/2014

Determinand	Codes	Units	LOD			
Organics						
>C8-C10 BCB Soil	N	mg/kg	1	f < 1.0	f < 1.0	n/t
>C10-C12 BCB Soil	N	mg/kg	1	f < 1.0	f < 1.0	n/t
>C12-C16 BCB Soil	N	mg/kg	1	f 1.7	f < 1.0	n/t
>C16-C21 BCB Soil	N	mg/kg	1	f 15.1	f < 1.0	n/t
>C21-C35 BCB Soil	N	mg/kg	1	f 334	f < 1.0	n/t
>C35-C40 BCB Soil	N	mg/kg	1	f 98.7	f 1.4	n/t
Total (>C8-C40) BCB Soil	N	mg/kg	1	f 450	f 1.4	n/t
Phenols						
Phenol	M	mg/kg	1	< 1	< 1	n/t
M,P-Cresol	N	mg/kg	1	< 1	< 1	n/t
O-Cresol	N	mg/kg	1	< 1	< 1	n/t
3,4-Dimethylphenol	N	mg/kg	1	< 1	< 1	n/t
2,3-Dimethylphenol	M	mg/kg	1	< 1	< 1	n/t
Trimethylphenol	M	mg/kg	1	< 1	< 1	n/t
Total Monohydric Phenols	N	mg/kg	5	< 5	< 5	n/t
Polyaromatic hydrocarbons						
Naphthalene	M	mg/kg	0.5	< 0.5	< 0.5	n/t
Acenaphthylene	M	mg/kg	0.5	< 0.5	< 0.5	n/t
Acenaphthene	M	mg/kg	0.5	< 0.5	< 0.5	n/t
Fluorene	M	mg/kg	0.5	< 0.5	< 0.5	n/t
Phenanthrene	M	mg/kg	0.5	1.1	< 0.5	n/t
Anthracene	M	mg/kg	0.5	< 0.5	< 0.5	n/t
Fluoranthene	M	mg/kg	0.5	2.0	< 0.5	n/t
Pyrene	M	mg/kg	0.5	1.7	< 0.5	n/t
Benzo (a) anthracene	M	mg/kg	0.5	0.9	< 0.5	n/t
Chrysene	M	mg/kg	0.5	1.9	< 0.5	n/t
Benzo (b) fluoranthene	M	mg/kg	0.5	0.8	< 0.5	n/t
Benzo (k) fluoranthene	M	mg/kg	0.5	1.7	< 0.5	n/t
Benzo (a) pyrene	M	mg/kg	0.5	1.0	< 0.5	n/t
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.5	1.2	< 0.5	n/t
Dibenzo(a,h)anthracene	M	mg/kg	0.5	< 0.5	< 0.5	n/t
Benzo(ghi)perylene	M	mg/kg	0.5	1.8	< 0.5	n/t
Total PAH(16) Speciated	M	mg/kg	2	15	< 2	n/t
Total PAH (Including Coronene)	N	mg/kg	2.1	17	n/t	< 2
BTEX						
Total BTEX	M	mg/kg	0.01	fg < 0.01	n/t	g < 0.01
Total Petroleum Hydrocarbons						
Mineral Oil	U	mg/kg	1	f 283	n/t	3
PCB (ICES 7 congeners)						
PCB (Total of 7 Congeners)	M	mg/kg	0.03	< 0.03	n/t	< 0.03

Results Summary

Report No.: 14-00513

WAC Analysis

Elab Ref:	3328					Landfill Waste Acceptance Criteria Limits		
Sample Date:	04/09/2014					Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:	TP1							
Depth:	0.2							
Site:	Wrexham							
Determinand		Code	Units					
Total Organic Carbon		N	%		1.9	3	5	6
Loss on Ignition		M	%		4.7	--	--	10
Total BTEX		M	mg/kg		< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg		< 0.03	1	--	--
TPH Total WAC		M	mg/kg		3	500	--	--
Total (of 17) PAHs		N	mg/kg		< 2	100	--	--
pH		M			6.2	--	>6	--
Acid Neutralisation Capacity		N	mol/kg		< 0.1	--	To evaluate	To evaluate

Eluate Analysis

			2:1	8:1	10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
			mg/l	mg/l	mg/kg			
Arsenic		N	0.027	0.007	0.10	0.5	2	25
Barium		N	0.134	0.025	0.39	20	100	300
Cadmium		N	< 0.001	< 0.001	< 0.01	0.04	1	5
Chromium		N	0.035	0.006	0.10	0.5	10	70
Copper		N	0.127	0.036	0.48	2	50	100
Mercury		N	< 0.005	< 0.005	< 0.01	0.01	0.2	2
Molybdenum		N	0.020	0.006	0.07	0.5	10	30
Nickel		N	0.032	0.008	0.11	0.4	10	40
Lead		N	0.149	0.015	0.32	0.5	10	50
Antimony		N	0.010	< 0.005	< 0.05	0.06	0.7	5
Selenium		N	0.005	< 0.005	< 0.05	0.1	0.5	7
Zinc		N	0.157	0.042	0.57	4	50	200
Chloride		N	< 5	< 5	< 50	800	15000	25000
Fluoride		N	< 1	< 1	< 10	10	150	500
Sulphate		N	3.000	3.000	28.20	1000	20000	50000
Total Dissolved Solids		N	< 10	< 10	< 100	4000	60000	100000
Phenol Index		N	< 0.01	< 0.01	< 0.10	1	-	-
Dissolved Organic Carbon		N	34.300	10.900	139.00	500	800	1000

Leach Test Information

Eluent Volume (ml)		N	225	1150				
pH		N	7.8	7.5				
Conductivity (uS/cm)		N	83	41				
Temperature (°C)		N	20	20				

Solid Information

Dry mass of test portion (g)			176					
Moisture (%)			16.7					

Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ELAB cannot be held responsible for any discrepancies with current legislation

Results Summary

Report No.: 14-00513

WAC Analysis

Elab Ref:	3326					Landfill Waste Acceptance Criteria Limits		
Sample Date:	03/09/2014					Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:	WS7							
Depth:	0.3							
Site:	Wrexham							
Determinand		Code	Units					
Total Organic Carbon		N	%		1.0	3	5	6
Loss on Ignition		M	%		2.2	--	--	10
Total BTEX		M	mg/kg		< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg		< 0.03	1	--	--
TPH Total WAC		M	mg/kg		283	500	--	--
Total (of 17) PAHs		N	mg/kg		17.0	100	--	--
pH		M			6.1	--	>6	--
Acid Neutralisation Capacity		N	mol/kg		< 0.1	--	To evaluate	To evaluate

Eluate Analysis

			2:1	8:1	10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
			mg/l	mg/l	mg/kg			
Arsenic		N	0.015	0.020	0.19	0.5	2	25
Barium		N	0.164	0.061	0.77	20	100	300
Cadmium		N	< 0.001	< 0.001	< 0.01	0.04	1	5
Chromium		N	< 0.005	< 0.005	< 0.05	0.5	10	70
Copper		N	0.052	0.045	0.46	2	50	100
Mercury		N	< 0.005	< 0.005	< 0.01	0.01	0.2	2
Molybdenum		N	0.052	0.021	0.26	0.5	10	30
Nickel		N	0.019	0.011	0.12	0.4	10	40
Lead		N	0.008	0.015	0.14	0.5	10	50
Antimony		N	0.014	0.005	0.07	0.06	0.7	5
Selenium		N	0.006	< 0.005	< 0.05	0.1	0.5	7
Zinc		N	0.045	0.036	0.38	4	50	200
Chloride		N	< 5	< 5	< 50	800	15000	25000
Fluoride		N	< 1	< 1	< 10	10	150	500
Sulphate		N	62.000	6.000	150.00	1000	20000	50000
Total Dissolved Solids		N	230.000	110.000	1290.00	4000	60000	100000
Phenol Index		N	< 0.01	< 0.01	< 0.10	1	-	-
Dissolved Organic Carbon		N	29.800	13.600	162.00	500	800	1000

Leach Test Information

Eluent Volume (ml)		N	280	1140				
pH		N	8	7.8				
Conductivity (uS/cm)		N	330	126				
Temperature (°C)		N	20	20				

Solid Information

Dry mass of test portion (g)			176					
Moisture (%)			7.5					

Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ELAB cannot be held responsible for any discrepancies with current legislation

Results Summary

Report No.: 14-00513

WAC Analysis

Elab Ref:	3320					Landfill Waste Acceptance Criteria Limits		
Sample Date:	04/09/2014					Inert Waste Landfill	Stable Non-reactive Hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:	WS1							
Depth:	0.2							
Site:	Wrexham							
Determinand		Code	Units					
Total Organic Carbon		N	%		1.4	3	5	6
Loss on Ignition		M	%		4.3	--	--	10
Total BTEX		M	mg/kg		< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg		< 0.03	1	--	--
TPH Total WAC		M	mg/kg		4	500	--	--
Total (of 17) PAHs		N	mg/kg		< 2	100	--	--
pH		M			6.4	--	>6	--
Acid Neutralisation Capacity		N	mol/kg		< 0.1	--	To evaluate	To evaluate

Eluate Analysis

			2:1	8:1	10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
			mg/l	mg/l	mg/kg			
Arsenic		N	0.035	0.013	0.15	0.5	2	25
Barium		N	0.124	0.039	0.50	20	100	300
Cadmium		N	< 0.001	< 0.001	< 0.01	0.04	1	5
Chromium		N	0.024	0.008	0.10	0.5	10	70
Copper		N	0.082	0.044	0.49	2	50	100
Mercury		N	< 0.005	< 0.005	< 0.01	0.01	0.2	2
Molybdenum		N	0.027	0.015	0.16	0.5	10	30
Nickel		N	0.014	0.008	0.09	0.4	10	40
Lead		N	0.183	0.027	0.47	0.5	10	50
Antimony		N	0.010	0.005	0.06	0.06	0.7	5
Selenium		N	< 0.005	< 0.005	< 0.05	0.1	0.5	7
Zinc		N	0.090	0.045	0.50	4	50	200
Chloride		N	< 5	< 5	< 50	800	15000	25000
Fluoride		N	< 1	< 1	< 10	10	150	500
Sulphate		N	4.000	3.000	35.50	1000	20000	50000
Total Dissolved Solids		N	150.000	< 10	193.00	4000	60000	100000
Phenol Index		N	< 0.01	< 0.01	< 0.10	1	-	-
Dissolved Organic Carbon		N	36.500	11.900	151.00	500	800	1000

Leach Test Information

Eluent Volume (ml)		N	226	1270				
pH		N	8.1	7.6				
Conductivity (uS/cm)		N	149	76				
Temperature (°C)		N	20	20				

Solid Information

Dry mass of test portion (g)			176					
Moisture (%)			14.4					

Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ELAB cannot be held responsible for any discrepancies with current legislation



Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY

Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 14-00513

Asbestos Qualitative Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Result
3320	0.20	WS1	Sandy silty loam	No asbestos detected
3321	0.20	WS2	Sandy silty loam	No asbestos detected
3322	0.15	WS3	Sandy silty loam	No asbestos detected
3323	0.20	WS4	Sandy silty loam	No asbestos detected
3324	0.20	WS5	Sandy silty loam	No asbestos detected
3325	0.25	WS6	Sandy silty loam	No asbestos detected
3326	0.30	WS7	Sandy silty loam	No asbestos detected
3327	0.30	WS8	Sandy silty loam	No asbestos detected

Method Summary

Report No.: 14-00513

Parameter	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil				
Hexavalent chromium	As submitted sample	15/09/2014	110	Colorimetry
Aqua regia extractable metals	Air dried sample	16/09/2014	118	ICPMS
Phenols in solids	As submitted sample	15/09/2014	121	HPLC
Polyaromatic hydrocarbons (GC-FID)	As submitted sample	15/09/2014	133	GC-FID
Total cyanide	As submitted sample	16/09/2014	204	Colorimetry
Basic carbon banding in soil	As submitted sample	15/09/2014	218	GC-FID
Asbestos identification	As submitted sample	25/09/2014	PMAN	Microscopy
Leachate				
Arsenic*		25/09/2014	101	ICPMS
Cadmium*		25/09/2014	101	ICPMS
Chromium*		25/09/2014	101	ICPMS
Lead*		25/09/2014	101	ICPMS
Nickel*		25/09/2014	101	ICPMS
Copper*		25/09/2014	101	ICPMS
Zinc*		25/09/2014	101	ICPMS
Mercury*		25/09/2014	101	ICPMS
Selenium*		25/09/2014	101	ICPMS
Antimony		25/09/2014	101	ICPMS
Barium*		25/09/2014	101	ICPMS
Molybdenum*		25/09/2014	101	ICPMS
pH Value*		25/09/2014	113	Electrometric
Electrical Conductivity*		25/09/2014	136	Probe
Dissolved Organic Carbon		25/09/2014	102	TOC analyser
Chloride*		25/09/2014	131	Ion Chromatography
Fluoride*		25/09/2014	131	Ion Chromatography
Sulphate*		25/09/2014	131	Ion Chromatography
Total Dissolved Solids		25/09/2014	144	Gravimetric
Phenol index		25/09/2014	121	HPLC
WAC Solids analysis				
pH Value**	Air dried sample	25/09/2014	113	Electrometric
Total Organic Carbon	Air dried sample	25/09/2014	210	IR
Loss on Ignition**	Air dried sample	25/09/2014	129	Gravimetric
Acid Neutralization Capacity to pH 7	Air dried sample	25/09/2014	NEN 737	Electrometric
Total BTEX**	As submitted sample	25/09/2014	181	GCMS
Mineral Oil**	As submitted sample	25/09/2014	117	GCFID
Total PCBs (7 congeners)	Air dried sample	25/09/2014	120	GCMS
Total PAH (17)**	As submitted sample	25/09/2014	133	GCFID



Report Information

Report No.: 14-00513

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/e	not evaluated
<	means "less than"
>	means "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

Rob Rodger

From: Steve Rhodes <steve.rhodes@enzygo.com>
Sent: 06 November 2020 17:00
To: Rob Rodger
Subject: RE: Site at Cefn Mawr

Hi Rob

I have compared the chemical test results against the current General Acceptance Criteria (GAC) values and these all meet the acceptable values for residential use with plant up-take. As such soils may be retained or re-used in garden areas to domestic houses.

Steve

Steve Rhodes BSc (Hons) MSc DIC CEng CGeol MIMMM MIEEnv Sc FGS
Director

COVID-19 STATEMENT

Please be advised that Enzygo is continuing to operate and provide services to our clients whilst following Government and WHO guidelines. All staff can homework with access to our IT and phone systems which will provide minimal disruption to our service, but we appreciate your understanding if some communications are delayed.

Enzygo Geoenvironmental Ltd,
Offices in Bristol, Sheffield and Manchester

Planning & EIA, Waste & Environmental Permitting, Noise & Vibration, Flood Risk & Hydrology, Hydrogeology, Landscape Design & LVIA, SI & Geo-environmental, Ecology, Traffic & Transport, Arboriculture

Tel: +44 (0) 1454 269237
Email: rsteve.rhodes@enzygo.com
Web: www.enzygo.com

Registered Office: Stag House, The Chipping, Wotton under Edge, GL12 7AD
Registered in England & Wales registered number: 10044180 **VAT number:** 237 466389



From: Rob Rodger <ral@larchgroup.co.uk>
Sent: 06 November 2020 15:25
To: Steve Rhodes <steve.rhodes@enzygo.com>
Subject: Site at Cefn Mawr

Afternoon Steve

Further to our telcon just now..

I'm in the process of discharging a condition on a planning up for a small site of 4 dwellings at Cefn Mawr where the requirement is for a verification report that the site soils that have been imported are 'clean, chemically tested topsoil' to a depth of 200 or 300mm depth depending on area.

I've been to the site and verified the depth etc but I'm not a soil scientist (I'm a Landscape Architect). I've been provided with the report attached with the soil analysis (that means little to me in its format) but note the matter in the report 'Reuse of Material' and need to demonstrate to the local authority (Wrexham) that the imported soils are satisfactory.

Any way, I wonder if you can help me?

My client here is a chap called Chris Gregory (magregory construction). My direct nr is 01829 271570

Look forward to hearing from you and thanks for your assistance

Regards

Rob Rodger