



RHONDDA
GEOTECHNICAL
SERVICES

PHASE 2
CONTAMINATED LAND RISK ASSESSMENT
NEATH PORT TALBOT
PLANNING APP. P/2021/0019
DETACHED DWELLING
37 PARISH ROAD
CWMGWRACH
NEATH
CF63 2HJ
14/07/2021

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EXECUTIVE SUMMARY (NON-TECHNICAL)

Outline planning with all matters reserved has been granted by Neath Port Talbot L.P.A. for a detached residential property at 37 Parish Road, Cwmgwrach. As part of the planning process N.P.T. have imposed a number of planning conditions on the proposed development. Several of these relate to the possibility of contaminated land existing at the site. An earlier desk study (known as a Phase 1 Report) has already been carried out by GeoSmart Information. This recommended further investigation. Rhondda Geotechnical Services were engaged by the client to review the Phase 1 and carry out a proportionate intrusive site investigation with soil sampling and testing. The report of their findings is known as a Phase 2 Report. R.G.S. carried out a robust programme of sampling and testing within the recognised recommendations for such work. The resulting Phase 2 report concluded there was only minor contamination at the site. Remediation of this was proposed to cut all pathways to human or environmental receptors. As a result of these findings the report recommends that the client applies for the discharge of some of these conditions. Subject to approval of the remediation strategy, the construction phase can then be carried out and the remaining conditions discharged.

INTRODUCTION TO PHASE 2

This report has been prepared by Rhondda Geotechnical Services (R.G.S.) on the instruction of Stuart James in relation to the construction of a detached property at Parish Road, Cwmgwyrach. (Planning permission ref. P/2020/0019 from Neath Port Talbot Council). Pre-commencement conditions 4 and 5 of this permission relate to contaminated land. The Clients have previously commissioned a Phase 1 Desk Study from GeoSmart Information of Shrewsbury. This has addressed Condition 4 (i), but has not provided a definitive course of action since this would partially depend on the results of an intrusive investigation. Condition 4 and 5 are reproduced in full below:-

4 As part of the first reserved matters application an assessment of the nature and extent of contamination affecting the application site area shall be submitted to and approved in writing by the Local Planning Authority. This assessment must be carried out by or under the direction of a suitably qualified competent person in accordance with BS10175 (2011) 'Investigation of Potentially Contaminated Sites Code of Practice' and shall assess any contamination on the site, whether or not it originates on the site. The report of the findings shall include:

- (i) a desk top study to identify all previous uses at the site and potential contaminants associated with those uses and the impacts from those contaminants on land and controlled waters. The desk study shall establish a 'conceptual site model' (CSM) which identifies and assesses all identified potential source, pathway, and receptor linkages;
- (ii) an intrusive investigation to assess the extent, scale and nature of contamination which may be present, if identified as required by the desk top study;
- (iii) an assessment of the potential risks to:
 - human health,
 - groundwater and surface waters
 - adjoining land,
 - property (existing or proposed) including buildings, crops, livestock, pets, woodland and service lines and pipes,
 - ecological systems,
 - archaeological sites and ancient monuments; and-
- (iv) an appraisal of remedial options, and justification for the preferred remedial option(s).

Reason:

To ensure that information provided for the assessment of the risks from land contamination to the future users of the land, neighbouring land, controlled waters, property and ecological systems is sufficient to enable a proper assessment, and to ensure compliance with Policies SP16 and EN8 of the Neath Port Talbot Local Development Plan.

5 No development shall commence on site until a remediation scheme to bring the site to a condition suitable for the intended use by removing any unacceptable risks to human health, buildings, other property and the natural and historic environment shall be prepared and submitted to and approved in writing with the Local Planning Authority. The scheme shall include all works to be undertaken, proposed remediation objectives, remediation criteria and site management procedures. The measures proposed within the remediation scheme shall be implemented in accordance with an agreed programme of works.

Reason:

To ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors, and to ensure compliance with Policies SP16 and EN8 of the Neath Port Talbot

Condition 6 is a remediation condition and will be entirely dependent on the findings of 4(ii) and 4(iii) above, together with any recommendations made in accordance with condition 5. Condition 7 is a standard condition relating to unexpected contamination being encountered during the construction Phase. This report will summarise the results of the Phase 2 Contaminated Land Risk Assessment and is intended to address planning conditions 4(ii-iv) and 5 and satisfy the L.P.A. that they can be discharged. The discharge of conditions 5 and 6 will be dependent on the findings of this report. The timing of the discharge of these conditions will be a matter for the client. The discharge of Condition 6 is a standard pre-occupation condition and cannot be discharged until the construction phase is complete. The findings of the GeoSmart Phase 1 are summarised in Tables 1 and 2 overleaf.

The GeoSmart report made the following recommendation:-

Given the nature of the historical land use (including the presence of a former asbestos structure) and also the history of mining activity local to the site, there is the potential for contamination risks to be present at the site. As such, it is recommended that a proportionate programme of site investigation and monitoring works be undertaken in order to establish the presence or absence of contamination and to enable a quantitative assessment of the associated risks.

There were no specific recommendations in the Phase 1 report for the design of any investigation. On such a compact site one would not have been expected. Due to the extremely large file size, the Phase 1 report will need to be submitted separately by the applicant.

TABLE 1						
QUALITATIVE HUMAN HEALTH RISK ASSESSMENT AND ENVIRONMENTAL RISK ASSESSMENT AT PARISH ROAD, CWMGWACH.						
CONTAMINANT SOURCE	PATHWAYS	RECEPTORS	POTENTIAL SEVERITY	PROBABILITY OF RISK	LEVEL OF RISK	FURTHER ACTION REQUIRED
ON SITE: POTENTIAL CONTAMINATION IN SOILS/MADE GROUND. POSSIBLY ELEVATED LEVELS OF METALS HYDROCARBONS AND PAH	INGESTION, DERMAL CONTACT, INHALATION	FUTURE END USERS, VISITORS	MEDIUM	MEDIUM	MEDIUM	SLIGHT POSSIBILITY OF MADE GROUND BEING A SOURCE OF CONTAMINATION ON SITE. FURTHER QUANTIFICATION REQUIRED VIA AN INTRUSIVE INVESTIGATION
	CONTACT WITH CONTAMINATED GROUNDWATER	FUTURE END USERS, VISITORS AND CONSTRUCTION WORKERS	MEDIUM			
	PERMEATION OF WATER PIPES	FUTURE END USERS AND SITE VISITORS	N/A			
	INGESTION OF HOME GROWN PRODUCE	FUTURE END USERS	N/A			
ON SITE: ASBESTOS AT OR NEAR GROUND SURFACE IN SOILS/MADE GROUND	INHALATION OF FIBRES IN AIRBORNE DUST	FUTURE END USERS AND SITE VISITORS	HIGH	MEDIUM	MEDIUM	POSSIBLE SOURCE OF ASBESTOS ON SITE. FURTHER QUANTIFICATION REQUIRED. INTRUSIVE INVESTIGATION WILL INCLUDE AN ASBESTOS SCREEN
		CONSTRUCTION WORKERS	HIGH	MEDIUM	MEDIUM	
ON SITE: POTENTIAL CONTAMINATION IN SOILS/MADE GROUND. POSSIBLY ELEVATED LEVELS OF CONTAMINANTS	RUN OFF	SURFACE DRAINAGE	MEDIUM	MEDIUM	MEDIUM	SLIGHT POSSIBILITY OF CONTAMINATION IN MADE GROUND ON SITE MEANS FURTHER QUANTIFICATION OF THE THREAT TO CONTROLLED WATERS/ ENVIRONMENTAL RECEPTORS MAY BE NECESSARY
	MIGRATION THROUGH SOIL VIA LEACHING	SHALLOW GROUNDWATER				
	ONWARD MIGRATION OF GROUNDWATER	BEDROCK AQUIFER				

TABLE 2 INITIAL GROUND GAS RISK ASSESSMENT PARISH ROAD, CWMGWRACH					
SOURCE	PATHWAY	RECEPTOR	CONSEQUENCE CLASSIFICATION	RISK	FURTHER ACTION
HAZARDOUS GROUND GAS FROM OFF SITE SOURCE	INHALATION, INJURY FROM EXPLOSION	SITE USERS, VISITORS, CONSTRUCTION WORKERS	SEVERE	MEDIUM. SLIGHT POSSIBILITY OF OFF SITE GENERATION OF MINE GASES MIGRATING ONTO SITE.	THE RISK REQUIRES FURTHER QUANTIFICATION DURING THE INTRUSIVE INVESTIGATION
HAZARDOUS GROUND GAS FROM OFF SITE SOURCE	DAMAGE FROM EXPLOSION	BUILDINGS	SEVERE		
HAZARDOUS GROUND GAS FROM ON SITE SOURCE	INHALATION, INJURY FROM EXPLOSION	SITE USERS, VISITORS, CONSTRUCTION WORKERS	SEVERE	MEDIUM. SLIGHT POSSIBILITY OF ON SITE GENERATION FROM MADE GROUND OR ORGANIC SOILS.	THE RISK REQUIRES QUANTIFICATION DURING THE INTRUSIVE INVESTIGATION
HAZARDOUS GROUND GAS FROM ON SITE SOURCE	DAMAGE FROM EXPLOSION	BUILDINGS	SEVERE		
RADON GAS	LONG TERM HAZARD FROM INHALATION	SITE USERS	SEVERE	LOW <1% LOCAL PROPERTIES ABOVE RADON ACTION LEVEL	NO RADON PROTECTION MEASURES REQUIRED

The Phase 2 report will follow the guidelines set out in the document “Development of Land Affected by Contamination: A Guide for Developers (Version 3)”. This was produced by the Welsh Land Contamination Working Group in 2017. In particular the methodology set out in appendix B with the check list for Phase 1 and 2 will be followed. The contaminated land exposure assessment (henceforth CLEA) produced by The Environment Agency will be used in the conceptual model, particularly in regard to the source-pathway-receptor concept for pollutant linkages. The entire project will be guided by the 2004 Defra/E.A. document CLR11 (Model Procedures for the Management of Land Contamination).

The current definition of contaminated land is “any land which appears to the local authority in whose area it is situated in to be in such a condition, by reason of substances in or under the ground that:-

- a. Significant harm is being caused, or there is a significant possibility of such harm being caused OR
- b. Pollution of controlled waters is being, or is likely to be caused”

Section 78A Part 2A of the Environmental Protection Act requires that a risk based approach should be used for assessing the contamination status of a site. For a site to be designated as contaminated it must be shown that the site is not fit for its current, or intended use. Statutory guidance states that a two stage approach should be adopted for the assessment of contaminated land.

- 1. Identification of potential pollution linkages
- 2. Assessment of the risk to receptors

The Phase 1 Contaminative Land Assessment is a qualitative assessment of the plausible pollution linkages that exist or may exist on site. This involves the development of a site conceptual model. Where risks are identified, a Phase 2 assessment, including intrusive investigations and laboratory testing of samples is carried out to more accurately quantify the risks present on site.

As stated previously, the Phase 1 Contaminated Land Assessment has already been carried out by others. It is not known the original report has already been reviewed by the L.P.A. If this is not the case, the two reports should be read

together. This is intended to avoid any needless duplication of information from the Phase 1 report, with the exception of a brief introduction to the site.

1. AUTHOR CREDENTIALS

The author of this report is Richard Davies. Richard holds a BSc. Honours degree in Geology from Liverpool University. Richard also holds a Master's Degree in Applied Environmental Geology from Cardiff University and is a Fellow of The Geological Society. He is a Supporter Member of CL: AIRE (Contaminated Land: Applications in Real Environments). Richard began his career as an engineer in the coal industry, before moving into site investigation in the 1980's. A significant proportion of Richard's 40 years practical experience has been on contaminated land in South Wales

2. SITE DESCRIPTION

The site is centred on Grid Reference 287720, 205330 at an elevation of 135m A.O.D. in a semi-rural area outside Glyneath. The site previously had a residential building on it which has since been demolished. According to the Phase 1 and a 2004 planning application, this was built of, or contained Asbestos. The ground surface is mixed Made Ground with vegetation starting to grow through. The site covers an area of approximately 0.08 Ha. There are no surface watercourses. The site location and site boundary together with a recent aerial photograph are all shown in the Phase 1 and will not be needlessly duplicated here.

3. SITE INVESTIGATION AND SAMPLING METHODOLOGY

Intrusive site investigations were carried out on 14/06/2021 under the supervision of Richard Davies. Works consisted of the digging of six trial pits with a 3-ton tracked excavator. The trial pit locations are shown in Figure 1 together with the depth of any samples taken. The site was level and the six trial pit locations were selected for being in the garden/ hard landscaping areas at the front and rear of the proposed house. It was also important to avoid live services on site. Eight samples were taken. This was considered reasonable and proportionate for an initial investigation of a site of this size. Trial pits were excavated through any Made Ground into the underlying natural ground, which was Diamicton (Boulder Clay/ Glacial Till). There was no sensory field evidence of contamination detected anywhere on site. Groundwater was not encountered in any of the pits

Samples of soils were collected, placed in British Standard sealed containers and immediately labelled with depth, location and sample number. Each sampling location had four samples taken. These comprised two one litre plastic tubs, one 60ml. amber glass jar and one 120ml. amber glass jar. This is the recommended quantity required for a broad general suite of testing. The samples were taken with a stainless steel trowel, cleaned between samples to avoid cross contamination. The samples were stored in cool boxes and dispatched by courier to the laboratory the following morning. This meant that the lab was in receipt of the samples within 48 hours of them being taken, and they were kept under correct conditions throughout. This is important to ensure the samples are “non-deviating” particularly in the case of testing for organic contaminants.

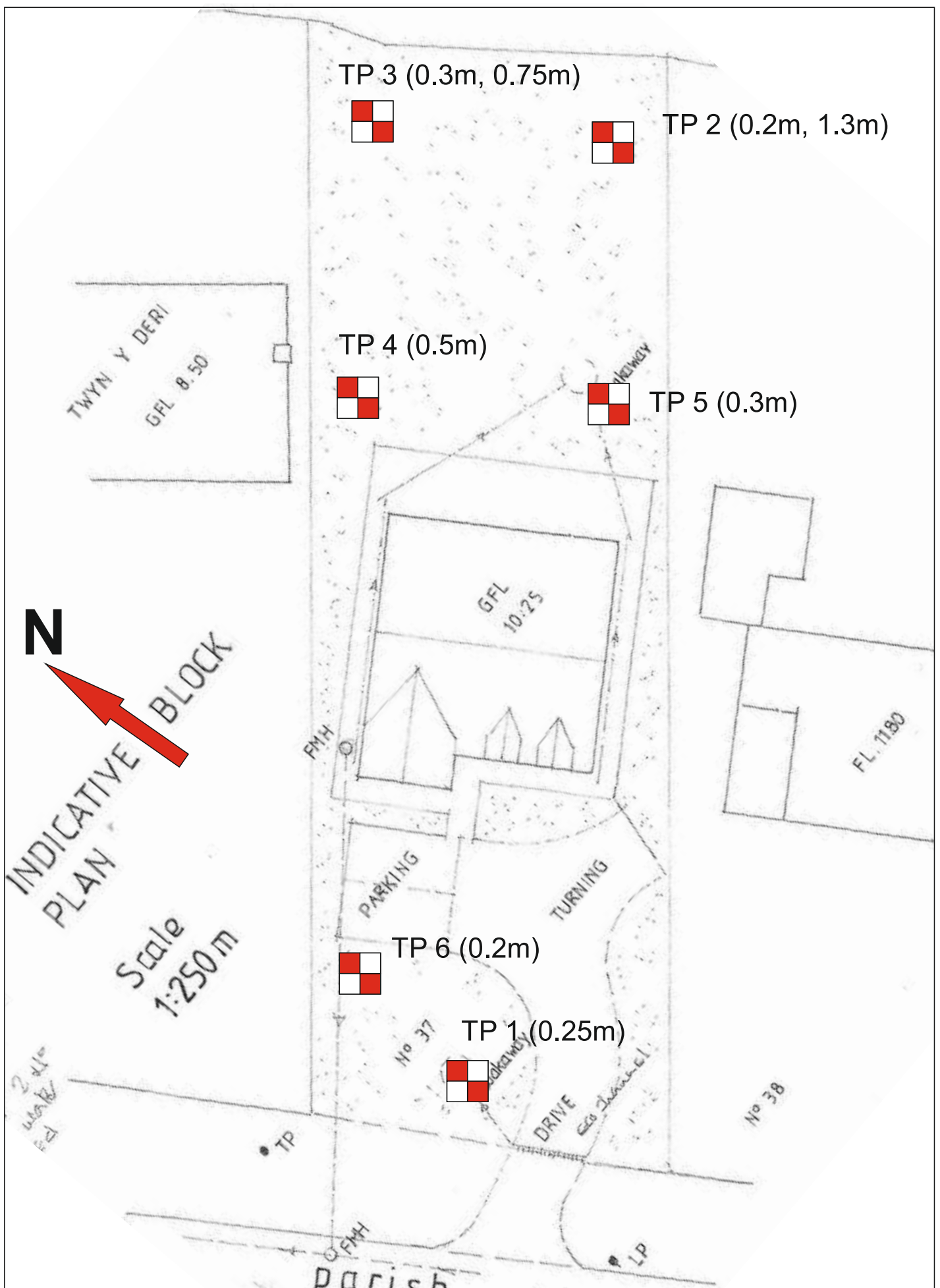


FIGURE 1
TRIAL PIT POSITIONS WITH SAMPLING DEPTHS IN BRACKETS.

4. TESTING STRATEGY

All the samples were tested by The Environmental Laboratory Ltd (reg. 3882193) at their laboratory in East Sussex. They hold both MCERTS and UKAS accreditation (UKAS lab no.2683). Their full details can be seen on the laboratory report 20-34308-12. The complete report is included as Appendix B.

With the exception of Asbestos the Phase 1 report was vague on the range of potential contaminants of concern identified. Because of this a wide range of contaminants was tested for. This is the CLEA 2.1 Suite plus asbestos screen. The substances tested for could be described as a broad general suite in common use in British contaminated land studies. The substances can be split into two main categories. Organic and Inorganic compounds.

The inorganic contaminants tested for were metals:-

Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc.

In addition, Free Cyanide was measured, and all samples were screened for Asbestos.

Total Organic Carbon and moisture were both measured. From this a calculation is used to derive Soil Organic Matter. This is needed to risk assess levels of P.A.H.'s, TPH's and Phenols which differ with varying S.O.M. values. A wide range of organic contaminants were tested for.

All samples were tested for P.A.H.s (Polycyclic Aromatic Hydrocarbons). Sixteen different compounds were measured. These are the USEPA16. Originating from the U.S.A. they are an internationally recognised, representative indicative group amongst the huge number of these compounds.

T.P.H. (total petroleum hydrocarbons) analysis was split up by Carbon Banding, along conventionally normal lines (Texas Banding). An aromatic/aliphatic split analysis was also carried out to allow further speciation of any hydrocarbon contamination detected.

The analysis for Organic contaminants also included a Phenol Suite. This contained a range of six Monohydric Phenols commonly found on contaminated sites.

5. CHOICE OF SUITABLE FOR USE VALUES (S4ULs) USED IN PHASE 2

Much work has been done in recent years on human health risk assessment for exposure to contaminated land. Originally the E.A. produced figures known as Soil Guidance Values (SGVs). These were later withdrawn, and this has resulted in the production of Generic Assessment Criteria (GACs). These are figures produced for individual substances. If the concentration of a contaminant is above its GAC, there is a potential for harm to human health (or controlled waters). Each contaminant has different levels for different exposure scenarios. For example, for any given contaminant, its GAC is far higher for a commercial development than it would be for Residential Use with consumption of homegrown produce. Many GACs have been published by Contaminated Land: Applications in real environments (CL:AIRE), Land Quality Management Ltd. (LQM) and the Environmental Industries Commission (EIC).

Due to different bodies producing GACS over the years since they were introduced, LQM have produced a complete revision of their figures and renamed them Suitable for Use Levels (S4ULs). The values used in this report are S4ULs with the exception of Lead which has a Category 4 Screening Levels (C4SL). Cyanide is not assessed in this way, instead it has an acute GAC, rather than one modelled on long term exposure. Asbestos also has its own safety levels governing land use.

The LQM S4ULs have been derived in accordance with the changes in exposure modelling presented within the C4SL framework, whilst still using a set of toxicological criteria that are set within the “minimal risk” range. The LQM/CIEH S4ULs were published to offer a set of collated information on the toxicity and transport properties for a number of common contaminants. They are widely considered to be suitable for use in planning assessments such as this. The most recent update was published in 2017 and reflects changes in UK human health risk assessment since the previous figures were published in 2009. All the data inputs used in the derivation of the S4ULs are presented in full in the publication LQM/CIEH Suitable 4 Use Levels and there is no intention to provide them here. These values are intended for use by professionals who have purchased them. To authenticate this the purchaser is supplied with an individual number to validate the report writer’s entitlement to use the LQM/CIEH S4ULs. This number can be seen on the result summary sheet. The author has the right to reproduce these values here, but they remain copyright of LQM, a specialist environmental consultancy based in Nottingham.

The development is a detached house with extensive garden and parking areas to the front and rear. Given the nature of the site, the Residential with Homegrown Produce Land Use S4ULs are appropriate, and these have been used when analysing the results for the risk assessment of the site.

6. SUMMARY OF GROUND CONDITIONS AND TEST RESULTS

The full trial pit logs to BS5930:2015 together with photographs of the pits can be found in Appendix A. In summary, all the pits with the exception of TP5 encountered a thin (0.35m-1.0m) layer of Made Ground on top of Diamicton. An infiltration test was carried out for SuDS and recorded an extremely low permeability of 9.68×10^{-7} . The true permeability is even lower as the test did not reach V_{p75-25} or anything remotely near it, in four hours and fifteen minutes.

A summary of the laboratory report in Appendix B has been produced overleaf in Tables 3-7. These compare the test results for each substance with its relevant Residential with Produce Land Use S4UL value.

There was no Cyanide in any of the samples. There was no asbestos in any of the samples.

With the organic contaminants, the samples are normally subdivided based on their Soil Organic Matter (S.O.M.) as the S4UL value for each organic contaminant is controlled by the S.O.M. value. Two of the samples tested fell in the S.O.M. band $>1\% <2.5\%$. One sample had a S.O.M. of $>2.5\% <6\%$. The remaining five samples had a S.O.M. $>6\%$. Because of this there are three different S4UL values for all the organic contaminants in Tables 3-5.

There were only very small quantities of the 16 P.A.H. range of substances in all the samples tested with no exceedances.

In Table 4, every one of the T.P.H. range tested for was either below the level of detection, or only present in minute trace quantities.

Because all the six speciated Phenols were below the level of detection in all samples, only the Phenol Index is shown, without speciation.

With the inorganic substances in Table 6, there was a single exceedance of one of the S4UL levels for the metals tested for. The Arsenic level in the sample from TP3 at 0.75m (highlighted in red) was above the relevant S4UL (44.8 mg/kg, S4UL= 37 mg/kg).

To summarise, levels of all contaminants present in the Made Ground in the garden areas are very low generally. A single minor exceedance of the S4UL value appropriate for the land use scenario was recorded for Arsenic. This needs to be seen in the context of the naturally high levels of Arsenic in the Coal Measures bedrock of South Wales, particularly Mudstones and Coal containing Iron Pyrites and Ironstone nodules. The Arsenic can be released by natural oxidation or from the burning of coal. The sample was from a thin (<100mm) layer of ash exposed in the side of TP3. No other discrete ash layers were seen in any of the other trial pits, although it is quite possible there is more diffuse ash within the Made Ground generally.

Some precautionary leachate preparation and testing was done on the sample with the Arsenic exceedance. 10:1 leachate preparation was used by the laboratory. This is superior to the older 2:1 preparation, and is considered best practice. The result is on page 5 of the ELAB report in Appendix B. Arsenic was below the level of detection in the prepared leachate. This result indicated that the contaminant was immobile. This could be due to the Arsenic compound being insoluble in water. Arsenic can also be rendered immobile due to strong sorption by clays, hydroxides and organic matter. The leachate testing was done to assess the threat to controlled waters from the slightly elevated contaminant level found in one sample. The result showed there was no threat posed by onward transport into the wider environment.

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ALL VALUES ARE IN mg/kg

ALL S4ULs REFER TO RESIDENTIAL WITH HOMEGROWN PRODUCE SCENARIO

SOIL ORGANIC MATTER(S.O.M.)											
			1%			>2.5%			>6%		
CONTAMINANT	TP2 1.3m	TP 5 0.3m	S4UL	TP2 0.2m	S4UL	TP1 0.25m	TP3 0.3m	TP3 0.75m	TP4 0.5m	TP6 0.2m	S4UL
NAPHTHALENE	<0.1	<0.1	2.3	0.2	5.6	<0.1	<0.1	<0.1	<0.1	<0.1	13
ACENAPHTHYLENE	<0.1	<0.1	170	<0.1	420	<0.1	<0.1	<0.1	<0.1	<0.1	920
ACENAPHTHENE	<0.1	<0.1	210	<0.1	510	<0.1	<0.1	<0.1	<0.1	<0.1	1100
FLOURENE	<0.1	<0.1	170	<0.1	400	<0.1	<0.1	<0.1	<0.1	<0.1	860
PHENANTHRENE	<0.1	<0.1	95	0.1	220	0.9	<0.1	<0.1	0.3	0.1	440
ANTHRACENE	<0.1	<0.1	2400	<0.1	5400	0.2	<0.1	<0.1	0.1	<0.1	11000
FLOURANTHENE	<0.1	<0.1	280	0.5	560	1.5	0.5	0.2	0.8	0.7	890
PYRENE	<0.1	<0.1	620	0.5	1200	1.2	0.3	0.1	0.6	0.4	2000
BENZO[a]ANTHRACENE	<0.1	<0.1	7.2	0.5	11	0.5	0.3	0.2	0.5	0.3	13
CHRYSENE	<0.1	<0.1	15	0.6	22	0.8	0.4	0.2	0.6	0.5	27
BENZO[b]FLOURANTHENE	<0.1	<0.1	2.6	0.7	3.3	0.9	0.5	0.3	0.6	0.4	3.7
BENZO[k]FLOURANTHENE	<0.1	<0.1	77	0.7	93	0.8	0.4	0.2	1.1	0.4	100
BENZO[a]PYRENE	<0.1	<0.1	2.2	0.5	2.7	0.7	0.3	0.2	0.5	0.4	3
INDENO[1,2,3-cd]PYRENE	<0.1	<0.1	27	0.6	36	0.6	0.3	0.2	0.4	0.3	41
DIBENZO[a,h]ANTHRACENE	<0.1	<0.1	0.24	0.2	0.28	0.1	0.1	<0.1	0.2	0.1	0.3
BENZO[g,h,i]PERYLINE	<0.1	<0.1	320	0.9	340	1.2	0.5	0.3	0.4	0.4	350
TOTAL(USEPA 16) PAHs	<0.4	<0.4	N/A	6.1	N/A	9.5	3.8	2	6.1	4	N/A
TABLE 3 POLYCYCLIC AROMATIC HYDROCARBONS (USEPA16)											

SUMMARY OF TEST RESULTS PARISH ROAD, CWMGWRACH

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SOIL ORGANIC MATTER(S.O.M.)		1%		>2.5%						>6%		
CARBON BANDING		TP2 1.3m	TP 5 0.3m	S4UL	TP2 0.2m	S4UL	TP1 0.25m	TP3 0.3m	TP3 0.75m	TP4 0.5m	TP6 0.2m	S4UL
>C5-C6	ALI	<0.01	<0.01	42	<0.01	78	<0.01	<0.01	<0.01	<0.01	<0.01	160
>C6-C8	ALI	<0.01	<0.01	100	<0.01	230	<0.01	<0.01	<0.01	<0.01	<0.01	530
>C8-C10	ALI	<1	<1	27	<1	65	<1	<1	<1	<1	<1	150
>C10-C12	ALI	<1	<1	130	<1	330	<1	<1	<1	<1	<1	760
>C12-C16	ALI	<1	<1	1100	<1	2400	<1	<1	<1	<1	<1	4300
>C16-C21	ALI	<1	<1	65000	<1	92000	<1	<1	<1	<1	<1	110000
>C21-C35	ALI	<1	<1		1.9		1.9	<1	<1	<1	<1	
>C35-C40	ALI	<1	<1	65000	<1	92000	<1	<1	<1	<1	<1	110000
>C5-C40	TOTAL ALI	<1	<1	N/A	2.1	N/A	2.1	1.4	<1	<1	<1	N/A
>C5-C7	ARO	<0.01	<0.01	70	<0.01	140	<0.01	<0.01	<0.01	<0.01	<0.01	300
>C7-C8	ARO	<0.01	<0.01	130	<0.01	290	<0.01	<0.01	<0.01	<0.01	<0.01	660
>C8-C10	ARO	<1	<1	34	<1	83	<1	<1	<1	<1	<1	190
>C10-C12	ARO	<1	<1	74	<1	180	<1	<1	<1	<1	<1	380
>C12-C16	ARO	<1	<1	140	<1	330	<1	<1	<1	<1	<1	660
>C16-C21	ARO	<1	<1	260	1.2	540	1.4	1	<1	<1	<1	930
>C21-C35	ARO	<1	<1	1100	<1	1500	6.3	2.6	<1	<1	<1	1700
>C35-C40	ARO	<1	<1	1100	<1	1500	1.1	<1	<1	<1	<1	1700
>C5-C40	TOTAL ARO	<1	<1	N/A	2.3	N/A	9.4	5.3	<1	1.7	<1	N/A
TOTAL TPH >C5-C40		<1	<1	N/A	2.6	N/A	11.5	6.8	<1	1.7	<1	N/A

TABLE 4 TOTAL PETROLEUM HYDROCARBONS WITH TEXAS BANDING AND ALIPHATIC/AROMATIC SPLIT

SUMMARY OF TEST RESULTS PARISH ROAD, CWMGWRACH

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SOIL ORGANIC MATTER(S.O.M.)	1%		>2.5%		>6%	
	TP2 1.3m	TP 5 0.3m	S4UL	TP2 0.2m	S4UL	S4UL
TOTAL PHENOLS	<5	<5	280	<5	550	1100

TABLE 5 PHENOL INDEX

CONTAMINANT	TP1 0.25m	TP2 0.2m	TP2 1.3m	TP3 0.3m	TP3 0.75m	TP4 0.5m	TP5 0.3m	TP6 0.2m	S4UL	
ARSENIC	31.3	34.6	10.6	26.3	44.8	28.6	10.9	30.6	37	
CADMIUM	0.6	1	<0.5	0.7	1.4	1.2	<0.5	1.5	11	
CHROMIUM	16.8	17.3	14.5	17.9	39	30.3	18.8	23.3	910	
COPPER	35.9	37.4	26.1	38.9	272	173	28.1	97.9	2400	
LEAD	63.1	65.7	18.7	63.3	171	145	17.3	127	200	(C4SL)
MERCURY	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	40	
NICKEL	16.9	12.1	22.7	16.3	101	68.4	8.2	27.6	180	
SELENIUM	1.2	2.3	<1	1.5	2	2.3	<1	1.8	250	
ZINC	149	176	72.4	210	698	718	40.3	416	3700	
CYANIDE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	22	GACacute

TABLE 6 TOXIC/HEAVY METALS AND CYANIDE

	TP1 0.25m	TP2 0.2m	TP2 1.3m	TP3 0.3m	TP3 0.75m	TP4 0.5m	TP5 0.3m	TP6 0.2m	
WEIGHT (g)	0	0	0	0	0	0	0	0	
% DRY WEIGHT OF SAMPLE	0	0	0	0	0	0	0	0	

TABLE 7 ASBESTOS ANALYSIS

SUMMARY OF TEST RESULTS PARISH ROAD, CWMGWRACH

7. REVISED RISK ASSESSMENT FOR GROUND GAS

The Phase 1 established there was minimal risk from ground gas migration from off-site sources. The risk from landfills greater than 250m away was examined and discounted.

Some reference was made to the site being in a mining area, but this was very poorly quantified in the Phase 1 despite the authors attaching a Coal Authority Consultants Report which they evidently didn't read. This states on page 4 that there have been no mine gas emissions within 500m of the site. Not only that, but cursory archive checks reveal there is no mining beneath the site at any depth. The nearest underground mining is 350m south of the site. There is opencast mining approximately 100m from the site, but this does not represent a source of mine gases. On the contrary, the removal of the coal and any associated old workings dissipates any gases and the cut is later backfilled with the inert Mudstones and Siltstones.

The Phase 1 stated the risk from on-site gas generation was considered unlikely but required quantification. The trial pitting established that the site has a thin veneer of Made Ground with no visible biodegradable material. This means there is no potential for gas generation. The Made Ground is underlain at very shallow depth by Diamicton. This contains very low levels of organic material and has no potential for gas generation. This is reflected in the revised gas risk assessment in Table 8 overleaf.

The Phase 1 established that <1% of local properties are above the Radon Action Threshold. This means no Radon Protection Measures will need to be incorporated into the new development.

8. RISK ASSESSMENT FOR CONTROLLED WATERS

The contaminants tested for in the soil samples, were generally at very low levels. The single sample with a solitary exceedance was used to prepare leachate solution. The leachate testing results showed the contaminant (arsenic) was immobile, and so the Made Ground does not form a threat to controlled waters. The potential source has been removed from the revised risk assessment in Table 9 overleaf.

9. REVISED RISK ASSESSMENT FOR SOILS

There was a single minor contaminant present in the Made Ground, and that was at 0.7m depth. There is no obvious pathway to above site receptors apart

from excavations during the construction phase. Any contractors should be made aware of this and include it in their RAMS. For this reason, the potential risk cannot be removed from Table 9 at this stage. As was discussed in Section 6, the actual risk is minimal. Simple P.P.E. and the prohibition of smoking, eating and drinking during excavations will be sufficient.

10. SUMMARY OF REMEDIATION OBJECTIVES, CRITERIA AND OPTIONS

The objective of any remediation strategy is to make the land suitable for its intended use. In this case a residential property. The possibility of the production and consumption of homegrown produce cannot be ruled out. As the soil beneath the site could possibly pose some risk to human or animal receptors, a remediation scheme in accordance with the requirements of Condition 5, and verification report in accordance with the requirement of Condition 6 are required.

Both the Made Ground and the Diamicton are manifestly unsuitable to grow anything. In order to be able to cultivate anything, a growing substrate would have to be imported. The proposed remediation scheme is simple. Any areas not covered with the house footprint or hard landscaping will need to be covered with a no dig membrane, and the ground level raised by 600mm. This need not be topsoil. The choice of material is entirely up to the developer as long as any imported material is certified and the paperwork kept for the final validation report (Condition 6). There is plenty of room behind the proposed property. Raising the ground in the immediate vicinity of the house may not be suitable because of the relationship of the D.P.C. to the ridge height stipulated by building control. If this were the case then it would be a simple matter to strip the Made Ground from around the house and push it further into the back garden area where it could be capped. A topographic survey with the proposed levels of any such work will need to be submitted to the L.P.A. for approval prior to the commencement of work.

Richard Davies BSc.(Hons.), MSc., F.G.S.

14/07/2021

TABLE 8 FINAL GROUND GAS RISK ASSESSMENT PARISH ROAD, CWMGWRACH					
SOURCE	PATHWAY	RECEPTOR	CONSEQUENCE CLASSIFICATION	RISK	FURTHER ACTION
HAZARDOUS GROUND GAS FROM OFF SITE SOURCE	INHALATION, INJURY FROM EXPLOSION	SITE USERS, VISITORS, CONSTRUCTION WORKERS	SEVERE	LOW. NO POSSIBILITY OF OFF SITE GENERATION OF MINE GASES MIGRATING ONTO SITE.	NONE. NO GROUND GAS PROTECTIVE MEASURES REQUIRED.
HAZARDOUS GROUND GAS FROM OFF SITE SOURCE	DAMAGE FROM EXPLOSION	BUILDINGS	SEVERE		
HAZARDOUS GROUND GAS FROM ON SITE SOURCE	INHALATION, INJURY FROM EXPLOSION	SITE USERS, VISITORS, CONSTRUCTION WORKERS	SEVERE	LOW. NO POSSIBILITY OF ON SITE GENERATION FROM MADE GROUND OR ORGANIC SOILS.	NONE. NO GROUND GAS PROTECTIVE MEASURES REQUIRED.
HAZARDOUS GROUND GAS FROM ON SITE SOURCE	DAMAGE FROM EXPLOSION	BUILDINGS	SEVERE		
RADON GAS	LONG TERM HAZARD FROM INHALATION	SITE USERS	SEVERE	LOW <1% LOCAL PROPERTIES ABOVE RADON ACTION LEVEL	NO RADON PROTECTION MEASURES REQUIRED

TABLE 9						
QUANTITATIVE HUMAN HEALTH RISK ASSESSMENT AND ENVIRONMENTAL RISK ASSESSMENT AT PARISH ROAD, CWMGWRACH.						
CONTAMINANT SOURCE	PATHWAYS	RECEPTORS	POTENTIAL SEVERITY	PROBABILITY OF RISK	LEVEL OF RISK	FURTHER ACTION REQUIRED
ON SITE: POTENTIAL CONTAMINATION IN SOILS/MADE GROUND. POSSIBLY ELEVATED LEVELS OF METALS HYDROCARBONS AND PAH	INGESTION, DERMAL CONTACT, INHALATION	FUTURE END USERS, VISITORS	MEDIUM	LOW TO MEDIUM	LOW TO MEDIUM	MINOR CONTAMINATION WAS DETECTED IN THE MADE GROUND. THE MAIN POSSIBLE PATHWAY WILL BE DURING THE CONSTRUCTION PHASE. CONTRACTORS SHOULD BE MADE AWARE OF THIS AND APPROPRIATE MEASURES TAKEN. THERE IS MINIMAL RISK TO END USERS. THE PROPOSED REMEDIATION MEASURES WILL CUT ALL PATHWAYS AND REMOVE THE RISK.
	CONTACT WITH CONTAMINATED GROUNDWATER	FUTURE END USERS, VISITORS AND CONSTRUCTION WORKERS	MEDIUM			
	PERMEATION OF WATER PIPES	FUTURE END USERS AND SITE VISITORS	MEDIUM			
	INGESTION OF HOME GROWN PRODUCE	FUTURE END USERS	MEDIUM			
ON SITE: ASBESTOS AT OR NEAR GROUND SURFACE IN SOILS/MADE GROUND	INHALATION OF FIBRES IN AIRBORNE DUST	FUTURE END USERS AND SITE VISITORS	HIGH	LOW	LOW	NONE. NO ASBESTOS WAS FOUND DURING THE LABORATORY TESTING.
		CONSTRUCTION WORKERS	HIGH	LOW	LOW	
ON SITE: POTENTIAL CONTAMINATION IN SOILS/MADE GROUND. POSSIBLY ELEVATED LEVELS OF CONTAMINANTS	RUN OFF	SURFACE DRAINAGE	MEDIUM	LOW	LOW	MINOR CONTAMINATION WAS DETECTED IN THE MADE GROUND. LEACHATE TESTING ESTABLISHED THIS WAS IMMOBILE AND THERE WAS NO ONWARD PATHWAY TO THE BROADER ENVIRONMENT
	MIGRATION THROUGH SOIL VIA LEACHING	SHALLOW GROUNDWATER				
	ONWARD MIGRATION OF GROUNDWATER	BEDROCK AQUIFER				

APPENDIX A
TRIAL PIT LOGS TO BS5930:2015
WITH PHOTOGRAPHS
PARISH ROAD
CWMGWRACH

Project: CWMGWRACH	Project No: CG16
Described By: R.DAVIES	Trial Pit No. TP1
Date: 14.06.2021	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability GOOD	Strike of Face A:
Shoring NONE	Loggers Signature

FACE SKETCHES - INCLUDING ANY SIGNIFICANT FINDINGS WITHIN TRIAL PIT

Samples and Tests		Strata	
Depth (m)	Type (B,D,ES)	Depth (m)	Strata Description
		G.L.	MADE GROUND. Loose greyish black sandy, clayey GRAVEL. Gravel is angular, fine to coarse of concrete, brick and tiles.
ES1	0.25	0.35	
			Soft to Firm, yellowish brown and grey mottled gravelly, sandy, silty CLAY. Gravel is subangular to subrounded, fine to coarse of Pennant Sandstone. Medium cobble content up to 190mm diameter.
		0.9	Firm to stiff brown and grey gravelly, sandy, silty CLAY. Gravel is subangular to subrounded, fine to coarse of Pennant Sandstone.
		1.0	Firm to stiff brown and grey gravelly, sandy, silty CLAY. Gravel is subangular to subrounded, fine to coarse of Pennant Sandstone.

Notes: ES-Environmental Soil
EW - Environmental Water
B - Bulk Disturbed
D - Small Disturbed

TRIAL PIT NUMBER

TP1 Sheet 1 of 1



FIGURE 2

TP 1

Project: CWMGWRACH	Project No: CG16
Described By: R.DAVIES	Trial Pit No. TP2
Date: 14.06.2021	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability GOOD	Strike of Face A:
Shoring NONE	Loggers Signature

FACE SKETCHES - INCLUDING ANY SIGNIFICANT FINDINGS WITHIN TRIAL PIT

Samples and Tests		Strata	
Depth (m)	Type (B,D,ES)	Depth (m)	Strata Description
		G.L.	MADE GROUND. Loose greyish black sandy, clayey GRAVEL. Gravel is angular, fine to coarse of concrete, brick and tiles.
ES1	0.2	0.4	
			Soft to Firm, yellowish brown and grey mottled gravelly, sandy, silty CLAY. Gravel is subangular to subrounded, fine to coarse of Pennant Sandstone. Medium cobble content up to 210mm diameter.
		1.0	Firm to stiff brown and grey gravelly, sandy, silty CLAY. Gravel is subangular to subrounded, fine to coarse of Pennant Sandstone. High cobble content up to 230mm diameter.
ES2	1.3	1.3	

Notes: ES-Environmental Soil
 EW - Environmental Water
 B - Bulk Disturbed
 D - Small Disturbed

TRIAL PIT NUMBER
TP2 Sheet 1 of 1



FIGURE 3 TP 2

Project: CWMGWRACH	Project No: CG16
Described By: R.DAVIES	Trial Pit No. TP3
Date: 14.06.2021	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability GOOD	Strike of Face A:
Shoring NONE	Loggers Signature

FACE SKETCHES - INCLUDING ANY SIGNIFICANT FINDINGS WITHIN TRIAL PIT

Samples and Tests		Strata	
Depth (m)	Type (B,D,ES)	Depth (m)	Strata Description
		G.L.	MADE GROUND. Loose to medium dense blackish grey clayey sandy GRAVEL. Gravel is angular, fine to coarse of brick, concrete and masonry.
0.3	ES1		
0.75	ES2	0.8	Soft to Firm, yellowish brown and grey mottled gravelly, sandy, silty CLAY. Gravel is angular to subrounded, fine to coarse of Pennant Sandstone. High cobble content, up to 280mm diameter.
		1.3	

Notes: ES-Environmental Soil
EW - Environmental Water
B - Bulk Disturbed
D - Small Disturbed

TRIAL PIT NUMBER
TP3 Sheet 1 of 1



FIGURE 4 TP3

Project: CWMGWRACH	Project No: CG16
Described By: R.DAVIES	Trial Pit No. TP4
Date: 14.06.2021	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability GOOD	Strike of Face A:
Shoring NONE	Loggers Signature

FACE SKETCHES - INCLUDING ANY SIGNIFICANT FINDINGS WITHIN TRIAL PIT

Samples and Tests		Strata	
Depth (m)	Type (B,D,ES)	Depth (m)	Strata Description
		G.L.	MADE GROUND. Loose to medium dense blackish grey clayey sandy GRAVEL. Gravel is angular, fine to coarse of brick, concrete and masonry.
0.5	ES1		
		0.6	Soft to Firm, yellowish brown and grey mottled gravelly, sandy, silty CLAY. Gravel is angular to subrounded, fine to coarse of Pennant Sandstone. High cobble content, up to 230mm diameter.
		1.0	

Notes: ES-Environmental Soil
 EW - Environmental Water
 B - Bulk Disturbed
 D - Small Disturbed

TRIAL PIT NUMBER
TP4 Sheet 1 of 1



FIGURE 5 TP 4

Project: CWMGWRACH	Project No: CG16
Described By: R.DAVIES	Trial Pit No. TP5
Date: 14.06.2021	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability GOOD	Strike of Face A:
Shoring NONE	Loggers Signature

FACE SKETCHES - INCLUDING ANY SIGNIFICANT FINDINGS WITHIN TRIAL PIT

Samples and Tests		Strata	
Depth (m)	Type (B,D,ES)	Depth (m)	Strata Description
		G.L.	Soft to Firm yellowish brown and grey mottled gravelly sandy silty CLAY. Gravel is angular to subrounded, fine to coarse of Pennant Sandstone. Medium cobble content up to 170mm diameter.
		0.25	Firm to stiff grey and brown mottled gravelly, sandy silty CLAY. Gravel is subangular to subrounded, fine to coarse of Pennant Sandstone and Quartzitic sandstone. High cobble content up to 260mm diameter.
ES1	0.3		
		0.7	

Notes: ES-Environmental Soil
 EW - Environmental Water
 B - Bulk Disturbed
 D - Small Disturbed

TRIAL PIT NUMBER
TP5 Sheet 1 of 1



FIGURE 6 TP 5

Project: CWMGWRACH	Project No: CG16
Described By: R.DAVIES	Trial Pit No. TP6
Date: 14.06.2021	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability GOOD	Strike of Face A:
Shoring NONE	Loggers Signature

FACE SKETCHES - INCLUDING ANY SIGNIFICANT FINDINGS WITHIN TRIAL PIT

Samples and Tests		Strata	
Depth (m)	Type (B,D,ES)	Depth (m)	Strata Description
		G.L.	MADE GROUND. Loose to medium dense blackish grey clayey sandy GRAVEL. Gravel is angular, fine to coarse of brick, concrete and masonry.
0.2	ES1		
		0.35	
			Soft to Firm, yellowish brown and grey mottled gravelly, sandy, silty CLAY. Gravel is angular to subrounded, fine to coarse of Pennant Sandstone. High cobble content, up to 260mm diameter.
		0.9	

Notes: ES-Environmental Soil
 EW - Environmental Water
 B - Bulk Disturbed
 D - Small Disturbed

TRIAL PIT NUMBER
TP6 Sheet 1 of 1



FIGURE 7

TP6

APPENDIX B
LABORATORY TEST REPORT
ELAB 21-34308-12
PARISH ROAD
CWMGWRACH



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 21-34308

Issue: 2. Replaces Analytical Report number 21-34308; issue no.1

Date of Issue: 08/07/2021

Contact: Richard Davies

Customer Details: Rhondda Geotechnical Services
56 Meyler Street
Thomastown
Porth
CF39 8EA

Quotation No: Q19-01527

Order No: CG16

Customer Reference: CG16

Date Received: 16/06/2021

Date Approved: 08/07/2021

Details: CWMGWRACH

Approved by: 

Mike Varley, Technical Manager

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

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Sample Summary

Report No.: 21-34308, issue number 2

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
240887	TP1 ES1 0.25	14/06/2021	16/06/2021	Silty loam	
240888	TP2 ES1 0.20	14/06/2021	16/06/2021	Silty loam	
240889	TP2 ES2 1.30	14/06/2021	16/06/2021	Silty loam	
240890	TP3 ES1 0.30	14/06/2021	16/06/2021	Silty loam	
240891	TP3 ES2 0.75	14/06/2021	16/06/2021	Loamy sand	
240892	TP4 ES1 0.50	14/06/2021	16/06/2021	Sandy loam	
240893	TP5 ES1 0.30	14/06/2021	16/06/2021	Silty clayey loam	
240894	TP6 ES1 0.20	14/06/2021	16/06/2021	Silty loam	

Results Summary

2683

Report No.: 21-34308, issue number 2

ELAB Reference	240887	240888	240889	240890	240891
Customer Reference	ES1	ES1	ES2	ES1	ES2
Sample ID					
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP1	TP2	TP2	TP3	TP3
Sample Depth (m)	0.25	0.20	1.30	0.30	0.75
Sampling Date	14/06/2021	14/06/2021	14/06/2021	14/06/2021	14/06/2021

Determinand	Codes	Units	LOD					
Soil sample preparation parameters								
Moisture Content	N	%	0.1	29.9	33.5	14.6	31.7	36.1
Material removed	N	%	0.1	17.4	12.2	< 0.1	16.2	31.3
Description of Inert material removed	N		0	Clinker	Clinker	None	Clinker	Clinker
Metals								
Arsenic	M	mg/kg	1	31.3	34.6	10.6	26.3	44.8
Cadmium	M	mg/kg	0.5	0.6	1.0	< 0.5	0.7	1.4
Chromium	M	mg/kg	5	16.8	17.3	14.5	17.9	39.0
Copper	M	mg/kg	5	35.9	37.4	26.1	38.9	272
Lead	M	mg/kg	5	63.1	65.7	18.7	63.3	171
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	16.9	12.1	22.7	16.3	101
Selenium	M	mg/kg	1	1.2	2.3	< 1.0	1.5	2.0
Zinc	M	mg/kg	5	149	176	72.4	210	698
Inorganics								
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Miscellaneous								
pH	M	pH units	0.1	7.8	7.0	6.7	7.0	6.9
Soil Organic Matter	U	%	0.1	6.5	4.7	2.0	6.2	6.4
Total Organic Carbon	N	%	0.01	7.1	7.6	2.4	13	34
Phenols								
Phenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
M,P-Cresol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
O-Cresol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
3,4-Dimethylphenol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
2,3-Dimethylphenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
2,3,5-trimethylphenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
Total Monohydric Phenols	N	mg/kg	5	< 5	< 5	< 5	< 5	< 5
Polyaromatic hydrocarbons								
Naphthalene	M	mg/kg	0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	0.9	0.1	< 0.1	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	1.5	0.5	< 0.1	0.5	0.2
Pyrene	M	mg/kg	0.1	1.2	0.5	< 0.1	0.3	0.1
Benzo(a)anthracene	M	mg/kg	0.1	0.5	0.5	< 0.1	0.3	0.2
Chrysene	M	mg/kg	0.1	0.8	0.6	< 0.1	0.4	0.2
Benzo(b)fluoranthene	M	mg/kg	0.1	0.9	0.7	< 0.1	0.5	0.3
Benzo(k)fluoranthene	M	mg/kg	0.1	0.8	0.7	< 0.1	0.4	0.2
Benzo(a)pyrene	M	mg/kg	0.1	0.7	0.5	< 0.1	0.3	0.2
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	0.6	0.6	< 0.1	0.3	0.2
Dibenzo(a,h)anthracene	M	mg/kg	0.1	0.1	0.2	< 0.1	0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	1.2	0.9	< 0.1	0.5	0.3
Total PAH(16)	M	mg/kg	0.4	9.5	6.1	< 0.4	3.8	2.0



Results Summary

2683

Report No.: 21-34308, issue number 2

ELAB Reference	240887	240888	240889	240890	240891
Customer Reference	ES1	ES1	ES2	ES1	ES2
Sample ID					
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP1	TP2	TP2	TP3	TP3
Sample Depth (m)	0.25	0.20	1.30	0.30	0.75
Sampling Date	14/06/2021	14/06/2021	14/06/2021	14/06/2021	14/06/2021

Determinand	Codes	Units	LOD					
TPH CWG								
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic	M	mg/kg	1	1.9	< 1.0	< 1.0	< 1.0	< 1.0
>C35-C40 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total aliphatic hydrocarbons (>C5 - C40)	N	mg/kg	1	2.1	< 1.0	< 1.0	1.4	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	M	mg/kg	1	1.4	1.2	< 1.0	1.0	< 1.0
>C21-C35 Aromatic	M	mg/kg	1	6.3	< 1.0	< 1.0	2.6	< 1.0
>C35-C40 Aromatic	M	mg/kg	1	1.1	< 1.0	< 1.0	< 1.0	< 1.0
Total aromatic hydrocarbons (>C5 - C40)	N	mg/kg	1	9.4	2.3	< 1.0	5.3	< 1.0
Total petroleum hydrocarbons (>C5 - C40)	N	mg/kg	1	11.5	2.6	< 1.0	6.8	< 1.0



Results Summary

2683

Report No.: 21-34308, issue number 2

ELAB Reference	240892	240893	240894
Customer Reference	ES1	ES1	ES1
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6
Sample Depth (m)	0.50	0.30	0.20
Sampling Date	14/06/2021	14/06/2021	14/06/2021

Determinand	Codes	Units	LOD			
Soil sample preparation parameters						
Moisture Content	N	%	0.1	28.9	30.7	38.5
Material removed	N	%	0.1	41.8	< 0.1	18.5
Description of Inert material removed	N		0	Clinker	None	Clinker
Metals						
Arsenic	M	mg/kg	1	28.6	10.9	30.6
Cadmium	M	mg/kg	0.5	1.2	< 0.5	1.5
Chromium	M	mg/kg	5	30.3	18.8	23.3
Copper	M	mg/kg	5	173	28.1	97.9
Lead	M	mg/kg	5	145	17.3	127
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	68.4	8.2	27.6
Selenium	M	mg/kg	1	2.3	< 1.0	1.8
Zinc	M	mg/kg	5	718	40.3	416
Inorganics						
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Miscellaneous						
pH	M	pH units	0.1	7.0	7.1	7.4
Soil Organic Matter	U	%	0.1	8.4	2.1	7.7
Total Organic Carbon	N	%	0.01	57	1.9	14
Phenols						
Phenol	M	mg/kg	1	< 1	< 1	< 1
M,P-Cresol	N	mg/kg	1	< 1	< 1	< 1
O-Cresol	N	mg/kg	1	< 1	< 1	< 1
3,4-Dimethylphenol	N	mg/kg	1	< 1	< 1	< 1
2,3-Dimethylphenol	M	mg/kg	1	< 1	< 1	< 1
2,3,5-trimethylphenol	M	mg/kg	1	< 1	< 1	< 1
Total Monohydric Phenols	N	mg/kg	5	< 5	< 5	< 5
Polyaromatic hydrocarbons						
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	0.3	< 0.1	0.1
Anthracene	M	mg/kg	0.1	0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	0.8	< 0.1	0.7
Pyrene	M	mg/kg	0.1	0.6	< 0.1	0.4
Benzo(a)anthracene	M	mg/kg	0.1	0.5	< 0.1	0.3
Chrysene	M	mg/kg	0.1	0.6	< 0.1	0.5
Benzo(b)fluoranthene	M	mg/kg	0.1	0.6	< 0.1	0.4
Benzo(k)fluoranthene	M	mg/kg	0.1	1.1	< 0.1	0.4
Benzo(a)pyrene	M	mg/kg	0.1	0.5	< 0.1	0.4
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	0.4	< 0.1	0.3
Dibenzo(a,h)anthracene	M	mg/kg	0.1	0.2	< 0.1	0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	0.4	< 0.1	0.4
Total PAH(16)	M	mg/kg	0.4	6.1	< 0.4	4.0



Results Summary

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Report No.: 21-34308, issue number 2

ELAB Reference	240892	240893	240894
Customer Reference	ES1	ES1	ES1
Sample ID			
Sample Type	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6
Sample Depth (m)	0.50	0.30	0.20
Sampling Date	14/06/2021	14/06/2021	14/06/2021

Determinand	Codes	Units	LOD			
TPH CWG						
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C35-C40 Aliphatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Total aliphatic hydrocarbons (>C5 - C40)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C35-C40 Aromatic	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Total aromatic hydrocarbons (>C5 - C40)	N	mg/kg	1	1.7	< 1.0	< 1.0
Total petroleum hydrocarbons (>C5 - C40)	N	mg/kg	1	1.7	< 1.0	< 1.0



Results Summary

2683

Report No.: 21-34308, issue number 2

ELAB Reference	240891
Customer Reference	ES2
Sample ID	
Sample Type	SOIL
Sample Location	TP3
Sample Depth (m)	0.75
Sampling Date	14/06/2021

Determinand	Codes	Units	LOD	
Metals				
Arsenic 10:1 extract	N	ug/l	5	< 5
Boron 10:1 extract	N	ug/l	5	13
Cadmium 10:1 extract	N	ug/l	1	< 1
Chromium 10:1 extract	N	ug/l	5	< 5
Copper 10:1 extract	N	ug/l	5	< 5
Lead 10:1 extract	N	ug/l	5	< 5
Mercury 10:1 extract	N	ug/l	0.1	< 0.1
Nickel 10:1 extract	N	ug/l	5	< 5
Selenium 10:1 extract	N	ug/l	5	< 5
Zinc 10:1 extract	N	ug/l	5	15
Inorganics				
Hexavalent chromium	N	ug/l	100	< 100

Results Summary

Report No.: 21-34308, issue number 2

Asbestos 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 #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
240887	0.25	TP1 ES1	Brown sandy soil, stones, concrete, clinker	No asbestos detected	n/t	n/t	n/t	n/t
240888	0.20	TP2 ES1	Brown soil, clinker, stones	No asbestos detected	n/t	n/t	n/t	n/t
240889	1.30	TP2 ES2	Brown soil, stones, clinker	No asbestos detected	n/t	n/t	n/t	n/t
240890	0.30	TP3 ES1	Brown soil, stones, clinker, terracota tile	No asbestos detected	n/t	n/t	n/t	n/t
240891	0.75	TP3 ES2	Brown sandy soil, clinker, stones, glass	No asbestos detected	n/t	n/t	n/t	n/t
240892	0.50	TP4 ES1	Brown sandy soil, clinker, stones	No asbestos detected	n/t	n/t	n/t	n/t
240893	0.30	TP5 ES1	Brown soil, stones	No asbestos detected	n/t	n/t	n/t	n/t
240894	0.20	TP6 ES1	Brown soil, stones, clinker	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

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Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	18/06/2021	113	Electromeric
Phenols in solids	M	As submitted sample	17/06/2021	121	HPLC
PAH (GC-FID)	M	As submitted sample	17/06/2021	133	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	23/06/2021	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	23/06/2021	181	GC-MS
Total cyanide	M	As submitted sample	18/06/2021	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	18/06/2021	210	IR
TPH CWG soil by gc-gc	M	As submitted sample	17/06/2021	271	
Asbestos identification	U	Air dried sample	21/06/2021	280	Microscopy
Aqua regia extractable metals	M	Air dried sample	18/06/2021	300	ICPMS
Leachate metals 10:1 extract	N		07/07/2021	301	ICPMS
Soil organic matter	U	Air dried sample	18/06/2021	BS1377:P3	Titrimetry

Tests marked N are not UKAS accredited

Report Information

Report No.: 21-34308, issue number 2

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
*	UKAS 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
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

LOD LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the sample received.
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request
Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

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) |

Where a sample has a deviation code, the applicable test result may be invalid.

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