



RHONDDA
GEOTECHNICAL
SERVICES

PHASE 2

CONTAMINATED LAND RISK ASSESSMENT

M.T.C.B.C. PLANNING APP. P/25/0247

NEW STORAGE UNIT WITH OFFICE

J.L.C. GROUNDWORKS CONTRACTORS LTD.

WILLOW WORKS

ABERCANAID INDUSTRIAL ESTATE

MERTHYR TYDFIL

CF48 1YF

29/01/2026

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This Phase 2 Risk Assessment is intended for review alongside the Phase 1 Risk Assessment, with the two documents being submitted together to M.T.C.B.C. in line with the requirements of Condition 4 of granted planning ref. P/25/0247. For this reason, the numbering of sections, figures and tables follows on from those in the Phase 1. To avoid needless repetition, Figures 1 and 2 from the Phase 1 have been included in the previous pages for ease of reference.

20. INFORMATION GAPS AND UNCERTAINTIES

This 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. The methodology set out in Appendix B with the check list for Phase 2 will be followed. The contaminated land exposure assessment (henceforth CLEA) produced by The Environment Agency will be used in the conceptual model, particularly regarding the source-pathway-receptor concept for pollutant linkages. The entire project will be guided by the 2021 C.L.R.M which has now superseded the withdrawn 2004 Defra/E.A. document CLR11 (Model Procedures for the Management of Land Contamination).

The Phase 1 Report was informed by a broad range of desk study material. The desk study concluded that there was a risk of contaminated Made Ground being present at the site. The only conclusive way to check for Made Ground and possible contamination was to carry out an intrusive site investigation involving trial pitting, taking samples and testing them for contaminants. It was likely the Made Ground would be of limited thickness. This was based on the appearance of the site, the historical mapping and previous nearby site investigations by the author. Since it is the uppermost material that would be likely to contain any contamination and possibly impact above ground receptors, trial pitting would be the preferred method of sampling. If contaminants were detected in the laboratory analysis of the soil samples, leachate tests could then be carried out. These could further quantify the risk to controlled waters and the wider environment.

21. SITE INVESTIGATION AND SAMPLING METHODOLOGY

Intrusive site investigations were carried out on 2nd December 2025 under the supervision of Richard Davies. Works consisted of the digging of three shallow trial pits with a 3-ton tracked excavator. The trial pit locations are shown in Figure 22 together with the depth of any samples taken. As described in the

Phase 1, the site has been used for many years for various commercial/industrial purposes. It is almost entirely covered in reinforced concrete. This will remain in situ, and the development is limited to a small office/storage unit. The locations where it would be possible to excavate trial pits were limited to the hardstanding area outside the current compound, but within the client's ownership. As can be seen in Figure 22, this is also the location of the proposed unit. Nevertheless, it was thought that the origin of the Made ground long pre-dated the concrete, and that the area sampled could be taken as representative of conditions across the site, beneath the concrete. All three pits proved granular Made ground. but were also governed by live services including water, gas and medium voltage electricity. Three soil samples were taken in all. This was considered reasonable and proportionate for an initial investigation of a site of this size. Trial pits were excavated to depths of 0.5m-0.7m. Further excavation was hindered by large obstructions. These were seemingly in situ foundations from older buildings seen on the historic mapping in the Phase 1 report.

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 a one litre plastic tub, one 60ml. amber glass jar and one 120ml. amber glass jar. This is the recommended quantity required by the laboratory 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 the samples 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.

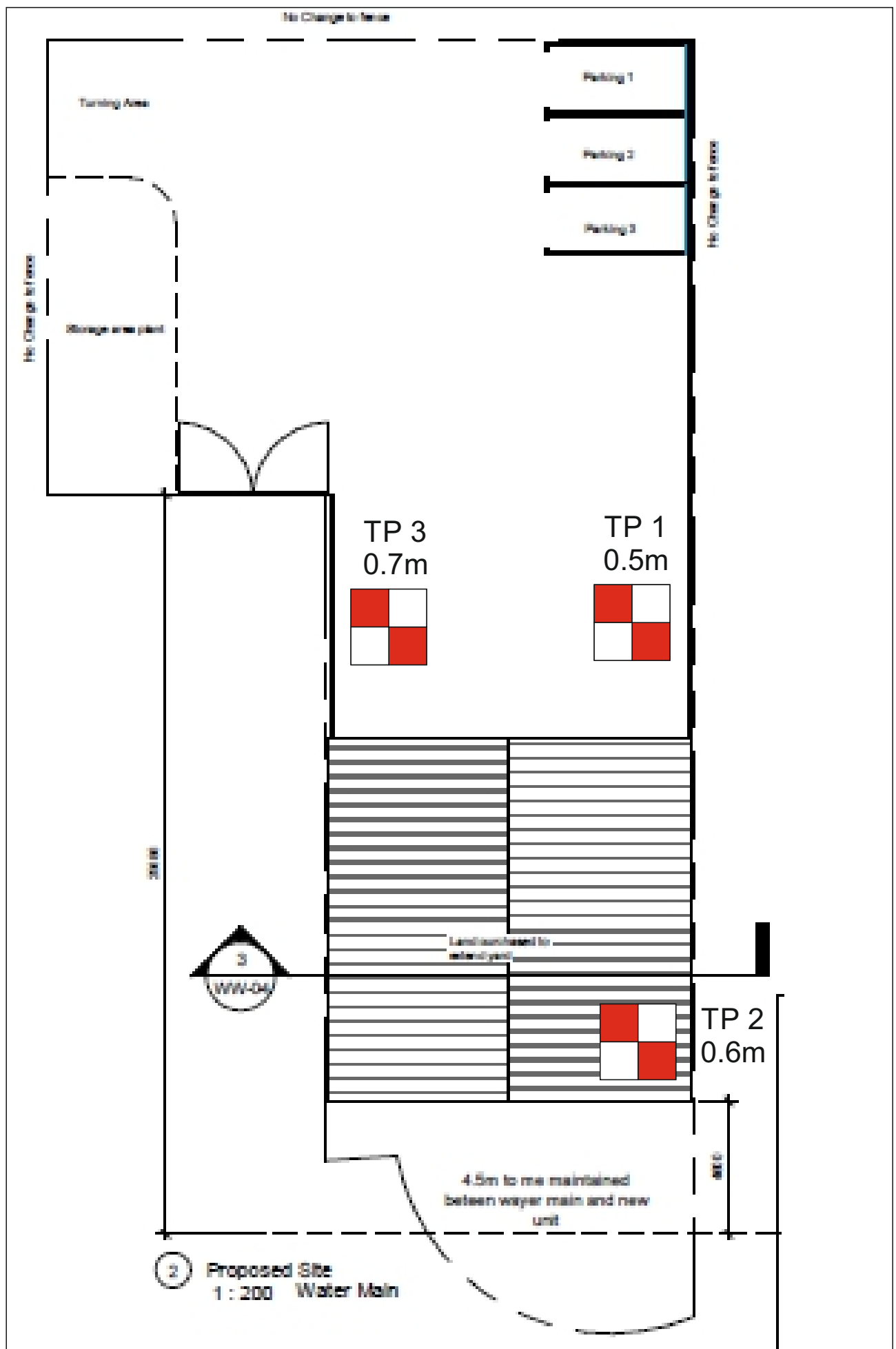


FIGURE 22 TRIAL PIT POSITIONS ON THE PROPOSED PLAN.

22. TESTING STRATEGY

All the samples were tested by Chemtech Ltd (reg. 3882193) at their laboratory in County Durham. They hold both MCERTS and UKAS accreditation (UKAS lab no.2531). Their full details can be seen on page 1 of the laboratory report 25-11877-01. The complete report is attached as Appendix C.

The site was known to be close to a former Gasworks. The 1995 DoE Gas Works Industry profile lists many possible contaminants. The publication makes it clear that not all are to be expected at any single location. Many are dependent on specific by-product manufacture being carried out at a particular site. For the Phase 2 to accompany the new application the testing scheduled was the CLEA 2.1 Suite with the addition of an asbestos screen. The substances tested for could be described as a broad general suite in common use in British contaminated land studies on sites with a past industrial use, including gas works. The substances tested for 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 organic contaminants. The risk assessments for organic contaminants 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 and 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. In addition, an analysis of Semi-Volatile Organic Compounds (SVOCs) was carried out

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

23. 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 non-government 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 except for Lead which has a Category 4 Screening Level (C4SL) produced by the Department for the Environment, Food and Rural Affairs. 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 numerous 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 sheets in Tables 3-8. The author has the right to reproduce these values here, but they remain copyright of LQM, a specialist environmental consultancy based in Nottingham.

24. SUMMARY OF GROUND CONDITIONS AND SOIL TEST RESULTS

The full trial pit logs to BS5930:2015 together with photographs of the trial pits can be found in Appendix B. In summary, all three pits were excavated to shallow depth in granular Made Ground. A summary of the laboratory report on the soil testing in Appendix C has been produced overleaf in Tables 3-7. These compare the test results for each substance with its relevant S4UL value as discussed in the previous section. Obviously, the Commercial Land Use Scenario has been selected for comparisons with accepted limits.

With the organic contaminants, the samples are normally subdivided based on their Soil Organic Matter (S.O.M.). This is because the S4UL value for each organic contaminant is controlled by the S.O.M. value. All three samples tested had S.O.M. values >6%. For this reason, there is a single S4UL value for all the organic contaminants in Tables 3-6.

Table 3 shows that there were three S4UL value exceedances for the USEPA16 range of Polycyclic Aromatic Hydrocarbons (P.A.H.s) in the sample from 0.7m in TP3. These are highlighted in red. Unsurprisingly these are the three of the USEPA16 with the lowest S4ULs. In the other two samples all the USEPA16 substances were present in small quantities. These were well below the relevant S4UL for each substance.

In Table 4 all the T.P.H. volatile ranges (C5-C10) were below the level of detection in all three samples. There were elevated levels of heavy end Aromatic T.P.H.s, particularly in the sample from TP3. It is possible this is from long term parking of plant and vehicles on permeable hardstanding.

In Table 5 all the SVOCs were below the level of detection in all five soil samples.

Because all the six speciated Phenols were below the level of detection in all five samples, only the Phenol Index is shown in Table 6, without speciation.

With the inorganic substances in Table 7, there were no exceedances for any Metal in any sample.

Low to moderate Cyanide levels were found in all three samples. Asbestos was not detected in any of the three samples.

To summarise, the slightly elevated levels of P.A.H. certain metals and Cyanide would be anticipated on a former gas works site. The only exceedances of commercial S4ULs are limited to three P.A.H. substances in a single sample.

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ALL VALUES ARE IN mg/kg

ALL S4ULs REFER TO COMMERCIAL LAND USE SCENARIO

SOIL ORGANIC MATTER(S.O.M.)						>6%
CONTAMINANT	TP1 0.5m	TP2 0.6m	TP3 0.7m			S4UL
NAPHTHALENE	0.654	0.307	8.610			23000
ACENAPHTHYLENE	0.421	0.464	6.570			100000
ACENAPHTHENE	0.024	0.031	0.552			100000
FLOURENE	0.075	0.091	3.330			71000
PHENANTHRENE	3.220	1.410	29.000			23000
ANTHRACENE	0.863	0.490	20.800			540000
FLOURANTHENE	9.560	3.560	91.000			23000
PYRENE	8.120	2.880	72.100			54000
BENZO[a]ANTHRACENE	4.520	2.330	54.400			180
CHRYSENE	4.630	2.670	55.600			350
BENZO[b]FLOURANTHENE	6.140	3.600	64.600			45
BENZO[k]FLOURANTHENE	2.250	1.240	25.500			1200
BENZO[a]PYRENE	4.750	2.630	51.700			36
INDENO[1,2,3-cd]PYRENE	5.680	3.210	50.900			510
DIBENZO[a,h]ANTHRACENE	0.868	0.601	10.400			3.6
BENZO[g,h,i]PERYLINE	4.250	2.270	35.600			4000
TOTAL(USEPA 16) PAHs	56.000	27.800	580.000			N/A
TABLE 3 POLYCYCLIC AROMATIC HYDROCARBONS (USEPA16)						

SUMMARY OF TEST RESULTS THE WILLOWS, MERTHYR TYDFIL

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ALL S4ULs REFER TO COMMERCIAL LAND USE SCENARIO

SOIL ORGANIC MATTER						>6%
CARBON BANDING	TP1 0.5m	TP2 0.6m	TP3 0.7m			S4UL
>C5-C6 ALI	< 0.10	< 0.10	< 0.10			1150*
>C6-C8 ALI	< 0.10	< 0.10	< 0.10			736*
>C8-C10 ALI	< 0.10	< 0.10	< 0.10			451*
>C10-C12 ALI	< 1.0	< 1.0	< 1.0			283*
>C12-C16 ALI	< 0.5	< 0.5	3.8			142*
>C16-C21 ALI	< 0.7	< 0.7	7.5			490000
>C21-C35 ALI	< 4.0	12.9	38.0			
>C35-C40 ALI	< 0.5	1.3	5.9			490000
>C5-C7 ARO	< 0.010	< 0.010	< 0.010			4710*
>C7-C8 ARO	< 0.010	< 0.010	< 0.010			4360*
>C8-C10 ARO	< 0.010	< 0.010	< 0.010			3580*
>C10-C12 ARO	3.7	4.0	15.5			10000
>C12-C16 ARO	7.9	9.0	48.4			10000
>C16-C21 ARO	47.7	33.8	458.0			7800
>C21-C35 ARO	80.5	92.7	1410.0			7900
>C35-C40 ARO	7.4	11.9	216.0			7900
TOTAL TPH >C5-C10	< 0.10	< 0.10	< 0.10			N/A
TOTAL TPH >C10-C40	149.0	166.0	2200.0			N/A

TABLE 4 TOTAL PETROLEUM HYDROCARBONS WITH TEXAS CARBON BANDING AND ALIPHATIC/AROMATIC SPLIT. * SOLUBILITY LIMIT LESS THAN THEORETICAL S4UL.

SOIL ORGANIC MATTER						>6%
CONTAMINANT	TP1 0.5m	TP2 0.6m	TP3 0.7m			S4UL
PHENOL	<0.1	<0.1	<0.1			3200
CRESOLS	<0.1	<0.1	<0.1			
XYLENOLS	<0.1	<0.1	<0.1			
NAPTHOLS	<0.1	<0.1	<0.1			
TRIMETHYLPHENOLS	<0.1	<0.1	<0.1			

TABLE 5 SVOCs

SUMMARY OF TEST RESULTS THE WILLOWS, MERTHYR TYDFIL

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ALL VALUES ARE IN mg/kg

ALL S4ULs REFER TO COMMERCIAL LAND USE SCENARIO

SOIL ORGANIC MATTER						> 6%
	TP1 0.5m	TP2 0.6m	TP3 0.7m			S4UL
PHENOL INDEX	<0.5	<0.5	<0.5			3200
TABLE 6 TOTAL MONOHYDRIC PHENOLS						

CONTAMINANT	TP1 0.5m	TP2 0.6m	TP3 0.7m		S4UL	
ARSENIC	19.9	20.1	25.5		640	
CADMIUM	< 1.6	< 1.6	< 1.6		190	
CHROMIUM	40.4	30.3	32.9		8600	
COPPER	40.5	44.2	56.5		68000	
LEAD	94.2	134.0	394.0		2300	(C4SL)
MERCURY	2.4	3.6	2.4		58	
NICKEL	37.8	27.7	36.5		980	
SELENIUM	4.3	< 3.0	5.2		12000	
ZINC	98.2	411.0	121.0		730000	
CYANIDE	1.7	2.8	6.8		22	GACacute
TABLE 7 TOXIC/HEAVY METALS AND CYANIDE						

	TP1 0.5m	TP2 0.6m	TP3 0.7m			
WEIGHT (g)	0	0	0			
% DRY WEIGHT OF SAMPLE	0	0	0			
TABLE 8 ASBESTOS ANALYSIS						

SUMMARY OF TEST RESULTS THE WILLOWS, MERTHYR TYDFIL

	GUIDELINE VALUE SOURCE				SAMPLE VALUE			
CONTAMINANT	E.Q.S.	W.F.D.	U.K.D.W.S.	W.H.O.	TP1 0.5m	TP2 0.6m	TP3 0.7m	
ARSENIC	50	50	10		6.87	3.65	2.42	
BORON					< 4.0	< 4.0	< 4.0	
CADMIUM	0.45	0.25	5		< 0.10	< 0.10	< 0.10	
CHROMIUM III	4.7				< 0.50	< 0.50	0.82	
CHROMIUM IV	3.4				< 1.5	< 1.5	< 1.5	
COPPER	1		2000		4.18	3.20	1.50	
MERCURY	0.07		1		1.94	3.06	< 0.60	
NICKEL	20		20		0.085	< 0.050	< 0.050	
LEAD	0.5		10		< 0.40	< 0.40	< 0.40	
SELENIUM			10	10	< 1.1	< 1.1	< 1.1	
ZINC	11.9		5000		< 3.5	4.8	< 3.5	
CYANIDE	1		50					
PHENOL	7.7							
M,P CRESOL								
O-CRESOL								
3,4 DIMETHYL PHENOL								
2,3 DIMETHYL PHENOL								
2,3,5 TRIMETHYL PHENOL								
TOTAL MONOHYDRIC								
NAPHTHALENE	2				< 0.10	< 0.10	0.72	
ACENAPHTHALENE	5.8				0.46	< 0.10	< 0.10	
ACENAPTHENE	0.1				0.23	< 0.10	< 0.10	
FLOURENE					0.54	< 0.10	0.18	
PHENANTHRENE					0.50	< 0.10	0.55	
ANTHRACENE	0.1				0.24	< 0.10	< 0.10	
FLORANTHENE	0.0063				0.55	< 0.10	< 0.10	
PYRENE					0.42	< 0.10	< 0.10	
BENZO[a]ANTHRACENE			0.1		< 0.10	< 0.10	< 0.10	
CHRYSENE					< 0.10	< 0.10	< 0.10	
BENZO[b]FLORANTHENE			0.1		< 0.10	< 0.10	< 0.10	
BENZO[k]FLORANTHENE			0.1		< 0.10	< 0.10	< 0.10	
BENZO[a]PYRENE	0.1		0.01		< 0.10	< 0.10	< 0.10	
INDENO[1,2,3]PYRENE	0.01				< 0.10	< 0.10	< 0.10	
DIBENZO[a,h]ANTHRACENE					< 0.10	< 0.10	< 0.10	
BENZO[g,h]PERYLENE			0.1		< 0.10	< 0.10	< 0.10	
TOTAL 16 PAH					2.93	< 1.60	< 1.60	
TABLE 9 LEACHATE SAMPLING RESULTS FROM SOIL AT THE WILLOWS, ABERCANAID								

VALUES IN RED INDICATE EXCEEDANCES OF THE LOWEST GUIDELINE VALUE WHERE THERE IS MORE THAN ONE PUBLISHED GUIDELINE VALUE. VALUES IN YELLOW ARE BELOW THE LOWEST GUIDELINE LEVEL OR ARE SUBSTANCES FOR WHICH THERE IS NO PUBLISHED GUIDELINE VALUES.

25. REVISED RISK ASSESSMENT FOR GROUND GAS

The Phase 1 desk study established there was no risk from landfill gas migrating to the site. The Coal Mining Gas Risk Assessment in the Phase 1 established there was no risk to the site from the migration of mine gases.

The trial pitting established there was no biodegradable material in the Made Ground at the site. Analysis of the soil samples from the site established there were no VOCs or SVOCs present. Therefore, there is no threat of vapour intrusion.

All risks from ground gases from all sources have now been removed from Table 10 which is the Final Ground Gas Risk Assessment.

26. RISK ASSESSMENT FOR CONTROLLED WATERS

Relatively minor soil contamination was detected in the soil samples from the Made Ground at the site. The permeability of the Made Ground at the site was visually estimated to be high. The lack of standing water following heavy rainfall prior to the site investigation would seem to confirm this. This means that any contaminants in the Made Ground could form a potential threat to controlled waters if they were mobilised. Controlled waters would include the groundwater beneath the site. The natural ground beneath the site has been found to be highly permeable in previous nearby site investigations. The water table was found to be relatively shallow, between 3m-4m during the same investigations. This means there is possible onward pathway to more distant environmental receptors via downward or lateral flow in the groundwater. The only exceedances of commercial S4ULs are for three PAH substances in a single sample. PAHs are known to have low solubilities in water. To assess the risk, leachate testing was arranged. 10:1 leachate preparation was carried out by the laboratory and the resulting solute tested for P.A.H. and heavy/toxic metal levels. The results are shown in Table 9 on the previous page. Unlike S4ULs, there is no universally accepted levels considered harmful to human health. As a result, in Table 9 there are multiple comparison standards. The most relevant are the Water Framework Directive (W.F.D.) and the U.K. Drinking Water Standard. Both are British. The Environmental Quality Standards (E.Q.S.) come from the E.U. and are hopelessly optimistic for a former industrial area such as Merthyr. For example, the U.K.D.W.S. for Copper is 2000 µg/litre, the E.Q.S. is 1 µg/litre. Some E.Q.S. values are only a tiny fraction of the Limit of Detection (LoD) achievable by any commercial laboratory in Britain. In Table 9 the results coloured red are above the lowest applicable standard.

The levels of all P.A.H. substances in the solute are very low. Less than one part in a million. Interestingly, the three that exceeded their E.Q.S. were not the same three that exceeded the soil S4UL. It can safely be assumed that the P.A.H. contamination would be subject to natural attenuation and degradation and can only present a minute threat to controlled waters. The dilution factor in the water bearing gravels below the site will be huge. However, the proximity of the River Taff, which is in hydraulic continuity with shallow groundwater should be borne in mind.

26. REVISED RISK ASSESSMENT FOR SOILS

Some contamination above the acceptable levels for the chosen ground use was detected in the soil samples from the site. These levels are for the Commercial Land Use Scenario and were chosen to reflect the lower sensitivity of future site users. With contamination detected in soils at the site there is a source and a potential pathway to above ground receptors. This source is only viable from the small area of the site not covered in reinforced concrete, but theoretically the pathway to above ground receptors could affect a wider area. This is shown visually in the Conceptual Site Model (C.S.M.) in Figure 23. This reflects the above assessments. Similarly, the risk from the contaminated Made Ground has not been removed from Table 11.

27. 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 small storage unit within a small compound. The compound itself sits within larger, mixed use working industrial area. There will be no soft landscaping/garden areas within the development. A comprehensive risk assessment including a detailed desk study, an intrusive site investigation and laboratory testing of soil samples has established that a remediation strategy is necessary. There are probably unknown, but possibly significant levels of contamination in the groundwater beneath the site. They will have no impact on the final site users. Furthermore, general environmental contamination in the wider area cannot possibly be considered the responsibility of the site developers. It is likely the entire Abercanaid Industrial Estate is underlain by contaminated soil and groundwater. It is known that at the National Grid site 65m south of the site, groundwater remediation was attempted via pumping wells. There are no freely available details, or any idea of the success/failure of the project. Remediation at the site will be extremely straightforward. This will simply involve covering the remaining exposed soil area with concrete. The footprint of the building itself will occupy a significant

proportion of the site not already concreted over. This will cut all pathways to above ground receptors. Also, the concrete will prevent any further ingress of rainwater, thus breaking the pathway to controlled waters. Intrusive groundworks will be minimal during the redevelopment of the site. Full risk assessments will need to be carried out by contractors at the site regarding contact with contaminated soil. Good work practices and P.P.E. will be sufficient to minimise any risk. Some services are existing, but consideration should be given to the depth of any new services. They are likely to be shallow, and certainly above the water table. Particular consideration should be given to the position and composition of the water connection. These matters are outside the scope of both this report and the planning conditions. Figure 24 is a C.S.M. of the site after remediation.

The conclusions of this report mean that, subject to the agreement of Merthyr Tydfil C.B.C. planning conditions 4 (i)-(iii) can be discharged in full. As discussed in the Phase 1, condition 4iv cannot possibly be pre-commencement. It is a physical impossibility. Therefore, 4iv should be disregarded so the development can commence. Condition 5 is word for word identical to 4iv and is pre-occupation, which is as it should be. Application to discharge this condition will be accompanied by a full Validation Report in due course.

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

29/01/2026

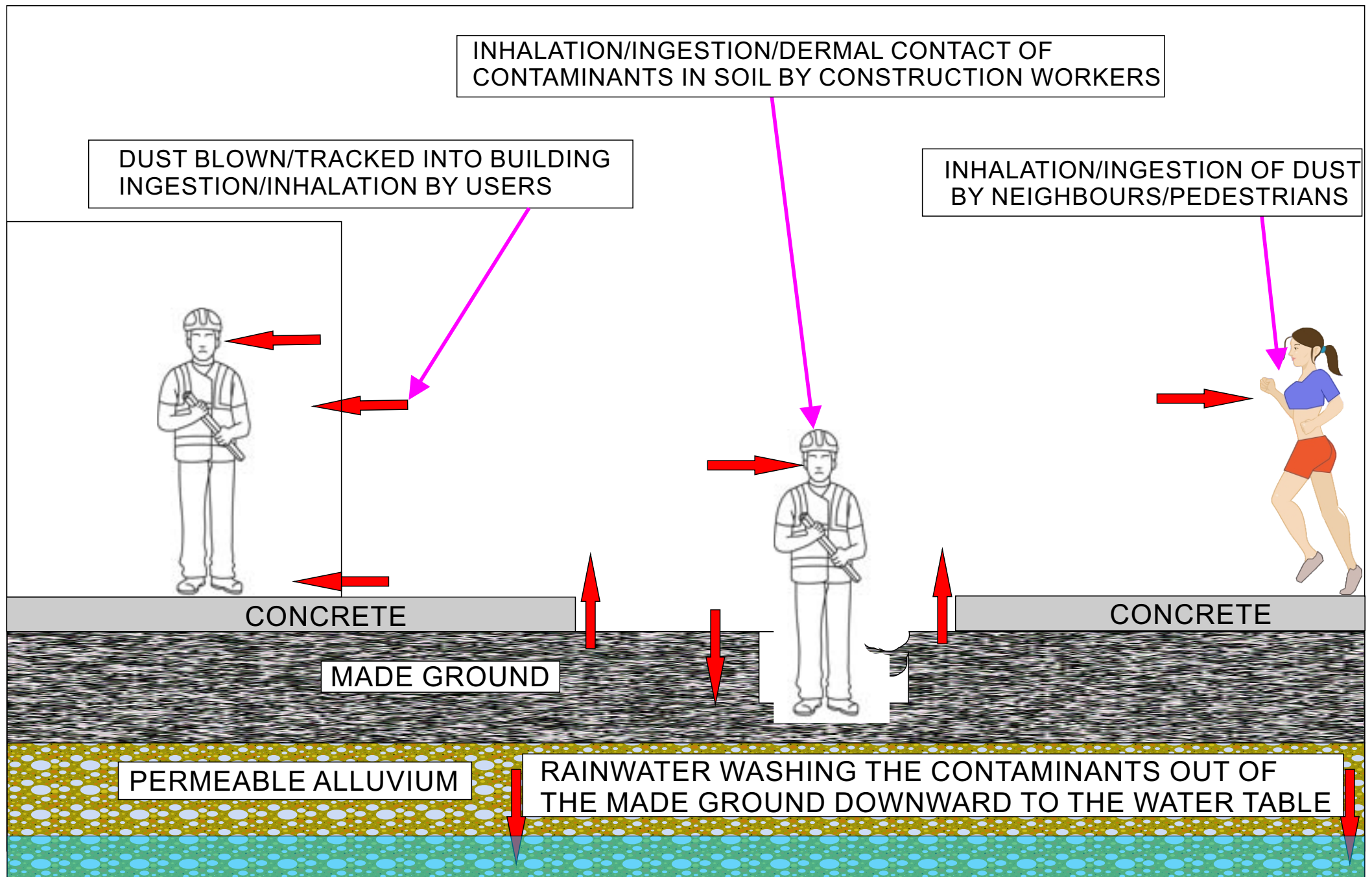


FIGURE 23
INITIAL CONCEPTUAL SITE MODEL OF THE SITE AT PRESENT.

TABLE 10 FINAL GROUND GAS RISK ASSESSMENT AT THE WILLOWS, ABERCANAID.					
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 LANDFILL GASES MIGRATING ONTO SITE. NO RISK FROM MINE GAS MIGRATION. .	NO FURTHER ACTION 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. SITE INVESTIGATION ESTABLISHED THERE WAS NO BIODEGRADABLE MATERIAL IN THE MADE GROUND. SAMPLE TESTING SHOWED NO VOLATILE CONTAMINANTS WERE PRESENT	NO FURTHER ACTION 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%-3% LOCAL PROPERTIES ABOVE RADON ACTION LEVEL.	NO RADON PROTECTION MEASURES REQUIRED

TABLE 11						
FINAL QUANTITATIVE HUMAN HEALTH RISK ASSESSMENT AND ENVIRONMENTAL RISK ASSESSMENT AT THE WILLOWS, ABERCANAID						
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, CYANIDE, PHENOLS, HYDROCARBONS AND PAH	INGESTION, DERMAL CONTACT, INHALATION	FUTURE END USERS, VISITORS	MEDIUM	MEDIUM	MEDIUM	SOIL TESTING REVEALED CONTAMINATION OF THE SHALLOW MADE GROUND ON THE SITE WITH AN POSSIBLE PATHWAY TO ABOVE GROUND RECEPTORS. CAPPING WITH CONCRETE WILL CUT THIS PATHWAY.
	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	SOIL TESTING SHOWED NO ASBESTOS PRESENT IN THE SAMPLES.
		CONSTRUCTION WORKERS	HIGH	LOW	LOW	
ON SITE: POTENTIAL CONTAMINATION IN SOILS/MADE GROUND. POSSIBLY ELEVATED LEVELS OF CONTAMINANTS	RUN OFF	SURFACE DRAINAGE	MEDIUM	MEDIUM	MEDIUM	FOLLOWING LEACHATE TESTING THERE IS A LOW RISK OF CONTAMINATION AT THE SITE HAVING A POSSIBLE ONWARD PATHWAY TO CONTROLLED WATERS. CAPPING WITH CONCRETE WILL CUT THIS PATHWAY.
	MIGRATION THROUGH SOIL VIA LEACHING	SHALLOW GROUNDWATER				
	ONWARD MIGRATION OF GROUNDWATER	BEDROCK AQUIFER				

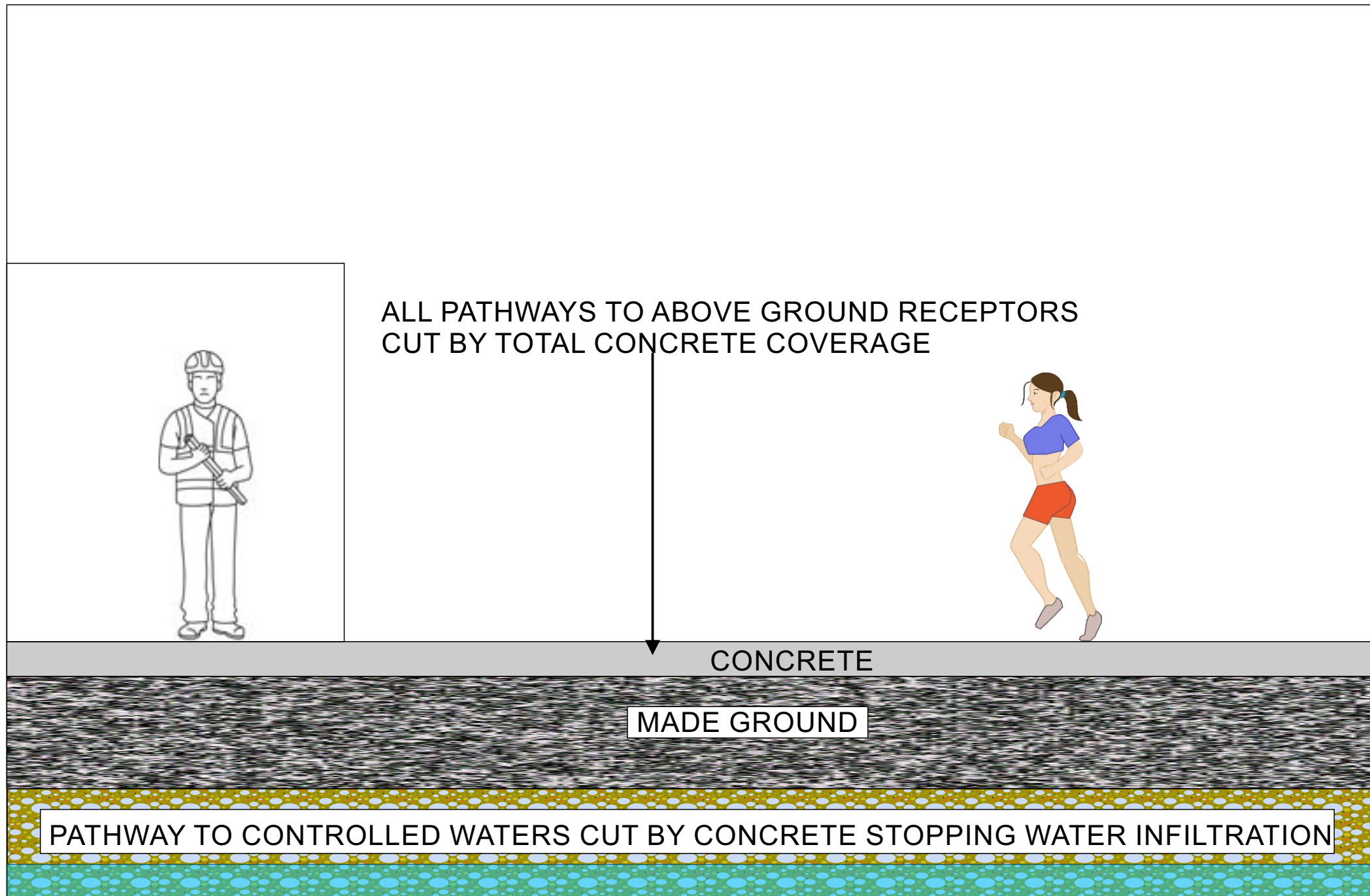


FIGURE 24
CONCEPTUAL SITE MODEL OF THE SITE AFTER REMEDIATION

APPENDIX B
TRIAL PIT PHOTOGRAPHS
AND
LOGS TO BS5930:2015
THE WILLOWS
ABERCANAID

Project: THE WILLOWS, ABERCANAID	Project No: WSM204
Described By: R.DAVIES	Trial Pit No. TP1
Date: 2.12.2025	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability LOOSE	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.	COMPACTED LIMESTONE
		0.15	AGGREGATE
		1.0	MADE GROUND. Loose to Medium dense black, sandy GRAVEL. Gravel is anular to rounded, fine to coarse of Quartzite (rounded) brick, slag and colliry waste (angular).
0.5	ES1		



TP 1 THE WILLOWS

Project: THE WILLOWS, ABERCANAID	Project No: WSM204
Described By: R.DAVIES	Trial Pit No. TP2
Date: 2.12.2025	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability LOOSE	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.	COMPACTED LIMESTONE
		0.15	AGGREGATE
		0.9	MADE GROUND. Loose to Medium dense black, sandy GRAVEL. Gravel is anular to rounded, fine to coarse of Quartzite (rounded) brick, slag and colliery waste (angular). In-situ brickwork and loose metal pipe
0.6	ES2		

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

TRIAL PIT NUMBER
TP2



TP 2 THE WILLOWS

Project: THE WILLOWS, ABERCANAID	Project No: WSM204
Described By: R.DAVIES	Trial Pit No. TP3
Date: 2.12.2025	Sheet: 1 of 1
Method / Plant TRACKED EXCAVATOR	Groundwater Observations: DRY
Stability LOOSE	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.	COMPACTED LIMESTONE
		0.15	AGGREGATE
		1.0	MADE GROUND. Loose to Medium dense black, sandy GRAVEL. Gravel is anular to rounded, fine to coarse of Quartzite (rounded) brick, slag and colliry waste (angular).
0.7	ES3		

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

TRIAL PIT NUMBER
TP3



TP 3 THE WILLOWS

APPENDIX C
CHEMTECH LABORATORY REPORT
25-11877-02
THE WILLOWS
ABERCANAID

ANALYTICAL TEST REPORT

Report Number 25-11877, issue number 2

Contract name: WSM204 The Willows Abercanaid

Client reference: WSM204

Clients name: Rhondda Geotechnical Services

Clients address: RHONGEOSER
56 Meyler Street
Thomastown
Porth
CF39 8EA

Samples received: 03/12/2025

Analysis started: 03/12/2025

Analysis completed: 19/12/2025

Report issued: 22/12/2025
2. Replaces Analytical Report number 25-11877; issue no.1

Key

U UKAS accredited test
M MCERTS & UKAS accredited test
(B) Analysis performed at Southampton Site
I/S Insufficient sample to carry out test
U/S Sample not suitable for testing
NAD No Asbestos Detected
Full key available on Information page



Approved by: Sam Rogerson
Receipt and Reporting Manager

Re-Issue Summary

Client: Rhondda Geotechnical Services
Address: 56 Meyler Street, Thomastown, Tonyrefail, Porth, CF39 8EA

Date: 22-Dec-25

Report No.: 25-11877

Issue: 2

This report replaces 25-11877, issue: 1, issued: 10 December 2025

Reason for Change

1. Client Request- Additional analysis

Details of Changes to Work / Results

Sample Refs:	79226	79227	79228
Tests* / Dets*:			
ChromiumVI by Discrete	A	A	A
Dissolved metals by ICP in	A	A	A
PAH in Leachate	A	A	A

Key

A - Additional Work added

D - Work Deleted

E - Result Edited*

R - Work Repeated*

*If a result changed, please refer to the previous report for the old result. The new result will be shown in this report.

Re-issued by: Georgia Hunter
Senior Reporting Administrator

Approved by: Sam Rogerson
Receipt and Reporting Manager



SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

% Moisture reported as MCERTS drying at 30°C

Lab ref	Sample ID	Depth (m)	Sample description	Material removed	% Removed	% Moisture
79226	TP1-ES1	0.50	Black Sand with Gravel and Vegetation.	-	-	14.3
79227	TP2-ES2	0.60	Black Sand with Gravel and Vegetation.	-	-	16.7
79228	TP3-ES3	0.70	Black Sand with Gravel and Vegetation.	-	-	15.9

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

- a Sampling date not provided
- b Sampling time not provided (waters only)
- c Sample not received in appropriate containers
- d Storage Temperature
- e Headspace present in sample container
- f Sample exceeded sampling to receipt
- g Sample exceeded holding time(s)

Lab ref	Sample ID	Depth (m)	Deviating	Tests (Reason for deviation)
79226	TP1-ES1	0.50	N	
79227	TP2-ES2	0.60	N	
79228	TP3-ES3	0.70	N	

SOILS

Lab Number					79226	79227	79228
Client Reference					SOIL	SOIL	SOIL
Sample ID					TP1-ES1	TP2-ES2	TP3-ES3
Depth (m)					0.50	0.60	0.70
Sampling Date					02/12/2025	02/12/2025	02/12/2025
Test	Method	Accred	LoD	Units			
Asbestos							
Asbestos Identification	SUBCO N	SU	0	-	NAD	NAD	NAD
Metals							
Arsenic	CE264	U	1.8	mg/kg	19.9	20.1	25.5
Cadmium	CE264	M	1.6	mg/kg	< 1.6	< 1.6	< 1.6
Chromium	CE264	U	2	mg/kg	40.4	30.3	32.9
Copper	CE264	U	1.6	mg/kg	40.5	44.2	56.5
Lead	CE264	U	2.3	mg/kg	94.2	134	394
Mercury	CE264	U	0.7	mg/kg	2.4	3.6	2.4
Nickel	CE264	M	2.1	mg/kg	37.8	27.7	36.5
Selenium	CE264	U	3	mg/kg	4.3	< 3.0	5.2
Zinc	CE264	M	4	mg/kg	98.2	411	121
Colourimetric							
Total Monohydric Phenols	CE078	N	0.5	mg/kg	< 0.50	< 0.50	< 0.50
Total Cyanide	CE077	N	1	mg/kg	1.7	2.8	6.8
Combustion							
Moisture Content	CE001	N	0.1	%	14.3	16.7	15.9
Total Organic Carbon	CE197	M	0.1	%	10.4	7.64	13.9
Soil Organic Matter	CE192	N	0.1	%	18.0	13.2	23.9
Polyaromatic hydrocarbons							
Naphthalene	CE087	M	0.016	mg/kg	0.654	0.307	8.61
Acenaphthylene	CE087	M	0.015	mg/kg	0.421	0.464	6.57
Acenaphthene	CE087	M	0.013	mg/kg	0.024	0.031	0.552
Fluorene	CE087	U	0.013	mg/kg	0.075	0.091	3.33
Phenanthrene	CE087	M	0.014	mg/kg	3.22	1.41	29.0
Anthracene	CE087	U	0.017	mg/kg	0.863	0.490	20.8
Fluoranthene	CE087	M	0.017	mg/kg	9.56	3.56	91.0
Pyrene	CE087	M	0.016	mg/kg	8.12	2.88	72.1
Benzo(a)anthracene	CE087	U	0.012	mg/kg	4.52	2.33	54.4
Chrysene	CE087	M	0.028	mg/kg	4.63	2.67	55.6
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	6.14	3.60	64.6



SOILS

Lab Number					79226	79227	79228
Client Reference					SOIL	SOIL	SOIL
Sample ID					TP1-ES1	TP2-ES2	TP3-ES3
Depth (m)					0.50	0.60	0.70
Sampling Date					02/12/2025	02/12/2025	02/12/2025
Test	Method	Accred	LoD	Units			
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	2.25	1.24	25.5
Benzo(a)pyrene	CE087	U	0.019	mg/kg	4.75	2.63	51.7
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	5.68	3.21	50.9
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	0.868	0.601	10.4
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	4.25	2.27	35.6
Total PAH(16)	CE087	N	0.28	mg/kg	56.0	27.8	580
Total Petroleum Hydrocarbons							
>C5-C6 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C6-C8 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C8-C10 Aliphatic (HS_1D_AL)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C10-C12 Aliphatic (EH_2D_AL)	CE250	N	1	mg/kg	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	< 0.5	< 0.5	3.8
>C16-C21 Aliphatic (EH_2D_AL)	CE250	N	0.7	mg/kg	< 0.7	< 0.7	7.5
>C21-C35 Aliphatic (EH_2D_AL)	CE250	N	4	mg/kg	< 4.0	12.9	38.0
>C35-C40 Aliphatic (EH_2D_AL)	CE250	N	0.5	mg/kg	< 0.5	1.3	5.9
>C5-C7 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
>C7-C8 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
>C8-C10 Aromatic (HS_1D_AR)	CE267	N	0.01	mg/kg	< 0.010	< 0.010	< 0.010
>C10-C12 Aromatic (EH_2D_AR)	CE250	N	0.6	mg/kg	3.7	4.0	15.5
>C12-C16 Aromatic (EH_2D_AR)	CE250	N	1	mg/kg	7.9	9.0	48.4
>C16-C21 Aromatic (EH_2D_AR)	CE250	N	2	mg/kg	47.7	33.8	458
>C21-C35 Aromatic (EH_2D_AR)	CE250	N	4.5	mg/kg	80.5	92.7	1410
>C35-C40 Aromatic (EH_2D_AR)	CE250	N	1.5	mg/kg	7.4	11.9	216
>C5-C10 Total (HS_1D_Total)	CE267	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
>C10-C40 Total (EH_2D_Total)	CE250	N	11.5	mg/kg	149	166	2200
Total Hydrocabons C5-C40 (HS_1D+EH_2D_Total)	CE250	N	11.5	mg/kg	149	166	2200
Wet Chem							
pH	CE004	M	0.1	pH units	8.2	8.4	8.8

SOIL SVOCS

Lab Number					79226	79227	79228
Client Reference					SOIL	SOIL	SOIL
Sample ID					TP1-ES1	TP2-ES2	TP3-ES3
Depth (m)					0.50	0.60	0.70
Sampling Date					02/12/2025	02/12/2025	02/12/2025
Test	Method	Accred	LoD	Units			
SVOC							
Phenol	CE189	N	0.1	mg/kg	< 0.10	< 0.10	0.22
Cresols	CE189	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Xylenols	CE189	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Naphthols	CE189	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Trimethylphenols	CE189	N	0.1	mg/kg	< 0.10	< 0.10	< 0.10

LEACHATE

Lab Number					79226	79227	79228
Client Reference					SOIL	SOIL	SOIL
Sample ID					TP1-ES1	TP2-ES2	TP3-ES3
Depth (m)					0.50	0.60	0.70
Sampling Date					02/12/2025	02/12/2025	02/12/2025
Test	Method	Accred	LoD	Units			
Metals							
Arsenic Leachate	CE265	U	0.1	µg/l	6.87	3.65	2.42
Boron Leachate	CE265	N	4	µg/l	< 4.0	< 4.0	< 4.0
Cadmium Leachate	CE265	U	0.1	µg/l	< 0.10	< 0.10	< 0.10
Chromium Leachate	CE265	U	0.5	µg/l	< 0.50	< 0.50	0.82
Copper Leachate	CE265	U	0.5	µg/l	4.18	3.20	1.50
Lead Leachate	CE265	U	0.6	µg/l	1.94	3.06	< 0.60
Mercury Leachate	CE265	N	0.05	µg/l	0.085	< 0.050	< 0.050
Nickel Leachate	CE265	U	0.4	µg/l	< 0.40	< 0.40	< 0.40
Selenium Leachate	CE265	U	1.1	µg/l	< 1.1	< 1.1	< 1.1
Zinc Leachate	CE265	U	3.5	µg/l	< 3.5	4.8	< 3.5
Colourimetric							
Chromium VI	CE259	U	1.5	µg/l	< 1.50	< 1.50	< 1.50
Polyaromatic hydrocarbons							
Naphthalene	CE051	N	0.1	µg/l	< 0.10	< 0.10	0.72
Acenaphthylene	CE051	N	0.1	µg/l	0.46	< 0.10	< 0.10
Acenaphthene	CE051	N	0.1	µg/l	0.23	< 0.10	< 0.10
Fluorene	CE051	N	0.1	µg/l	0.54	< 0.10	0.18
Phenanthrene	CE051	N	0.1	µg/l	0.50	< 0.10	0.55
Anthracene	CE051	N	0.1	µg/l	0.24	< 0.10	< 0.10
Fluoranthene	CE051	N	0.1	µg/l	0.55	< 0.10	< 0.10
Pyrene	CE051	N	0.1	µg/l	0.42	< 0.10	< 0.10
Benzo(a)anthracene	CE051	N	0.1	µg/l	< 0.10	< 0.10	< 0.10
Chrysene	CE051	N	0.1	µg/l	< 0.10	< 0.10	< 0.10
Benzo(b)fluoranthene	CE051	N	0.1	µg/l	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	CE051	N	0.1	µg/l	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	CE051	N	0.1	µg/l	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	CE051	N	0.1	µg/l	< 0.10	< 0.10	< 0.10
Dibenzo(a,h)anthracene	CE051	N	0.1	µg/l	< 0.10	< 0.10	< 0.10
Benzo(g,h,i)perylene	CE051	N	0.1	µg/l	< 0.10	< 0.10	< 0.10
Total PAH(16)	CE051	N	1.6	µg/l	2.93	< 1.60	< 1.60

METHOD DETAILS

METHOD	TESTNAME	METHOD SUMMARY	ANALYSIS BASIS
CE267	VPH in Soil	HS-GCFID	As submitted sample
CE250	GCXGC in Soil	DCM Extraction and GCxGC-FID	As submitted sample
SUBCON	Asbestos Soil	HSG248	Air Dried Sample
CE189	SVOC in solids	DCM Extraction and GCMS	As submitted sample
CE265	Dissolved metals by ICP in Leachate	ICPMS	As submitted sample
CE264	Metals by ICP in Soil	ICPOES	Air dried sample
CE259	ChromiumVI by Discrete Analyser in Leach	Gallery	As submitted sample
CE051	PAH in Leachate	DCM Extraction and GCMS	As submitted sample
CE087	PAH in Soil	DCM Extraction and GCMS	As submitted sample
CE078	Phenols in Soil	Continuous Flow Analyser	As submitted sample
CE077	Cyanides in Soils	Continuous Flow Analyser	As submitted sample
CE197	Primacs in Soil	Primacs	Air dried sample

REPORT INFORMATION

Report No.:25-11877, issue number 2

Key	
U	ISO17025 Accredited Result
M	ISO17025 and MCERTS Accredited Result
N	Do not currently hold accreditation
^	MCERTS accreditation not applicable for sample matrix
*	ISO17025 accreditation not applicable for sample matrix
S	Subcontracted
I/S	Insufficient Sample
U/S	Unsuitable sample
N/T	Not tested
<	Means "less than"
>	Means "greater than"

LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

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

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

The results relate only to the sample received.

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Moisture Content Calculated on a Wet Weight basis (at 30°C)

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

Where sampling was undertaken by Chemtech Environmental Limited it is outside the UKAS accreditation scope.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

For soils and solids, all results are reported on a dry basis (30°C). Samples dried at no more than 30°C in a drying cabinet.

For soils and solids, analytical results are inclusive of stones and 'inert' material, where applicable.

'Client Reference', 'Sample ID', 'Sample Location', 'Sample Type', 'Depth', 'Sample Date' and 'Sample Time' information is provided by the customer

Sample Retention and Disposal

All soil samples will be retained for a period of 4 weeks from the point of receipt

All water samples will be retained for a period of 2 weeks from the point of Reporting

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

Unless specifically identified (noted as "(B)" in analyte name) all internal analysis performed at Durham site

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