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FIRST CHOICE HOUSING ASSOCIATION

NR 2 NANT LAIS, MINERA, WREXHAM, LL11 3YY

STAGE 1 - PHASE 2 – GROUND CONTAMINATION INVESTIGATION REPORT

REPORT No. E1330.S1.P2.GCI.R1

DECEMBER 2020



Client : FIRST CHOICE HOUSING ASSOCIATION

Project Title : NR 2 NANT LAIS, MINERA, WREXHAM, LL11 3YY

Document Title: STAGE 1 - PHASE 2 – GROUND CONTAMINATION INVESTIGATION REPORT

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Report No. E1330.S1.P2.GGI.R1
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1. INTRODUCTION.

1.1 Background and Terms of Reference

- 1.1.1 In December 2020 e-geo Solutions Ltd were commissioned by First Choice Housing Ltd to undertake a ground contamination investigation at a proposed residential refurbishment site at Number 2 Nant Lais, Minera, Wrexham. The objective of the investigation was, to determine the ground conditions at the site and to assess the site with respect to potential contamination.
- 1.1.2 This report presents the findings of the Phase 2 intrusive investigations with the chemical analysis of soil samples.
- 1.1.3 The proposed site development involves the conversion of the existing dwelling and double garage into one and two person flats. The existing structures will remain in their present form and the only addition will be a constructed link between the garage and existing dwelling containing a bathroom. There are no changes to the external areas other than provision of additional parking areas to the front of the property. The findings of the intrusive investigation have been assessed against this proposed development and end use.
- 1.1.4 The report has been prepared by e-geo Solutions Ltd for the sole use of the Client, for the purposes described and no extended duty of care applies to other parties. Any other party using this report for any purpose whatsoever do so at their own risk and any duty care to that party is specifically excluded.
- 1.1.5 The comments given, and opinions expressed, in this report are based on the information available at the time the report was compiled, however there may be additional information and data which becomes available at a later date which has an impact on the report content. Where data supplied by others has been used it has been assumed that the information is correct. No responsibility can be accepted by e-geo Solutions Ltd for inaccuracies within the data supplied by others.
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1.2 Report Contents

- 1.2.1 The report includes sections on:-
- Present site description, profile and environmental setting
 - The scope of the investigation, testing and analysis and its justification
 - The geological and hydro-geological conditions encountered in trial pits
 - Chemical analysis results and an assessment of contamination

2. SITE LOCATION, DESCRIPTION AND PROFILE.

2.1 Site Location

- 2.1.1 The site is located on Nant Lais at the junction with the B5426 to the northwest of Coedpoeth, near Wrexham. The site location is shown on Figure 1. The site is bordered by residential properties to the west, south and east, and the B5426 to the north. The site is centred at Grid Ref 327733 351766.



Figure 1 – Site Location

2.2 Site Description and Topography

- 2.2.1 The site area is at the junction of the Nant Lais housing estate road and the B5426. The site comprises a relatively new two storey brick built residential property with adjacent double garage surrounded by small grassed lawns and paved patio and parking areas. The site is flat and level and at a similar elevation as the surrounding land. An aerial photograph of the site showing the site boundaries and surrounding land use is presented as Figure 2.



Figure 2 -Aerial Photograph

2.3 Site Profile

- 2.3.1 A desk-based study of the site has been undertaken. Full details of the site history and the geological and environmental setting are presented in a report E1330.S1.P1.R1 Nr 2 Nant Lais, Minera, Wrexham, LL11 3YY - Stage 1 - Phase 1 – Desk Study and Preliminary Ground Contamination Risk Assessment – (08/12/20). A summary of the findings is presented below:

Profile Item	NR 2 NANT LAIS, MINERA, WREXHAM, LL11 3YY
Site Status:	The majority of the site is occupied by a relatively new brick built two storey residential property in good condition. Surrounding the property are paved paths and a small patio to the west. Adjacent to the house and to the north is a double garage with a paved access and parking area. To the south west, south and south east of the house are areas of lawn. The site area is flat and level with the northern portion slightly 'cut' into the ground relative the ground to the north and northwest. Overall the site area is at the boundary between agricultural land to the west and north and residential properties to the east and southeast.
Site History:	1873/74 -. The site is agricultural land. The surrounding land within 250m is agricultural land with a row of 20 small houses and a 'smithy' 75m northwest. Mi9nera Lead mines and associated infrastructure and wastes are 750m southwest 1899 - The site and surrounding land to 1000m is as in 1873/74. 1912 - The site and surrounding land to 1000m is as in 1899. 1961/62 - The site is as in 1912. The surrounding land is generally as it was 1912 but Five Crosses garage has been built 75m east with residential properties to the southeast of it. There are two small structures immediately west and a property 'Hafoty' immediately further west. The coal shafts are no longer indicated but the 'small tips' remain. The Minera Lead mines are disused. 1984 - There is a residential property on the site with adjacent structure. The surrounding land is generally as in 1962 but the 'Twenty houses have been

	demolished and replaced with a public house. There are 'engineering works' 110m and 180m north northeast. Two properties have been built to the southeast and an additional property to the west. 1989 - The site is as in 1984. The surrounding land is as in 1984, with the addition of more properties along and extended Nant Lais.
Services:	There are no main services within the site
Geology:	The British Geological Survey Map extract indicates that the near surface deposits below the site are Glacial Till deposits of the Devensian Diamicton Till formation. The solid geology below the site comprises sandstone of the Pennine Lower and Middle Coal Measures Formation. The Glacial Till deposits will comprise clay and silt with varying proportions of sand and gravel of locally derived rock and probably many cobbles and boulders. The deposits are likely to be present to depths of typically 15m. The bedrock directly below the site comprises fine grained argillaceous rocks of sandstone. The nearest made ground is 199m north east of the site There are no historical surface ground working features on site. The nearest BritPits feature is the Minera Coal Pit 152m south east where deep coal was mined. The nearest historical surface workings features are 'Unspecified Heaps' 121m south east, dated 1938 and 224m north east dated 1960. The nearest shaft is a disused shaft 146m south east (1900). The nearest colliery is 376m east (1949). The property is in a surface area that could be affected by underground mining in 2 seams of coal at 70m to 100m depth, and last worked in 1884. All movement due to mining of these coal seams should have stopped by now. The property is not within a surface area that could be affected by present or future underground mining There are no known shafts or mine entries within the site or within 20 metres of the boundary and the Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31st October 1994 The Coal Authority has no record of a mine gas emission requiring action There is a very low risk of ground subsidence from natural hazards within the site boundary. There is a very low risk of ground movement due to landslides.
Radon :	The site is within a radon affected area with between 1% and 3% of properties above the Action Level as defined by the Health Protection Agency. No radon protection measures will be necessary.
Ground Permeability :	The drift deposits will be of high to low permeability. The bedrock will be of low permeability with permeability governed predominantly by fractures and fissures.
Hydrogeology:	The superficial (drift) deposits below the site are classed as 'Secondary' undifferentiated aquifer. The aquifer can be either classed A or B depending on the soil type but were previously classed as a minor or non-aquifer. The bedrock below the site is classed as a 'Secondary A' aquifer. These are Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. They were previously minor aquifers. There are no Groundwater Abstraction Licences or Potable abstractions within 500m. There are no Surface water Abstraction points within 2000m of the site. There are no source protection zones within 500m of the site. The soil vulnerability is classed as low with low permeable soils over a minor aquifer.
Hydrology:	The nearest watercourse is the Afon Clywedog and is 206m south and is an inland river not affected by tidal action but has no direct connection to the site.

Sensitive Land Uses:	There are no Sites of Special Scientific Interest within 500m of the site.
Landfills:	There are no Environment Agency historic landfill sites or records of landfill sites within 500m.
Flood Risk:	The site is not within a Zone 2 floodplain area as defined by the Environment Agency. A Zone 2 floodplain is one where the annual probability of flooding is 0.1% (one in one thousand) or greater from rivers and the sea but less than 1.0% from rivers or 0.5% from the sea.
Pollution Incidents:	There are no records of Environment Agency pollution incidents which occurred on the site.
Potential Contamination:	There are no significant potentially contaminative industrial land uses that have occurred at the site. The nearest potential off-site contamination source is a garage 21m east, but no records of fuel storage tanks and the garage is at a lower elevation than the site. Although coal mining has been carried out in the area there is no evidence to indicate there is a risk from mine workings, mine wastes or mine gas. Minera lead mine was located approximately 800m southwest. There is no likelihood of mine waste being present on the site, however windblown dust may have carried to the site, with naturally occurring elevated metal concentrations in the soils.

3. GROUND INVESTIGATION WORKS.

3.1 Previous Investigations

- 3.1.1 No known previous investigations have been undertaken at the site.

3.2 Scope of Work – Exploratory Holes

- 3.2.1 A ground contamination investigation was undertaken to provide information on the ground conditions at the site. The works were carried out by e-geo Solutions Ltd with the field work element undertaken on 12 December 2020. The investigation was designed, supervised and administered by e-geo Solutions Ltd and undertaken in accordance with BS5930 (1999) – code of Practice for Site Investigations (Amendment 1).
- 3.2.2 The majority of the site is covered with existing buildings which are to be renovated. Trial holes were therefore restricted to the small lawn areas to the south, southwest and east of the dwelling.
- 3.2.3 Vehicle access was not possible and therefore the main scope of work involved:
- The excavation of 4 Nr hand excavated auger/trial pits to allow strata description and soil sampling
 - The examination of ground strata by a geo-environmental engineer and the careful description of soil types. Detailed descriptions of the ground strata are presented on the trial pit records on Appendix 1.
 - Collection of ground samples from near the topsoil and near surface soil strata for chemical analysis

3.3 Scope of Work – Testing and Analysis

- 3.3.1 The initial desk study and conceptual model indicated that the only plausible possible contamination source was metal contamination originating from the former Minera Lead mines 750m southwest. A total of 8 Nr. topsoil and shallow ground strata samples were collected from the auger/trial pits and submitted for chemical analysis based on the possible metal contamination, at an accredited analytical laboratory. The analytical results are presented in Appendix 2. Samples were tested for:

Suite	Chemical Determinants	No. of Samples
Suite 1	pH, arsenic, cadmium, chromium (total and hexavalent), lead, mercury, selenium, copper, nickel, zinc	8

3.4 Trial Hole Locations

- 3.4.1 Trial pit locations are indicated on Figure 3 below.

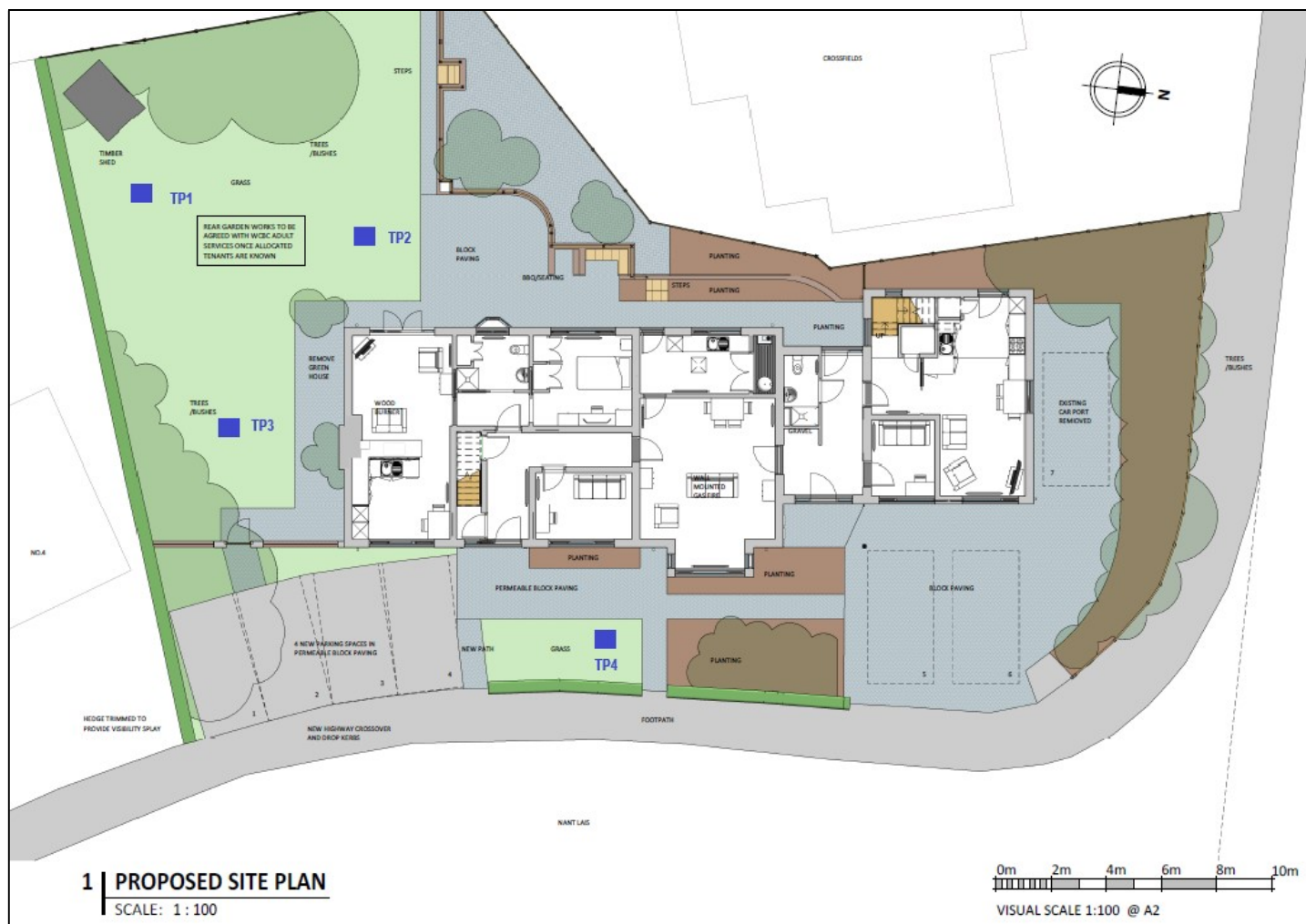


Figure 3 – Auger/Trial Pit Locations (TP1 to TP4)

4. GROUND CONDITIONS AND GEOLOGY.

4.1 General

- 4.1.1 Details of the ground strata and depths are presented on the trial pit records in Appendix 1. A summary of the findings is presented below.

4.2 Stratigraphy

- 4.2.1 The ground strata and depths encountered during the investigation were:

Stratum	Description	Depth to base m range (average)
TOPSOIL	Dark brown loamy clayey slightly gravely TOPSOIL	0.20 to 0.30
GLACIAL TILL - CLAY	Stiff to very stiff light brown with some medium brown and light grey mottling slightly gravely silty CLAY	1.00+

4.3 Groundwater

- 4.3.1 No groundwater was encountered in the trial pits.

4.4 Contamination Observations

- 4.4.1 During the examination of the ground strata there were no obvious indications of contamination.

5. CONTAMINATION ASSESSMENT

5.1 General

- 5.1.1 The results of the chemical analysis of soils samples are presented in Appendix 2. An assessment of the results of the analysis on samples has been undertaken to determine the presence and extent of any ground contamination. The assessment of contamination undertaken is a 'Tier 1 Generic Risk Assessment' which requires the comparison of contaminant concentrations to a set of generic assessment criteria (GAC).
- 5.1.2 Contaminant concentrations below the GAC are considered not to warrant further risk assessment. It should be noted that exceeding the GAC does not necessarily mean there is a risk, and the site should be remediated.

5.2 Soils Reference Values

- 5.2.1 A generic quantitative risk assessment (GQRA) has been undertaken using the chemical analysis results for the soil samples retained from the site. The GAC guideline criteria have been calculated to be protective of human health are related to defined exposure scenarios.
- 5.2.2 The investigated site is to be developed with residential housing with gardens and for assessment purposes the proposed use of the site has been taken as 'residential with potential consumption of home-grown vegetables'. The relevant GAC guideline criteria have been derived from:

Ref	Guideline Criteria
1	LQM/CIEH 'Suitable 4 Use Levels' (S4ULs) residential with home grown produce (oral and dermal) where available
2	DEFRA/Welsh Assembly Government C4SL – 'residential with potential consumption of home-grown vegetables'

5.3 Soils Analysis Assessment

- 5.3.1 The results of the screening against guideline criteria values are presented in the table below. Where values exceed the relevant guideline concentrations they are highlighted in the table.

PROJECT				NR 2 NANT LAIS, MINERA, WREXHAM							
BH/TP SAMPLE DEPTH SAMPLE TYPE DATE SAMPLED				TP1	TP1	TP2	TP2	TP3	TP3	TP4	TP4
				0.25	0.50	0.30	0.30	0.20	0.50	0.80	0.30
				TS	CLAY	TS	CLAY	TS	CLAY	TS	CLAY
				12/12/2020	12/12/20	12/12/20	12/12/20	12/12/20	12/12/20	12/12/20	12/12/20
		Ref: 1	Ref: 2								
Arsenic	mg/kg	37	200	13.8	4.2	11.1	9.9	12.1	9.4	11.2	9.5
Cadmium	mg/kg	11		2.5	0.2	4.4	1.3	4.6	0.2	3.7	1.5
Chromium (total)	mg/kg	910		78.0	52.7	96.4	63.8	70.4	61.9	76.6	59.5
Copper	mg/kg	2400		25	4	27	10	30	22	31	12
Lead	mg/kg			557	120	936	756	974	170	1104	323
Mercury	mg/kg	1.2		<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	180		18.9	5.2	13.7	7.7	16.0	19.1	15.5	8.7
Selenium	mg/kg	250		<1	<1	<1	2	1	1	1	2
Boron WS	mg/kg	290		0.9	0.4	1.3	0.7	1.9	0.5	1.7	0.8
Zinc	mg/kg	3700		517	55	847	168	805	88	1000	260
pH	mg/kg			6.89	8.39	7.01	7.98	7.05	8.07	7.46	8.02
Chromium (hex)	mg/kg	6		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3



Exceeds Guideline Criteria Ref 1

Exceeds Guideline Criteria Ref 2

5.3.2 Comparison of the analytical results for metals and non-metals using maximum concentrations as a means of assessment with the Tier 1 GAC values for 'residential use with home grown produce', based on an oral and dermal pathway indicates that the shallow ground strata of both TOPSOIL and the underlying CLAY contain concentrations of lead above available respective trigger concentrations.

5.3.3 Concentrations of cadmium and chromium were significantly below the guideline concentrations.

5.3.4 Concentrations of arsenic were below the guideline concentration.

5.3.5 Concentrations of selenium and mercury were generally below the detection limits.

5.3.6 Concentrations of copper, nickel and zinc were significantly below the guideline concentrations.

5.4 Risk Assessment - Contamination Source

5.4.1 The results of the site investigation and analysis of ground samples has identified the following:

- Widespread (6 samples from 8 and all topsoil) elevated concentrations of lead (range from 323mg/kg to 1104mg/kg compared to SGV of 200mg/kg)

5.5 Risk Assessment - Potential Receptors and Sensitivity

5.5.1 The principal receptors during and following site redevelopment for residential use are:

- Humans – Future residents – site to be used for residential purposes
- Humans – Site construction personnel – personnel involved in site construction activities
- Humans – Adjacent property occupiers – adjacent residential property to the south and west

- Buildings and Construction materials - site already developed with residential building with associated buried services and infrastructure

5.6 Risk Assessment - Potential Pathways and Exposure Scenarios

5.6.1 The following potential pathways may exist at the site following development.

- Human health exposure via Ingestion and dermal contact with soil particles in garden areas and ingestion of garden produce grown on the site, with identified solid contaminants
- Direct contact with buried services and construction materials

5.7 Preliminary Risk Assessment

5.7.1 In order for any risk to exist, a "Source - Pathway - Receptor" linkage must be established. This linkage requires:

- A source of contamination in the ground which has the potential to cause harm or to cause pollution of controlled waters.
- A pathway by or through which a receptor is being exposed to or affected by a contaminant or, could be so exposed or affected by a contaminant.
- A receptor that could be harmed by exposure to a contaminant.

5.7.2 The identification of each of these three elements is linked to the identification of the others. A pathway can only be present if it is capable of exposing an identified receptor to an identified contaminant. That particular contaminant should likewise be capable of harming or, in the case of controlled waters, be capable of polluting that particular receptor. If a pollutant source, pathway and receptor are found to be present then there could be a risk to the identified receptor. If there is an absence of any part of the source, pathway or receptor process, there is no risk.

5.7.3 The results of sampling and analysis indicated slightly elevated concentrations of lead within the shallow soil and made ground at the site. Based on the Source-Pathway-Target model the assessment of risks is as follows:

HUMANS - (Future site users)				
Contaminant Source	Pathway	Linkage Probability	Consequence	RISK/Comment
Lead in topsoil and near surface clay	Ingestion (Dermal contact/ Inhalation)	Possible	Moderate	Medium. Widespread occurrences of heavy metal lead at shallow depth

Descriptor	Description	Descriptor	Description
Almost certain	Likely to occur on many occasions	Catastrophic	Death
Likely	Will probably recur but not persistent	Major	Permanent harm
Possible	May recur occasionally	Moderate	Semi-permanent injury/damage
Unlikely	Not expected to happen but is possible	Minor	Short term harm/damage
None	Will not happen	None	No injury or adverse outcome

Chemical contaminants impacting human health

- 5.7.4 Concentrations of lead are elevated within the topsoil and underlying clay where there is a possibility of direct contact with humans and site users leading to a risk of ingestion of soil and dust which is the primary pathway. With the use of the site for residential purposes there is a medium risk to human health.
- 5.7.5 Only very limited groundworks are proposed. Any risk to construction personnel can be removed with the use of appropriate ppe.

Damage to services and construction materials

- 5.7.6 At the concentrations of contaminants detected there is no risk to potable water supplies in plastic pipes, however the local water authority should be consulted regarding the need for barrier pipe to be used in newly laid water supply pipes.

Risk to Controlled Waters

- 5.7.7 The superficial deposits below the site are classed as a minor or non-aquifer and at the concentrations of lead detected and the im-permeability of the clay there is no risk to controlled waters.

5.8 Risk Control and Mitigation

- 5.8.1 Elevated concentrations of heavy metal lead capable of causing harm to human health were detected within the topsoil and shallow ground strata at the site.
- 5.8.2 To remove potential risks the options for risk control include:
- Removal of topsoil and shallow soils and provision of a barrier layer to prevent direct contact with any residual lead in the deeper ground strata.
- 5.8.3 For the barrier layer the overall objective is to break the exposure pathway with different methods to be used in different areas of the development depending on the final use and construction. Normal site construction activities will provide the requirement of a barrier layer where any building extension and sealed surfaces are present. The thickness and material specification within a particular area will be dependent on the final construction at that location and should be detailed in a Remediation Strategy.

Footprint of Residential Building Extension – Barrier can be provided by standard floor slab construction of solid concrete floor slab placed on compacted granular formation material (depth dependent upon structural requirements) or suspended floor slab. The concrete construction will provide a solid barrier to all possible exposure and contact with the underlying ground materials following site development.

Parking Areas – Barrier layer will be provided by final surface covering placed on compacted granular sub-base material and any imported uncontaminated materials. The sealed surface and underlying structural construction materials will provide a solid barrier to all possible exposure and contact with the underlying ground materials when final surfaces have been placed.

Lawn and Garden Areas – An effective barrier layer can be provided by placing a minimum of 600mm of uncontaminated subsoil and topsoil (a depth greater than 2 worked spade depths) within garden and lawn areas. This depth of cover will provide a physical barrier to direct contact and exposure to inhalation and ingestion and an adequate thickness for vegetation growth. The barrier layer should comprise a minimum of 200mm of uncontaminated good quality topsoil and 400mm of natural uncontaminated subsoil. A high visibility warning layer should be placed below the subsoil.

- 5.8.4 It is likely that to retain current site levels that the existing topsoil and subsoil to a total depth of 600mm will have to be excavated. All excavated contaminated ground materials will require disposal off site at an appropriately licensed facility. Classification and acceptance of the soils. Any soils removed off site should be recorded, and documentary evidence of the disposal route

retained. Similarly, all imported soils should be uncontaminated and from an approved source. Documentary evidence of all imported soils and topsoil should be retained.

Appendix 1 - Trial Pit Records

TRIAL PIT RECORD

						Trial Pit No: TP1			
Date : 12.12.20						Site: Nr2 Nant Lais, Minera			
Excavator : Hand auger excavation						E1330			
Pit size : 300mm dia Depth : 1.00m						Elev (m aOD):			
						SAMPLE RECORD			
Pit No	Depth From (m)	Depth To (m)	Interval (m)	Strata Description	Depth	Type B U D W	Depth (m)	Number	
	0.00	0.30	0.30	Dark brown loamy clayey slightly gravely TOPSOIL		D	0.10		
	0.30	1.00+		Stiff to very stiff light brown with some medium brown and light grey mottling slightly gravely silty CLAY	0.5	D	0.60		
					1.0				
		1.00		Base of pit at 1.00m	1.5				
					2.0				
					2.5				
Remarks Sidewalls : Groundwater : In-situ testing : Contaminants : Services : Pit sides stable None None None observed None									



TRIAL PIT RECORD

						Trial Pit No: TP2		
Date : 12.12.20						Site: Nr2 Nant Lais, Minera		
Excavator : Hand auger excavation						E1330		
Pit size : 300mm dia Depth : 1.00m						Elev (m aOD):		
						SAMPLE RECORD		
Pit No	Depth From (m)	Depth To (m)	Interval (m)	Strata Description	Depth	Type B U D W	Depth (m)	Number
	0.00	0.30	0.30	Dark brown loamy clayey slightly gravely TOPSOIL		D	0.10	
	0.30	1.00+		Stiff to very stiff light brown with some medium brown and light grey mottling slightly gravely silty CLAY	0.5	D	0.60	
					1.0			
		1.00		Base of pit at 1.00m	1.5			
					2.0			
					2.5			
Remarks Sidewalls : Pit sides stable Groundwater : None In-situ testing : None Contaminants : None observed Services : None								

TRIAL PIT RECORD

						Trial Pit No: TP2		
Date : 12.12.20						Site: Nr2 Nant Lais, Minera		
Excavator : Hand auger excavation						E1330		
Pit size : 300mm dia Depth : 1.00m						Elev (m aOD):		
						SAMPLE RECORD		
Pit No	Depth From (m)	Depth To (m)	Interval (m)	Strata Description	Depth	Type B U D W	Depth (m)	Number
	0.00	0.20	0.20	Dark brown loamy clayey slightly gravely TOPSOIL		D	0.10	
	0.20	1.00+		Stiff to very stiff light brown with some medium brown and light grey mottling slightly gravely silty CLAY	0.5			
						D	0.60	
					1.0			
		1.00						
				Base of pit at 1.00m	1.5			
					2.0			
					2.5			
Remarks Sidewalls : Pit sides stable Groundwater : None In-situ testing : None Contaminants : None observed Services : None								

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Appendix 2 - Chemical Analysis Results

E-Geo Solutions
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0UN



Attention : Huw Littler-Jones
Date : 17th December, 2020
Your reference :
Our reference : Test Report 20/17709 Batch 1
Location : Coed Poeth
Date samples received : 14th December, 2020
Status : Final report
Issue : 1

Eight samples were received for analysis on 14th December, 2020 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Lucas Halliwell
Project Co-ordinator

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: E-Geo Solutions
Reference:
Location: Coed Poeth
Contact: Huw Littler-Jones
EMT Job No: 20/17709

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Client Name: E-Geo Solutions

Reference:

Location: Coed Poeth

Contact: Huw Littler-Jones

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/17709

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

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REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 20/17709

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes