

Report No

22181/R2

Date

October 2023

Project

BLAENDULAIS – SUPPLEMENTARY GROUND INVESTIGATION

Client

TRJ

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BRIDGEND
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Report No:	Date:
22181/R2	October 2023

Project:
BLAENDULAIS – SUPPLEMENTARY GROUND INVESTIGATION

Issue Number	Status	Description of Amendments
1	Draft	
2	Final	Lab testing incorporated
3	Final	Remaining lab

Report prepared by :	
Signed 	October 2023

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1.0 INTRODUCTION

1.1 Introduction

Spectrum Geo Services (SGS) were commissioned by TRJ Ltd. to complete a review of existing GI data at a site at Blaendulais, Seven Sisters, SA10 9DN. This review recommended further ground investigation operations, due to the fact that the building plans had required a change in footprint, due to a coal shaft buffer zone.

The site is approximately 0.228ha in area and is centred on National Grid Reference (NGR) 81942, 08914. The approximate postcode of the site being SA10 9DN.

SGS had completed a review of previous data (22181_R1) dated August 2023, which noted the requirement to undertake further window sampling, trial pitting and probe holes at the site to confirm the ground conditions and the potential presence of shallow coal seams/workings.

1.2 Scope of Works

The objectives of this assessment are to investigate the near surface deposits by window sampling and pitting, and to drill 2 No rotary probe holes with water flush, to determine/confirm the present of coals and the potential presence of broken ground or open workings which may influence the development.

1.3 Limitations

Subsoils are inherently variable and by their very nature are hidden from view such that no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may therefore be present beneath the site that were not apparent from the data available for review.

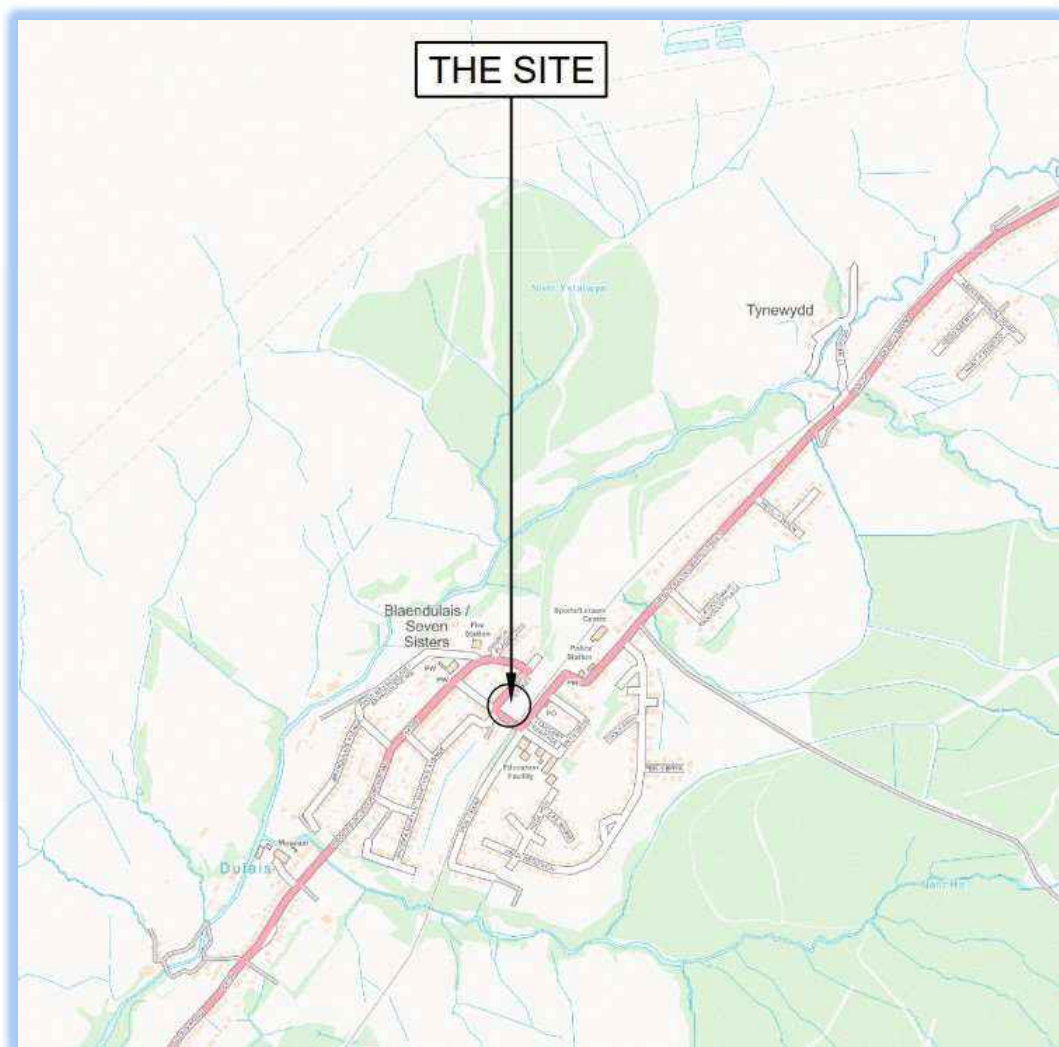
Unless specifically noted to the contrary, it should be assumed that this report has not been submitted to any regulatory authorities for approval. Redevelopment sites in particular may have planning conditions attached in respect of contaminated land assessment. Where we are made aware of such conditions in advance of scoping the works, we can tailor the report to the regulatory authority requirements. Where we are not made aware of any such requirements there can be no certainty that our investigation will meet any or all of the regulatory authority requirements.

2.0 EXISTING SITE INFORMATION

2.1 Site Location

The site is located at Blaendulais, Seven Sisters, SA10 9DN.

At the time of the investigation, the site comprised an open area of rough grass, as shown in Drawing 22181/01.



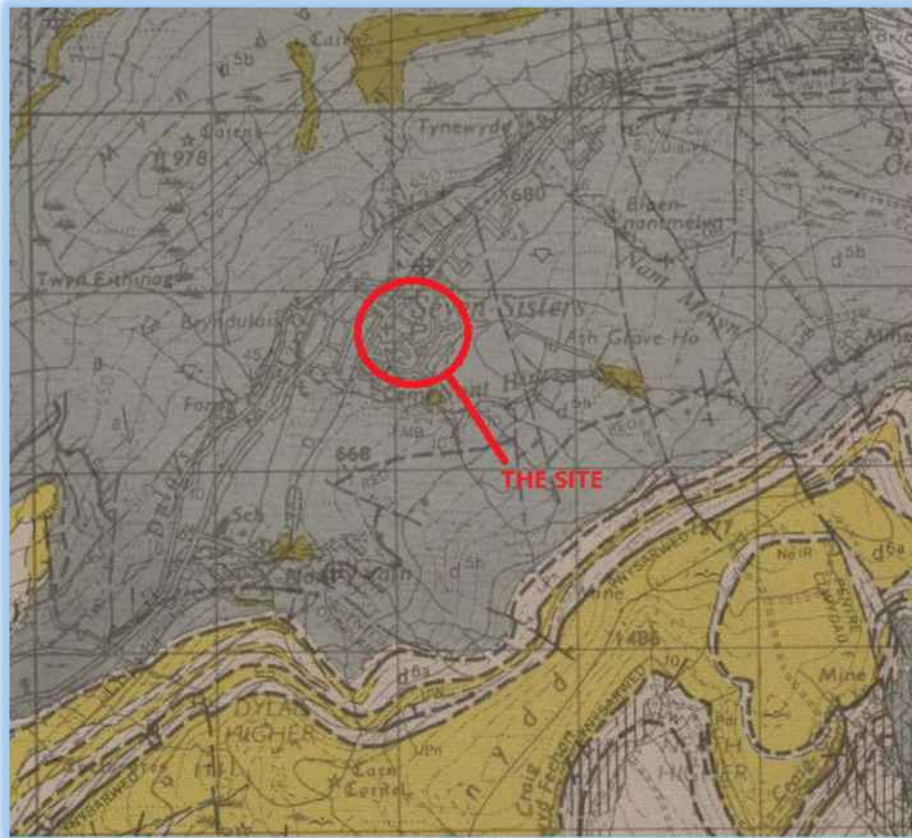
Drawing 22181/01.

2.2 Published Geology

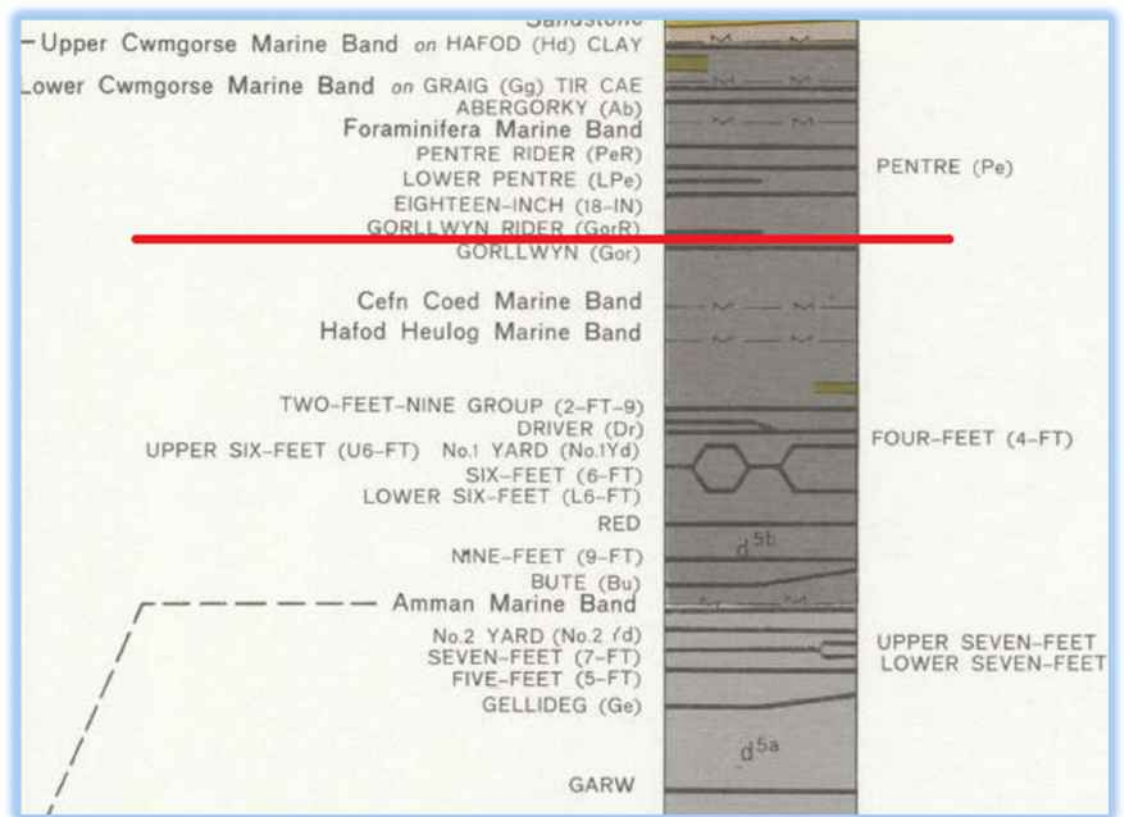
Information published by the British Geological Survey (BGS) suggests the site to be underlain by a sequence comprising;

Bedrock Geology

South Wales Middle Coal Measures Formation - Mudstone, siltstone and sandstone. Sedimentary bedrock formed between 318 and 309.5 million years ago during the Carboniferous period.



Drawing 22181/02: Geological Setting



Drawing 22181/03: Geological Column

2.3 Hydrology

The site lies to the east of the River Avan, with elevated ground to the west.

Thus, it is anticipated that the predominant groundwater flow is in an westerly westerly.

3.0 SITE OPERATIONS

3.1 Site Works

Site works comprised window sampling, machine dug trial pits and 2 rotary drilled probe holes, employing water flush and Klemm drill rig. These were drilled on 29 and 30 September 2023. The positions are shown on Drawing 22177/Locs.

100% water flush returns were noted by the driller during the rotary probing. On completion the holes were filled with bentonite grout, with no excessive take.

Borehole logs are shown in Appendix B.

4.0 DESK STUDY

4.1 Introduction

A desk study of the site was previously undertaken by Socotec, as noted in 22181_R1.

The SOCOTEC desk top study (DTS) and field reconnaissance report (Report No. H1060- 21) supplied by Neath Port Talbot County Borough Council outlined the following summary of the sites and its key risks.

- Geoenvironmental and geotechnical hazards may both be encountered on this site – geotechnical hazards are likely to be low but potentially high if the coals seam outcropping beneath the site has been worked, while geoenvironmental hazards may pose moderate risk. A ground investigation should be carried out to confirm the ground conditions, groundwater levels and ground gas at the proposed development locations to provide information to allow for the assessment of geotechnical parameters to be used for preliminary design of foundations along with an assessment of potential contamination on and beneath the site.
- The information available at this stage indicates there are potential current and historical sources of contamination on or beneath the site. The sources of these are the hard standing, past mining, former railway sidings and mill pond(s). There are likely to be contaminated soils beneath the site and as the use

of soft verges has not been ruled out (neither has the production of edible plants) there is a clear pathway linkage for these to pose a risk to the end users and maintenance workers post development and construction workers during development. The potential for a thicknesses of Made Ground, to be present also means that there is potential for ground gases to also pose a risk.

- Further risks are also posed by the surrounding rail sidings further from the site, though the reduced likely pathways mean these pose a lower risk than those present on the site.
- A ground investigation should be carried out to confirm the ground conditions and allow assessment of the contamination potentially present at the site. Based on these finding a full geoenvironmental assessment will be required to assess the risks posed to the development and its receptors
- The information at desk study stage indicates the site is underlain by coal bearing strata that has been subject to mining both in the area surrounding and directly beneath the site. There is a coal seam recorded as outcropping directly beneath the site and though this is not recorded as having been worked its shallow nature means it may have been worked but not recorded. Therefore, it may pose a potentially significant risk to the development. In addition the deeper worked and shallow seam are also potentially sources for the generation of ground gases.

4.2 Previous Ground Investigation

Subsequently, Tetra Tech undertook a Phase2 Ground Investigation.

The site investigation was undertaken between 16th and 19th May 2022. The scope of the investigation specified by Neath Port Talbot Council is based on the desk top study undertaken by SOCOTEC Report No. H1060-21 and included the following:

- *Two combined dynamic sample and rotary open hole boreholes (BH01 and BH02) to a depth of 30metres, with sampling and SPTs in the upper 10metres.*
- *Twelve windowless sample boreholes (WS01-WS12) to refusal at depths ranging between 0.4 and 2.9m bgl, with regular SPTs and samples taken.*

- *One day of soakaway testing in two trial pits (TP03 and TP04) at depths of 1.4m bgl and 1.1m bgl.*
- *Five TRL DCP locations to obtain indicative CBR values around the site.* • *Installation of gas/groundwater monitoring standpipes within both boreholes and one windowless sample borehole (WS08).*
- *On-site inspection and logging of recovered samples.*
- *Representative soil samples taken and submitted for geotechnical classification testing. Representative soil samples submitted and tested for a suite of potential contaminants.*

4.3 Coal Mining Risk Assessment (CMRA)

The risk assessment indicates that there is a Low Risk of ground instability as a result of deep or shallow recorded/unrecorded mining and mining geology beneath the site. Following the drilling of two rotary openhole boreholes no workings were encountered in the Gorwlllyn seam.

4.4 Ground Contamination

Laboratory testing has recorded a limited number of exceedances on beryllium and arsenic, however within the context of the proposed development and the predominant hard standing the recorded concentrations are not considered to pose a significant risk to site users. Elevated concentrations of PAH have also been recorded in the soil derived leachate samples, with a single PAH compound identified within groundwater. However, given the limited nature of the exceedances and the low permeability of the subsurface strata the recorded concentrations are not considered to pose a risk to controlled waters.

4.5 Ground Gas

Ground gas monitoring undertaken on the site has recorded limited concentrations of carbon dioxide and methane within the subsurface. The site has been defined as a Characteristic Situation 1 (Very Low risk) whereby no ground gas protection measures are considered necessary within the context of the proposed development.

4.0 SITE CONDITIONS ENCOUNTERED

4.1 Ground Conditions

Boreholes 5 and 6 noted a generalised succession as indicated in Table 5.1.

Stratum	Depth to base (m)	Remarks
MADE GROUND	0.30 to 0.70	
Stiff CLAY	0.70 to 2.90	Glacial Till
GRAVEL	(1.20)	SA01 only
MUDSTONE	(30.00)	
BH03 Coal	24.80 – 25.00	
BH04 Coal	22.20 – 22.50	

Table 4.1. Generalised Strata

4.2 Groundwater Conditions

Water strikes were noted at 1.50m as a seepage at SA01 and between 11.20m and 15.00m at BH03 and 04.

It should be noted that groundwater levels vary due to changes in climatic and other conditions and may therefore vary from those recorded during these operations.

4.3 Soakaway Testing

None of the soakaway testing produced an appropriate infiltration rate (If), as the ground was impermeable. The results are appended.

5.0 LABORATORY TESTING

Chemical laboratory testing was conducted to determine the concentrations of the following;

- Metals
- Asbestos
- pH and SO₄
- PAH MS
- TPH CWG
- WAC E 1 stage

The results are appended.

6.0 PRELIMINARY CONCEPTUAL MODEL AND QUALITATIVE RISK ASSESSMENT

Source Characterisation

All potential **on-site** and **off-site** sources of contamination identified by this desk study are detailed in Table 6.1.1 below. The table also details any which have been discounted.

Table 6.1. 1: Identified Potential Sources of Contamination

Source		Distance (m)	Compass Direction	Identified by:	Comments
Probable Made Ground	On-Site	0		Possible	Suite of contamination testing required to negate source.

It is not possible to discount all of the potential sources of contamination. Potential sources of contamination which cannot be discounted are carried forward to a preliminary qualitative risk assessment. The Contaminants of Concern (CoC) for the remaining potential sources of contamination are listed in Table 6.1.2.

Table 6.1. 2: Contaminants of Concern

CONTAMINANTS OF CONCERN								
Source	Metals	Cadmium	PAH	Soil Organic Matter	SO ₄ , SO ₃	pH	Asbestos	Chromium IV
ON-SITE								
Made Ground	X	X	X	X	X	X	X	X

7.0 GEOTECHNICAL PARAMETERS

7.1 Introduction

This section presents geotechnical parameters, which will be taken forward into the foundation options appraisals, and assigns parameters to the strata encountered. We have chosen not to assess geotechnical parameters of the Made Ground, as it is variable both laterally and vertically.

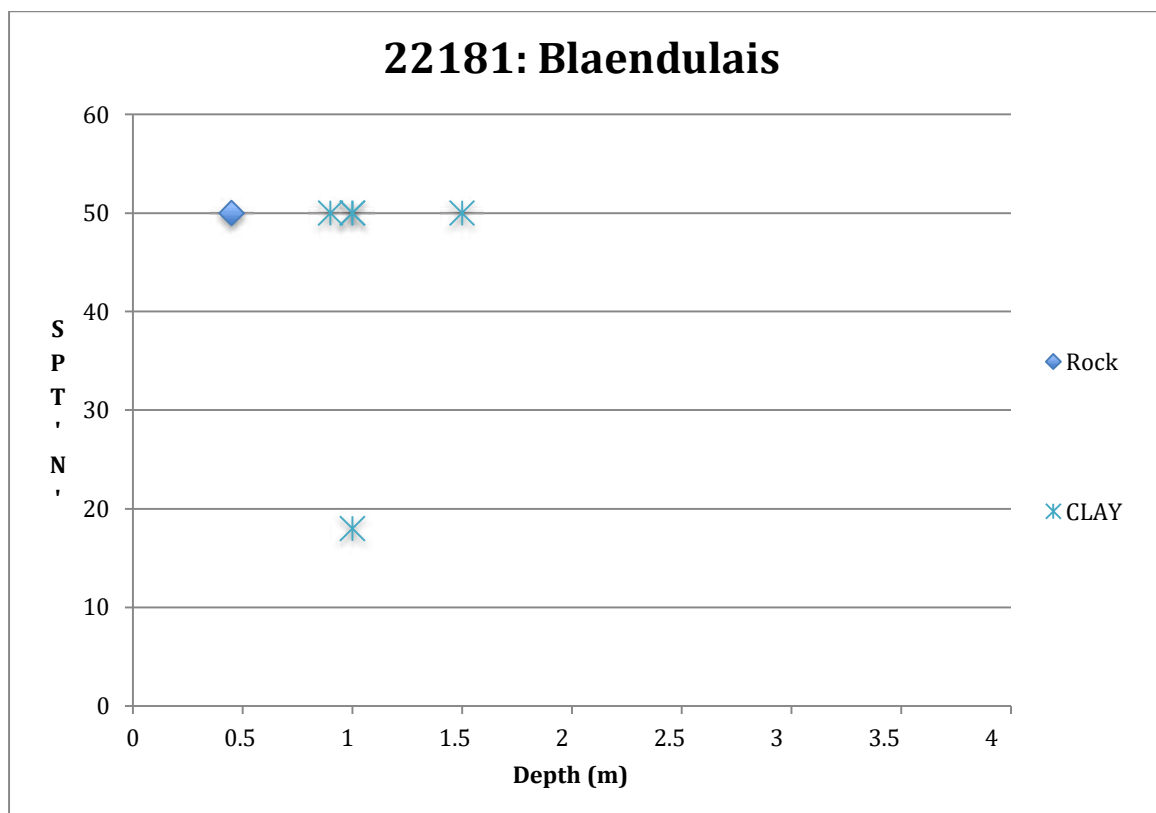


Figure 7.1. SPT N vs Depth

7.1.1 Stiff CLAY

What has been described as stiff gravelly CLAY, was noted beneath the Made Ground.

The upper surface was noted at depths of between 0.30m and 0.70m, below the Made Ground.

Uncorrected SPT N values of between 18 and refusal were recorded. Allowing for the effects of overburden and correcting accordingly suggests the strata to be stiff.

Employing correlations developed by Stroud et al, the following is recommended.

- *Undrained Shear Strength (c_u) – 100kN/m²*
- *Coefficient of Volume Compressibility (m_v) – 0.09m²/MN*

8.0 GEOTECHNICAL ASSESSMENT

8.1 Introduction

The following sections provide an assessment of the options relating to foundation options at site, making suggestions relating to potential options/assessment for bearing capacity and foundations and attack to buried concrete.

8.2 Foundation Options

At a depth of 1.00m to 1.50m the CLAY would provide an allowable bearing capacity (q_a) in the order of 100kN/m², however care must be taken to inspect the stratum for loose or waterlogged zones.

It should be noted that the upper surface of the weathered rock was noted at shallow depth in several exploratory holes, as shallow as 0.70m in TP05. Thus, there may be need to employ breakers to accomplish excavations for foundations and services.

Excavations in the Made Ground will degrade in wet conditions, and thus close support should be considered. Water was monitored as shallow as 1.50m depth, thus this may affect excavation depths. It is recommended that pumping from open sump is allowed for.

All formations must be inspected by a professional Geotechnical Engineer to confirm that the materials will accommodate the allowable bearing capacity calculated, and so that soft spots are identified, and removed.

8.3 Attack to Buried Concrete

Laboratory testing during, noted slightly acid to alkaline pH values, and a maximum water soluble sulphate value of 0.19g/l, indicating Sulphate Class DS-1, in accordance with BRE Special Digest 1.

8.4 Groundwater

Groundwater was monitored at around 1.50m at it's shallowest.

It is prudent to assume that there may be perched tables or standing water during periods of rainfall. Thus, pumping from open sumps should be accommodated for.

It should be noted that groundwater levels vary due to changes in climatic and other conditions and may therefore at times vary from those recorded during these operations.

9.0 CONTAMINATION TESTING

Contamination testing was undertaken on four soil samples, as shown in the Appendices.

Client Sample ID	Units	TP01	TP03	WS02	WS03			
Depth to Top		0.60	0.30	0.30	0.40			
Sample Type		Soil - ES	Soil - ES	Soil - ES	Soil - ES	S4UL/ C4SL Resi With	S4UL/ C4SL Resi Without	POS Resi
% Stones >10mm	% w/w	13.1	12.7	13.9	3.6			
pH	pH	6.24	9.63	9.02	8.26			
Sulphate (water sol 2:1)	g/l	0.04	0.19	0.07	<0.01			
Organic matter	% w/w	2.1	0.4	6.2	96.4			
Arsenic	mg/kg	3	26	15	5	37	40	79
Boron (water soluble)	mg/kg	<1.0	<1.0	<1.0	<1.0	290	11000	21000
Cadmium	mg/kg	<0.5	<0.5	1.3	<0.5	11	65	120
Copper	mg/kg	16	49	65	53	2400	7100	12000
Chromium	mg/kg	12	14	13	6	910	910	1500
Chromium Hex	mg/kg		<1	<1	<1	6	6	7.7
Lead	mg/kg	11	33	38	32	190	310	630
Mercury	mg/kg	<0.17	<0.17	<0.17	<0.17	40	56	120
Nickel	mg/kg	14	23	26	9	180	180	230
Selenium	mg/kg	<1	<1	<1	<1	250	430	1100
Zinc	mg/kg	31	126	2990	75	3700	40000	8100
TPH total (>C6-C40)	mg/kg	528	87	99	60	48000	64000	
Asbestos in Soil (inc. matrix)								
Asbestos in soil		NAD	NAD	NAD	NAD			
Asbestos ACM - Suitable for Water Absorption Test?		N/A	N/A	N/A	N/A	Non detected		
PAH-16MS								
Acenaphthene	mg/kg	0.01	<0.01	0.01	0.06	1100	6000	
Acenaphthylene	mg/kg	0.01	<0.01	<0.01	0.01	920	6000	
Anthracene	mg/kg	0.02	<0.02	<0.02	0.07	11000	37000	
Benzo(a)anthracene	mg/kg	<0.04	0.09	0.11	0.14	13	15	
Benzo(a)pyrene	mg/kg	<0.04	0.08	0.09	0.07	3	3.2	
Benzo(b)fluoranthene	mg/kg	<0.05	0.16	0.18	0.29	3.7	4	
Benzo(ghi)perylene	mg/kg	<0.05	0.07	0.08	<0.05	350	360	
Benzo(k)fluoranthene	mg/kg	<0.07	<0.07	<0.07	0.09	100	110	
Chrysene	mg/kg	<0.06	0.14	0.16	0.29	27	32	
Dibenzo(ah)anthracene	mg/kg	<0.04	<0.04	<0.04	<0.04	0.3	0.32	
Fluoranthene	mg/kg	<0.08	0.19	0.2	0.57	890	1600	
Fluorene	mg/kg	0.04	<0.01	<0.01	0.02	860	4500	
Indeno(123-cd)pyrene	mg/kg	<0.03	0.08	0.09	0.06	41	46	
Naphthalene	mg/kg	<0.03	<0.03	0.03	0.12	13	13	
Phenanthrene	mg/kg	<0.03	0.15	0.15	0.71	440	1500	
Pyrene	mg/kg	<0.07	0.13	0.16	0.27	2000	3800	
Total PAH-16MS	mg/kg	0.08	1.09	1.26	2.77	17761	60984	

Table 9.1: Soil Contamination Results

The results have been compared with current Environment Agency limits for Residential with and without homegrown produce and POS Resi Uses. Table 9.1 shows the recorded values, related to current Soil Guideline Values (SGVs)/S4UL, or other published values.

Thus, it is evident that all positions were within guidelines for Residential with and without plant uptake. Thus, no remediation strategy is required.

Waste Acceptance Criteria (WAC) Testing was undertaken on a single sample from WS04. No values exceeded inert landfill levels. It is likely that under the contractors Material Management Plans, further testing will be required for materials being removed from site.

10.0 COAL INVESTIGATION ASSESSMENT

The drilling operations noted in the original phase of investigations, noted no coal. The two boreholes during this phase noted a thin coal (200mm to 300mm thick) at 22m to 25m depths. No workings were noted and no loss of flush recorded in any of the holes.



Fig 10: Geoindex Extract

This, combined with the knowledge that there was no flush take during the drilling, indicates that there are no workings within these seams, which in most would by their dimensions appear to be non-economic for deep mining.

Thus, it is considered that no further investigation is required, and that no ground stabilisation is required for the development.

11.0 ADDITIONAL COMMENTS

Reference should also be made to the Tetra Tech Desk Top Study and Geotechnical Interpretive reports. The recommendations given in these reports regarding foundation type, gas protection, made ground and potential hazardous materials should be considered.

Foundations are to be coordinated with any new or existing services.

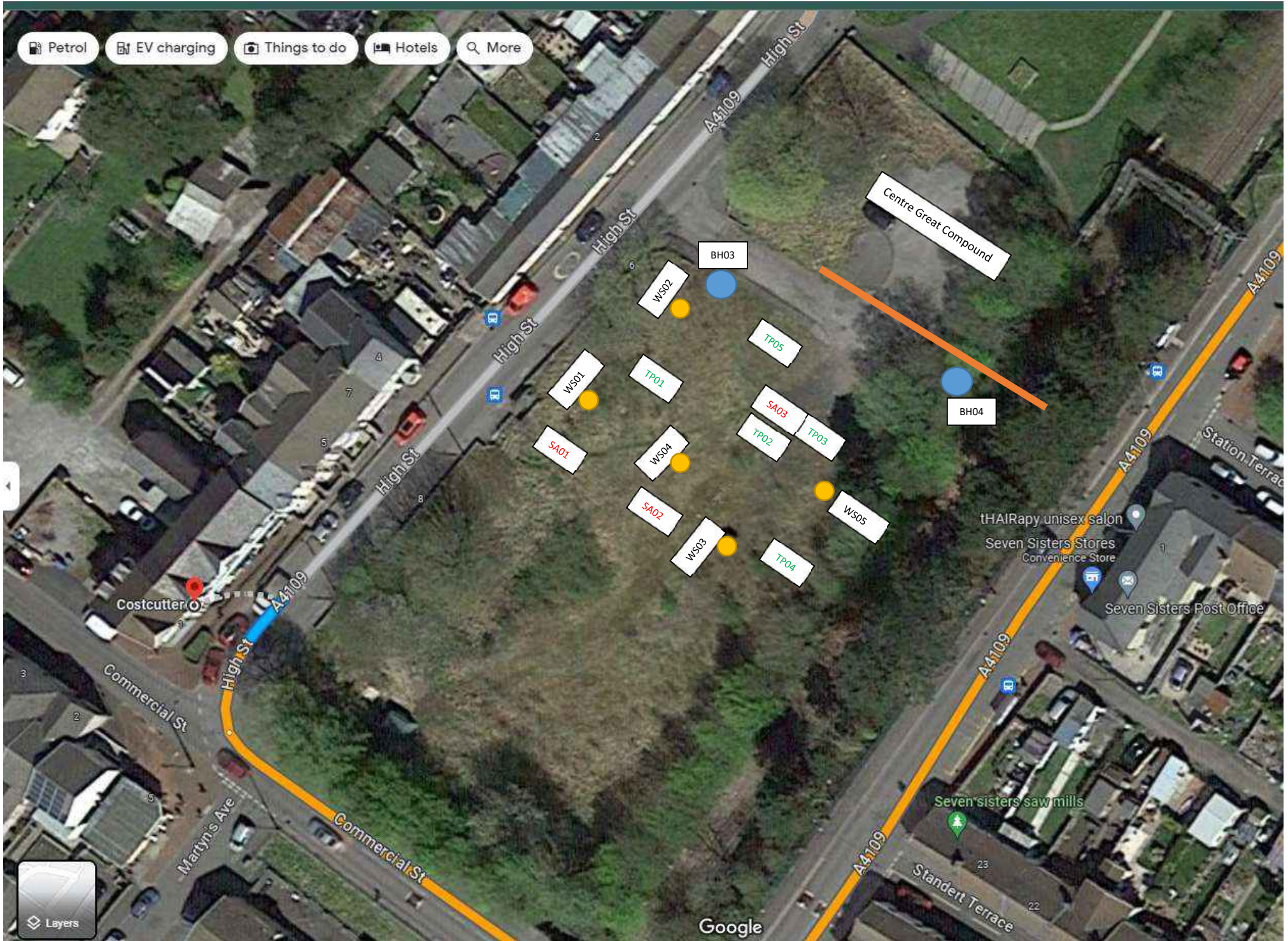
Any excavated material is to be WAC tested and WM3 assessed. Material that cannot be re-used for landscaping is to be removed off site for disposal at a suitable licenced facility.

APPENDIX A

Drawings

Borehole Location Plan

Drawing 22181_Locs



APPENDIX B

Borehole Logs



Rotary Core Log

Project Name: Blaendulais				Client: TRJ				Date: 09/10/2023			
Location: Blaendulais				Contractor: Apex Drilling Services							
Project No. : 22181				Crew Name: TD/JB				Drilling Equipment: Fraste PLG			
Borehole Number BH03		Hole Type RO		Level		Logged By PL		Scale 1:50		Page Number Sheet 1 of 3	

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
								0.40			BACKFILL **	
											CLAY **	1
								1.30			CLAY and BOULDERS **	2
								2.90			WEATHERED MUDSTONE **	3
												4
								4.30			SANDSTONE **	5
								5.30			MUDSTONE **	
								5.90			SANDSTONE **	6
												7
												8
												9
												10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
Remarks																	



Rotary Core Log

Project Name: Blaendulais				Client: TRJ				Date: 09/10/2023			
Location: Blaendulais				Contractor: Apex Drilling Services							
Project No. : 22181				Crew Name: TD/JB				Drilling Equipment: Fraste PLG			
Borehole Number BH03		Hole Type RO		Level		Logged By PL		Scale 1:50		Page Number Sheet 2 of 3	

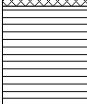
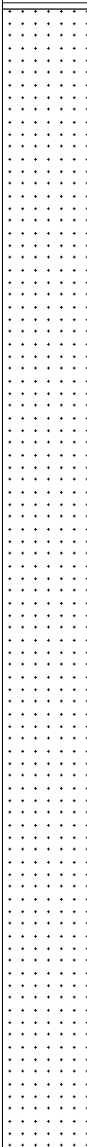
Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
	▼							17.20			SANDSTONE **	11
												12
												13
												14
												15
												16
												17
											MUDSTONE **	18
												19
												20

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)

Remarks																	
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Project Name: Blaendulais						Client: TRJ						Date: 09/10/2023						
Location: Blaendulais						Contractor: Apex Drilling Services												
Project No. : 22181						Crew Name: TD/JB						Drilling Equipment: Fraste PLG						
Borehole Number BH04			Hole Type RO			Level			Logged By PL			Scale 1:50			Page Number Sheet 1 of 3			
Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description							
				TCR	SCR	RQD			0.40			BACKFILL **					1	
													WEATHERED MUDSTONE **					
																SANDSTONE **		
							8.70			SILTSTONE **					9			
															10			
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush						
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)	
Remarks																		

[illegible][illegible]



Rotary Core Log

Project Name: Blaendulais				Client: TRJ				Date: 09/10/2023									
Location: Blaendulais				Contractor: Apex Drilling Services													
Project No. : 22181				Crew Name: TD/JB				Drilling Equipment: Fraste PLG									
Borehole Number BH04		Hole Type RO		Level		Logged By PL		Scale 1:50		Page Number Sheet 3 of 3							
Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description						
				TCR	SCR	RQD					MUDSTONE **	21					
								22.20			COAL **	22					
								22.50			MUDSTONE **	23					
												24					
								25.10			SILTSTONE **	25					
												26					
												27					
												28					
												29					
								30.00			End of Borehole at 30.000m	30					
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
Remarks																	



Trial Pit Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Equipment: 2.5 ton excavator	
Location Number SA01	Location Type TP	Level	Logged By PL	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.50	ES		0.50			MADE GROUND: Multicoloured clayey sandy angular to subangular fine to coarse GRAVEL of sandstone, brick and concrete with low cobble content of angular brick, sandstone and concrete. Fill.	1
					1.20			Brown, orange and grey slightly sandy clayey subrounded fine to coarse GRAVEL of sandstone with low cobble content of subrounded sandstone. GLACIAL TILL.	2
								End of Borehole at 1.200m	3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks



Trial Pit Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Equipment: 2.5 ton excavator	
Location Number SA02	Location Type TP	Level	Logged By PL	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50 - 1.00	ES		0.10			Soft dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of brick and sandstone. TOPSOIL.	
					0.50			MADE GROUND: Multicoloured clayey sandy angular to subangular fine to coarse GRAVEL of sandstone, brick and concrete with low cobble content of angular brick, sandstone and concrete. Fill.	
					1.00			Stiff brown, orange and grey slightly sandy gravelly CLAY with low cobble content of subangular to subrounded sandstone. Gravel is subangular to subrounded fine to coarse of sandstone. GLACIAL TILL.	
								End of Borehole at 1.000m	1
									2
									3
									4
									5

Dimensions		Trench Support and Comment				Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks		Date	Rate	Remarks

Remarks							





Trial Pit Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Equipment: 2.5 ton excavator	
Location Number TP01	Location Type TP	Level	Logged By PL	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.60 - 0.90	ES		0.50			MADE GROUND: Multicoloured clayey sandy angular to subangular fine to coarse GRAVEL of sandstone, brick and concrete with low cobble content of angular brick, sandstone and concrete. Fill.	1
								Stiff to very stiff brown, orange and grey slightly sandy gravelly CLAY with low cobble content of subangular to subrounded sandstone. Gravel is subangular to subrounded fine to coarse of sandstone. GLACIAL TILL.	
					1.50			End of Borehole at 1.500m	2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks							
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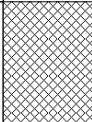






Trial Pit Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Equipment: 2.5 ton excavator	
Location Number TP04	Location Type TP	Level	Logged By PL	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			MADE GROUND: Black and grey slightly silty angular to subangular fine to coarse GRAVEL of sandstone and brick with medium cobble content of angular brick and sandstone. Fill.	
					0.70			Strong grey and dark grey SANDSTONE. Bedrock of the SOUTH WALES MIDDLE COAL MEASURES FORMATION	
								End of Borehole at 0.700m	1
									2
									3
									4
									5

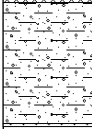
Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks							
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Trial Pit Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Equipment: 2.5 ton excavator	
Location Number TP05	Location Type TP	Level	Logged By PL	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			MADE GROUND: Black and grey slightly silty angular to subangular fine to coarse GRAVEL of sandstone and brick with medium cobble content of angular brick and sandstone. Fill.	
					0.70			Stiff to very stiff brown, orange and grey slightly sandy gravelly CLAY with low cobble content of subrounded sandstone. Gravel is subrounded fine to coarse of sandstone. GLACIAL TILL.	
					0.71			Strong grey and dark grey SANDSTONE. Bedrock of the SOUTH WALES MIDDLE COAL MEASURES FORMATION End of Borehole at 0.700m	1
									2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks							
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Percussion Drilling Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Drilling Equipment: DART	
Borehole Number WS01	Hole Type WS	Level	Logged By PL	Scale 1:50	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.50			GL - 0.50: MADE GROUND: Black and grey slightly silty angular to subangular fine to coarse GRAVEL of sandstone and brick with medium cobble content of angular brick and sandstone. Fill. 0.50 - 1.00: Stiff brown, orange and grey slightly sandy gravelly CLAY with low cobble content of subangular to subrounded sandstone. Gravel is subangular to subrounded fine to coarse of sandstone. GLACIAL TILL. No Recovery Probable Bedrock End of Borehole at 1.500m	
		1.00	SPT	N=18 (4,2/2,4,7,5)	1.00				1
		1.50	SPT	N=50 (3,4/50 for 20mm)	1.50 1.51				2
									3
									4
									5
									6
									7
									8
									9
									10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks



Percussion Drilling Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Drilling Equipment: DART	
Borehole Number WS02	Hole Type WS	Level	Logged By PL	Scale 1:50	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.50	ES		0.50			GL - 0.50: MADE GROUND: Black and grey slightly silty angular to subangular fine to coarse GRAVEL of sandstone and brick with medium cobble content of angular brick and sandstone. Fill.	
		0.70 - 1.00	ES					0.50 - 1.30: Stiff brown, orange and grey slightly sandy gravelly CLAY with low cobble content of subangular to subrounded sandstone. Gravel is subangular to subrounded fine to coarse of sandstone. GLACIAL TILL.	1
		1.00	SPT	N=50 (3,3/50 for 160mm)	1.30 1.31			Probable Bedrock End of Borehole at 1.300m	2
									3
									4
									5
									6
									7
									8
									9
									10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks



Percussion Drilling Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Drilling Equipment: DART	
Borehole Number WS03	Hole Type WS	Level	Logged By PL	Scale 1:50	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40 - 0.70	ES					GL - 0.70: MADE GROUND: Black and grey slightly silty angular to subangular fine to coarse GRAVEL of sandstone and brick with medium cobble content of angular brick and sandstone. Fill.	
		0.70 - 1.00	ES		0.70			0.70 - 0.90: Stiff brown, orange and grey slightly sandy gravelly CLAY with low cobble content of subangular to subrounded sandstone. Gravel is subangular to subrounded fine to coarse of sandstone. GLACIAL TILL.	1
		0.90	SPT	N=30 (1,1/30 for 5mm)	0.90 0.91			Probable Bedrock End of Borehole at 0.900m	2
									3
									4
									5
									6
									7
									8
									9
									10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks



Percussion Drilling Log

Project Name: Blaendulais		Client: TRJ		Date: 10/10/2023	
Location: Blaendulais		Contractor: Apex Drilling Services			
Project No. : 22181		Crew Name: LJ		Drilling Equipment: DART	
Borehole Number WS04	Hole Type WS	Level	Logged By PL	Scale 1:50	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20 - 0.50	ES					GL - 0.50: MADE GROUND: Black and grey slightly silty angular to subangular fine to coarse GRAVEL of sandstone and brick with medium cobble content of angular brick and sandstone. Fill. 0.50 - 1.00: Stiff to very stiff brown, orange and grey slightly sandy gravelly CLAY with low cobble content of subangular to subrounded sandstone. Gravel is subangular to subrounded fine to coarse of sandstone. GLACIAL TILL. Probable Bedrock End of Borehole at 1.000m	
		0.50 - 1.00	ES		0.50				
		1.00	SPT	N=50 (3,5/50 for 10mm)	1.00 1.10				1
									2
									3
									4
									5
									6
									7
									8
									9
									10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks



Percussion Drilling Log

Project Name: Blaendulais			Client: TRJ			Date: 10/10/2023		
Location: Blaendulais			Contractor: Apex Drilling Services					
Project No. : 22181			Crew Name: LJ			Drilling Equipment: DART		
Borehole Number WS05		Hole Type WS		Level		Logged By PL		Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.45	SPT	N=50 (25 for 15mm/50 for 10mm)	0.45 0.46			GL - 0.45: MADE GROUND: Black and grey slightly silty angular to subangular fine to coarse GRAVEL of sandstone and brick with medium cobble content of angular brick and sandstone. Fill. 0.45: Strong grey and dark grey SANDSTONE. Bedrock of the SOUTH WALES MIDDLE COAL MEASURES FORMATION End of Borehole at 0.450m	1 2 3 4 5 6 7 8 9 10

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks



Appendix C

Laboratory Testing

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 23/10186
Issue Number: 1

Date: 07 November, 2023

Client: Spectrum Geo Services
Foxglove Cottage
Cwm Risca Lane
Tondu
Wales
CF32 0EH

Project Manager: Rob Griffiths
Project Name: Blaendulais
Project Ref: 22181
Order No: 22181/01
Date Samples Received: 16/10/23
Date Instructions Received: 16/10/23
Date Analysis Completed: 07/11/23

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 23/10186

Client Project Name: Blaendulais

Client Project Ref: 22181

Lab Sample ID	23/10186/1	23/10186/2	23/10186/3	23/10186/4	23/10186/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP01	TP03	WS02	WS03	WS04					
Depth to Top	0.60	0.30	0.30	0.40	0.20					
Depth To Bottom	0.90	0.60	1.00	0.70	0.50					
Date Sampled	11-Oct-23	11-Oct-23	11-Oct-23	11-Oct-23	11-Oct-23					
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES					
Sample Matrix Code	3A	4AE	4AE	4AE	4AB					
% Stones >10mm _A	13.1	12.7	13.9	3.6	35.3			% w/w	0.1	A-T-044
pH _D ^{M#}	6.24	9.63	9.02	8.26	9.01			pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.04	0.19	0.07	<0.01	-			g/l	0.01	A-T-026s
Organic Matter _D ^{M#}	2.1	0.4	6.2	96.4	-			% w/w	0.1	A-T-032s
Arsenic _D ^{M#}	3	26	15	5	-			mg/kg	1	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0	<1.0	-			mg/kg	1	A-T-027s
Cadmium _D ^{M#}	<0.5	<0.5	1.3	<0.5	-			mg/kg	0.5	A-T-024s
Copper _D ^{M#}	16	49	65	53	-			mg/kg	1	A-T-024s
Chromium _D ^{M#}	12	14	13	6	-			mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	-			mg/kg	1	A-T-040s
Lead _D ^{M#}	11	33	38	32	-			mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	-			mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	14	23	26	9	-			mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	<1	-			mg/kg	1	A-T-024s
Zinc _D ^{M#}	31	126	2990	75	-			mg/kg	5	A-T-024s
TPH total (>C6-C40) _A ^{M#}	528	87	99	60	-			mg/kg	10	A-T-007s

Envirolab Job Number: 23/10186

Client Project Name: Blaendulais

Client Project Ref: 22181

Lab Sample ID	23/10186/1	23/10186/2	23/10186/3	23/10186/4	23/10186/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP01	TP03	WS02	WS03	WS04					
Depth to Top	0.60	0.30	0.30	0.40	0.20					
Depth To Bottom	0.90	0.60	1.00	0.70	0.50					
Date Sampled	11-Oct-23	11-Oct-23	11-Oct-23	11-Oct-23	11-Oct-23					
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES					
Sample Matrix Code	3A	4AE	4AE	4AE	4AB					
Asbestos in Soil (inc. matrix)										
Asbestos in soil _D [#]	NAD	NAD	NAD	NAD	-					A-T-045
Asbestos Matrix (visual) _D	-	-	-	-	-					A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-	-					A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A	N/A	-					A-T-045

Envirolab Job Number: 23/10186

Client Project Name: Blaendulais

Client Project Ref: 22181

Lab Sample ID	23/10186/1	23/10186/2	23/10186/3	23/10186/4	23/10186/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP01	TP03	WS02	WS03	WS04					
Depth to Top	0.60	0.30	0.30	0.40	0.20					
Depth To Bottom	0.90	0.60	1.00	0.70	0.50					
Date Sampled	11-Oct-23	11-Oct-23	11-Oct-23	11-Oct-23	11-Oct-23					
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES					
Sample Matrix Code	3A	4AE	4AE	4AE	4AB					
PAH-16MS										
Acenaphthene _A ^{M#}	0.01	<0.01	0.01	0.06	-			mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	0.01	<0.01	<0.01	0.01	-			mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	0.02	<0.02	<0.02	0.07	-			mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	0.09	0.11	0.14	-			mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	0.08	0.09	0.07	-			mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	0.16	0.18	0.29	-			mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	0.07	0.08	<0.05	-			mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	0.09	-			mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	0.14	0.16	0.29	-			mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A	<0.04	<0.04	<0.04	<0.04	-			mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	0.19	0.20	0.57	-			mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	0.04	<0.01	<0.01	0.02	-			mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	0.08	0.09	0.06	-			mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	0.03	0.12	-			mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	0.15	0.15	0.71	-			mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	0.13	0.16	0.27	-			mg/kg	0.07	A-T-019s
Total PAH-16MS _A	0.08	1.09	1.26	2.77	-			mg/kg	0.01	A-T-019s

Report Notes

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
 The results reported herein relate only to the material supplied to the laboratory.
 The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **six weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
 Analytical results reflect the quality of the sample at the time of analysis only.
 Opinions and Interpretations expressed are outside our scope of accreditation.
 The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
 A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Key

Superscript "#"	Accredited to ISO 17025
Superscript "M"	Accredited to MCertS
Superscript "U"	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript "A"	Analysis performed on as-received Sample
Subscript "D"	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript "A"	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
N/A	Not applicable

Asbestos

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
 Stones etc. are not removed from the sample prior to analysis
 Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing, and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs

Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.

Soil Chemical Analysis:

All results are reported as dry weight (<40°C).
 For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
 For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
 All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
 Results "with Clean up" indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:

EPH CWG results have humics mathematically subtracted through instrument calculation.
 Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the accreditation range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Spectrum Geo Services, Foxglove Cottage, Cwm Risca Lane, Tondy, Wales,
CF32 0EH

Project: Blaendulais

Clients Project No: 22181

Project No: 23/10186

Date Received: 16/10/2023 (am)

Cool Box Temperatures (°C): 12.1

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	23/10186/1	23/10186/2	23/10186/3	23/10186/4	23/10186/5
Client Sample No					
Client Sample ID/Depth	TP01 0.60-0.90m	TP03 0.30-0.60m	WS02 0.30-1.00m	WS03 0.40-0.70m	WS04 0.20-0.50m
Date Sampled	11/10/23	11/10/23	11/10/23	11/10/23	11/10/23
A-T-004s					23/10/2023
A-T-007s	23/10/2023	23/10/2023	23/10/2023	23/10/2023	23/10/2023
A-T-019s	25/10/2023	25/10/2023	25/10/2023	25/10/2023	25/10/2023
A-T-022s					23/10/2023
A-T-024s	26/10/2023	26/10/2023	28/10/2023	26/10/2023	
A-T-025w					30/10/2023
A-T-026s	26/10/2023	26/10/2023	26/10/2023	26/10/2023	
A-T-026w					30/10/2023
A-T-026w (F)					30/10/2023
A-T-027s	27/10/2023	27/10/2023	27/10/2023	27/10/2023	
A-T-030s					26/10/2023
A-T-031s	26/10/2023	26/10/2023	26/10/2023	26/10/2023	26/10/2023
A-T-031w					30/10/2023
A-T-032s	02/11/2023	01/11/2023	01/11/2023	07/11/2023	02/11/2023
A-T-032w					30/10/2023
A-T-037w					30/10/2023
A-T-040s	02/11/2023	26/10/2023	26/10/2023	26/10/2023	
A-T-044	27/10/2023	27/10/2023	27/10/2023	27/10/2023	27/10/2023
A-T-045	20/10/2023	20/10/2023	20/10/2023	20/10/2023	
A-T-050w					30/10/2023
A-T-ANCs					26/10/2023
Calc-no stones					30/10/2023
Probe (w)					30/10/2023

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Final Test Report

Envirolab Job Number: 23/10186
Issue Number: 1

Date: 7-Nov-23

Client: Spectrum Geo Services
Foxglove Cottage
Cwm Risca Lane
Tondu
Wales
CF32 0EH

Project Manager: Rob Griffiths
Project Name: Blaendulais
Project Ref: 22181
Order No: 22181/01

Date Samples Received: 16-Oct-23
Date Instructions Received: 16-Oct-23
Date Analysis Completed: 7-Nov-23

Notes - Soil analysis

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

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

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid

Predominant Matrix Codes: 1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

HWOL TPH Code: EH_CU_1D_AL: Extractable hydrocarbons - i.e. everything extracted by the solvent(s), Clean-up - e.g. by florisil, silica gel, GC - Single coil gas chromatography, Aliphatics only

Approved by:



Richard Wong
Client Manager

Sample Details					Landfill Waste Acceptance Criteria Limits			
Lab Sample ID	Method	ISO17025	MCERTS	23/10186/5				
Client Sample Number					Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill	
Client Sample ID				WS04				
Depth to Top				0.2				
Depth to Bottom				0.50				
Date Sampled				11/10/2023				
Sample Type				Soil - ES				
Sample Matrix Code				4AB				
Solid Waste Analysis								
pH (pH Units) _D	A-T-031	N	N	9.01		-	>6	-
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	0.46		-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.1		-	to be evaluated	to be evaluated
Loss on Ignition (%) _D	A-T-030	N	N	2.7		-	-	10
Total Organic Carbon (%) _D	A-T-032	N	N	0.89		3	5	6
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N	0.52		100	-	-
Mineral Oil (mg/kg) _{A EH_CU_1D_AL}	A-T-007	N	N	64		500	-	-
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N	<0.007		1	-	-
Sum of BTEX (mg/kg) _A	A-T-022	N	N	<0.01		6	-	-
Eluate Analysis				10:1	10:1	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
				mg/l	mg/kg			
Arsenic	A-T-025	N	N	0.007	0.070	0.5	2	25
Barium	A-T-025	N	N	0.015	0.150	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.01	0.04	1	5
Chromium	A-T-025	N	N	0.003	0.030	0.5	10	70
Copper	A-T-025	N	N	0.006	0.060	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.005	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.001	0.010	0.5	10	30
Nickel	A-T-025	N	N	<0.002	<0.02	0.4	10	40
Lead	A-T-025	N	N	<0.001	<0.01	0.5	10	50
Antimony	A-T-025	N	N	0.012	0.120	0.06	0.7	5
Selenium	A-T-025	N	N	0.001	0.010	0.1	0.5	7
Zinc	A-T-025	N	N	0.012	0.120	4	50	200
Chloride	A-T-026	N	N	1	11	800	15000	25000
Fluoride	A-T-026	N	N	0.2	2.0	10	150	500
Sulphate as SO ₄	A-T-026	N	N	51	512	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	96	960	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.1	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<2.0	<200	500	800	1000
Leach Test Information								
pH (pH Units)	A-T-031	N	N	9.4				
Conductivity (µS/cm)	A-T-037	N	N	192				
Mass Sample (kg)				0.205				
Dry Matter (%)	A-T-044	N	N	85.2				
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation								



Results Summary

Apex Testing Solutions Limited

Sturmi Way
Village Farm Industrial Estate
Pyle
Bridgend
CF33 6BZ

Telephone: 01656 746762

E-mail: andrew.grogan@apex-drilling.com

laura.davis@apex-drilling.com

<u>Reporting Details</u>		<u>Key Information</u>	
Company Name:	Spectrum Geo	Site Name:	Blaendulais
Address:	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH	Job Number:	D23449
Contact Name:	Rob	Date Received:	16/10/2023
Contact Number:		Job Coordinator:	A. Grogan

Item No.	Tests Undertaken	Number of Tests
1	Atterburg Limits (4 point) - BS1377-2: 1990	3
2	# pH & sulphate (pH/SO ₄)	3
3	Courier Charge	3

Results Issued: 25/10/2023

Comments

Results herein relate only to samples received in the laboratory and where not sampled by Apex Testing Solutions personnel relate to the samples as received.

Where tests are UKAS accredited any Opinion and/or Interpretation expressed herein are outside the scope of the UKAS Accreditation. The reports shall not be reproduced in full without the written approval of the laboratory.

Please contact the job coordinator should any further information be required.

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014+A1:2022

Project No: D23449

Project Name: 22181 - Blaendulais

Client: Spectrum Geo

Address: Foxglove Cottage

Cwm Risca Lane

Bridgend

ATS Sample No: 34755

CF32 0EH

Site Ref / Hole ID: WS02

Sample No:

Depth (m): 0.70 - 1.00

Sample Type: Disturbed

**Sampling Certificate
Received:** No

Material Description: Brown sandy gravelly
CLAY

Location in Works: N/a

Material Source: Ex-Site

Date Sampled: Unknown

Material Supplier: Ex-Site

Sampled By: Client

Specification: ISO 17892-1

Date Received: 16 October 2023

Date Tested: 21 October 2023

Test Results

Moisture Content (%)

20.9

Remarks:

QA Ref.

EN ISO 17892-
1:2014 A1:2022



Apex Testing Solutions

Sturmi Way, Village Farm Industrial Est,
Pyle, Bridgend, CF33 6BZ

Tel: 01656 746762 Fax: 01656 749096



7771

Approver

A Grogan

A Grogan, Laboratory Manager

Date

21/10/2023

Fig

MC

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990. Clause 4.3/5.3/5.4

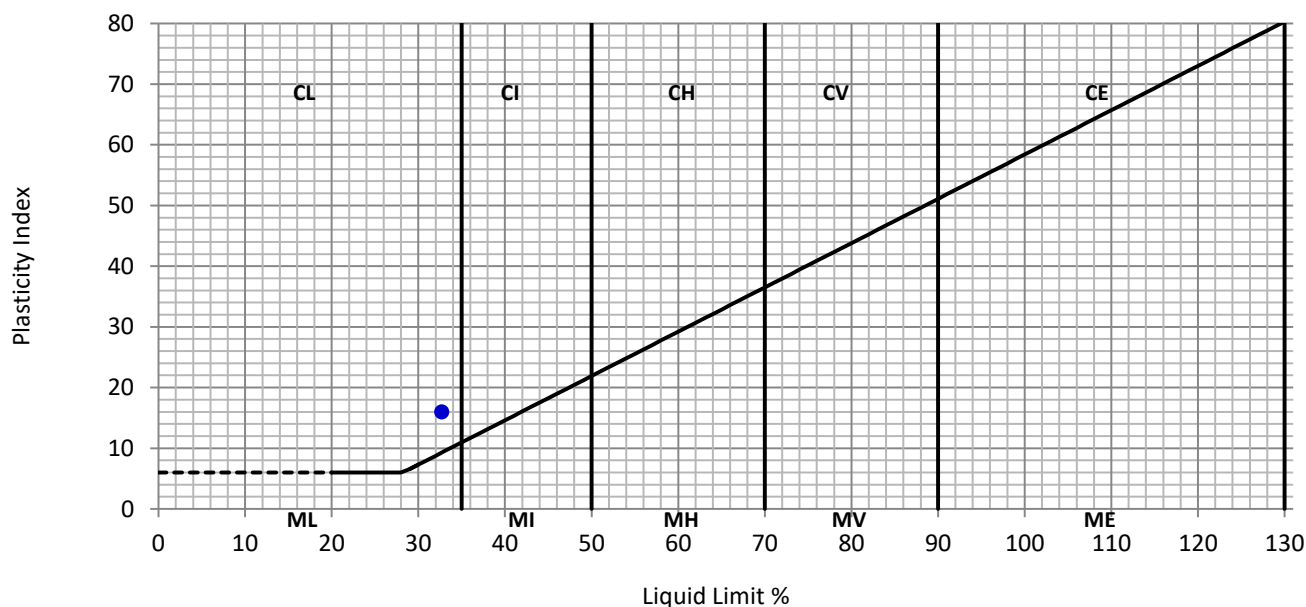
Project No:	D23449	Client:	Spectrum Geo
Project Name:	22181 - Blaendulais	Address:	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH
ATS Sample No:	34755		

Site Ref / Hole ID:	WS02	Depth (m):	0.70 - 1.00
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Brown sandy gravelly CLAY
Location in Works:	N/a	Material Source:	Ex-Site
Date Sampled:	Unknown	Material Supplier:	Ex-Site
Sampled By:	Client	Specification:	BS1377
Date Received:	16 October 2023	Date Tested:	19 October 2023

Test Results

Liquid Limit	33	%
Plastic Limit	17	%
Plasticity Index	16	%

Preparation:	4.2.4 Sieved Specimen
Proportion retained on 425µm sieve:	35 %



Remarks:

QA Ref.

BS1377 - 2
Rev. 3.0



Apex Testing Solutions

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7771

Approver

A Grogan

A Grogan, Laboratory Manager

Date

21/10/2023

Fig.

ATT

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014+A1:2022

Project No: D23449

Project Name: 22181 - Blaendulais

Client: Spectrum Geo

Address: Foxglove Cottage

Cwm Risca Lane

Bridgend

ATS Sample No: 34756

CF32 0EH

Site Ref / Hole ID: WS03

Sample No:

Depth (m): 0.70 - 1.00

Sample Type: Disturbed

**Sampling Certificate
Received:** No

Material Description: Dark grey very gravelly
CLAY

Location in Works: N/a

Material Source: Ex-Site

Date Sampled: Unknown

Material Supplier: Ex-Site

Sampled By: Client

Specification: ISO 17892-1

Date Received: 16 October 2023

Date Tested: 18 October 2023

Test Results

Moisture Content (%)

17.6

Remarks:

QA Ref.

EN ISO 17892-
1:2014 A1:2022



Apex Testing Solutions

Sturmi Way, Village Farm Industrial Est,
Pyle, Bridgend, CF33 6BZ

Tel: 01656 746762 Fax: 01656 749096



7771

Approver

A Grogan

A Grogan, Laboratory Manager

Date

21/10/2023

Fig

MC

TEST REPORT
LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX
BS 1377:Part 2:1990. Clause 4.3/5.3/5.4

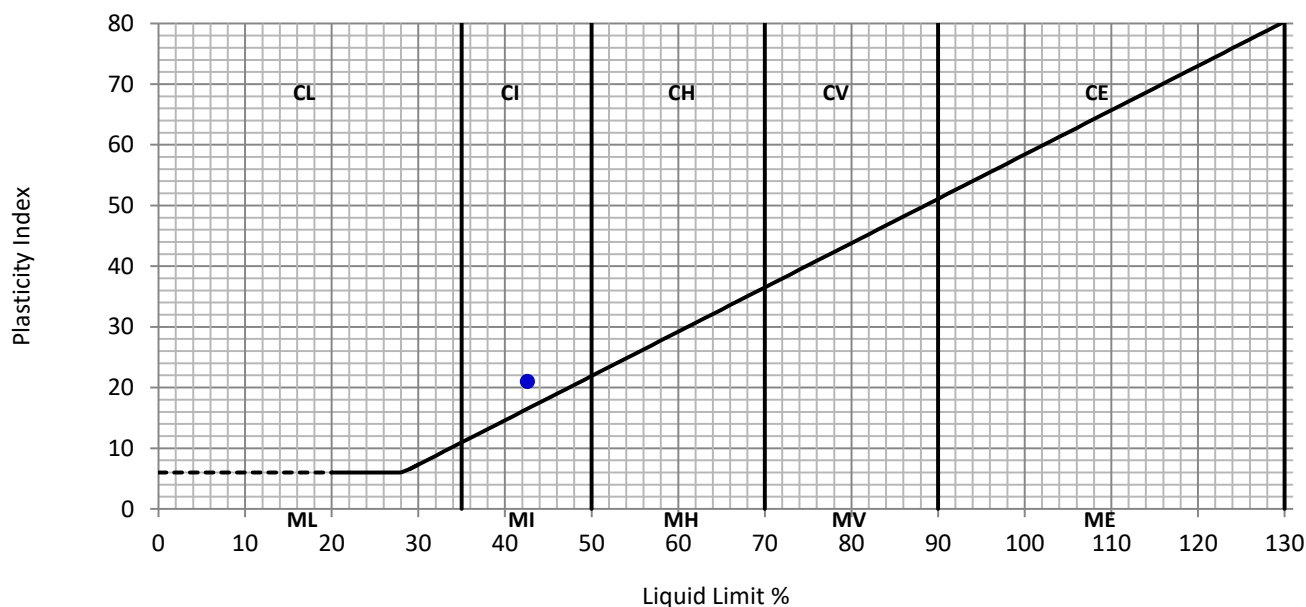
Project No:	D23449	Client:	Spectrum Geo
Project Name:	22181 - Blaendulais	Address:	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH
ATS Sample No:	34756		

Site Ref / Hole ID:	WS03	Depth (m):	0.70 - 1.00
Sample No:		Sample Type:	Disturbed
Sampling Certificate Received:	No	Material Description:	Dark grey very gravelly CLAY
Location in Works:	N/a	Material Source:	Ex-Site
Date Sampled:	Unknown	Material Supplier:	Ex-Site
Sampled By:	Client	Specification:	BS1377
Date Received:	16 October 2023	Date Tested:	19 October 2023

Test Results

Liquid Limit	43	%
Plastic Limit	22	%
Plasticity Index	21	%

Preparation:	4.2.4 Sieved Specimen
Proportion retained on 425µm sieve:	76 %



Remarks:

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014+A1:2022

Project No: D23449

Project Name: 22181 - Blaendulais

Client: Spectrum Geo

Address: Foxglove Cottage

Cwm Risca Lane

Bridgend

ATS Sample No: 34757

CF32 0EH

Site Ref / Hole ID: WS04

Sample No:

Depth (m): 0.50 - 1.00

Sample Type: Disturbed

**Sampling Certificate
Received:** No

Material Description: Brown sandy gravelly
CLAY

Location in Works: N/a

Material Source: Ex-Site

Date Sampled: Unknown

Material Supplier: Ex-Site

Sampled By: Client

Specification: ISO 17892-1

Date Received: 16 October 2023

Date Tested: 21 October 2023

Test Results

Moisture Content (%)

9.9

Remarks:

QA Ref.

EN ISO 17892-
1:2014 A1:2022



Apex Testing Solutions

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Pyle, Bridgend, CF33 6BZ

Tel: 01656 746762 Fax: 01656 749096



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Approver

A Grogan

A Grogan, Laboratory Manager

Date

21/10/2023

Fig

MC