

Report No

23086/R1

Date

December 2023

Project

WALL COLMONOY, PONTARDAWE – GROUND INVESTIGATION REPORT

Client

Wall Colmonoy

**Spectrum Geo Services
Foxglove Cottage,
Cwm Risca Lane,
Tondu,
BRIDGEND
CF32 0EH**

Report No:	Date:
23086/R1	December 2023

Project: WALL COLMONOY, PONTARDAWE – GROUND INVESTIGATION REPORT
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Issue Number	Status	Description of Amendments
1	Draft	

Report prepared by:	
Signed 	December 2023

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1.0 INTRODUCTION

1.1 Introduction

Spectrum Geo Services (SGS) were requested by Wall Colmonoy, to undertake a ground investigation and assessment at the site of a proposed new nitrogen tank and associated facilities.

The drilling and testing operations were undertaken by Spectrum Geo Services (SGS).

This report includes details of this ground investigation at the site, previous ground investigations and recommendations regarding ground conditions and foundation options.

1.2 Scope of Works

SGS were requested to supervise ground investigation works and to develop a report providing geotechnical parameters and foundation options.

1.3 Development Proposals

It is understood that a new nitrogen cylinder and facilities are proposed at the site.

1.4 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 was 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 situated to the east of Pontardawe at postcode SA8 4HL. The site location plan is included in Figure1.

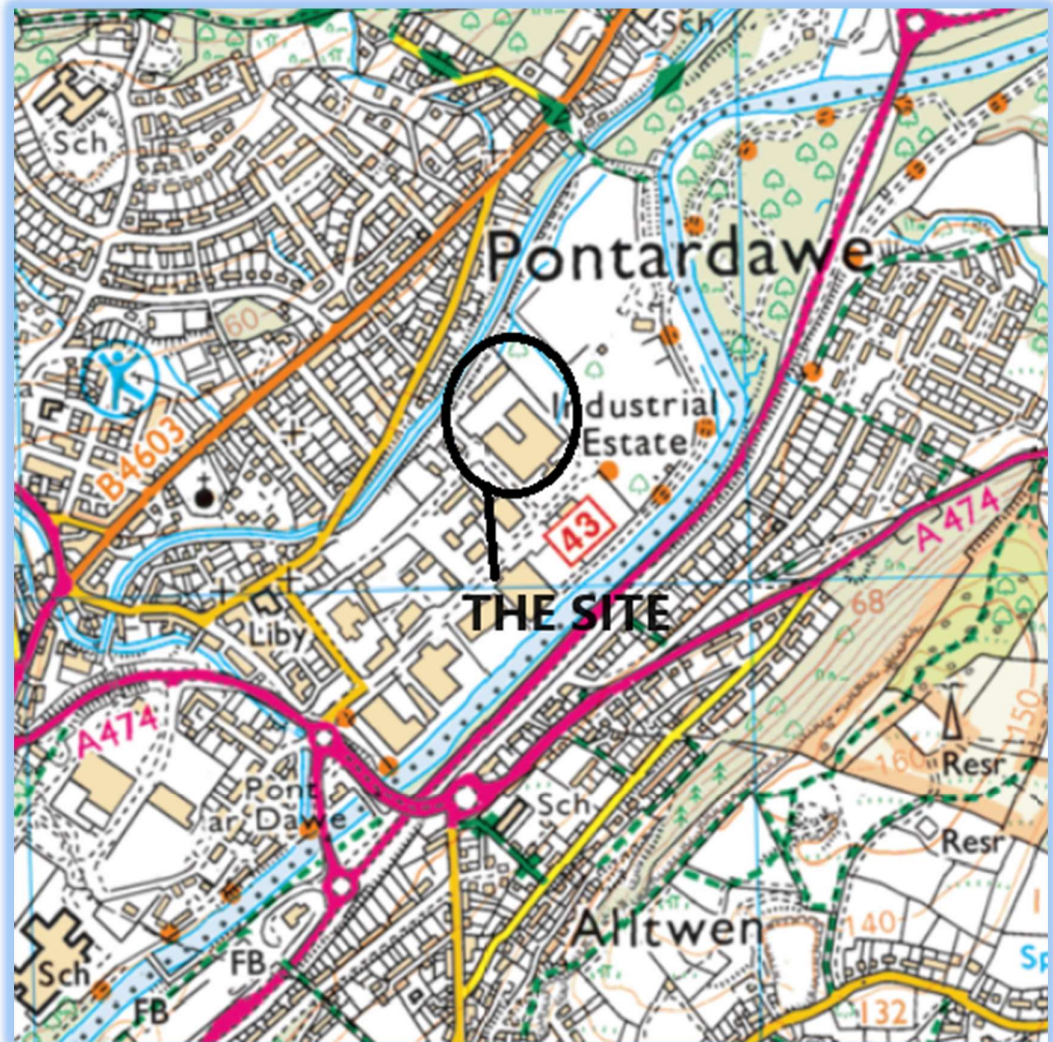


Figure 1: Site Location

2.2 Published Geology

Based on the 1:10,000 geological map the following geological setting is anticipated;

Superficial Geology

Alluvium - Clay, silt, sand and gravel. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.

Bedrock Geology

Brithdir Member - Sandstone. Sedimentary bedrock formed between 309.5 and 308 million years ago during the Carboniferous period.

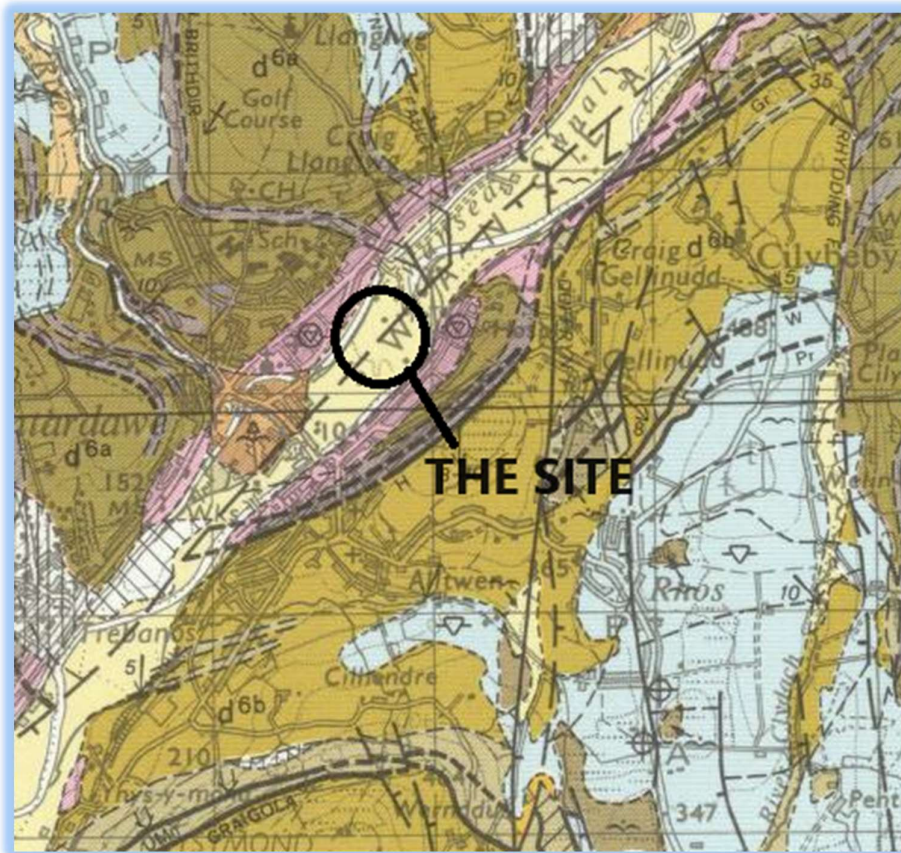


Figure 2: Geology

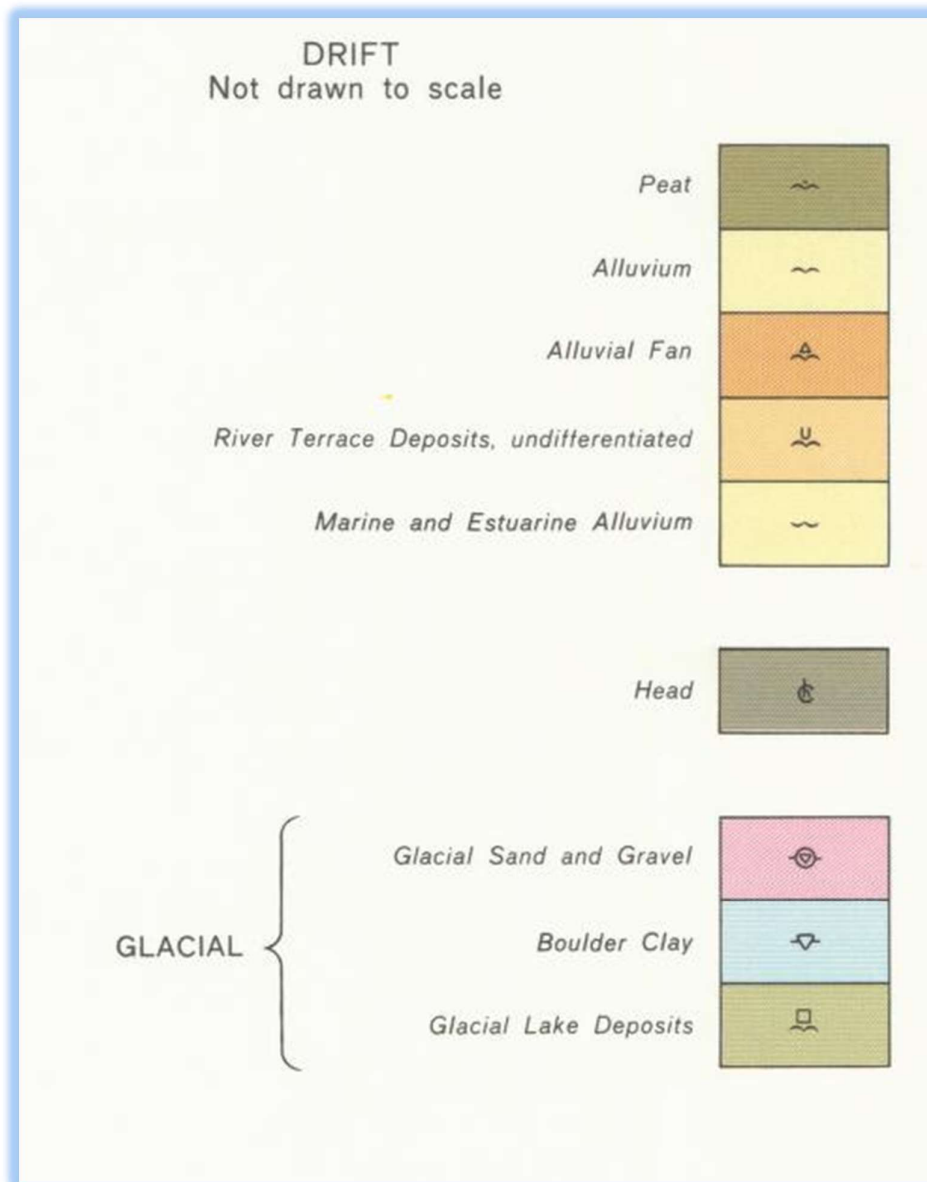


Figure 3: Solid Geological Succession

The site lies over thick alluvial deposits, in turn lying over the Brithdir Coal Measures.

Figure 4 shows data from the Coal Authority Interactive Viewer. The hatched areas are High Risk Zones and sub-crops of coal. The site is not within the CA High Risk Development Area.

3.0 SITE OPERATIONS

3.1 Site Works

Site works comprised 2No dynamic/rotary boreholes, which encountered difficult drilling conditions, which resulted in the requirement for a Cable Percussion borehole. Works were undertaken during the period 24 October to 08 November 2023.

The work was undertaken in accordance with BS5930.

Samples were recovered of strata encountered, to allow visual geotechnical assessment and in-situ Standard Penetration Testing was undertaken during drilling within the superficial deposits.

On completion a 50mm standpipe was installed to allow future monitoring.

4.0 LABORATORY TESTING

4.1 Introduction

On completion of site operations, selected soil and rock samples were scheduled for geotechnical and chemical laboratory testing, in general accordance with BS1377 methodologies.

The following laboratory testing was undertaken and is Appended.

- Particle Size Distribution,
- Atterberg Limits
- Water Soluble Sulphate and pH
- Standard Contamination Suite

The results are appended.

5.0 SITE CONDITIONS ENCOUNTERED

5.1 Ground Conditions

The ground conditions encountered are presented in Table 5.1.

Stratum	Depth to base (m)	Remarks
MADE GROUND	1.50	
Soft CLAY/SILT	3.00	Alluvium
Medium dense to dense SAND/GRAVEL	12.95 – (15.00)	Alluvium
Medium dense SAND	20.00	Alluvium (BH03 only)
Firm to stiff CLAY/SILT	(35.00)	Alluvium (BH03 only)

Table 5.1 Generalised Strata

5.2 Groundwater Conditions

During the field operations, water strikes were not noted in the rotary holes due to methodology. BH03 noted a strike at 1.00m depth.

Groundwater monitoring undertaken post fieldwork (pm 06/10/23) noted water at 2.47m depth.

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.

6.0 SUMMARISED GEOTECHNICAL PARAMETERS

6.1 Introduction

This section presents geotechnical parameters, which will be taken forward into the foundation options appraisals and assigns parameters to the strata encountered. The Made Ground is considered to be heterogeneous, and thus not assessed for foundation options.

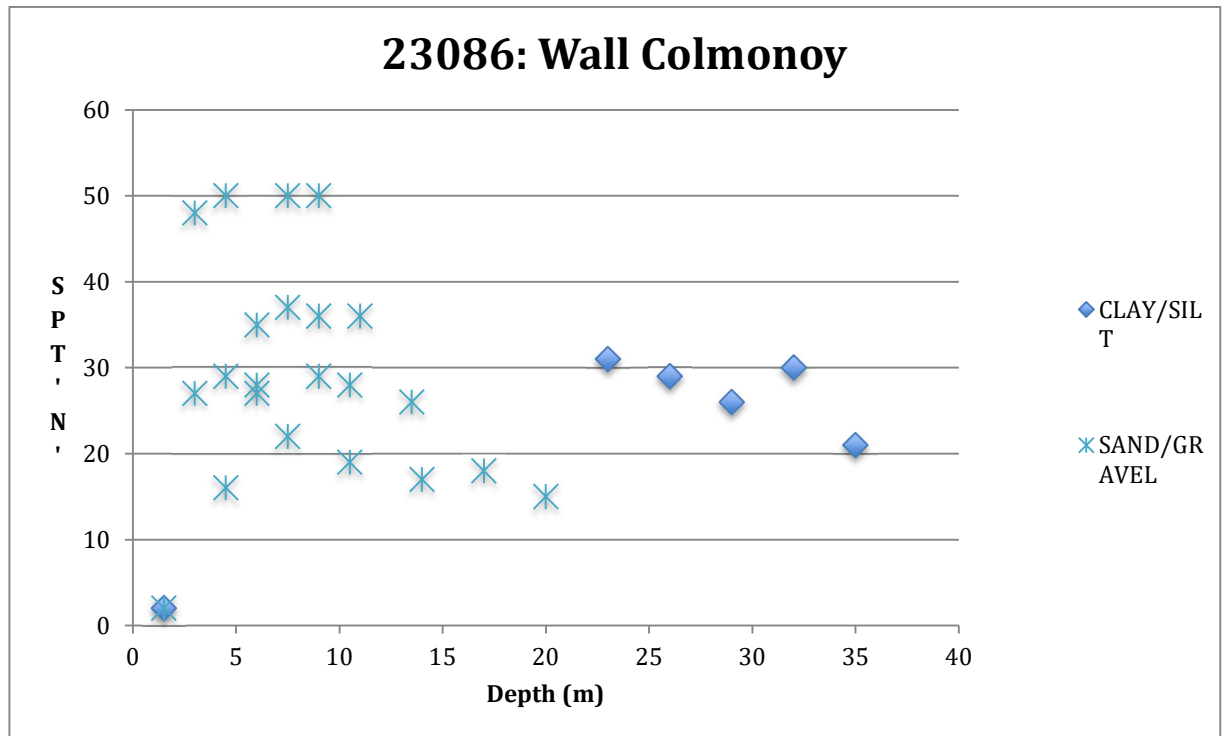


Figure 6: SPT'N' v Depth

6.2 Very soft to Soft CLAY

Very stiff to stiff CLAYs were noted at to 3.00m depth at each borehole.

Atterberg Limit analyses, showed the clays to be of low plasticity (CL), and with moisture contents close to the liquid limit, thus of low strength

Based upon the visual descriptions the following parameters are considered appropriate.

Undrained cohesive strength (c_u) - 20kN/m²

SPT correlations developed by Stroud et al, suggest the following:

Undrained cohesive strength (c_u) - 15kN/m²

Coefficient of Volume Compressibility (m_v) - 0.76m²/MN

Thus, of very soft consistency and high compressibility.

6.3 Medium Dense to Very Dense SAND/GRAVEL

These were noted to 20m depth at BH03.

Standard Penetration Testing (SPT) N60 values (uncorrected for overburden pressure) of between 15 and refusal, averaging 31 were recorded, suggesting based upon correlations by Peck, Hanson and Thorburn:

Angle of shearing resistance (ϕ) = 36degrees.

6.4 Lower SILT/ CLAY

Firm to stiff CLAYs were noted at 20 to 35m depth.

Standard Penetration Testing (SPT) N60 values (uncorrected for overburden pressure) of between 21 and 31, averaging 27 were recorded, suggesting based upon correlations by Stroud et al:

Undrained cohesive strength (c_u) - 125kN/m²

Coefficient of Volume Compressibility (m_v) - 0.08m²/MN

....suggesting a stiff CLAY of low compressibility.

7.0 GEOTECHNICAL ASSESSMENT

7.1 Introduction

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

In general, all site won materials will be highly sensitive to wetting and should be protected from the elements. A sacrificial capping layer should be incorporated during any temporary works.

It should be noted that this report is not a design report and as such, the designer should ensure that they have taken all aspects into account when designing foundation options and related geotechnical aspects and risks. In particular, there is a low density of investigation points and the designer should make contractors aware of the potential for variations in ground conditions.

7.2 Foundations General

The final choice of foundation option will be dependent upon a variety of factors, physical, practical and economic.

The SANDs and GRAVELs below 3.00m, would provide an allowable bearing capacity (q_a) in the order of 150kN/m². Shallow groundwater will prove problematical for installation of conventional foundations.

Thus, it is recommended that loads are transmitted to the granular strata, or the stiff CLAY depending upon actual anticipated loadings.

Any pile designs by others must be undertaken within current CIRIA guidelines, and an appropriate load testing regime developed.

Driven piling methods are not considered to be suitable, due to the proximity of existing structures.

The factors governing the end bearing capacity and settlement of the pile may be summarised as follows;

- a) The length to diameter ratio of the socket,
- b) The strength of the strata around and beneath the socket,
- c) The condition of the side walls in the socket, ie roughness and presence of slurry,
- d) Condition of the base of the pile hole, with regards drill cuttings and other loose debris.

Open temporary excavations would require support and require careful management with regards protection from rain and water degradation. 0

7.3 Attack to Buried Concrete

Laboratory testing during noted slightly alkaline pH values, and a maximum water soluble sulphate value of 0.08g/l, indicating Sulphate Class DS-1, in accordance with BRE Special Digest 1.

7.4 Groundwater

Groundwater was noted as being within the upper few metres and as such will have an impact on shallow excavations and pile design.

8.0 CONTAMINATION TESTING

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

Sample ID	Units	BH02	BH02	6% SOM
Depth to Top		0.50	2.50	Commercial C4SL
		1.00	3.00	
% Stones >10mm	% w/w	<0.1	16.2	
pH	pH	10.76	7.97	
Sulphate (water sol 2:1)	g/l	0.08	0.04	
Organic Matter	% w/w	2	0.7	
Arsenic	mg/kg	<1	3	640
Boron	mg/kg	5.6	<1.0	240000
Cadmium	mg/kg	1.4	<0.5	190
Copper	mg/kg	83	10	68000
Chromium	mg/kg	1190	14	8600
Chromium (hexavalent)	mg/kg	<1	<1	33
Lead	mg/kg	70	13	2700 P
Mercury	mg/kg	<0.17	<0.17	1100
Nickel	mg/kg	41	18	980
Selenium	mg/kg	25	<1	12000
Zinc	mg/kg	280	39	730000
TPH total (>C6-C40)	mg/kg	14	<10	
Asbestos in Soil (inc. matrix)				
Asbestos in soil		NAD	NAD	
Asbestos ACM - Suitable for Water Absorption Test?		N/A	N/A	
PAH-16MS				5% SOM
Acenaphthene	mg/kg	<0.01	<0.01	100000
Acenaphthylene	mg/kg	<0.01	<0.01	100000
Anthracene	mg/kg	<0.02	<0.02	540000
Benzo(a)anthracene	mg/kg	<0.04	<0.04	98
Benzo(a)pyrene	mg/kg	<0.04	<0.04	15
Benzo(b)fluoranthene	mg/kg	<0.05	<0.05	100
Benzo(ghi)perylene	mg/kg	<0.05	<0.05	660
Benzo(k)fluoranthene	mg/kg	<0.07	<0.07	140
Chrysene	mg/kg	<0.06	<0.06	140
Dibenzo(ah)anthracene	mg/kg	<0.04	<0.04	13
Fluoranthene	mg/kg	<0.08	<0.08	23000
Fluorene	mg/kg	<0.01	<0.01	70000
Indeno(123-cd)pyrene	mg/kg	<0.03	<0.03	62
Naphthalene	mg/kg	<0.03	<0.03	540
Phenanthrene	mg/kg	<0.03	<0.03	23000
Pyrene	mg/kg	<0.07	<0.07	55000
Total PAH-16MS	mg/kg	<0.08	<0.08	912768

Table 8.1: Contamination Results

The results have been compared with current Environment Agency limits for Commercial Uses. Table 8.1 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. Thus, a remediation strategy is not required.

APPENDIX A

Drawings

Exploratory Hole Location Plan

Drawing SGS/23086/Locs



APPENDIX B

Exploratory Hole Logs

Borehole

BH01, 02 and 03



Rotary Core Log

Project Name: Wall Colmonoy			Client: Wall Colmonoy			Date: 27/10/2023		
Location: Pontardawe			Contractor: Apex Drilling Services Ltd					
Project No. : 23086			Crew Name: CJ			Drilling Equipment: Klemm		
Borehole Number BH01		Hole Type RO		Level		Logged By CJ		Page Number Sheet 1 of 2

Well	Water	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.05			Macadam MADE GROUND: Grey subangular to subrounded fine to coarse GRAVEL of slag and brick.	
										Wet	1
							1.50			No Recovery: Drillers description - Very soft grey silt	2
							(48) 3.00			Medium dense brown and grey slightly clayey SAND AND GRAVEL. Sand is fine to coarse. Gravel is subrounded to rounded fine to coarse of sandstone and quartz. Probable medium cobble content but not recovered.	3
							3.70			Recovered material was from dynamic sampling methods	4
										No Recovery. Drillers description and returned cuttings indicate stratum to be medium dense locally very dense sand, gravel and cobbles of sandstone and quartz. Probably ALLUVIUM	5
							(29)				6
							(27)				7
							(50)				8
							(36)				9
											10

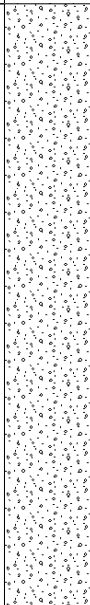
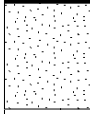
Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Drilling Flush					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation	Depth Top	Depth Base	Type	Colour	Min (%)	Max (%)
15.00	120	15.00	120														

Remarks 50mm Standpipe Installed Slotted 3.0 to 12.0m																	
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Rotary Core Log

Project Name: Wall Colmonoy				Client: Wall Colmonoy				Date: 27/10/2023			
Location: Pontardawe				Contractor: Apex Drilling Services Ltd							
Project No. : 23086				Crew Name: CJ				Drilling Equipment: Klemm			
Borehole Number BH01		Hole Type RO		Level		Logged By CJ		Scale 1:50		Page Number Sheet 2 of 2	

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description						
				TCR	SCR	RQD											
							(28)				No Recovery. Drillers description and returned cuttings indicate stratum to be medium dense locally very dense sand, gravel and cobbles of sandstone and quartz. Probably ALLUVIUM	11					
							(26)					12					
								14.00			Black COAL 15.00m. Blowing sand, back to 9.00m Recovered material was from dynamic sampling methods	13					
								14.30				14					
								15.00			Medium dense grey silty fine to medium SAND. Borehole abandoned due to blowing sands End of Borehole at 15.000m	15					
												16					
												17					
												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 (%)
15.00	120	15.00	120														
Remarks																	
50mm Standpipe Installed Slotted 3.0 to 12.0m																	
																	

[illegible][illegible]



Rotary Core Log

Project Name: Wall Colmonoy				Client: Wall Colmonoy				Date: 27/10/2023			
Location: Pontardawe				Contractor: Apex Drilling Services Ltd							
Project No. : 23086				Crew Name: CJ				Drilling Equipment: Klemm			
Borehole Number BH02		Hole Type RO		Level		Logged By CJ		Scale 1:50		Page Number Sheet 2 of 2	

Well	Water	Depth (m)	Type /FI	Coring			Diameter Recovery (SPT)	Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD						
							(19)				No Recovery. Drillers description and returned cuttings indicate stratum to be medium dense locally very dense sand, gravel and cobbles of sandstone and quartz. Probably ALLUVIUM	11
												12
											 13.50m. Blowing sand, back to 8.40m	13
								13.50			End of Borehole at 13.500m	14
												15
												16
												17
												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 (%)
13.50	120	13.50	120														

Remarks																	
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Remarks	
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Remarks	
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Percussion Drilling Log

Project Name: Wall Colmonoy		Client: Wall Colmonoy		Date: 31/10/2023 - 07/11/2023	
Location: Pontardawe		Contractor: Apex Drilling Services Ltd			
Project No. : 23086		Crew Name: AJ/IB		Drilling Equipment: Oilcon Wayfarer	
Borehole Number BH03	Hole Type CP	Level	Logged By PL	Scale 1:50	Page Number Sheet 3 of 4

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.50 - 21.00	B					Stiff dark grey slightly sandy slightly gravelly silty CLAY. Gravel is subrounded to rounded fine to coarse of sandstone and quartz. ALLUVIUM	21
		22.50 - 23.00	B						22
		23.00	SPT	N=31 (4,5/7,8,8,8)					23
		24.50 - 25.00	B						24
		25.50 - 26.00	B						25
		26.00	SPT	N=29 (7,6/6,7,8,8)					26
		26.50 - 27.00	B		27.00				27
		27.50 - 28.00	B					Firm locally stiff grey sandy clayey SILT. ALLUVIUM	28
		28.50 - 29.00	B						29
		29.00	SPT	N=26 (6,7/6,6,7,7)					29
		29.50 - 30.00	B						30

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	
10.00	250	10.00	250	0.00	0.20	00:30						
27.00	200	27.00	200	0.71	1.20	00:45						
35.00	150	35.00	150	8.60	9.00	00:30						
				9.00	9.50	00:30						
				9.50	10.00	01:00						

Remarks												
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Percussion Drilling Log

Project Name: Wall Colmonoy		Client: Wall Colmonoy		Date: 31/10/2023 - 07/11/2023	
Location: Pontardawe		Contractor: Apex Drilling Services Ltd			
Project No. : 23086		Crew Name: AJ/IB		Drilling Equipment: Oilcon Wayfarer	
Borehole Number BH03	Hole Type CP	Level	Logged By PL	Scale 1:50	Page Number Sheet 4 of 4

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		32.00	SPT	N=30 (5,6/7,7,8,8)				Firm locally stiff grey sandy clayey SILT. ALLUVIUM	31
		34.00 - 34.50	B						32
		35.00	SPT	N=21 (4,5/5,5,5,6)	35.00				33
								End of Borehole at 35.000m	34
									35
									36
									37
									38
									39
									40

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
10.00	250	10.00	250	0.00	0.20	00:30					
27.00	200	27.00	200	0.71	1.20	00:45					
35.00	150	35.00	150	8.60	9.00	00:30					
				9.00	9.50	00:30					
				9.50	10.00	01:00					

Remarks

APPENDIX C

Laboratory Test Results

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 23/11060
Issue Number: 1

Date: 22 November, 2023

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

Project Manager: Rob Griffiths
Project Name: Wall Colmonoy
Project Ref: 23086
Order No: 23086/01
Date Samples Received: 09/11/23
Date Instructions Received: 09/11/23
Date Analysis Completed: 22/11/23

Approved by:



Gemma Berrisford
Deputy Client Services Supervisor

Envirolab Job Number: 23/11060

Client Project Name: Wall Colmonoy

Client Project Ref: 23086

Lab Sample ID	23/11060/1	23/11060/2						Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH02	BH02								
Depth to Top	0.50	2.50								
Depth To Bottom	1.00	3.00								
Date Sampled	07-Nov-23	07-Nov-23								
Sample Type	SOLID	SOIL - ES								
Sample Matrix Code	7	1A								
% Stones >10mm _A	<0.1	16.2						% w/w	0.1	A-T-044
pH _D ^{M#}	10.76 ^U	7.97						pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.08 ^U	0.04						g/l	0.01	A-T-026s
Organic Matter _D ^{M#}	2.0 ^U	0.7						% w/w	0.1	A-T-032s
Arsenic _D ^{M#}	<1 ^U	3						mg/kg	1	A-T-024s
Boron (water soluble) _D ^{M#}	5.6 ^U	<1.0						mg/kg	1	A-T-027s
Cadmium _D ^{M#}	1.4 ^U	<0.5						mg/kg	0.5	A-T-024s
Copper _D ^{M#}	83 ^U	10						mg/kg	1	A-T-024s
Chromium _D ^{M#}	1190 ^U	14						mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1						mg/kg	1	A-T-040s
Lead _D ^{M#}	70 ^U	13						mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17						mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	41 ^U	18						mg/kg	1	A-T-024s
Selenium _D ^{M#}	25 ^U	<1						mg/kg	1	A-T-024s
Zinc _D ^{M#}	280 ^U	39						mg/kg	5	A-T-024s
TPH total (>C6-C40) _A ^{M#}	14 ^U	<10						mg/kg	10	A-T-007s

Envirolab Job Number: 23/11060

Client Project Name: Wall Colmonoy

Client Project Ref: 23086

Lab Sample ID	23/11060/1	23/11060/2						Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH02	BH02								
Depth to Top	0.50	2.50								
Depth To Bottom	1.00	3.00								
Date Sampled	07-Nov-23	07-Nov-23								
Sample Type	SOLID	SOIL - ES								
Sample Matrix Code	7	1A								
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD								A-T-045
Asbestos Matrix (visual) _o	-	-								A-T-045
Asbestos Matrix (microscope) _o	-	-								A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _o	N/A	N/A								A-T-045

Envirolab Job Number: 23/11060

Client Project Name: Wall Colmonoy

Client Project Ref: 23086

Lab Sample ID	23/11060/1	23/11060/2						Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BH02	BH02								
Depth to Top	0.50	2.50								
Depth To Bottom	1.00	3.00								
Date Sampled	07-Nov-23	07-Nov-23								
Sample Type	SOLID	SOIL - ES								
Sample Matrix Code	7	1A								
PAH-16MS										
Acenaphthene _A ^{MF}	<0.01 ^U	<0.01						mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{MF}	<0.01 ^U	<0.01						mg/kg	0.01	A-T-019s
Anthracene _A ^{MF}	<0.02 ^U	<0.02						mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{MF}	<0.04 ^U	<0.04						mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{MF}	<0.04 ^U	<0.04						mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{MF}	<0.05 ^U	<0.05						mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{MF}	<0.05 ^U	<0.05						mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{MF}	<0.07 ^U	<0.07						mg/kg	0.07	A-T-019s
Chrysene _A ^{MF}	<0.06 ^U	<0.06						mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A	<0.04	<0.04						mg/kg	0.04	A-T-019s
Fluoranthene _A ^{MF}	<0.08 ^U	<0.08						mg/kg	0.08	A-T-019s
Fluorene _A ^{MF}	<0.01 ^U	<0.01						mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{MF}	<0.03 ^U	<0.03						mg/kg	0.03	A-T-019s
Naphthalene _A ^{MF}	<0.03 ^U	<0.03						mg/kg	0.03	A-T-019s
Phenanthrene _A ^{MF}	<0.03 ^U	<0.03						mg/kg	0.03	A-T-019s
Pyrene _A ^{MF}	<0.07 ^U	<0.07						mg/kg	0.07	A-T-019s
Total PAH-16MS _A	<0.08 ^U	<0.08						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: Wall Colmonoy
Clients Project No: 23086

Project No: 23/11060
Date Received: 09/11/2023 (am)
Cool Box Temperatures (°C): 9.3

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	23/11060/1	23/11060/2
Client Sample No		
Client Sample ID/Depth	BH02 0.50-1.00m	BH02 2.50-3.00m
Date Sampled	07/11/23	07/11/23
A-T-007s	20/11/2023	20/11/2023
A-T-019s	16/11/2023	16/11/2023
A-T-024s	22/11/2023	22/11/2023
A-T-026s	21/11/2023	21/11/2023
A-T-027s	22/11/2023	22/11/2023
A-T-031s	22/11/2023	22/11/2023
A-T-032s	21/11/2023	21/11/2023
A-T-040s	21/11/2023	22/11/2023
A-T-044	20/11/2023	20/11/2023
A-T-045	13/11/2023	13/11/2023

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



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:	Wall Colmony
Address:	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH	Job Number:	D23483
Contact Name:	Rob	Date Received:	15/11/2023
Contact Number:		Job Coordinator:	A. Grogan

Item No.	Tests Undertaken	Number of Tests
1	Water Content - ISO 17892 2014+A1:2022	3
2	Atterburg Limits (4 point) - BS1377-2: 1990	3
3	Particle Size Distribution - BS1377-2: 1990	4

Results Issued: 17/11/2023

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: D23483

Project Name: 23086 - Wall Colmonoy

Client: Spectrum Geo

Address: Foxglove Cottage

Cwm Risca Lane

Bridgend

ATS Sample No: 35138

CF32 0EH

Site Ref / Hole ID: BH03

Sample No:

Depth (m): 1.50 - 2.50

Sample Type: Bulk

**Sampling Certificate
Received:** No

Material Description: Dark grey slightly
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: 15 November 2023

Date Tested: 17 November 2023

Test Results

Moisture Content (%)

33.4

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

L Davis

Date

17/11/2023

Fig

MC

L Davis, Quality Manager

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

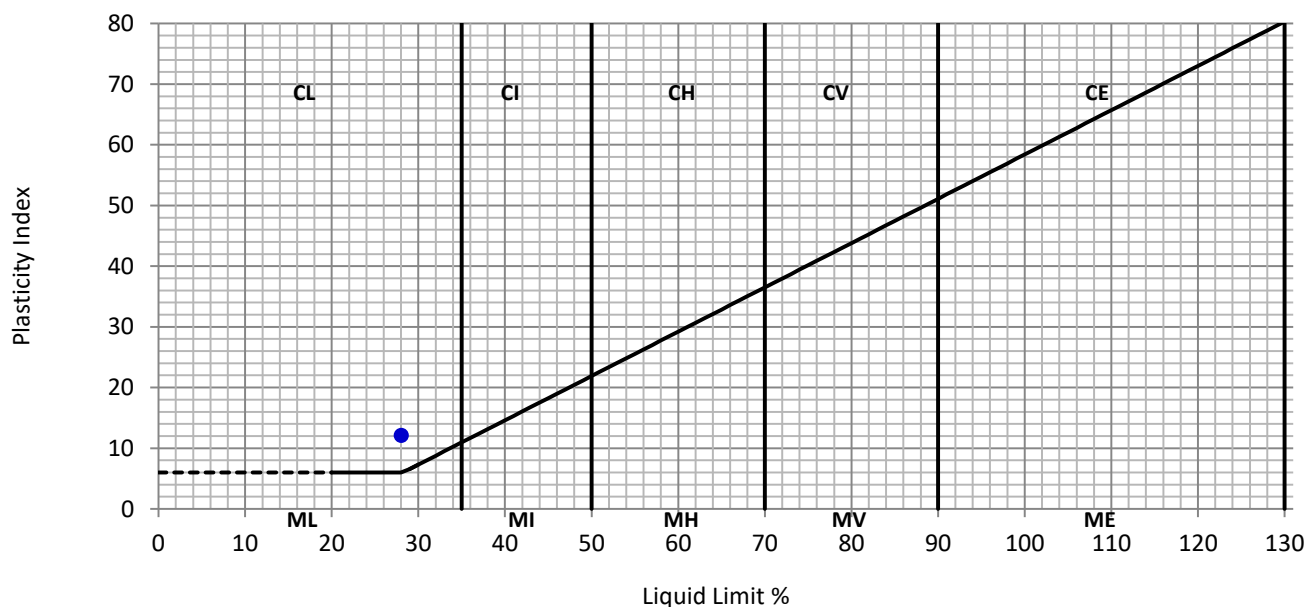
Project No:	D23483	Client:	Spectrum Geo
Project Name:	23086 - Wall Colmonoy	Address:	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH
ATS Sample No:	35138		

Site Ref / Hole ID:	BH03	Depth (m):	1.50 - 2.50
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Dark grey slightly 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:	15 November 2023	Date Tested:	16 November 2023

Test Results

Liquid Limit	28	%
Plastic Limit	16	%
Plasticity Index	12	%

Preparation:	4.2.4 Sieved Specimen
Proportion retained on 425µm sieve:	9 %



Remarks:

QA Ref.

BS1377 - 2
Rev. 3.0



Apex Testing Solutions

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

L Davis

L Davis, Quality Manager

Date

17/11/2023

Fig.

ATT

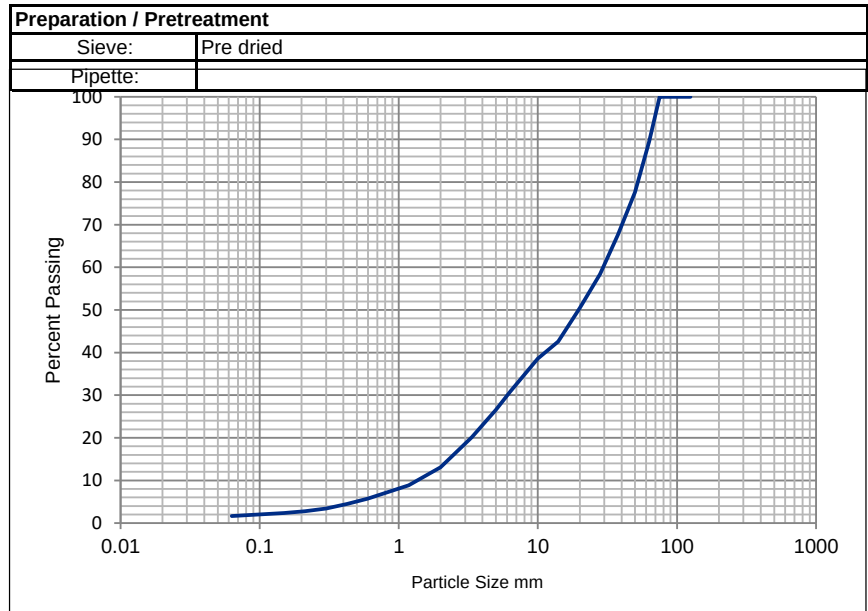
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D23483	Client:	Spectrum Geo
Project Name:	23086 - Wall Colmonoy	Address	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH
ATS Sample No:	35139		

Site Ref / Hole ID:	BH03	Depth (m):	4.00 - 4.50
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Grey sandy GRAVEL with medium cobble content
Location in Works:	N/a	Material Source:	Ex-Site
Date Sampled:	Unknown	Material Supplier:	Ex-Site
Sampled By:	Client	Specification:	BS1377
Date Received:	15 November 2023	Date Tested:	17 November 2023

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	89
50	78
37.5	68
28	58
20	50
14	43
10	39
6.3	31
5.0	27
3.35	20
2.00	13
1.18	9
0.600	6
0.425	5
0.300	3
0.212	3
0.150	2
0.063	2



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	11	N/A	
Gravel	76		
Sand	11	Dry mass of sample, kg	
Silt / Clay	2	15.5	n/a

Remarks:

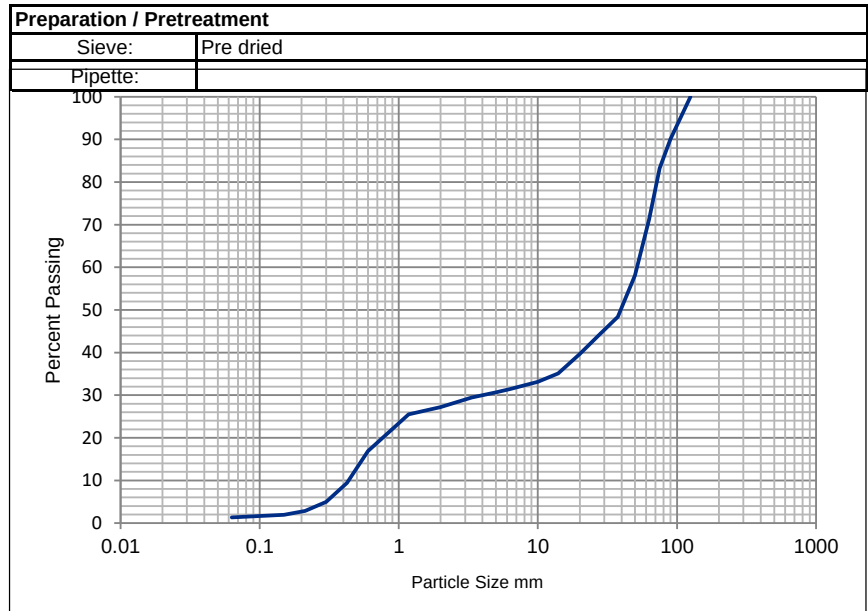
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D23483	Client:	Spectrum Geo
Project Name:	23086 - Wall Colmonoy	Address	Foxglove Cottage
			Cwm Risca Lane
			Bridgend
ATS Sample No:	35140		CF32 0EH

Site Ref / Hole ID:	BH03	Depth (m):	7.00 - 7.50
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Brown sandy GRAVEL with high cobble content
Location in Works:	N/a	Material Source:	Ex-Site
Date Sampled:	Unknown	Material Supplier:	Ex-Site
Sampled By:	Client	Specification:	BS1377
Date Received:	15 November 2023	Date Tested:	17 November 2023

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	90
75	83
63	71
50	58
37.5	48
28	44
20	40
14	35
10	33
6.3	31
5.0	31
3.35	29
2.00	27
1.18	26
0.600	17
0.425	9
0.300	5
0.212	3
0.150	2
0.063	1



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	29	N/A	
Gravel	44		
Sand	26	Dry mass of sample, kg	
Silt / Clay	1	11.6	n/a

Remarks:

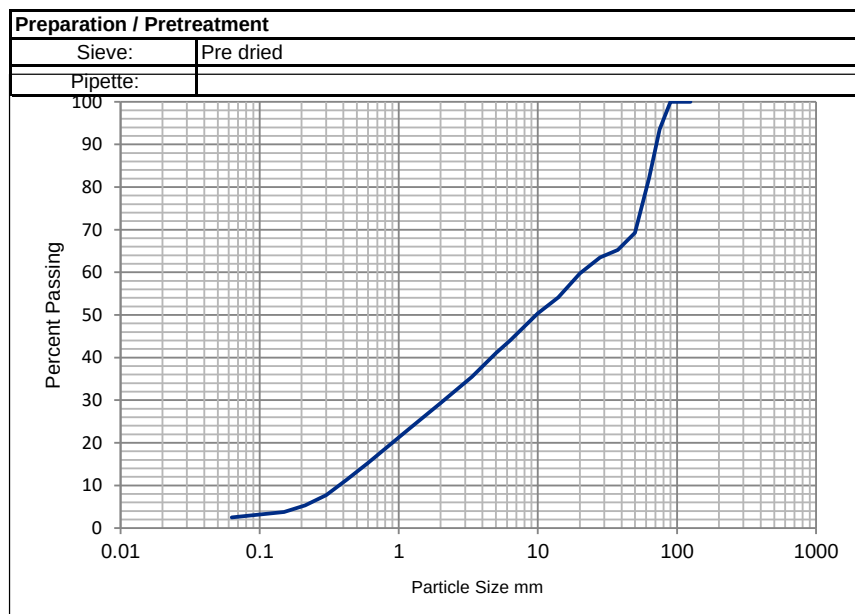
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D23483	Client:	Spectrum Geo
Project Name:	23086 - Wall Colmonoy	Address	Foxglove Cottage
			Cwm Risca Lane
			Bridgend
ATS Sample No:	35141		CF32 0EH

Site Ref / Hole ID:	BH03	Depth (m):	9.50 - 10.00
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Brown slightly clayey sandy GRAVEL with medium cobble content
Location in Works:	N/a	Material Source:	Ex-Site
Date Sampled:	Unknown	Material Supplier:	Ex-Site
Sampled By:	Client	Specification:	BS1377
Date Received:	15 November 2023	Date Tested:	17 November 2023

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	94
63	82
50	69
37.5	65
28	63
20	60
14	54
10	50
6.3	44
5.0	41
3.35	35
2.00	29
1.18	23
0.600	15
0.425	11
0.300	8
0.212	5
0.150	4
0.063	3



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	18	N/A	
Gravel	53		
Sand	27	Dry mass of sample, kg	
Silt / Clay	3	11.4	n/a

Remarks:

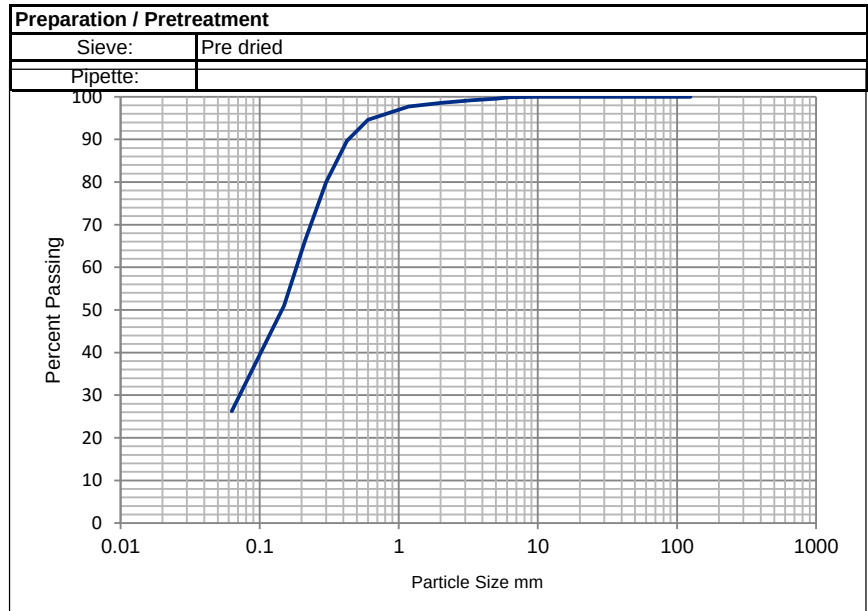
TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

Project No:	D23483	Client:	Spectrum Geo
Project Name:	23086 - Wall Colmonoy	Address	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH
ATS Sample No:	35142		

Site Ref / Hole ID:	BH03	Depth (m):	14.00 - 15.00
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Grey very clayey SAND
Location in Works:	N/a	Material Source:	Ex-Site
Date Sampled:	Unknown	Material Supplier:	Ex-Site
Sampled By:	Client	Specification:	BS1377
Date Received:	15 November 2023	Date Tested:	17 November 2023

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	99
2.00	99
1.18	98
0.600	95
0.425	90
0.300	80
0.212	66
0.150	51
0.063	26



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient D ₆₀ / D ₁₀
Cobbles / Boulders	0	N/A	
Gravel	1		
Sand	72	Dry mass of sample, kg	
Silt / Clay	26	0.8	n/a

Remarks:

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014+A1:2022

Project No: D23483
Project Name: 23086 - Wall Colmonoy

Client: Spectrum Geo
Address: Foxglove Cottage
Cwm Risca Lane
Bridgend
CF32 0EH

ATS Sample No: 35143

Site Ref / Hole ID: BH03

Depth (m): 22.50 - 23.00

Sample No:

Sample Type: Bulk

Sampling Certificate Received: No

Material Description: Grey slightly gravelly sandy 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: 15 November 2023

Date Tested: 17 November 2023

Test Results

Moisture Content (%)

25.1

Remarks:

QA Ref.

EN ISO 17892-1:2014 A1:2022



Apex Testing Solutions

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Approver

L Davis

Date

17/11/2023

Fig

MC

L Davis, Quality Manager

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

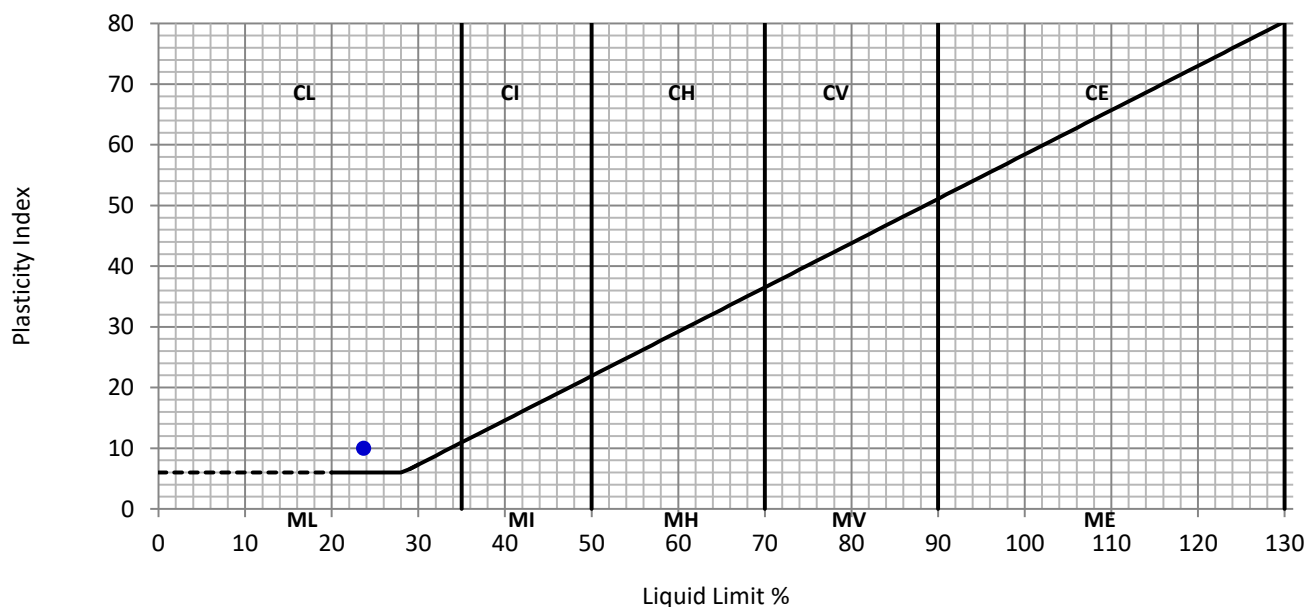
Project No:	D23483	Client:	Spectrum Geo
Project Name:	23086 - Wall Colmonoy	Address:	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH
ATS Sample No:	35143		

Site Ref / Hole ID:	BH03	Depth (m):	22.50 - 23.00
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Grey slightly gravelly sandy CLAY
Location in Works:	N/a	Material Source:	Ex-Site
Date Sampled:	Unknown	Material Supplier:	Ex-Site
Sampled By:	Client	Specification:	BS1377
Date Received:	15 November 2023	Date Tested:	16 November 2023

Test Results

Liquid Limit	24	%
Plastic Limit	14	%
Plasticity Index	10	%

Preparation:	4.2.4 Sieved Specimen
Proportion retained on 425µm sieve:	6 %



Remarks:

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014+A1:2022

Project No: D23483

Project Name: 23086 - Wall Colmonoy

Client: Spectrum Geo

Address: Foxglove Cottage

Cwm Risca Lane

Bridgend

ATS Sample No: 35144

CF32 0EH

Site Ref / Hole ID: BH03

Sample No:

Depth (m): 27.50 - 28.00

Sample Type: Bulk

**Sampling Certificate
Received:** No

Material Description: Grey slightly 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: 15 November 2023

Date Tested: 17 November 2023

Test Results

Moisture Content (%)

24.9

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

L Davis

Date

17/11/2023

Fig

MC

L Davis, Quality Manager

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

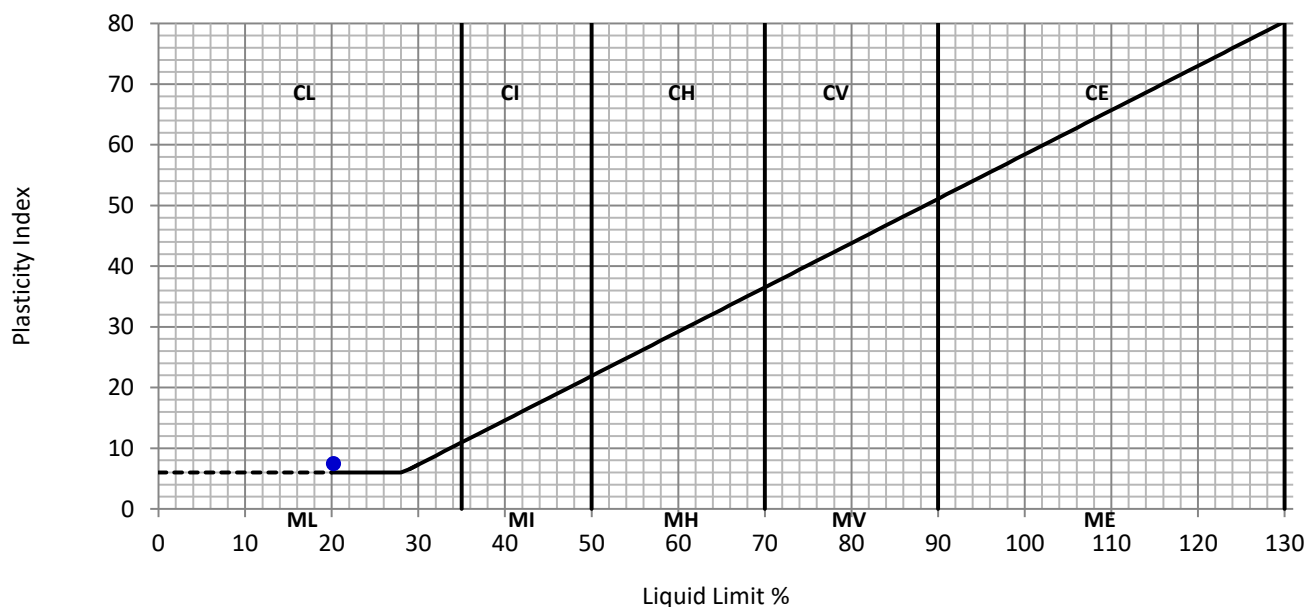
Project No:	D23483	Client:	Spectrum Geo
Project Name:	23086 - Wall Colmonoy	Address:	Foxglove Cottage Cwm Risca Lane Bridgend CF32 0EH
ATS Sample No:	35144		

Site Ref / Hole ID:	BH03	Depth (m):	27.50 - 28.00
Sample No:		Sample Type:	Bulk
Sampling Certificate Received:	No	Material Description:	Grey slightly 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:	15 November 2023	Date Tested:	16 November 2023

Test Results

Liquid Limit	20	%
Plastic Limit	13	%
Plasticity Index	7	%

Preparation:	4.2.4 Sieved Specimen
Proportion retained on 425µm sieve:	8 %



Remarks:

APPENDIX D

Water Monitoring

GM1

APPENDIX E

Photographic Plates

HEAVY
WHEN
FULL

26/10/23

PROJECT
PROJECT NO
TP
DEPTH (M)
FACE

WALL COLMONOY
23086
B401
3.00 3.70
13.50 15.00



27 Aug/23

PROJECT
PROJECT NO
TP
DEPTH (M)
FACE

WALL COL MONOY
23086
B402
0.20 to 3.00
Box 1 of 2



1.50 0.20

3.00 1.50



27 HQ/23

PROJECT
PROJECT NO
TP
DEPTH (M)
FACE

WALL COLMONOY
23086
BH02
3.00 ~~4.50~~
13x2+2

