GARNSWLLT WWTW

GROUND INVESTIGATION FACTUAL REPORT

Report No. Q1031/FR.01 June 2023

DOCUMENT CONTROL

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APPENDICES

0.0 FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

0.1 General

Recommendations made and opinions expressed in the report are based on the strata observed in the excavations, together with the results of site and laboratory tests. No responsibility can be held for conditions which have not been revealed by the Exploratory Holes or which occur between Exploratory Holes. Whilst the report may suggest the likely configuration of strata, both between Exploratory Holes and below the maximum depth of investigation, this is only indicative, and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

0.2 Investigation Procedures

Cable Percussive (CP) and Sonic Drilled Boreholes and Trial Pitting techniques for ground investigation have been employed within the project. All Exploratory Hole operations, sampling and logging of soils, and in-situ testing complies with the recommendations of the British Code of Practice BS 5930: 2015 'Site Investigations', British Code of Practice BS 10175: A2:2017 'Investigation of Potentially Contaminated Sites' and BS 1377: 1990, 'Methods of Test for Soils for Engineering Purposes'.

0.3 Routine Sampling

Representative bulk disturbed and environmental samples of the different strata are taken following completion of logging. These samples are sealed and labelled in clear plastic bags and 2kg plastic tubs. Soil samples obtained for environmental testing are sampled and sealed in borosilicate amber jars or in specialist vessels where required. Ground Water samples were sampled and sealed in borosilicate amber bottles or in specialist vessels where required All samples are returned from site to QGL's laboratory for controlled storage within 24 hours of sampling to await test scheduling/requirements.

0.4 In-Situ Testing, Surveying & Instrumentation

In-situ testing comprised:

- Standard Penetration Testing within Boreholes (SPT)
- Dynamic Cone Penetrometer (TRL DCP)
- Variable Head tests
- All exploratory hole locations to be surveyed for location and elevation.

0.5 Groundwater

Where possible, the depth of entry of any influx of groundwater is recorded during the course of excavation or boring operations. The rate of inflow into the excavation or borehole is monitored during the course of the excavation or during boring procedures. Upon encountering any water strikes, work is temporarily halted and the water levels monitored for a standard twenty-minute period recording the change in water level at the end of the twenty minutes.

Groundwater conditions observed in the excavations are those appertaining to the period of investigation. It should be noted, however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or other causes.

0.6 Retention of Samples

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded. Further to notifying the Engineer/ Client with one week's notice all soil and/or rock samples not tested will be discarded. 28 days after submission of the approved final report.

1.0 INTRODUCTION

1.1 General

Upon the instructions of J.N. Bentley, the Principal Contractor and Client, and in liaison with the Project Designer, Mott MacDonald, Quantum Geotechnic Limited (QGL) was commissioned to undertake a ground investigation for the proposed improvement works at Garnswllt WWTW.

The site is located at National Grid Reference 262089E, 209879N.

The siteworks were carried out between 27thth February and 3rd March 2023 with additional works scheduled carried out between 4th April and 13th April 2023.

QGL were the appointed Contractor for the works, under order number JNB/SV32/SL/22/0002 issued on 25th November 2022. The works were commissioned in order to establish general ground conditions on the site to allow the design and construction works to proceed.

This report presents a factual account of the fieldwork carried out, includes descriptions of the strata encountered, available groundwater observations, details of in-situ testing undertaken and provides results of subsequent laboratory testing of samples obtained from the investigation.

General notes on the techniques employed by QGL are described in the Foreword together with the limitations inherent in carrying out site investigation work.

1.2 Purpose of Ground Investigation

The purpose of the ground investigation is to characterise the engineering, chemical and hydraulic properties of the ground within the areas of proposed new structures.

1.3 Initial Scope of Work

The initial scope of works entails the following:

- 3 no. Cable Percussive Boreholes to 10mbgl.
- 4 no. Sonic Drilled Boreholes to 20mbgl
- 3 no. Machine Excavated Trial Pits to 3.0mbgl, excavated by Client.
- In-Situ Testing
- Post Fieldwork Ground Gas and Groundwater Monitoring / Sampling
- Geotechnical and Geo-environmental Laboratory Testing.

- Provide a factual report detailing the investigation.

General notes on the techniques employed by Quantum are described in the Foreword together with the limitations inherent in carrying out ground investigation work.

2.0 SITE DETAIL

2.1 Site Description

The site is located to the west of the village of Garnswllt, approximately 3.5km south of Ammanford, Carmarthenshire.

The site is an existing Waste Water Treatment Works, close to the eastern bank of the River Loughor. The site is relatively level. There are several treatment tanks with associated buildings and infrastructure across the site with Attenuation ponds to the North of the site.

Access to the site is gained via an access track off Ffordd Ynys Tawelog running south from the village. The site is accessed via a level crossing on the Heart of Wales Railway line. Permission was requested each time vehicles needed to cross by contacting the signalman at Pantyffynnon using the phone provided.

The site has been categorised as "yellow" based on the nature of the site and its historical uses, the category of the site has been defined in accordance with the Guidelines for the Safe Investigation by Drilling of Landfills and Contaminated Land (SISG, 1993).

The general extent of the site is shown in Figure 1 in Appendix I.

2.2 Statutory Service Information

All service information was held by the Client with the relevant plans and information made available to QGL prior to commencement of the intrusive works.

A permit to excavate was issued by QGL for all exploratory holes. Standard QGL procedures for breaking ground were followed and all areas were scanned using a cable avoidance tool. A hand dug trial pit was excavated to 1.2m prior to commencement of drilling where services may be at risk. All hand excavation was undertaken using insulated digging tools.

2.3 Published Geology

Details of the published and inferred geology of the site are summarised as follows:

<u>Made Ground</u>

Made Ground may be present based on the site history.

<u>Superficial Deposits</u>

Alluvium, that may comprise clay, silt, sand and gravel, is mapped overlaying Glacial Till comprising

Glaciofluvial Sand and Gravel deposits.

Bedrock Geology

The solid geology in the area is indicated to be the South Wales Upper Coal Measure typically comprising mudstone, sandstone, siltstone and coal.

3.0 FIELDWORK

3.1 General

A summary of the works completed and covered by this report are given below:

- 3 No. Cable Percussive Boreholes. (BH01 - BH03)
- 4 No. Sonic Drilled Boreholes (BH-SD01 – BH-SD04)
- 3 No. Machine Excavated Trial Pit (TP01 – TP03)
- In-Situ testing and sampling.
- Post fieldwork groundwater and ground gas monitoring.

Full time site supervision and attendance from QGL was undertaken on all aspects of the site works and subsequent reinstatement works of all exploratory hole locations. All service plans were held onsite, with all site personnel inducted by QGL and briefed of the pertinent Risk Assessments and Method Statements relating to the tasks to be undertaken.

The borehole locations were subject to a 1.2m deep service / utility inspection pit prior to any drilling. Also, each area of investigation was fully eCAT4+ ('Cable Avoidance Tool') scanned prior to breaking ground.

3.2 Exploratory Hole Locations

The exploratory hole locations were specified by the Project Designer, with consideration given to access constraints, and set out on site by QGL using the co-ordinates provided.

Exploratory Hole Location Plans are presented as Figure 2 in Appendix I and the Exploratory Hole co-ordinates and levels are detailed within Table 1.

Table 1: *Exploratory Hole Co-Ordinates & Levels*

Exploratory Hole	Easting	Northing	Height (mAOD)
BH01	262062.90	209849.66	16.6
BH01A	262066.62	209848.50	16.6
BH02	262038.54	209870.24	16.58
BH02A	262036.75	209870.52	16.62
BH03	262053.87	209934.12	19.26
BH-SD01	262116.22	209846.96	16.61
BH-SD02	262142.23	209842.00	16.57
BH-SD03	262168.22	209846.93	17.16
BH-SD04	262040.61	209935.66	19.09
TP01	262196.44	210040.76	18.86

TP02	262202.42	210070.78	19.17
TP03	262202.42	210098.85	19.13
DCP01	262080.31	209867.04	16.67
DCP02	262070.78	209875.09	16.66
DCP03	262057.36	209885.39	16.49
DCP04	262203.94	209937	19.42
DCP05	262206.01	209937	19.3
DCP06	262203.29	210012.25	19.19
DCP07	262200.25	210027.15	19.02
Filter Bed Sample	262181.98	210107.91	16.20

3.3 Boreholes

Cable Percussive Boreholes

Three Cable Percussive Boreholes, BH01A, BH02A and BH03, were drilled using a Dando 2000 cable percussion drill rig owned and operated by CJ Associates. Two boreholes, BH01 and BH02 were terminated in the hand pit due to encountering obstructions and were relocated in liaison with the Client (BH01A & BH02A).

Representative bulk disturbed, small disturbed samples and environmental samples were recovered from each Cable Percussive Borehole throughout the boring works for geotechnical and geo-environmental characterisation of the underlying ground conditions.

Sonic Drilled Boreholes

Four Boreholes, BH-SD01 – BH-SD04 were progressed by Sonic Drilling methods using a DB320 Rubber tracked Rota-Sonic Drill owned and operated by GeoSonic Drilling.

A sonic drill head works by emitting high frequency resonant vibrations down the drill string to the drill bit. The borehole is advanced by using a sonic drill bit and core barrel attached to drive rods. Casing is generally used to maintain borehole stability. The core barrel and casing are advanced into the ground by use of thrust, vibration and rotation. The sample is emptied into plastic core bags by vibrating the barrel.

The samples recovered from the Sonic Borehole were logged in accordance with BS5930: 2015 +A2:2010; BS EN ISO 14688-1:2017, BS EN ISO 14688-2:2017 and BS EN 14869-1: 2003 and sub-sampled to satisfy the required sampling regime.

In-situ testing was carried out in all boreholes (see section 3.5.).

The sequence of deposits encountered during the investigation is detailed within the Engineering Geologist's logs presented within Appendix II. The logs highlight the nature of the soils encountered and provide descriptions of the strata revealed at the site. Details of the Boreholes, including final depths in metres below ground level (mbgl) are provided below in Table 2.

Table 2: *Borehole details*

Exploratory Hole ID	Drilling method	SPT Hammer Reference	Termination Depth (mbgl)	Terminating Strata	Notes/Reason for Termination
BH01	CP	N/A	1.30	Made Ground	Possible service at base of pit
BH01A	CP	CJ09	10.0	River Terrace Gravels	Specified Depth / Engineers Instruction
BH02	CP	N/A	1.0	Made Ground	Sandstone Boulder in pit
BH02A	CP	CJ09	10.0	River Terrace Gravels	Specified Depth / Engineers Instruction
BH03	CP	CJ09	10.7	River Terrace Gravels	Specified Depth / Engineers Instruction
BH-SD01	Sonic	GS015	25.0	Glacial Till	Specified Depth / Engineers Instruction
BH-SD02	Sonic	GS015	20.0	Glacial Till	Specified Depth / Engineers Instruction
BH-SD03	Sonic	GS015	20.0	Glacial Till	Specified Depth / Engineers Instruction
BH-SD04	Sonic	GS015	20.0	Glacial Till	Specified Depth / Engineers Instruction

3.4 Trial Pits

Three Trial Pits were excavated using a wheeled JCB 3CX 180º excavator supplied and operated QGL's approved sub contractor John Jones Plant and Transport. The exploratory hole positions are shown on the exploratory hole location plan in Appendix I.

This method of investigation allows direct sampling of the near surface deposits for identification purposes, as well as assessment of any salient features and Made Ground or disturbed ground. The trial pits were logged in accordance with BS5930:2015; BS EN ISO 14688-1:2017 and BS EN ISO 14688-2:2017,and supervised at all times by an Engineering Geologist from QGL.

All Trial Pits were backfilled with compacted layers of arisings upon completion. Surface reinstatement was levelled, and existing turf replaced where necessary.

Geotechnical and Environmental samples were taken within the superficial deposits for laboratory testing purposes.

Details of the Trial Pits including final depths in metres below ground level (mbgl) are provided in Table 3.

Table 3: *Trial Pit Detail*

Exploratory Hole ID	Exploratory Hole Type	Final Length (mbgl)	Terminating Strata	Reason for termination
TP01	Machine Excavated Trial Pit	4.0	River Terrace Gravels	Specified Depth / Engineers Instruction
TP02	Machine Excavated Trial Pit	3.4	River Terrace Gravels	Specified Depth / Engineers Instruction
TP03	Machine Excavated Trial Pit	4.0	Alluvium	Specified Depth / Engineers Instruction

A complete set of Engineering Geologist's Trail Pit logs are presented within Appendix III.

3.5 In-Situ Testing

3.5.1 Standard Penetration Testing

Standard penetration tests (SPTs) were undertaken within all boreholes, at intervals specified by Mott MacDonald.

This is a dynamic test as described in BS EN ISO 22476-3:2005 + A1:2011. Within fine grained or cohesive soils, the test incorporates a small diameter tube (650mm length, 50mm external diameter and 35mm internal diameter) with a cutting shoe known as the 'split barrel sampler'. The sampler is forced into the soil dynamically using blows from a 63.5kg hammer dropped through 760mm. The sampler is initially advanced 150mm into the soil with seating blows, then the number of blows required to advance the sampler each 75mm increment up to a depth of 300mm is recorded. This cumulative total number of blows over the 300mm test is referred to as the "N" value. For coarse gravels and bedrock the split barrel is replaced by a 60° cone (SPT(C) - Standard Penetration Test (Cone)). SPT/SPT(C) results are detailed within the relevant borehole Logs. The SPT calibration certificate for the SPT hammer used during this investigation is presented in Appendix II.

3.5.2 Dynamic Cone Penetration Testing (TRL DCP's)

A total of 7 No. TRL DCP tests (DCP01-DCP07) were undertaken on site. The TRL approved dynamic cone penetrometer test permits a calculation and derivation of a corresponding California Bearing Ratio (CBR) value to facilitate road pavement design. This method is often used where access to undertake conventional CBR testing is not available.

The DCP test involves the fall of a fixed weight over a fixed height to force a 20mm diameter, 60º cone into the near surface soils. The depth of penetration for varying numbers of blows is recorded and is then converted to a CBR value using well established empirical correlations (Highways Agency, 2008). In general, the tests were undertaken between the existing ground surface and 1.0m below ground level, thus providing a profile of correlated CBR values within the near-surface soils. No water was added to the soils prior to testing, so they were in their natural condition. The correlated CBR values are also shown on the test result sheets in Appendix IV.

3.5.3 Variable Head Tests

Five Variable Head tests were undertaken in accordance with BS EN ISO 22282-2 within boreholes BH01A, BH02A, BH03 and BH-SD01 – BH-SD04. The testing involves filling of the borehole's with clean water, or lowering the water level within the boreholes, and recording the time it takes for the water to drain or rise at set intervals. Table 8 overpage provides information as to which boreholes underwent permeability testing.

The variable head datasets and calculated permeabilities are provided within Appendix V

3.6 Soil Sampling

Disturbed samples of soil were taken in clear sealed plastic bags and white plastic tubs. Environmental samples were taken at various depths as noted on the relevant logs.

The environmental samples were dispatched to Chemtest, Coventry using a daily courier service for storage awaiting testing instructions from the Engineer. Environmental soil samples were taken in amber glass jars, vials and plastic tubs provided by the laboratory to suit the anticipated testing.

Geotechnical samples were returned from site to QGL's laboratory for controlled storage to await test scheduling/requirements. For specific details of laboratory testing see Section 4.0.

3.7 Gas and Groundwater Monitoring

Both single 50mm ID, and double 19mm/50mm ID gas and groundwater standpipes were installed within each of the Boreholes as per Engineer's instructions.

Table 4: *Monitoring Installation Details*

Exploratory Hole ID	Pipe ID	Installation Diameter	Installation Response Zone (mbgl)
BH01A	A	50mm	2.50 – 8.50
BH02A	A	19mm	2.50 – 3.50
	B	50mm	2.50 – 8.50
BH03	A	50mm	2.00 – 8.50
BH-SD01	A	50mm	2.00 – 16.50
BH-SD02	A	50mm	6.00 – 15.50
BH-SD03	A	50mm	3.00 – 12.50
BH-SD04	A	50mm	6.00 – 17.00

Four post fieldwork monitoring sessions have been completed. Water samples from each standpipe were obtained during the post fieldwork monitoring.

Monitoring comprised groundwater and ground gas monitoring. Gas monitoring was undertaken using a GA2000 gas analyser to measure the following:

- Atmospheric pressure
- Flow rates (L/hr)
- Methane
- Carbon Dioxide
- Oxygen
- Carbon Monoxide
- Hydrogen Sulphide

The ground gas/water monitoring results are provided within Appendix VI.

4.0 LABORATORY TESTING

4.1 General

The laboratory testing was scheduled by Mott MacDonald and comprised a number of geotechnical classification and performance tests as well as chemical testing on selected soil samples and ground water samples recovered from the investigation.

4.2 Geotechnical Testing

Geotechnical classification and performance testing was undertaken at QGL's approved UKAS accredited laboratory at GSTL, Llanelli.

Geotechnical tests undertaken on selected soil samples are listed below. All the geotechnical soil testing work was carried out in accordance with the procedures stipulated in the various sections of BS 1377:1990 "Methods of test for soils for civil engineering purposes" and to UKAS accreditation where applicable and chemical testing carried out in accordance with BRE Special Digest 1:2005 "Concrete in aggressive ground".

Geotechnical soil testing undertaken:

- 14 No. Moisture content
- 14 No. Liquid limit, plastic limit and plasticity index
- 44 No. Particle size distribution by wet sieving
- 8 No. Sedimentation
- 2 No. Organic Matter
- 11 No. Suite D (Brownfield site pyrite present)

Geotechnical Laboratory Test results are presented in Appendix VII.

4.3 Geo-Environmental Testing

Geo-Environmental chemical testing was undertaken at Eurofins Chemtest ltd, Coventry. All testing was scheduled by Mott MacDonald. The following suites of testing were scheduled:

- 9 No. Mott MacDonald Comprehensive Soil Suite
- 1 No. TPH CWG
- 11 No. Mott MacDonald Comprehensive Leachate Suite
- 6 No. Waste Acceptance Criteria (Inert Suite)
- 3 No. Special Digest SD1 Suite
- 7 No. Mott MacDonald Comprehensive Water Suite

Samples were obtained from a selected Filter Bed as instructed by the designer for the following testing:

- 1 No. Mott MacDonald Comprehensive Leachate Suite

Chemical Laboratory Test results are presented in Appendix VIII.

5.0 REFERENCES

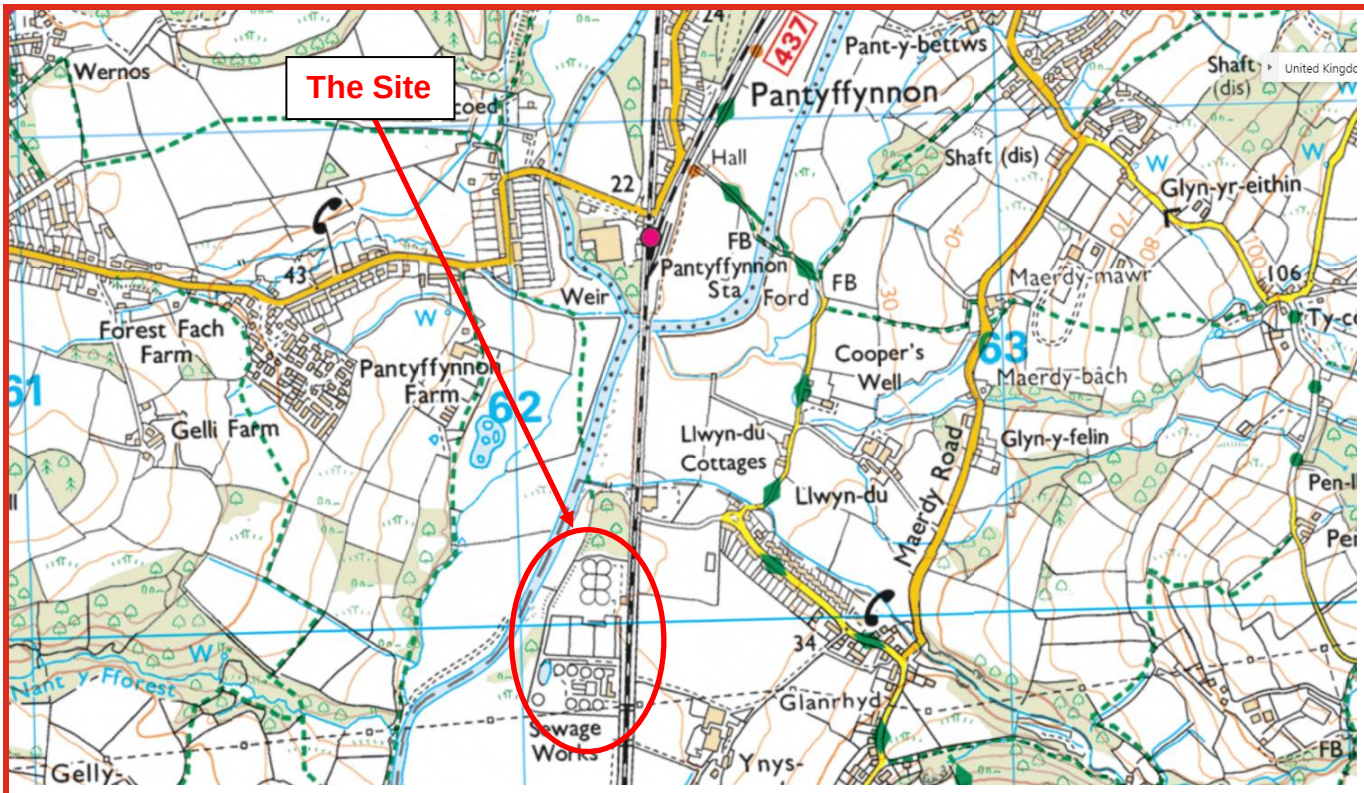
British Geological Survey:

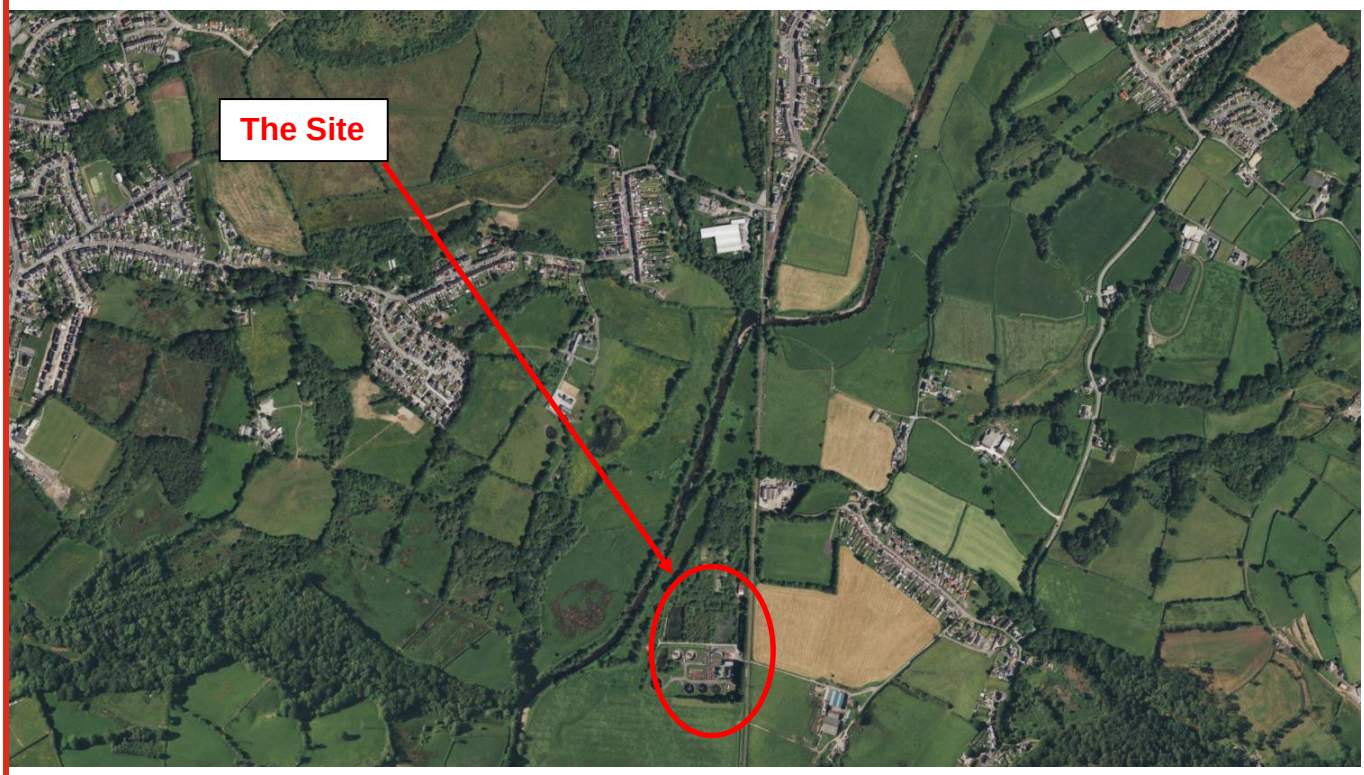
- The British Geological Survey, 1:50 000 Geological Sheets 210 (England and Wales).
- BGS online maps and lexicon database – www.bgs.co.uk

Specialist Publications:-

- British Code of Practice BS 5930:2015 *'Code of Practice for Site Investigations'*
- British Code of Practice BS 1377:1990 *'Methods of test for soils for civil engineering purposes'.*
- British Code of Practice BS EN ISO 14688-1:2002+A2:2013 investigation and testing. Identification and classification of soil. Identification and description
- British Code of Practice BS EN ISO 14688-2:2004+A2:2013 Geotechnical investigation and testing. Identification and classification of soil. Principles for a classification.
- British Code of Practice BS EN ISO 14689-1:2003 Ground Investigation and Testing – Identification and classification of rock
- Health and Safety Executive Guidance Note EH40/90
- *CIRIA Report 143* 'The Standard Penetration Test (SPT): Methods and Use', 1995.
- BRE (2005) Special Digest 1:2005, 3rd Edition, Concrete in aggressive ground. BRE, Garston.
- BS 6031: 2009 Code of Practice for Earthworks.
- Workmanship for excavation shall comply with BS 8000: 1989 Part 1, Sections 3.1, 3.2 and 3.3.
- Specification for Highway Works (MCHW 1), Volume 1, Series 600 & Series 800, 2006 with Amendment 2016
- ICE UK Specification for Ground Investigation Second Edition.
- Design Manual for Roads and Bridges: Volume 7 Pavement Design and Maintenance
- Specification for Highways Works Series 600 Earthworks
- Highways Agency Interim Advice Note 73/06, Rev 1 2009, Clause 7.7

APPENDIX I – **SITE PLANS AND FIGURES**





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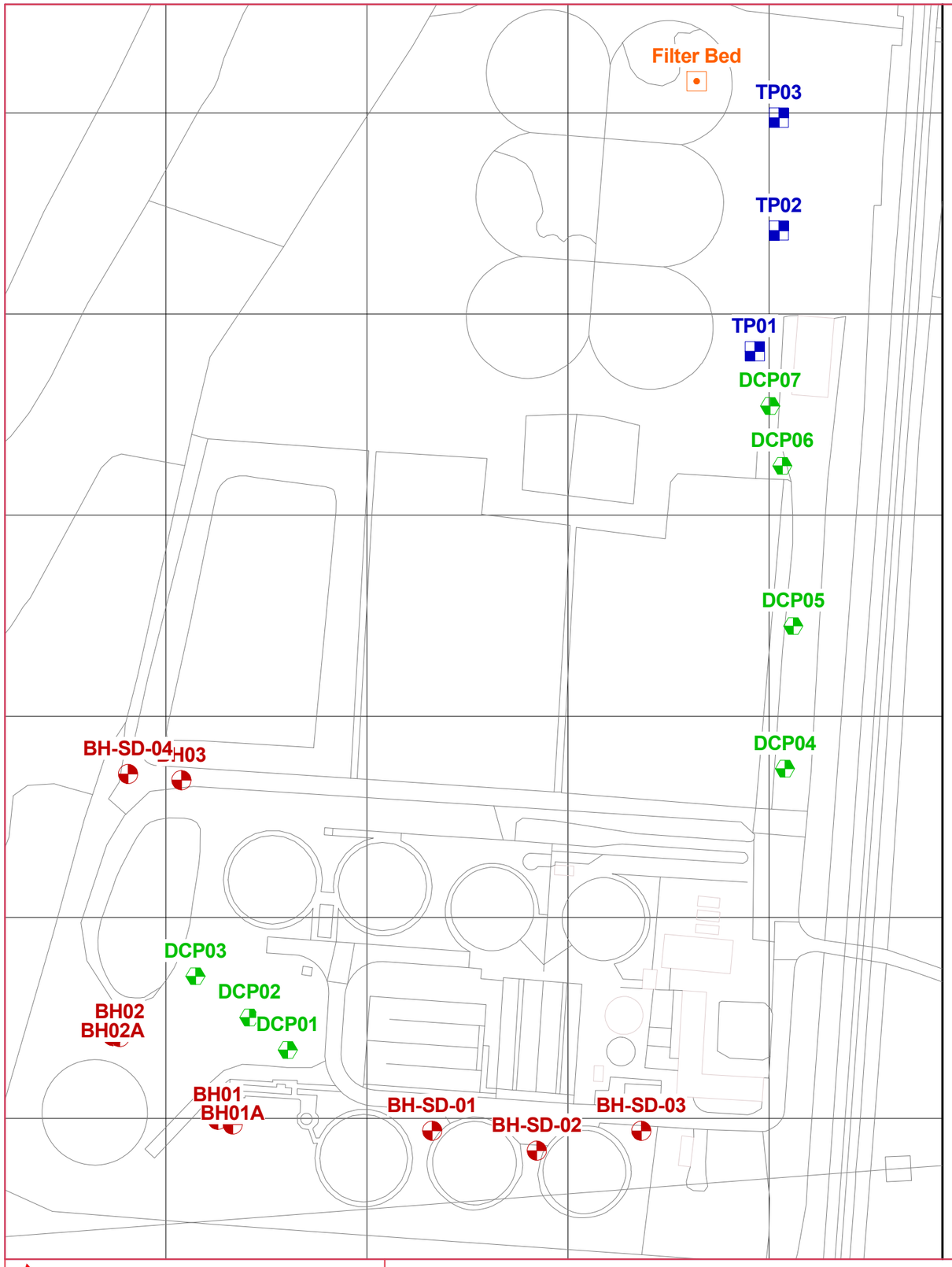
GARNSWLLT WWTW

Site Location Plan

Figure 1

Scale: Not to Scale

Job No. Q1066



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KEY
Borehole
Trial Pit
Dynamic Probe
In-situ Test
Window Sample
Sampling Point
Historical Borehole

PROJECT
GARNSWLLT WWTW

DRAWING TITLE:
EXPLORATORY HOLE LOCATION PLAN

JOB NO.	FIGURE NO.
Q1031	2
DATE	SCALE
01/06/23	1:1200

APPENDIX II – **BOREHOLE LOGS**

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No.
BH01

Dates : 27/2/23 - 27/2/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.60 m A.O.D.
Level to Ordnance Datum

Coordinates: 262062.90 E
209849.66 N
Co-ordinates to Local Grid

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	
0					(0.50)	MADE GROUND - Dark brown gravelly SILT with medium cobble content. Gravel is fine to coarse angular to sub-rounded sandstone and mudstone. Cobbles are sub-rounded sandstone and mudstone.		(0.50)	
					0.50			16.10	
					(0.60)	MADE GROUND - Brown very clayey GRAVEL with medium cobble content. Gravel is fine to coarse sub-rounded to angular limestone and sandstone. Cobbles are sub-rounded limestone.		(0.60)	
1					1.10			15.50	
					(0.20)	MADE GROUND - Light grey slightly sandy GRAVEL. Gravel is fine angular limestone. Sand is fine to coarse. (POSSIBLE PIPE BEDDING)		(0.20)	
					1.30	Terminated at 1.3mbgl upon encountering possible pipe bedding		15.30	
2									
3									
4									
5									
6									
7									
8									
9									
10									

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours

Equipment / plant used:

Remarks:

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email: enquiries@quantumgeotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
		1 Of 1	10.1	

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No. BH01A

Dates : 27/2/23 - 28/2/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.60 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262066.62 E 209848.50 N *Co-ordinates to Local Grid*

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
0	0.20 - 0.50	B1			(0.50)	MADE GROUND - Dark brown gravelly SILT with medium cobble content. Gravel is fine to coarse angular to sub-rounded sandstone and mudstone. Cobbles are sub-rounded sandstone and mudstone.		(0.50)		
	0.20	ES1			0.50			16.10		
	0.50 - 1.00	B2				MADE GROUND - Brown very clayey GRAVEL with medium cobble content. Gravel is fine to coarse sub-rounded to angular limestone and sandstone. Cobbles are sub-rounded limestone.				
	0.50	ES2								
1	1.00	ES3								
	1.20 - 1.70	B3	1.20	SPT (C) 9 (3-4-**3-2-2-2**)	(1.80)			(1.80)	1	
	1.80	D1								
2	2.00 - 2.50	B4	2.00	SPT (C) 5 (2-3-**2-1-1-1**)						
	2.00	ES4			2.30	Soft light brown slightly sandy gravelly silty CLAY with low cobble content. Gravel is fine to coarse sub-rounded to angular limestone and sandstone. Cobbles are sub-rounded to sub-angular sandstone and limestone. Sand is fine to coarse. (ALLUVIUM)		14.30		
	2.80	D2			(0.50)			(0.50)		
3	3.00 - 3.50	B5	3.00	SPT (C) 15 (5-6-**7-3-3-2**)	2.80			13.80	1	
	3.80	D3				Brown slightly silty sandy GRAVEL with low cobble content. Gravel is fine to coarse angular to sub-rounded sandstone and limestone. Cobbles are sub-angular sandstone. Sand is fine to coarse. (RIVER TERRACE GRAVELS)				
4	4.00 - 4.50	B6	4.00	SPT (C) 35 (5-7-**10-11-8-6**)						
	4.80	D4								
5	5.00 - 5.50	B7	5.00	SPT (C) 33 (7-9-**6-7-10-10**)						
	5.80	D5	5.80	SPT (C) 50/220mm (10-12-**15-16-19/70mm**-)						
6	6.00 - 6.50	B8			(7.20)			(7.20)		
	6.80	D6								
7	7.00 - 7.50	B9	7.00	SPT (C) 50/210mm (12-13-**17-17-16/60mm**-)						
	7.80	D7								
8	8.00 - 8.50	B10	8.00	SPT (C) 50/220mm (9-13-**12-18-20/70mm**-)						
	8.80	D8								
9	9.00 - 9.50	B11	9.00	SPT (C) 44 (7-8-**10-10-12-12**)						
	9.80	D9								
10			10.00	SPT (C) 42 (6-7-**10-9-12-11**)	10.00	Terminated at 10.0mbgl. Target Depth		6.60		
11										

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
27/02/2023 16:45	4.00	4.00	1.40
01/03/2023 09:00	10.00	10.00	1.31
28/03/2023 17:30	9.40	9.40	1.30

Casing

Depth	Cas. Dia.
10.00	150.00

Groundwater

Struck	Rose To	Behaviour	Sealed
3.00	1.38	Rapid groundwater inflow below 3.0mbgl	

Chiselling

From	To	Hours
5.80	6.00	0:30
6.00	7.00	2:00
7.00	8.00	3:00
8.00	9.00	1:30
9.50	9.80	0:45

Equipment / plant used: Dando 2000

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl. Gravel content to high in Clay strata to undertake UT100 sample.

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All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No.
BH02

Dates : 1/3/23 - 1/3/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.58 m A.O.D.
Level to Ordnance Datum

Coordinates: 262038.54 E
209870.24 N
Co-ordinates to Local Grid

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water
0	0.20 - 0.50 0.20 0.50 - 1.00 0.50	B1 ES1 B2 ES2			(0.10) 0.10 (0.90)	MADE GROUND - Soft dark brown SILT with many rootlets (TOPSOIL) MADE GROUND - Brown very gravelly SILT with medium cobble content. Gravel is fine to coarse sub-rounded to angular limestone and sandstone. Cobbles are sub-rounded limestone.		(0.10) 16.48 (0.90)	
1	1.00	ES3			1.00	Terminated at 1.0mbgl on sandstone boulder		15.58	
2									
3									
4									
5									
6									
7									
8									
9									
10									

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed

Chiselling

From	To	Hours

Equipment / plant used:

Remarks:

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Operator:

Logged By.

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All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No. BH02A

Dates : 1/3/23 - 3/3/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.62 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262036.75 E 209870.52 N *Co-ordinates to Local Grid*

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
0					(0.10)	MADE GROUND - Soft dark brown SILT with many rootlets (TOPSOIL)		(0.10)		
					0.10			16.52		
						MADE GROUND - Brown very gravelly SILT with medium cobble content. Gravel is fine to coarse sub-rounded to angular limestone and sandstone. Cobbles are sub-rounded limestone.				
1	1.20 - 1.70	B1	1.20	SPT (C) 14 (4-4-**3-3-4-4**)	(2.00)			(2.00)		
	1.80	D1								
2	2.00	ES1	2.00	SPT (C) 4 (1-1-**1-1-1-1**)					1	
	2.00 - 2.50	B2								
	2.80	D2			2.10	Soft brownish grey very silty slightly gravelly CLAY. Gravel is fine to coarse sub-rounded to angular sandstone. (ALLUVIUM)		14.52		
3	3.00 - 3.50	B3	3.00	SPT (C) 26 (3-5-**6-6-7-7**)	(1.10)			(1.10)		
					3.20	Brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse sub-angular to rounded sandstone, quartzitic sandstone and mudstone. (RIVER GRAVEL)		13.42	1	
	3.80	D3			(0.80)			(0.80)		
4	4.00 - 4.50	B4	4.00	SPT (C) 34 (4-5-**7-7-10-10**)	4.00			12.62		
	4.80	D4				Brown very sandy GRAVEL with medium cobble content. Gravel is fine to coarse sub-angular to rounded sandstone, quartzitic sandstone and mudstone. Cobbles are sub-rounded sandstone. (RIVER GRAVEL)				
5	5.00 - 5.50	B5	5.00	SPT (C) 43 (6-8-**9-11-11-12**)						
	5.80	D5								
6	6.00 - 6.50	B6	6.00	SPT (C) 50/220mm (10-15/70mm-**21-14-15/70mm**-)						
	6.80	D6								
7	7.00 - 7.50	B7	7.00	SPT (C) 50/105mm (25/70mm-**38-12/30mm**--)	(6.00)			(6.00)		
	7.80	D7								
8	8.00 - 8.50	B8	8.00	SPT (C) 50/220mm (17-8/25mm-**16-17-17/70mm**-)						
	8.80	D8								
9	9.00 - 9.50	B9	9.00	SPT (C) 50/210mm (10-15-**17-20-13/60mm**-)						
	9.80	D9								
10			10.00	SPT (C) 48 (9-11-**11-12-12-13**)	10.00	Terminated at 10.0mbgl		6.62		
11										

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
01/03/2023 17:00	3.80	3.80	1.70
02/03/2023 17:00	9.60	9.60	1.50

Casing

Depth	Cas. Dia.
10.00	150.00

Groundwater

Struck	Rose To	Behaviour	Sealed
3.20	1.90	Medium groundwater inflow below 3.2mbgl	

Chiselling

From	To	Hours
5.40	6.00	2:20
6.00	7.00	2:20
7.00	8.00	2:00
8.00	9.00	1:45

Equipment / plant used: Dando 2000

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl. Gravel content to high in Clay strata to undertake UT100 sample.

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All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No. BH03

Dates : 6/3/23 - 7/3/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 19.26 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262053.87 E 209934.12 N *Co-ordinates to Local Grid*

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
0					(0.10)	Reinforced Concrete		(0.10)		
	0.20 - 0.60	B1			0.10	MADE GROUND - Grey sandy GRAVEL. Gravel is fine to coarse angular limestone (Sub-base)		19.16		
	0.20	ES1			(0.10)			(0.10)		
	0.50	ES2			0.20	MADE GROUND - Brown sandy GRAVEL with high cobble content. Gravel is fine to coarse rounded sandstone with occasional angular brick fragments. Sand is fine to coarse. Cobbles are rounded sandstone.		19.06		
	0.60 - 1.20	B2			(1.00)			(1.00)		
1	1.00	ES3								
	1.20 - 1.70	B3	1.20	SPT (C) 2 (2-1-**0-0-1-1**)	1.20			18.06		
	1.50	ES4			(0.70)			(0.70)		
	1.90	D1			1.90	Geofabric at 1.2mbgl		17.36		
2	2.00 - 2.50	B4	2.00	SPT (C) 10 (3-3-**2-3-2-3**)		MADE GROUND - Brown very clayey GRAVEL with medium cobble content. Gravel is fine to coarse sub-rounded to rounded sandstone. Cobbles are sub-rounded sandstone.				
	2.00	ES5								
	2.80	D2								
3	3.00 - 3.50	B5	3.00	SPT (C) 22 (1-2-**4-6-8-4**)		Soft grey very silty slightly gravelly CLAY. Gavel is fine to coarse sub-rounded to sub-angular sandstone and mudstone. (ALLUVIUM)			1	
	3.80	D3								
4	4.00 - 4.50	B6	4.00	SPT (C) 4 (1-1-**1-1-1-1**)	(4.40)	..... between 4.0 and 4.5mbgl pockets of fibrous black PEAT. Hydrocarbon odour		(4.40)		
	4.00	ES6								
	4.80	D4								
5	5.00 - 5.50	B7	5.00	SPT (C) 4 (1-1-**1-1-1-1**)						
	5.80	D5								
6	6.00 - 6.50	B8	6.00	SPT (C) 39 (3-5-**8-9-10-12**)					1	
					6.30	Brown silty sandy GRAVEL. Gravel is fine to coarse rounded sandstone. Sands is fine to coarse.		12.96		
					(0.20)			(0.20)		
	6.80	D6			6.50	Brown and grey sandy GRAVEL with medium cobble content. Gravel is fine to coarse sub-rounded to rounded sandstone and quartzitic sandstone. Cobble are sub-rounded sandstone. (RIVER GRAVEL)		12.76		
7	7.00 - 7.50	B9	7.00	SPT (C) 50 (8-10-**15-17-18**-)						
	7.80	D7								
8	8.00 - 8.50	B10	8.00	SPT (C) 50/265mm (15-10/60mm-**17-12-12-9/40mm**)						
					(4.20)			(4.20)		
	8.80	D8								
9	9.00 - 9.50	B11	9.00	SPT (C) 50/205mm (25-**18-20-12/55mm**-)						
	9.80	D9								
10	10.00 - 10.50	B12	10.00	SPT (C) 41 (8-9-**9-10-11-11**)						
	10.70	D10			10.70	Terminated at 10.7mbgl		8.56		
11										

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
06/03/2023 17:00	6.00	6.00	
07/03/2023 15:30	10.70	10.70	3.30

Casing

Depth	Cas. Dia.
10.70	150.00

Groundwater

Struck	Rose To	Behaviour	Sealed
6.20	3.40	Rapid groundwater inflow below 6.2mbgl	

Chiselling

From	To	Hours
6.30	7.00	0:45
7.00	8.00	1:50
8.00	9.00	2:00
9.00	9.60	1:20

Equipment / plant used: Dando 2000

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl. Gravel content to high in Clay strata to undertake UT100 sample.

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All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No. BH-SD-01

Dates : 4/4/23 - 5/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.61 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262116.22 E 209846.96 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thickness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
0					(0.20)	TOPSOIL: Brown gravelly slightly sandy CLAY.		(0.20)		
	0.30 - 0.50	B1			0.20	MADE GROUND: Brown silty slightly clayey slightly sandy GRAVEL with low cobble content sandstone and concrete. Gravel is sub angular to sub rounded fine to coarse sandstone, siltstone and concrete.		16.41		
	0.30	ES1								
	0.80	ES2			(1.30)			(1.30)		
1	1.00 - 1.20	B2								
	1.20	ES3								
	1.30 - 1.50	B3				...high cobble content from 1.05mbgl				
			1.50	SPT (S) 4 (2-3-**1-2-1-0**)	1.50	MADE GROUND: Brownish grey slightly silty slightly sandy GRAVEL with low cobble content of sandstone. Gravel is angular to sub angular fine to coarse sandstone and siltstone.		15.11		
2	2.00 - 2.50	B4			(1.30)			(1.30)		
	2.20	ES4								
	2.80 - 3.00	B5								
3	3.00	SPTLS	3.00	SPT (S) 37 (4-4-**9-7-13-8**)	2.80	Orangeish brown slightly clayey slightly sandy GRAVEL. Gravel is sub angular to sub rounded fine to coarse sandstone and siltstone, fine to medium angular quartz.		13.81		
	3.00 - 4.50	B6								
	3.20	ES5								
4										
	4.50	SPTLS	4.50	SPT (S) 29 (5-13-**8-6-7-8**)						
	4.50 - 6.00	B7								
5					(4.50)			(4.50)		
6	6.00	SPTLS	6.00	SPT (S) 28 (3-7-**8-5-8-7**)						
	6.00 - 7.30	B8								
7										
	7.50	SPTLS	7.50	SPT (S) 32 (6-8-**12-7-7-6**)	7.30	Brown clayey slightly sandy GRAVEL with low cobble content of quartzitic sandstone. Gravel is sub angular to sub rounded fine to coarse sandstone, and siltstone. with lenses of black fine to medium siltstone.		9.31		
	7.50 - 9.00	B9								
8										
9	9.00	SPTLS	9.00	SPT (S) 41 (7-14-**12-10-10-9**)	(3.20)			(3.20)		
	9.00 - 10.50	B10								
10										
	10.50	SPTLS	10.50	SPT (S) 48 (1-6-**4-7-18-19**)	10.50	Brownish grey slightly silty slightly sandy GRAVEL with medium cobble content sandstone. Gravel is sub angular to sub rounded fine to coarse sandstone and siltstone, red sub angular fine to medium mudstone and angular coarse quartzitic sandstone.		6.11		
	10.50 - 12.00	B11								
11										

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

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Operator:	Logged By.	Sheet No.	m Per Page
Geo Sonic	A Jones	1 Of 3	12

All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No. BH-SD-01

Dates : 4/4/23 - 5/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.61 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262116.22 E 209846.96 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thickness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
12	12.00 12.00 - 13.50	SPTLS B12	12.00	SPT (S) 9 (5-8-**4-2-1-2**)	(3.80)			(3.80)		
13	13.50 13.50 - 14.00	SPTLS B13	13.50	SPT (S) 22 (2-4-**4-5-6-7**)						
14	14.30 - 14.70	B14			14.30 (0.40)	Brownish grey clayey gravelly SAND. Sand is fine to coarse. Gravel is angular to sub angular fine sandstone and siltstone.		2.31 (0.40)		
	14.80 - 15.00	B15			14.70			1.91		
15	15.00 15.00 - 16.00	SPTLS B16	15.00	SPT (S) 17 (2-2-**4-4-4-5**)	(0.30) 15.00	Brownish grey sandy slightly gravelly CLAY. Gravel is angular to sub angular fine sandstone.		(0.30) 1.61		
16					(1.20)	Brownish grey clayey slightly gravelly SAND. Sand is medium to coarse.		(1.20)		
	16.20 - 16.50	B17			16.20			0.41		
	16.50 16.50 - 18.00	SPTLS B18	16.50	SPT (S) 32 (7-6-**6-6-9-11**)	(0.30) 16.50	Brownish grey clayey sandy GRAVEL. Gravel is sub angular to sub rounded fine to coarse sandstone and siltstone.		(0.30) 0.11		
17						Brownish grey SAND and GRAVEL. Sand is fine to coarse. Gravel is sub angular to sub rounded fine to coarse sandstone.				
18	18.00 18.00 - 19.50	SPTLS B19	18.00	SPT (S) 22 (3-2-**3-4-6-9**)						
19					(4.20)			(4.20)		
	19.50	SPTLS	19.50	SPT (S) 23 (2-4-**4-8-4-7**)						
20	20.00 - 20.50	B20								
	20.70 - 21.00	B21			20.70	Soft slightly clayey sandy SILT. Sand is fine to coarse.		-4.09		
21	21.00	SPTLS	21.00	SPT (S) 5 (0-0-**0-0-1-4**)						
22										
	22.50	SPTLS	22.50	SPT (S) 10 (0-0-**0-1-5-4**)						
23	23.00 - 24.50	B23			(4.30)			(4.30)		
						becoming slightly gravelly from 23.5mbgl				

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
04/04/2023 17:30	20.00	20.00	
05/04/2023 07:30	20.00	20.00	

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

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Operator:	Logged By.	Sheet No.	m Per Page	
Geo Sonic	A Jones	2 Of 3	12	All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No.
BH-SD-01

Dates : 4/4/23 - 5/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.61 m A.O.D.
Level to Ordnance Datum

Coordinates: 262116.22 E
209846.96 N
Co-ordinates to National Grid

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
24	24.00	SPTLS	24.00	SPT (S) 20 (4-5-**6-2-5-7**)						
25					25.00	Borehole terminated at extended depth of 25.0mbgl as directed by MMB.		-8.39		
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
05/04/2023 10:50	25.00	25.00	

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

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Operator:	Logged By.	Sheet No.	m Per Page
Geo Sonic	A Jones	3 Of 3	12

All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No.
BH-SD-02

Dates : 5/4/23 - 6/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.57 m A.O.D.
Level to Ordnance Datum

Coordinates: 262142.23 E
209842.00 N
Co-ordinates to National Grid

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
0	0.20	ES1			(0.05)	TARMAC		(0.05)		
	0.30 - 0.50	B1			0.05	MADE GROUND: Brown slightly clayey sandy GRAVEL. Gravel is sub angular to sub rounded fine to coarse sandstone and siltstone, angular coarse tile fragments.		16.52		
	0.50	ES2			(0.55)			(0.55)		
	0.80 - 1.20	B2			0.60	MADE GROUND: Grey gravelly slightly sandy slightly organic CLAY with low cobble content of rounded sandstone.		15.97		
1	1.00	ES3								
	1.50	SPTLS	1.50	SPT (S) 0 (0-0-**0-0-0-0**)						
	1.50 - 2.50	D1								
		B3								
2	2.00	ES4								
	2.50	D2			(3.80)			(3.80)		
3	3.00 - 4.00	B4	3.00	SPT (S) 0 (0-0-**0-0-0-0**)		with timber from 2.8-3.0mbgl				
	3.00	ES5								
	3.50	D3								
4	4.00	ES6								
	4.50	SPTLS	4.50	SPT (S) 12 (4-5-**6-2-2-2**)	4.40	MADE GROUND: Orange brown slightly clayey sandy GRAVEL. Gravel is sub angular to sub rounded fine to coarse sandstone and siltstone.		12.17		
	4.50 - 5.50	B5								
5	5.00	ES7			(1.20)			(1.20)		
	5.60 - 6.00	B6			5.60	MADE GROUND: Grey slightly silty slightly sandy GRAVEL with high cobble content of sandstone. Gravel is angular to sub angular fine to coarse sandstone, angular glazed clay pipe fragments. ...with slight hydrocarbon odour and shine on gravel		10.97		
	5.80	ES8			(0.40)			(0.40)		
6	6.00	SPTLS	6.00	SPT (S) 39 (3-8-**10-10-10-9**)	6.00	Orange brown clayey sandy GRAVEL with low cobble content of sandstone. Gravel is sub angular to sub rounded fine to coarse sandstone, siltstone and angular fine to medium red mudstone.		10.57		
	6.50 - 7.50	B7								
	6.50	ES9								
7										
	7.50	SPTLS	7.50	SPT (S) 20 (4-6-**4-6-5-5**)						
	7.50 - 8.50	B8								
8										
	9.00	SPTLS	9.00	SPT (S) 25 (2-4-**6-5-7-7**)	(5.80)	slightly clayey from 9.0mbgl		(5.80)		
	9.00 - 10.00	B9								
9										
10						with high cobble content from 10.0mbgl				
	10.50	SPTLS	10.50	SPT (S) 42 (14-8-**10-8-8-16**)						
	10.50 - 11.50	B10								
11										
					11.80	Dark grey slightly silty sandy GRAVEL. Gravel is		4.77		

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

Quantum Geotech
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Operator:	Logged By.	Sheet No.	m Per Page	
Geo Sonic	A Jones	1 Of 2	12	All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No.
BH-SD-02

Dates : 5/4/23 - 6/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 16.57 m A.O.D.
Level to Ordnance Datum

Coordinates: 262142.23 E
209842.00 N
Co-ordinates to National Grid

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
12	12.00	SPTLS	12.00	SPT (S) 10 (5-4-**2-2-3-3**)	(0.70)	sub angular to sub rounded fine to coarse sandstone and siltstone.		(0.70)		
	12.00 - 12.50	B11			12.50			4.07		
	12.60	D4			(0.20)	Brown slightly gravelly SAND. Sand is fine to coarse.		(0.20)		
13	13.00 - 13.50	B12			12.70	Brown silty sandy GRAVEL. Gravel is sub angular to sub rounded fine to coarse sandstone and siltstone.		3.87		
	13.50	SPTLS	13.50	SPT (S) 17 (1-1-**2-3-6-6**)						
	13.50 - 15.00	B13								
14					(2.60)			(2.60)		
15	15.00	SPTLS	15.00	SPT (S) 8 (2-2-**0-1-2-5**)						
	15.00 - 15.30	B14			15.30	Brown silty slightly gravelly SAND. Sand is fine to coarse. Gravel is sub angular to sub rounded fine to coarse sandstone.		1.27		
	15.50	D5								
	15.50 - 16.00	B15								
16										
	16.50	SPTLS	16.50	SPT (S) 16 (2-2-**3-4-4-5**)						
17	17.00 - 18.00	B16								
					(4.70)			(4.70)		
18	18.00	SPTLS	18.00	SPT (S) 16 (1-1-**2-4-5-5**)						
	18.00 - 19.00	B17								
19	19.00 - 19.50	B19								
	19.50	SPTLS	19.50	SPT (S) 26 (2-3-**3-7-6-10**)						
20					20.00	Borehole terminated at scheduled depth, 20.0mbgl		-3.43		
21										
22										
23										

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
05/04/2023 17:30	15.00	15.00	
06/04/2023 07:30	15.00	15.00	1.44
06/04/2023 09:30	15.00	15.00	

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

Quantum Geotech
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Operator:	Logged By.	Sheet No.	m Per Page
Geo Sonic	A Jones	2 Of 2	12

All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No. BH-SD-03

Dates : 6/4/23 - 12/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 17.16 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262168.22 E 209846.93 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thickness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
0	0.20 - 0.40	B1			(0.15)	TOPSOIL: Brown sandy slightly gravelly CLAY.		(0.15)		
	0.30	ES1			0.15	MADE GROUND: Dark brown grey clayey slightly		17.01		
	0.50	ES2			(0.35)	silty slightly sandy GRAVEL. Gravel is angular fine		(0.35)		
	0.80 - 1.00	B2			0.50	to coarse limestone.		16.66		
1	1.00	ES3				Orangeish brown slightly silty sandy CLAY.				
	1.20	D1								
	1.50	SPTLS	1.50	SPT (S) 0 (0-0-**0-0-0-0**)						
	1.50 - 2.50	B3			(2.30)			(2.30)		
2										
	2.20	D2								
	2.70	D3								
3	3.00	SPTLS	3.00	SPT (S) 20 (3-5-**4-4-4-8**)	2.80	Orangeish brown clayey sandy GRAVEL. Gravel		14.36		
	3.00 - 4.00	B4				is sub angular to sub rounded fine to coarse				
4						sandstone and siltstone, rare fine to medium				
	4.50	SPTLS	4.50	SPT (S) 11 (1-1-**3-2-3-3**)	(3.20)	angular quartz.		(3.20)		
	4.50 - 5.50	B5								
5										
6	6.00	SPTLS	6.00	SPT (S) 20 (3-4-**5-4-5-6**)	6.00	Brown slightly clayey sandy GRAVEL with low		11.16		
	6.50 - 7.50	B6				cobble content sandstone. Gravel is sub angular				
7						to sub rounded fine to coarse sandstone and				
	7.50	SPTLS	7.50	SPT (S) 17 (3-3-**4-4-4-5**)		siltstone, rare fine to medium angular quartz.				
8	8.00 - 9.00	B7								
9	9.00	SPTLS	9.00	SPT (S) 23 (6-9-**6-6-5-6**)	(6.00)			(6.00)		
	9.50 - 10.50	B8								
10										
	10.50	SPTLS	10.50	SPT (S) 19 (3-4-**5-5-6-3**)						
11	11.00 - 12.00	B9								

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
06/04/2023 12:00	1.20		1.20
11/04/2023 13:00	1.20		1.20

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed
1.20		Seepage at 1.2mbgl	

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

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Operator:	Logged By.	Sheet No.	m Per Page
Geo Sonic	A Jones	1 Of 2	12

All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No. BH-SD-03

Dates : 6/4/23 - 12/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 17.16 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262168.22 E, 209846.93 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results	Strata Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
12	12.00	SPTLS	12.00	SPT (S) 21 (5-4-**6-6-5-4**)	12.00	Grey brown slightly sandy GRAVEL with high cobble content sandstone and quartzitic sandstone. Gravel is sub angular to sub rounded fine to coarse sandstone and quartzitic sandstone.		5.16		
	12.50 - 13.50	B10								
13			13.50	SPT (C) 16 (2-1-**3-4-3-6**)	(3.00)			(3.00)		
14										
15	15.00 - 16.00	B11	15.00	SPT (C) 17 (4-5-**3-2-5-7**)	15.00	Brown slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse sandstone and siltstone.		2.16		
16										
	16.50	SPTLS	16.50	SPT (S) 19 (1-1-**4-5-5-5**)	(0.20)	with thin bands of silty slightly gravelly Sand from 16.4 -16.6mbgl		(0.20)		
	16.50 - 17.50	D4 B12			16.60			0.56		
17					(3.20)			(3.20)		
	17.80 - 17.90	D5			(0.10)	with thin bands of silty slightly gravelly Sand from 17.8 - 17.9mbgl		(0.10)		
18	18.00	SPTLS	18.00	SPT (S) 17 (1-2-**2-4-4-7**)	17.90			-0.74		
	18.50 - 19.50	B13			18.20	Grey silty slightly gravelly SAND. Sand is fine to coarse.		-1.04		
19					(1.80)			(1.80)		
	19.50	SPTLS	19.50	SPT (S) 17 (0-0-**1-4-5-7**)						
20					20.00	Borehole terminated at scheduled depth, 20.0mbgl		-2.84		
21										
22										
23										

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
11/04/2023 17:30	15.00	15.00	
12/04/2023 07:00	15.00	15.00	1.95
12/04/2023 09:45	20.00	20.00	

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

Quantum Geotech
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Operator:	Logged By.	Sheet No.	m Per Page
Geo Sonic	A Jones	2 Of 2	12

All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No. BH-SD-04

Dates : 11/4/23 - 13/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 19.09 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262040.61 E 209935.66 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
0					(0.15)	Reinforced CONCRETE		(0.15)		
	0.20 - 0.30	B1			0.15	MADE GROUND - Grey sandy GRAVEL. Gravel		18.94		
	0.30	ES1			(0.15)	is fine to coarse angular limestone (Sub-base)		(0.15)		
	0.50 - 1.00	B2			0.30	MADE GROUND - Brown sandy GRAVEL with		18.79		
	0.70	ES2			(1.00)	high cobble content. Gravel is fine to coarse		(1.00)		
1						rounded sandstone. Sand is fine to coarse.				
	1.20	ES3			1.30	Cobbles are rounded sandstone.		17.79		
	1.50	SPTLS	1.50	SPT (S) 0 (0-0-**0-0-0-0**)	(0.60)	MADE GROUND: Soft grey sandy slightly gravelly		(0.60)		
	1.50 - 1.80	B3				slightly organic CLAY with plastic.				
	1.50	ES4			1.90	Brown slightly gravelly sandy slightly organic		17.19		
2	2.00 - 2.50	B4			(1.00)	CLAY.		(1.00)		
	2.50	ES5								
	3.00	SPTLS	3.00	SPT (S) 0 (1-0-**0-0-0-0**)	2.90	Soft dark brown sandy organic CLAY with lenses		16.19		
3		D1			(0.20)	of peat.		(0.20)		
	3.50 - 4.00	B5			3.10	Soft grey brown sandy slightly gravelly CLAY.		15.99		
					(1.10)			(1.10)		
4										
	4.50	SPTLS	4.50	SPT (S) 0 (0-0-**0-0-0-0**)	4.20	Grey sandy gravelly CLAY.		14.89		
	4.50 - 5.00	B6			(1.20)			(1.20)		
5										
	5.50 - 5.80	B7			5.40	Black fibrous PEAT		13.69		
					(0.50)			(0.50)		
6	6.00	SPTLS	6.00	SPT (S) 11 (1-0-**2-3-3-3**)	5.90	Orange brown slightly silty sandy GRAVEL with		13.19		
	6.00 - 7.00	B8				low cobble content of rounded sandstone. Gravel				
7						is sub angular to sub rounded fine to coarse				
						sandstone and siltstone with rare angular quartz.				
	7.50	SPTLS	7.50	SPT (S) 39 (6-5-**6-6-10-17**)						
	7.50 - 8.50	B9								
8										
	9.00	SPTLS	9.00	SPT (S) 46 (3-3-**5-12-17-12**)						
	9.00 - 10.00	B10								
9										
10										
	10.50 - 11.50	B11	10.50	SPT (C) 39 (8-9-**10-9-9-11**)						
11										
					(11.10)			(11.10)		

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
11/04/2023 15:30	1.20		1.00
12/04/2023 11:00	1.20		1.00

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed
1.20		Seepage at 1.2mbgl;	
2.55		Slow ground water ingress at 2.55mbgl	

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

Quantum Geotech
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Operator:	Logged By.	Sheet No.	m Per Page
Geo Sonic	A Jones	1 Of 2	12

All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Borehole No.
BH-SD-04

Dates : 11/4/23 - 13/4/23

Location :

Job Number : Q1031

Engineer : Mott MacDonald

Ground Level : 19.09 m A.O.D.
Level to Ordnance Datum

Coordinates: 262040.61 E
209935.66 N
Co-ordinates to National Grid

m B.G.L.	Samples Depth	Samples Type No. Blows	Insitu Test Results Depth	Insitu Test Results Test Results	Strata Depth (Thick-ness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	Water	Install/ Backfill
12	12.00 - 13.00	B12	12.00	SPT (C) 35 (5-10-**8-8-10-9**)						
13										
	13.50 - 14.50	B13	13.50	SPT (C) 48 (4-13-**14-11-11-12**)						
14										
15	15.00 - 16.00	B14	15.00	SPT (C) 47 (9-10-**12-12-10-13**)		with high cobble content from 15.0mbgl				
16										
			16.50	SPT (C) 19 (5-5-**6-4-4-5**)						
17					17.00	Dark grey silty slightly gravelly SAND. Sand is fine to coarse.		2.09		
	17.50 - 17.70	B15								
	17.80	D2								
18	18.00	SPTLS	18.00	SPT (S) 6 (1-2-**1-1-2-2**)		with lenses of sandy Silt.				
	18.50 - 19.50	B16			(3.00)			(3.00)		
19										
	19.50	SPTLS	19.50	SPT (S) 18 (1-2-**3-3-6-6**)						
20					20.00	Hole terminated at scheduled depth, 20.0mbgl		-0.91		
21										
22										
23										

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
12/04/2023 07:30	20.00	20.00	
12/04/2023 17:30	20.00	20.00	

Casing

Depth	Cas. Dia.

Groundwater

Struck	Rose To	Behaviour	Sealed

Chiselling

From	To	Hours

Equipment / plant used: Sonic Rig 15; SPT Hammer GS015

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. Hand excavated pit undertaken GL to 1.2mbgl.

Quantum Geotech
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Operator:	Logged By.	Sheet No.	m Per Page
Geo Sonic	A Jones	2 Of 2	12

All measurements in metres unless otherwise stated

AGS

Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Dynamic Sampling Uk Ltd
Unit 8 Victory Park
Victory Road
Derby
DE24 8ZF

Hammer Ref:	CJ09
Test Date:	14/07/2022
Report Date:	14/07/2022
File Name:	CJ09.spt
Test Operator:	B.HUNTER

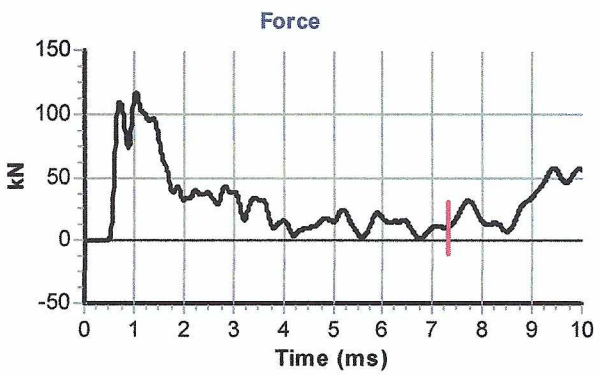
Instrumented Rod Data

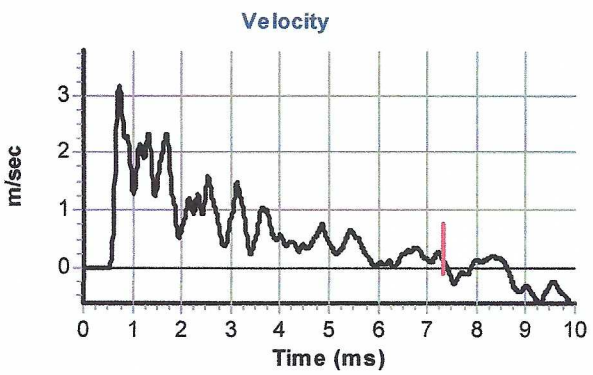
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.5
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	62901
Accelerometer No.2:	62902

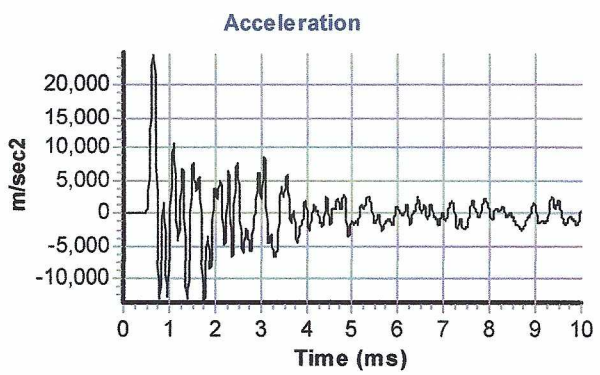
Hammer Information

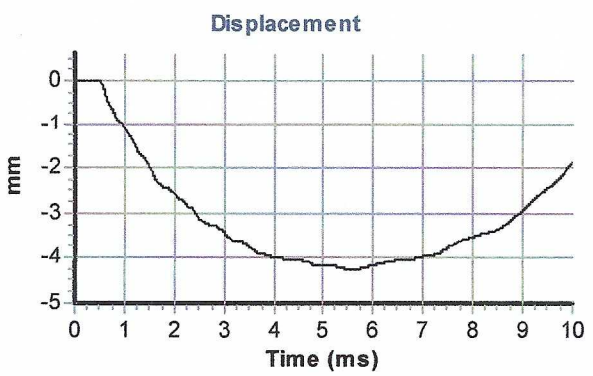
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
String Length L (m):	10.0

Comments / Location









Calculations

Area of Rod A (mm2):	970
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	288

Energy Ratio E_r (%): **61**

Signed: B.Hunter

Title: Operations Manager

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

GeoSonic Drilling
Unit J
Greenfield Complex
Greenfield Street
Alloa
Clackmannanshire

SPT Hammer Ref:	GS0015
Test Date:	06/01/2023
Report Date:	25/01/2023
File Name:	GS0015.spt
Test Operator:	CDW

Instrumented Rod Data

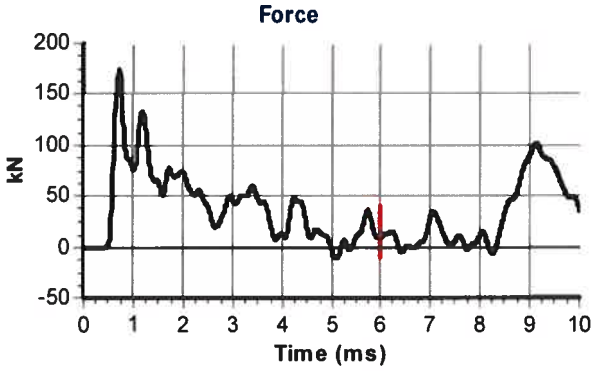
Diameter d_r (mm):	76
Wall Thickness t_r (mm):	4.5
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	11794
Accelerometer No.2:	5843

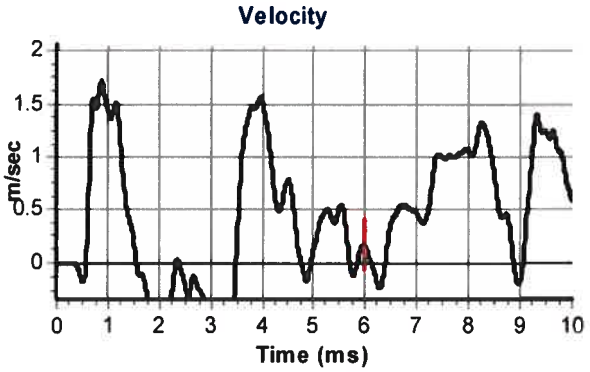
SPT Hammer Information

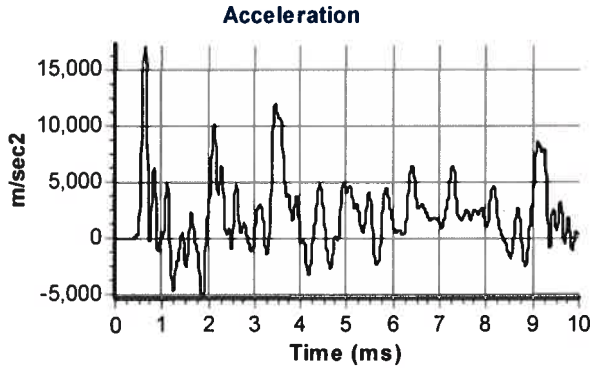
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	18.0

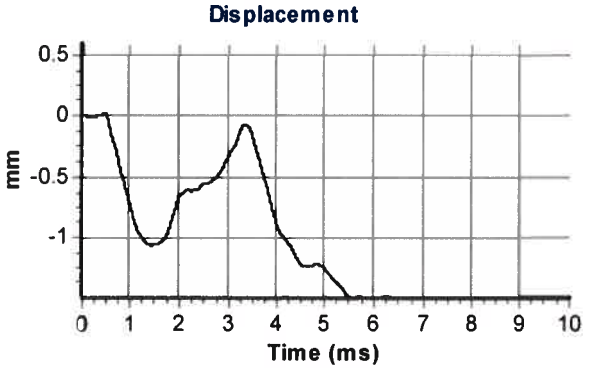
Comments / Location

Test undertaken at GeoSonic test facility.









Calculations

Area of Rod A (mm2):	1011
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	335

Energy Ratio E_r (%): **71**

Signed: Callum Whitelaw
Title: Contracts Manager

KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

 Made Ground	 Topsoil	 Clay
 Gravel	 Sand	 Silt
 Peat	 Boulders	 Cobbles
 Chalk	 Conglomerate	 Volcaniclastic
 Asphalt	 Void	 Mudstone
 Siltstone	 Sandstone	 Limestone
 Ironstone	 Mudstone / Siltstone	 Breccia
 Coal	 Coral	 Bedrock
 Shale	 Gypsum	 Igneous (Coarse Grained)
 Igneous (Fine Grained)	 Igneous (Medium Grained)	 Metamorphic (Coarse Grained)
 Metamorphic (Fine Grained)	 Metamorphic (Medium Grained)	

INSTALLATION / BACKFILL DETAILS

 Arisings	 Concrete	 Bentonite cement grout
 Bentonite seal	 Filter	 Pea Gravel
 Plain pipe	 Slotted pipe	Piezometer / Standpipe tip

NOTE:
Legend symbols in accordance with BS 5930 (2015)

Quantum Geotech

KEY TO BOREHOLE AND TRIAL PIT LOGS

m.A.O.D. metres Above Ordnance Datum.

SAMPLE AND TEST TYPES

U	Undisturbed driven tube sample - 102mm diameter, 450mm long.
P	Undisturbed pushed piston sample - 102mm diameter, 1000mm long.
TW	Undisturbed thin walled push in sample - 100mm diameter, 750mm long.
B	Bulk disturbed sample.
BLK	Block Sample
CBR	Heavy duty undisturbed sample - 154 mm diameter (CBR mould).
D	Small disturbed sample.
LB	Large Bulk disturbed sample (for earthworks testing)
C	Core sample
W	Water sample
G	Gas sample
ES	Environmental sample (soil)
j	Jar sample
t	Tub sample
p	Pot sample
s	Small sample
v	Vial sample
S	Standard Penetration Test using split spoon sampler. (See Note).
C	Standard Penetration Test using a solid 60 degree cone. (See Note).

NOTE: Where a single value is quoted this is the N value for 300 mm penetration following a seating drive of 150 mm. Where this full penetration is not achieved the number of blows is quoted for the penetration below the seating drive eg. 63/160 mm.
Where total penetration is less than the seating drive this is indicated by a + and the number of blows for total penetration is quoted eg. +50/75 mm.

HV	Hand Vane Test. Vane undrained shear strength, c_u, quoted in kPa.
V	Borehole Vane Test. Vane undrained shear strength, c_u, quoted in kPa.
FHT/RHT	Falling / Rising Head Permeability Test.

CORE RUN DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
FI	Fracture Index. NI - Non intact where > 25 No. per metre length.

WATER COLUMN SYMBOLS

	First water strike, second water strike etc.
	Standing water level after first strike, second strike etc.
	Seepage.

NOTE:
Legend symbols in accordance with BS 5930 (2015)

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APPENDIX III – **TRIAL PIT LOGS**

Contract : Garnswllt WWTW

Client : JN Bentley

Trial Pit No. TP01

Dates : 1/3/23 - 1/3/23

Location :

Job Number : Q1031

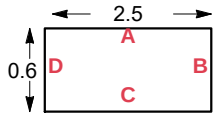
Engineer : Mott MacDonald

Ground Level : 18.86 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262196.44 E 210040.76 N *Co-ordinates to Local Grid*

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Strata Description	Legend	Red. Level A.O.D.	WATER
	0.20 - 0.50	B1			0.70	MADE GROUND - Brown gravelly SILT with high cobble and boulder content. Gravel is fine to coarse angular to sub-rounded sandstone, concrete and tarmac. Cobbles and boulders are angular concrete and curb stones.			
	0.20 -	ES1							
	0.50 -	D1							
		ES2			0.70	MADE GROUND - Dark grey and brown very silty GRAVEL with high cobble content. Gravel is fine to coarse angular to rounded slag and sandstone. Cobbles are angular to sub-rounded sandstone and concrete.		18.16	
	0.90 - 1.10	B2							
1	1.00 -	ES3			0.80				
					1.50	Greyish brown very silty slightly gravelly SAND with medium to high cobble content. Gravel is fine to coarse rounded to sub-rounded sandstone. Sand is fine to medium. Cobbles are sub-rounded sandstone.		17.36	
	1.60 - 1.80	B3							
	1.70 -	D2							
		ES4							
2					1.50	..... below 2.5mbgl slightly silty very gravelly SAND			
	2.60 - 2.80	B4							
	2.70 -	D3							
3					3.00	Stiff brown, locally orange, slightly sandy slightly gravelly CLAY. Gravel is fine to coarse rounded sandstone.		15.86	
	3.40 - 3.60	B5			0.80				
	3.50 -	D4	3.5	Vane - P=13 - R=5kN/m2 Vane - P=14 - R=4kN/m2					
	3.80 - 4.00	B6			3.80	Brown very silty slightly sandy GRAVEL with medium cobble content. Gravel is fine to coarse sub-rounded to rounded sandstone and quartzitic sandstone. Cobbles are rounded to sub-rounded sandstone.		15.06	
4					0.20				
					4.00	Terminated at 4.0mbgl. Full reach of excavator		14.86	

PLAN



Groundwater: Seepage below 3.8mbgl

Stability: Unstable between 1.5 and 3.0mbgl

Shoring: N/A

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground.

Equipment Used: JCB 3CX

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Operator:	Logged By.	Sheet No.	m Per Page	
J Jones	P Darby	1 Of 3	5	All measurements in metres unless otherwise stated

AGS

Contract : Garnswllt WWTW Client : JN Bentley		Trial Pit No. TP01
Dates : 1/3/23 - 1/3/23 Location :	Job Number : Q1031 Engineer : Mott MacDonald	Ground Level : 18.86 m A.O.D. *Level to Ordnance Datum* Coordinates: 262196.44 E 210040.76 N *Co-ordinates to Local Grid*

Contract : Garnswllt WWTW Client : JN Bentley		Trial Pit No. TP01
Dates : 1/3/23 - 1/3/23 Location :	Job Number : Q1031 Engineer : Mott MacDonald	Ground Level : 18.86 m A.O.D. *Level to Ordnance Datum* Coordinates: 262196.44 E 210040.76 N *Co-ordinates to Local Grid*

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AGS

Contract : Garnswllt WWTW

Client : JN Bentley

Trial Pit No. TP02

Dates : 1/3/23 - 1/3/23

Location :

Job Number : Q1031

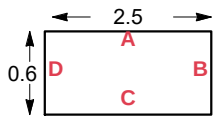
Engineer : Mott MacDonald

Ground Level : 19.17 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262202.42 E 210070.78 N *Co-ordinates to Local Grid*

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thick-ness)	Strata Description	Legend	Red. Level A.O.D.	WATER
	0.20 - 0.50	B1			0.90	MADE GROUND - Brown gravelly SILT with high cobble and boulder content. Gravel is fine to coarse angular to sub-rounded sandstone, concrete and tarmac. Cobbles and boulders are angular concrete and curb stones.			
	0.20 -	ES1							
	0.50 -	D1							
		ES2							
	0.90 - 1.10	B2			0.90	MADE GROUND - Grey and brown slightly silty GRAVEL with high cobble content. Gravel is coarse angular slag. Cobbles are angular slag.		18.27	
1	1.00 -	ES3			0.40				
	1.40 - 1.60	B3			1.30	Firm greyish brown slightly sandy slightly gravelly clayey SILT. Gravel is fine to coarse rounded sandstone and occasional fine to medium angular coal. Sand is fine.		17.87	
	1.50 -	D2			0.50				
		ES4							
					1.80	Greyish brown very sandy GRAVEL with low cobble content. Gravel is fine to coarse sub-rounded to rounded sandstone, quartzitic sandstone and mudstone. Cobbles are sub-rounded sandstone. Sand is fine to coarse.		17.37	
2	2.00 - 2.20	B4			1.60				
3	3.00 - 3.20	B5							
					3.40	Terminated at 3.4mbgl due to significant instability		15.77	

PLAN



Groundwater: Seepage below 3.2mbgl.

Stability: Significant instability below 1.8mbgl

Shoring: N/A

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground.

Equipment Used: JCB 3CX

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J Jones	P Darby	1 Of 3	5	All measurements in metres unless otherwise stated

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Contract : Garnswllt WWTW **Client : JN Bentley**		**Trial Pit No.** **TP02**
Dates : 1/3/23 - 1/3/23 Location :	Job Number : Q1031 Engineer : Mott MacDonald	Ground Level : 19.17 m A.O.D. *Level to Ordnance Datum* Coordinates: 262202.42 E 210070.78 N *Co-ordinates to Local Grid*

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J Jones	P Darby	2 Of 3		All measurements in metres unless otherwise stated

Contract : Garnswllt WWTW Client : JN Bentley		Trial Pit No. TP02
Dates : 1/3/23 - 1/3/23 Location :	Job Number : Q1031 Engineer : Mott MacDonald	Ground Level : 19.17 m A.O.D. *Level to Ordnance Datum* Coordinates: 262202.42 E 210070.78 N *Co-ordinates to Local Grid*

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Contract : Garnswllt WWTW

Client : JN Bentley

Trial Pit No. TP03

Dates : 1/3/23 - 1/3/23

Location :

Job Number : Q1031

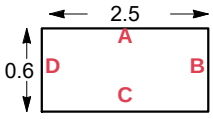
Engineer : Mott MacDonald

Ground Level : 19.13 m A.O.D. *Level to Ordnance Datum*

Coordinates: 262202.42 E 210098.85 N *Co-ordinates to Local Grid*

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Strata Description	Strata Legend	Strata Red. Level A.O.D.	WATER
	0.05 -	D1			0.10	MADE GROUND - Dark brown organic SILT with many rootlets (TOPSOIL)			
		ES1			0.10			19.03	
	0.20 - 0.50	B1				MADE GROUND - Greyish brown clayey slightly gravelly organic SILT. Gravel is fine to coarse sub-rounded to sub-angular sandstone, mudstone and quartz.			
	0.30 -	D2							
		ES2			0.70				
	0.80 - 1.20	B2			0.80	MADE GROUND - Grey and brown slightly silty GRAVEL with high cobble content. Gravel is coarse angular slag. Cobbles are angular slag.		18.33	
1	1.00 -	ES3			0.40				
					1.20	Firm greyish brown slightly sandy slightly gravelly clayey SILT. Gravel is fine to coarse rounded sandstone and occasional fine to medium angular coal. Sand is fine.		17.93	
	1.40 - 1.60	B3							
	1.50 -	D3							
		ES4			0.80				
2					2.00	Soft orangeish brown slightly silty very sandy slightly gravelly CLAY. Gravel is fine to coarse rounded sandstone.		17.13	
	2.40 - 2.60	B4							
	2.50 -	D4	2.5	Vane - P=13 - R=3kN/m2 Vane - P=15 - R=0kN/m2 Vane - P=16 - R=0kN/m2					
3					2.00				
	3.40 - 3.60	B5							
	3.50 -	D5	3.5	Vane - P=13 - R=0kN/m2 Vane - P=18 - R=0kN/m2 Vane - P=16 - R=0kN/m2					
4					4.00	Terminated at 4.0mbgl. Full reach of excavator		15.13	

PLAN



Groundwater:

Stability: Stable

Shoring: N/A

Remarks: Set out in liaison with Client. PAS survey undertaken by Client prior to breaking ground. No groundwater Encountered

Equipment Used: JCB 3CX

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Contract : Garnswllt WWTW Client : JN Bentley		Trial Pit No. TP03
Dates : 1/3/23 - 1/3/23 Location :	Job Number : Q1031 Engineer : Mott MacDonald	Ground Level : 19.13 m A.O.D. *Level to Ordnance Datum* Coordinates: 262202.42 E 210098.85 N *Co-ordinates to Local Grid*

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Contract : Garnswllt WWTW Client : JN Bentley		Trial Pit No. TP03
Dates : 1/3/23 - 1/3/23 Location :	Job Number : Q1031 Engineer : Mott MacDonald	Ground Level : 19.13 m A.O.D. *Level to Ordnance Datum* Coordinates: 262202.42 E 210098.85 N *Co-ordinates to Local Grid*

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J Jones	P Darby	3 Of 3		All measurements in metres unless otherwise stated

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KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

 Made Ground	 Topsoil	 Clay
 Gravel	 Sand	 Silt
 Peat	 Boulders	 Cobbles
 Chalk	 Conglomerate	 Volcaniclastic
 Asphalt	 Void	 Mudstone
 Siltstone	 Sandstone	 Limestone
 Ironstone	 Mudstone / Siltstone	 Breccia
 Coal	 Coral	 Bedrock
 Shale	 Gypsum	 Igneous (Coarse Grained)
 Igneous (Fine Grained)	 Igneous (Medium Grained)	 Metamorphic (Coarse Grained)
 Metamorphic (Fine Grained)	 Metamorphic (Medium Grained)	

INSTALLATION / BACKFILL DETAILS

 Arisings	 Concrete	 Bentonite cement grout
 Bentonite seal	 Filter	 Pea Gravel
 Plain pipe	 Slotted pipe	Piezometer / Standpipe tip

NOTE:
Legend symbols in accordance with BS 5930 (2015)

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KEY TO BOREHOLE AND TRIAL PIT LOGS

m.A.O.D. metres Above Ordnance Datum.

SAMPLE AND TEST TYPES

U	Undisturbed driven tube sample - 102mm diameter, 450mm long.
P	Undisturbed pushed piston sample - 102mm diameter, 1000mm long.
TW	Undisturbed thin walled push in sample - 100mm diameter, 750mm long.
B	Bulk disturbed sample.
BLK	Block Sample
CBR	Heavy duty undisturbed sample - 154 mm diameter (CBR mould).
D	Small disturbed sample.
LB	Large Bulk disturbed sample (for earthworks testing)
C	Core sample
W	Water sample
G	Gas sample
ES	Environmental sample (soil)
j	Jar sample
t	Tub sample
p	Pot sample
s	Small sample
v	Vial sample
S	Standard Penetration Test using split spoon sampler. (See Note).
C	Standard Penetration Test using a solid 60 degree cone. (See Note).

NOTE: Where a single value is quoted this is the N value for 300 mm penetration following a seating drive of 150 mm. Where this full penetration is not achieved the number of blows is quoted for the penetration below the seating drive eg. 63/160 mm.
Where total penetration is less than the seating drive this is indicated by a + and the number of blows for total penetration is quoted eg. +50/75 mm.

HV	Hand Vane Test. Vane undrained shear strength, c_u, quoted in kPa.
V	Borehole Vane Test. Vane undrained shear strength, c_u, quoted in kPa.
FHT/RHT	Falling / Rising Head Permeability Test.

CORE RUN DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
FI	Fracture Index. NI - Non intact where > 25 No. per metre length.

WATER COLUMN SYMBOLS

	First water strike, second water strike etc.
	Standing water level after first strike, second strike etc.
	Seepage.

NOTE:
Legend symbols in accordance with BS 5930 (2015)

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APPENDIX IV – **TRL DCP RESULTS**

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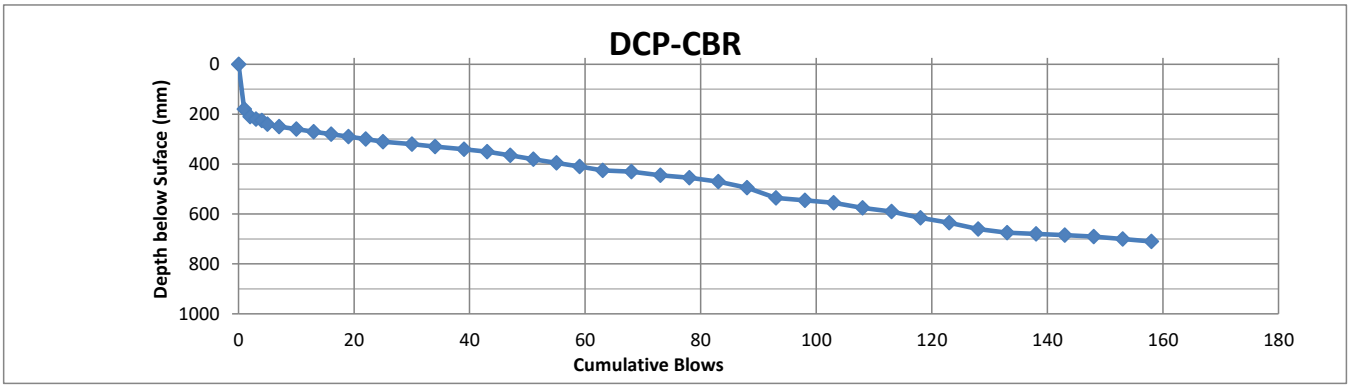
Determination of Equivalent CBR using TRL Dynamic Cone Penetrometer DCP
CBR Relationship based on Kleyn & Van Heerden (60° Cone) - TRL, DMRB HD 29/08 & TP 12

Client Name:	J N Bentley			
Contract Name:	Garnswllt WWTW	**Contract No.:**		Q1066

Site Reference:	DCP01	Lab. Reference:	n/a	Date Tested:	01/03/2023
Sample Location:	DCP01				
Supplier:	In-Situ	Source:		n/a	
Depth Start of Test (mm)	0	Tested By:		PD	



CBR Relationship - TRL Equation $Log_{10}(CBR) = 2.48-1.057*Log_{10}(Peneration\ Rate)$

Layer No.	Number of Blows		Penetration (mm)		Rate of Penetration (mm/blow)	Equilavent CBR (%)	Remarks
	Start	Finish	Start	Finish			
1	1	5	180	240	15.00	17	
2	5	93	240	535	3.35	84	
3	93	113	535	675	7.00	39	
4	113	158	675	710	0.78	394	

Signed: *Phil Darby*
Position: Principal Engineering Geologist
Dated: 01 March 2023

Quantum Geotech

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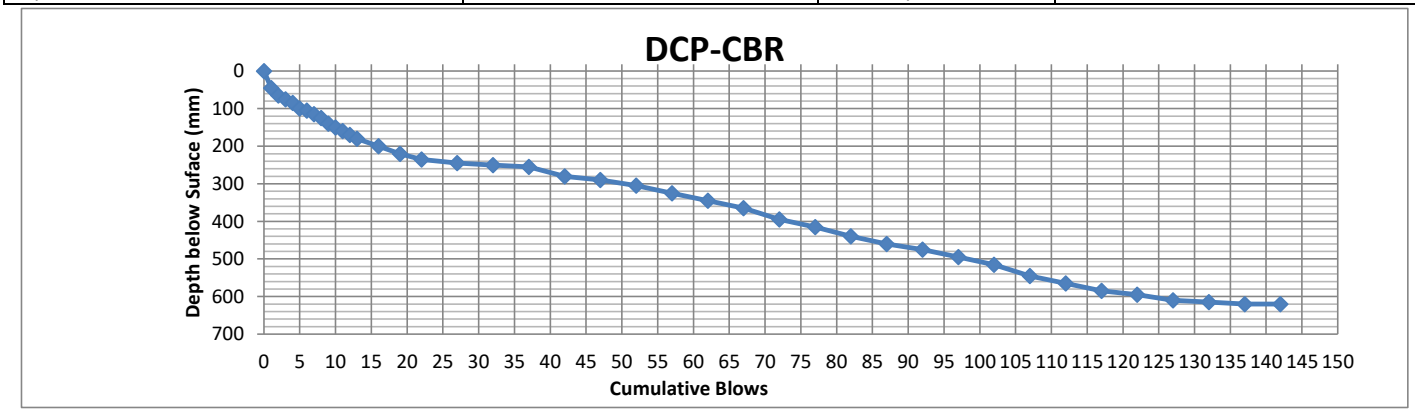
Tel.: 01554 744880

Determination of Equivalent CBR using TRL Dynamic Cone Penetrometer DCP
CBR Relationship based on Kleyn & Van Heerden (60° Cone) - TRL, DMRB HD 29/08 & TP 12

Client Name:	J N Bentley		
Contract Name:	Garnswllt WWTW	**Contract No.:**	Q1066

Site Reference:	DCP02	Lab. Reference:	n/a	Date Tested:	01/03/2023
Sample Location:	DCP02				
Supplier:	In-Situ	Source:		n/a	
Depth Start of Test (mm)	0	Tested By:		PD	



CBR Relationship - TRL Equation $Log_{10}(CBR) = 2.48-1.057*Log_{10}(Peneration\ Rate)$

Layer No.	Number of Blows		Penetration (mm)		Rate of Penetration (mm/blow)	Equilavent CBR (%)	Remarks
	Start	Finish	Start	Finish			
1	0	19	0	220	11.58	23	
2	19	37	220	255	1.94	150	
	37	127	255	610	3.94	71	
	127	137	610	620	1.00	302	

Signed: *Phil Darby*
Position: Principal Engineering Geologist
Dated: 01 March 2023

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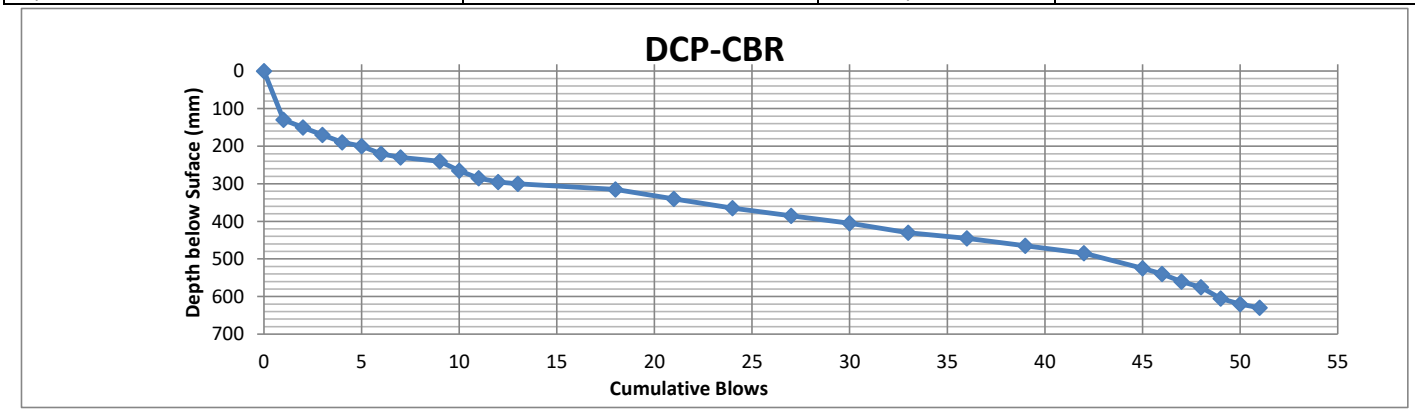
Determination of Equivalent CBR using TRL Dynamic Cone Penetrometer DCP
CBR Relationship based on Kleyn & Van Heerden (60° Cone) - TRL, DMRB HD 29/08 & TP 12

Client Name:	J N Bentley		
Contract Name:	Garnswllt WWTW	**Contract No.:**	Q1066

Site Reference:	DCP03	Lab. Reference:	n/a	Date Tested:	01/03/2023
Sample Location:	DCP03				
Supplier:	In-Situ	Source:		n/a	
Depth Start of Test (mm)	0	Tested By:		PD	



CBR Relationship - TRL Equation $Log_{10}(CBR) = 2.48-1.057*Log_{10}(Peneration\ Rate)$

Layer No.	Number of Blows		Penetration (mm)		Rate of Penetration (mm/blow)	Equilavent CBR (%)	Remarks
	Start	Finish	Start	Finish			
1	1	12	130	295	15.00	17	
2	12	18	295	315	3.33	85	
3	12	42	315	485	5.67	48	
4	42	51	485	630	16.11	16	

Signed: *Phil Darby*
Position: Principal Engineering Geologist
Dated: 01 March 2023

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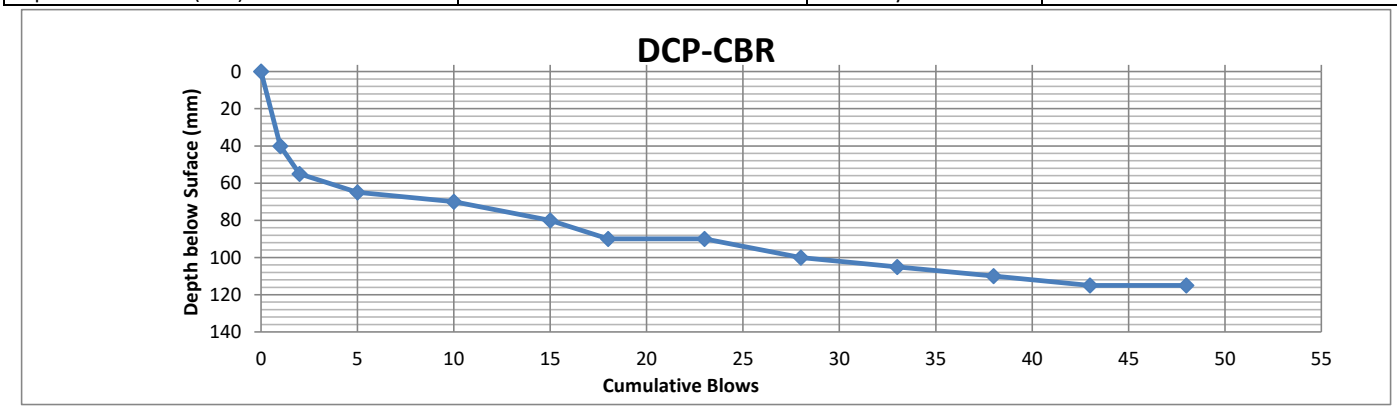
Determination of Equivalent CBR using TRL Dynamic Cone Penetrometer DCP
CBR Relationship based on Kleyn & Van Heerden (60° Cone) - TRL, DMRB HD 29/08 & TP 12

Client Name:	J N Bentley		
Contract Name:	Garnswllt WWTW	**Contract No.:**	Q1066

Site Reference:	DCP01	Lab. Reference:	n/a	Date Tested:	01/03/2023
Sample Location:	DCP01				
Supplier:	In-Situ	Source:		n/a	
Depth Start of Test (mm)	0	Tested By:		PD	



CBR Relationship - TRL Equation $Log_{10}(CBR) = 2.48-1.057*Log_{10}(Peneration\ Rate)$

Layer No.	Number of Blows		Penetration (mm)		Rate of Penetration (mm/blow)	Equilavent CBR (%)	Remarks
	Start	Finish	Start	Finish			
1	0	2	0	55	27.50	9	
2	2	18	55	90	2.19	132	
3	18	43	90	115	1.00	302	

Signed: *Phil Darby*
Position: Principal Engineering Geologist
Dated: 01 March 2023

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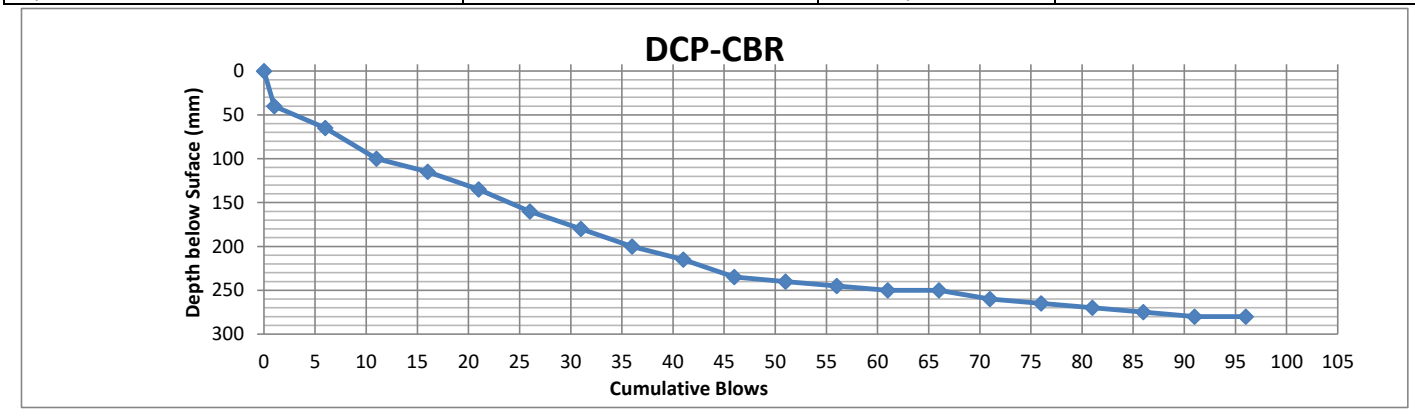
Tel.: 01554 744880

Determination of Equivalent CBR using TRL Dynamic Cone Penetrometer DCP
CBR Relationship based on Kleyn & Van Heerden (60° Cone) - TRL, DMRB HD 29/08 & TP 12

Client Name:	J N Bentley		
Contract Name:	Garnswllt WWTW	**Contract No.:**	Q1066

Site Reference:	DCP05	Lab. Reference:	n/a	Date Tested:	01/03/2023
Sample Location:	DCP05				
Supplier:	In-Situ	Source:		n/a	
Depth Start of Test (mm)	0	Tested By:		PD	



CBR Relationship - TRL Equation $Log_{10}(CBR) = 2.48-1.057*Log_{10}(Peneration\ Rate)$

Layer No.	Number of Blows		Penetration (mm)		Rate of Penetration (mm/blow)	Equilavent CBR (%)	Remarks
	Start	Finish	Start	Finish			
1	1	46	40	235	4.33	64	
2	46	91	235	280	1.00	302	

Signed: *Phil Darby*
Position: Principal Engineering Geologist
Dated: 01 March 2023

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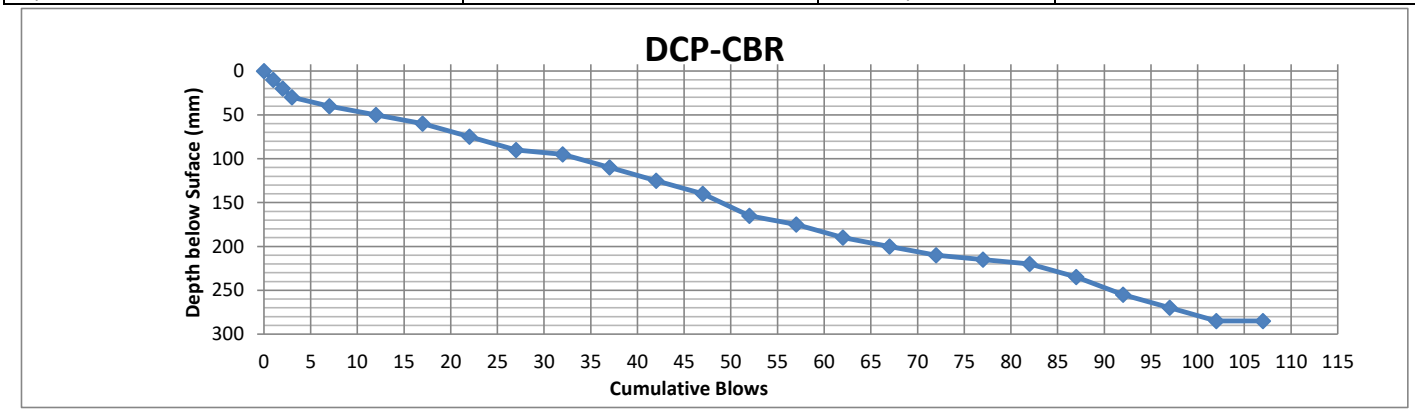
Tel.: 01554 744880

Determination of Equivalent CBR using TRL Dynamic Cone Penetrometer DCP
CBR Relationship based on Kleyn & Van Heerden (60° Cone) - TRL, DMRB HD 29/08 & TP 12

Client Name:	J N Bentley		
Contract Name:	Garnswllt WWTW	**Contract No.:**	Q1066

Site Reference:	DCP06	Lab. Reference:	n/a	Date Tested:	01/03/2023
Sample Location:	DCP06				
Supplier:	In-Situ	Source:		n/a	
Depth Start of Test (mm)	0	Tested By:		PD	



CBR Relationship - TRL Equation $Log_{10}(CBR) = 2.48-1.057*Log_{10}(Peneration\ Rate)$

Layer No.	Number of Blows		Penetration (mm)		Rate of Penetration (mm/blow)	Equilavent CBR (%)	Remarks
	Start	Finish	Start	Finish			
1	0	3	0	30	10.00	26	
2	3	72	30	210	2.61	110	
3	72	102	210	285	2.50	115	

Signed: *Phil Darby*
Position: Principal Engineering Geologist
Dated: 01 March 2023

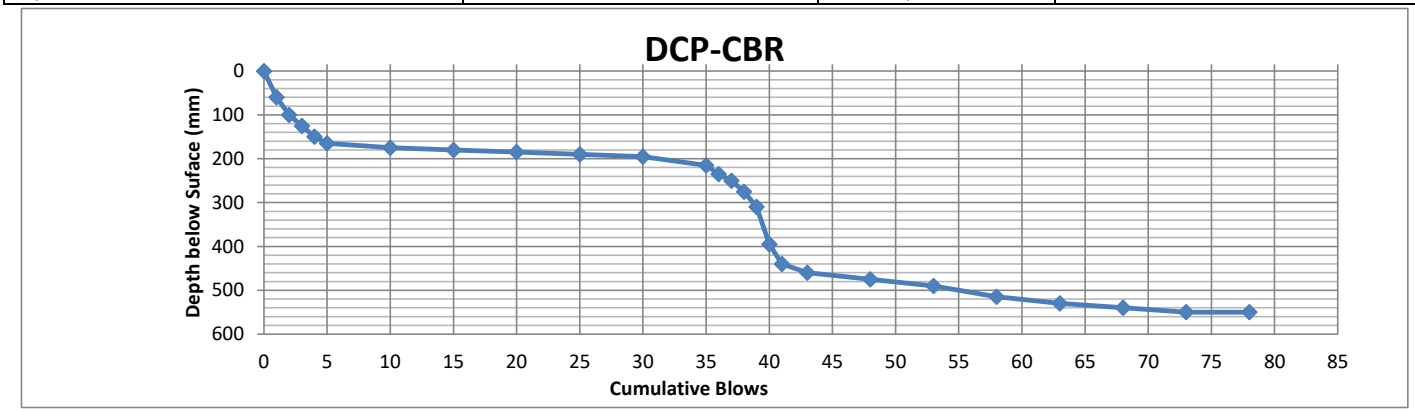
Quantum Geotech

Plas Newydd, Llanedi
Pontarddulais, Swansea
SA4 0FQ
Tel.: 01554 744880

Determination of Equivalent CBR using TRL Dynamic Cone Penetrometer DCP
CBR Relationship based on Kleyn & Van Heerden (60° Cone) - TRL, DMRB HD 29/08 & TP 12

Client Name:	J N Bentley		
Contract Name:	Garnswllt WWTW	**Contract No.:**	Q1066

Site Reference:	DCP07	Lab. Reference:	n/a	Date Tested:	01/03/2023
Sample Location:	DCP07				
Supplier:	In-Situ	Source:		n/a	
Depth Start of Test (mm)	0	Tested By:		PD	



CBR Relationship - TRL Equation $Log_{10}(CBR) = 2.48-1.057*Log_{10}(Peneration\ Rate)$

Layer No.	Number of Blows		Penetration (mm)		Rate of Penetration (mm/blow)	Equilavent CBR (%)	Remarks
	Start	Finish	Start	Finish			
1	0	5	0	165	33.00	7	
2	5	32	165	215	1.85	157	
3	32	41	215	440	25.00	10	
4	41	73	440	550	3.44	82	

Signed: *Phil Darby*
Position: Principal Engineering Geologist
Dated: 01 March 2023

APPENDIX V – **VARIABLE HEAD TEST RESULTS**

Variable Head Test Results

Contract Number:	Q1031
Contract Name:	Garnswllt WTW
Borehole Number:	BH01A
Date of test:	09/03/2023
Test Number:	1
Type:	Rising Head Test

Groundwater level prior to test start:	1.23	
Top of test zone:	2.50	mbgl
Base of test zone:	8.50	mbgl
Internal diameter of casing/standpipe:	150	mm
Length of test section (L) =	6.00	m
Diameter of test section (D) =	0.150	m
L/D =	40.000	

Time (t) 00:00	Time Elapsed (t - t0) mins	Water Depth m	Head h(t) m	Head Ratio h0/h(t)	Head Ratio ln[h0/h(t)]
	0	**36ltr of water pumped from borehole over 5 minute period. Unable to lower head of water in borehole.**			
	1				
	2				
	3				
	4				
	5				
	10				
	15				
	20				
	25				
	30				
	45				
	60				

$$k = \alpha \cdot S / F$$

BS EN ISO 22282-2:2012

α	Gradient of graph	1/min 1/sec
S	Internal cross-section	m^2
F	Shape Factor	m

k =	**m/s**

Variable Head Test Results

Contract Number:	Q1031
Contract Name:	Garnswllt WTW
Borehole Number:	BH02A (50mm standpipe)
Date of test:	09/03/2023
Test Number:	1
Type:	Rising Head Test

Groundwater level prior to test start:	1.40	
Top of test zone:	2.50	mbgl
Base of test zone:	8.50	mbgl
Internal diameter of casing/standpipe:	150	mm
Length of test section (L) =	6.00	m
Diameter of test section (D) =	0.150	m
L/D =	40.000	

Time (t) 00:00	Time Elapsed (t - t0) mins	Water Depth m	Head h(t) m	Head Ratio h0/h(t)	Head Ratio ln[h0/h(t)]
	0	**36ltr of water pumped from borehole over 5 minute period. Unable to lower head of water in borehole.**			
	1				
	2				
	3				
	4				
	5				
	10				
	15				
	20				
	25				
	30				
	45				
	60				

$$k = \alpha \cdot S / F$$

BS EN ISO 22282-2:2012

α	Gradient of graph	1/min 1/sec
S	Internal cross-section	m^2
F	Shape Factor	m

k =	**m/s**

Variable Head Test Results

Contract Number:	Q1031
Contract Name:	Garnswllt WTW
Borehole Number:	BH03
Date of test:	09/03/2023
Test Number:	1
Type:	Rising Head Test

Groundwater level prior to test start:	3.53	
Top of test zone:	2.00	mbgl
Base of test zone:	8.50	mbgl
Internal diameter of casing/standpipe:	150	mm
Length of test section (L) =	6.50	m
Diameter of test section (D) =	0.150	m
L/D =	43.333	

Time (t) 00:00	Time Elapsed (t - t0) mins	Water Depth m	Head h(t) m	Head Ratio h0/h(t)	Head Ratio ln[h0/h(t)]
	0	**36ltr of water pumped from borehole over 5 minute period. Unable to lower head of water in borehole.**			
	1				
	2				
	3				
	4				
	5				
	10				
	15				
	20				
	25				
	30				
	45				
	60				

$$k = \alpha \cdot S / F$$

BS EN ISO 22282-2:2012

α	Gradient of graph	1/min 1/sec
S	Internal cross-section	m^2
F	Shape Factor	m

k =	**m/s**

Variable Head Test Results

Contract Number:	Q1031
Contract Name:	Garnswllt WTW
Borehole Number:	BHSD01
Date of test:	25/04/2023
Test Number:	1
Type:	Falling Head Test

Groundwater level prior to test start:	12.70	
Top of test zone:	2.00	mbgl
Base of test zone:	16.50	mbgl
Internal diameter of casing/standpipe:	50	mm
Length of test section (L) =	14.50	m
Diameter of test section (D) =	0.150	m
L/D =	96.667	

Time (t) 00:00	Time Elapsed (t - t0) mins	Water Depth m	Head h(t) m	Head Ratio h0/h(t)	Head Ratio ln[h0/h(t)]
	0	**Unable to raise head of water in borehole.**			
	1				
	2				
	3				
	4				
	5				
	10				
	15				
	20				
	25				
	30				
	45				
	60				

$$k = \alpha \cdot S / F$$

BS EN ISO 22282-2:2012

α	Gradient of graph	1/min 1/sec
S	Internal cross-section	m^2
F	Shape Factor	m

k =	**m/s**

Variable Head Test Results

Contract Number:	Q1031
Contract Name:	Garsnwllt WTW
Borehole Number:	BHSD02
Date of test:	25/04/2023
Test Number:	1
Type:	Falling Head Test

Groundwater level prior to test start:	1.73	
Top of test zone:	6.00	mbgl
Base of test zone:	15.50	mbgl
Internal diameter of casing/standpipe:	150	mm
Length of test section (L) =	9.50	m
Diameter of test section (D) =	0.150	m
L/D =	63.333	

Time (t) 00:00	Time Elapsed (t - t0) mins	Water Depth m	Head h(t) m	Head Ratio h0/h(t)	Head Ratio ln[h0/h(t)]
	0	1.52	0.21	1.0000	0.0000
	1	1.72	0.01	21.0000	3.0445
	2				
	3				
	4				
	5				
	10				
	15				
	20				
	25				
	30				
	45				
	60				

$$k = \alpha \cdot S / F$$

BS EN ISO 22282-2:2012

α	Gradient of graph	3.044	1/min
		0.05073333	1/sec
S	Internal cross-section	0.01767146	m²
F	Shape Factor	12.3287	m

k =	**7.27E-05**	**m/s**

Variable Head Test Results

Contract Number:	Q1031
Contract Name:	Garnswllt WTW
Borehole Number:	BHSDS03
Date of test:	25/04/2023
Test Number:	1
Type:	Falling Head Test

Groundwater level prior to test start:	2.27	
Top of test zone:	3.00	mbgl
Base of test zone:	12.50	mbgl
Internal diameter of casing/standpipe:	150	mm
Length of test section (L) =	9.50	m
Diameter of test section (D) =	0.150	m
L/D =	63.333	

Time (t) 00:00	Time Elapsed (t - t0) mins	Water Depth m	Head h(t) m	Head Ratio h0/h(t)	Head Ratio ln[h0/h(t)]
	0	1.80	0.47	1.0000	0.0000
	1	2.26	0.01	47.0000	3.8501
	2	2.27	0.00		
	3				
	4				
	5				
	10				
	15				
	20				
	25				
	30				
	45				
	60				

$$k = \alpha \cdot S / F$$

BS EN ISO 22282-2:2012

α	Gradient of graph	3.8501	1/min
		0.06416833	1/sec
S	Internal cross-section	0.01767146	m²
F	Shape Factor	12.3287	m

k =	**9.20E-05**	**m/s**

Variable Head Test Results

Contract Number:	Q1031
Contract Name:	Garnswllt WTW
Borehole Number:	BHSD04
Date of test:	25/04/2023
Test Number:	1
Type:	Falling Head Test

Groundwater level prior to test start:	4.14	
Top of test zone:	6.00	mbgl
Base of test zone:	17.00	mbgl
Internal diameter of casing/standpipe:	150	mm
Length of test section (L) =	11.00	m
Diameter of test section (D) =	0.150	m
L/D =	73.333	

Time (t) 00:00	Time Elapsed (t - t0) mins	Water Depth m	Head h(t) m	Head Ratio h0/h(t)	Head Ratio ln[h0/h(t)]
	0	3.60	0.54	1.0000	0.0000
	1	4.13	0.01	54.0000	3.9890
	2				
	3				
	4				
	5				
	10				
	15				
	20				
	25				
	30				
	45				
	60				

$$k = \alpha \cdot S / F$$

BS EN ISO 22282-2:2012

α	Gradient of graph	3.989	1/min
		0.06648333	1/sec
S	Internal cross-section	0.01767146	m²
F	Shape Factor	13.8558	m

k =	**8.48E-05**	**m/s**

APPENDIX VI – **GAS AND GROUNDWATER MONITORING RESULTS**

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Garnswllt wwtw
Project No.:	Q1031
BH/TP No.:	BH01A
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
16.6	A	50mm standpipe	9.00	2.5 - 8.5

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level		HoleDepth		Local Weather		Remarks
											mbgl	mAOD	mbgl	mAOD	Recent	Current	
A	31.03.23		986	-0.01	0.2	0.3	1.0	19.4	2	0	0.93	15.67	8.87	7.73	Dry	Dry	
A	04.04.23		1031	0.32	-11.4	0.2	0.6	20.0	0	0	1.51	15.09	8.71	7.89	Rain	Overcast	
A	11.04.23		1013	0.14	0.5	0.3	0.7	19.7	1	0	1.60	15.00	8.65	7.95	Rain	Rain	
A	18.04.23		1030	-0.07	-5.0	0.3	0.6	19.8	1	0	1.68	14.92	8.58	8.02	Dry	Dry	
A	25.04.23		1021	0.04	0.1	0.3	0.4	19.5	1	0	1.81	14.79	8.56	8.04	Dry	Dry	
A	4.05.23		1009	-0.22	1.1	0.3	0.1	20.8	0	0	1.92	14.68	8.60	8.00	Dry	Dry	
A	11.05.23		1016	-1.03	0.4	0.3	0.2	20.7	1	0	1.74	14.86	8.60	8.00	Sunny	Sunny	
A	18.05.23		1029	-0.34	0.3	0.0	0.1	20.9	0	0	1.90	14.70	8.62	7.98	Sunny	Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Garnswllt wwtw
Project No.:	Q1031
BH/TP No.:	BH02A
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
16.62	B	50mm standpipe	9.00	2.5 - 8.5
	A	19mm Standpipe	3.50	2.5 - 3.5

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level		HoleDepth		Local Weather		Remarks
											mbgl	mAOD	mbgl	mAOD	Recent	Current	
B	31.03.23		986	-0.01								16.62		16.62	Dry	Dry	Unable to monitor, Area flooded
B	04.04.23		1031	0.32	0.0	0.2	0.1	20.0	0	0	1.38	15.24	8.54	8.08	Rain	Overcast	
B	11.04.23		1013	0.14	0.0	0.3	0.1	18.9	0	0	1.46	15.16	8.52	8.10	Rain	Rain	
B	18.04.23		1030	-0.07	0.0	0.3	0.4	19.4	0	0	1.56	15.06	8.50	8.12	Dry	Dry	
B	25.04.23		1021	0.04	0.0	0.3	0.1	19.9	0	0	1.69	14.93	8.55	8.07	Dry	Dry	
B	4.05.23		1009	-0.22	0.1	0.3	0.2	20.5	0	0	1.78	14.84	8.56	8.06	Dry	Dry	
B	11.05.23		1016	-1.03	0.1	0.3	0.1	20.1	1	0	1.63	14.99	8.56	8.06	Sunny	Sunny	
A	11.05.23		1016	-1.03	0.1	0.5	0.0	17.6	2	0	1.57	15.05	3.18	13.44	Sunny	Sunny	
B	18.05.23		1029	-0.34	0.2	0	0.1	20.5	0	0	1.77	14.85	8.56	8.06	Sunny	Sunny	
A	18.05.23		1029	-0.34	0.2	0	0.4	19.3	0	0	1.74	14.88	3.18	13.44	Sunny	Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Garnswllt wwtw
Project No.:	Q1031
BH/TP No.:	BH3
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
19.26	A	50mm standpipe	9.00	2.00 - 8.50

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level		HoleDepth		Local Weather		Remarks
											mbgl	mAOD	mbgl	mAOD	Recent	Current	
A	31.03.23		986	-0.01	0.3	7.2	0.9	4.9	0	0	3.37	15.89	8.59	10.67	Dry	Dry	
A	04.04.23		1031	0.32	0.1	0.5	0.7	17.8	0	0	3.93	15.33	8.60	10.66	Rain	Overcast	
A	11.04.23		1013	0.14	0.2	11.9	2.4	1.6	0	0	3.99	15.27	8.59	10.67	Rain	Rain	
A	18.04.23		1030	-0.07	0.2	22.6	3.0	0.3	0	0	4.10	15.16	8.58	10.68	Dry	Dry	
A	25.04.23		1021	0.04	0.2	33.7	3.3	3.6	0	0	4.19	15.07	8.55	10.71	Dry	Dry	
A	4.05.23		1009	-0.22	0.4	39.6	5.8	3.2	0	0	4.32	14.94	8.57	10.69	Dry	Dry	
A	11.05.23		1016	-1.03	0.0	54.1	6.1	0.9	0	0	4.16	15.10	8.57	10.69	Sunny	Sunny	
A	18.05.23		1029	-0.34	0.1	16.8	5.3	7.1	0	0	4.30	14.96	8.58	10.68	Sunny	Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Garnswllt wwtw
Project No.:	Q1031
BH/TP No.:	BHSD01
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
16.61	A	50mm standpipe	17.00	2.00 - 16.50

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level		HoleDepth		Local Weather		Remarks
											mbgl	mAOD	mbgl	mAOD	Recent	Current	
A	11.04.23		1013	0.14	0.1	0.3	0.1	20.9	0	0	1.54	15.07	16.90	-0.29	Rain	Rain	
A	18.04.23		1030	-0.07	0.2	0.3	0.1	20.6	0	0	1.63	14.98	16.93	-0.32	Dry	Dry	
A	25.04.23		1021	0.04	0.2	0.3	0.1	20.6	0	0	1.76	14.85	16.89	-0.28	Dry	Dry	
A	4.05.23		1009	-0.22	0.4	0.3	0.1	20.2	0	0	1.86	14.75	16.88	-0.27	Dry	Dry	
A	11.05.23		1016	-1.03	0.4	0.3	0.1	20.5	0	0	1.70	14.91	16.89	-0.28	Sunny	Sunny	
A	18.05.23		1029	-0.34	0.1	0.0	0.0	19.7	0	0	1.85	14.76	16.89	-0.28	Sunny	Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Garnswllt wwtw
Project No.:	Q1031
BH/TP No.:	BHSD02
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
16.57	A	50mm standpipe	16.00	6.00 - 15.50

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level		HoleDepth		Local Weather		Remarks
											mbgl	mAOD	mbgl	mAOD	Recent	Current	
A	11.04.23		1013	0.14	0.1	0.4	0.4	20.7	0	0	1.58	14.99	15.77	0.80	Rain	Rain	
A	18.04.23		1030	-0.07	0.2	0.3	0.1	20.8	0	0	1.59	14.98	15.67	0.90	Dry	Dry	
A	25.04.23		1021	0.04	0.2	0.2	0.1	20.7	0	0	1.72	14.85	15.66	0.91	Dry	Dry	
A	4.05.23		1009	-0.22	0.3	0.3	0.1	20.8	0	0	1.83	14.74	15.66	0.91	Dry	Dry	
A	11.05.23		1016	-1.03	0.4	0.3	0.1	20.7	0	0	1.66	14.91	15.66	0.91	Sunny	Sunny	
A	18.05.23		1029	-0.34	0.0	0.0	0.1	19.7	0	0	1.82	14.75	15.66	0.91	Sunny	Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Garnswllt wwtw
Project No.:	Q1031
BH/TP No.:	BHSD03
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
17.16	A	50mm standpipe	13.00	3.00 - 12.50

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level		HoleDepth		Local Weather		Remarks
											mbgl	mAOD	mbgl	mAOD	Recent	Current	
A	18.04.23		1030	-0.07	0.3	0.1	20.0	4.0	4	0	2.14	15.02	12.46	4.70	Dry	Dry	
A	25.04.23		1021	0.04	0.2	0.3	0.3	20.2	0	0	2.27	14.89	12.46	4.70	Dry	Dry	
A	4.05.23		1009	-0.22	0.3	0.5	0.3	20.4	0	0	2.39	14.77	12.42	4.74	Dry	Dry	
A	11.05.23		1016	-1.03	0.3	0.6	0.6	20.2	0	0	3.20	13.96	12.42	4.74	Sunny	Sunny	
A	18.05.23		1029	-0.34	0.1	0.0	0.4	19.3	0	1	2.38	14.78	12.42	4.74	Sunny	Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Garnswllt wwtw
Project No.:	Q1031
BH/TP No.:	BHSD04
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
19.09	A	50mm standpipe	17.50	6.00 - 17.00

Pipe	Date	Time (24hrs)	Atmos Pressure mBar	Differential Well Pressure mBar	Flow L/hr	CH_4 %	CO_2 %	O_2 %	CO ppm	H_2S ppm	Water Level		HoleDepth		Local Weather		Remarks
											mbgl	mAOD	mbgl	mAOD	Recent	Current	
A		18.04.23	1030	-0.07	0.3	0.1	20.5	1.0	1	0	4.03	15.06	17.25	1.84	Dry	Dry	
A		25.04.23	1021	0.04	0.1	0.4	0.4	19.9	0	0	4.14	14.95	17.27	1.82	Dry	Dry	
A		4.05.23	1009	-0.22	0.3	0.3	0.3	20.5	0	0	4.24	14.85	17.23	1.86	Dry	Dry	
A		11.05.23	1016	-1.03	0.2	0.4	0.4	20.2	0	0	4.10	14.99	17.24	1.85	Sunny	Sunny	
A		18.05.23	1029	-0.34	0.0	0.0	0.2	20.0	0	0	4.24	14.85	17.26	1.83	Sunny	Sunny	

APPENDIX VII – **GEOTECHNICAL LABORATORY TEST RESULTS**

Laboratory Report

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES A PHENNA GROUP COMPANY

Contract Number: 65265

Client Ref: **Q1031**
Client PO: **Q1031**

Date Received: **14-03-2023**
Date Completed: **04-04-2023**
Report Date: **04-04-2023**

Client: **Quantum Geotechnic Ltd**
Plas Newydd
Llanedi
Pontarddulais
Swansea
SA4 0FQ

This report has been checked and approved by:

Shaun Thomas
Site Manager

Contract Title: **Garswllt WWTW**
For the attention of: **Phil Darby**

Test Description	Qty
Moisture Content of Soil BS1377 : Part 2 : Clause 3.2 : 1990 - * UKAS	9
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	9
PSD Wet & Dry Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	19
Organic Matter Content Sub-contracted Test	2
BRE Full Suite **includes pH, water & acid soluble sulphate, total sulphur, magnesium, chloride and nitrate** Sub-contracted Test	10
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (Human Resources/ Health and Safety Manager)

GEO Site & Testing Services Ltd
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Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	Summary of Soil Descriptions	
Contract Number	62565	
Project Name	Garswllt WWTW	
Client Reference	Q1031	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
BH01A	1	B	0.20	-	0.50	Brown fine to medium gravelly sandy silty CLAY
BH01A	2	B	0.90	-	1.00	Brown fine to coarse gravelly silty CLAY
BH01A	3	B	1.20	-	1.70	Brown silty clayey sandy fine to coarse GRAVEL
BH01A	4	B	2.00	-	2.50	Brown fine to coarse gravelly silty CLAY
BH01A	6	B	4.00	-	4.50	Brown silty clayey sandy fine to coarse GRAVEL
BH01A	8	B	6.00	-	6.50	Brown silty clayey sandy fine to coarse GRAVEL
BH02	2	B	0.50	-	1.00	Brown sandy silty clayey fine to coarse GRAVEL
BH02A	1	B	1.20	-	1.70	Brown silty clayey sandy fine to coarse GRAVEL
BH02A	1	B	1.80	-		Brown fine to coarse gravelly silty CLAY
BH02A	2	B	2.00	-	2.50	Brown fine to medium gravelly sandy silty CLAY
BH02A	3	B	3.00	-	3.50	Brown silty clayey sandy fine to coarse GRAVEL with cobbles
BH02A	4	B	4.00	-	4.50	Brown silty clayey sandy fine to coarse GRAVEL with cobbles
BH02A	6	B	6.00	-	6.50	Brown silty clayey sandy fine to coarse GRAVEL with cobbles
BH03	2	B	0.50	-	1.00	Brown silty clayey sandy fine to coarse GRAVEL with cobbles
BH03	3	B	1.20	-	1.70	Brown silty clayey sandy fine to coarse GRAVEL with cobbles
BH03	5	B	3.00	-	3.50	Brown fine to medium gravelly sandy clayey SILT
BH03	6	B	4.00	-	4.50	Brown fine to medium gravelly sandy clayey SILT
BH03	7	B	5.00	-	5.50	Brown fine to medium gravelly sandy clayey SILT
BH03	8	B	6.00	-	6.50	Brown silty clayey sandy fine to coarse GRAVEL with cobbles
BH03	9	B	7.00	-	7.50	Brown silty clayey sandy fine to coarse GRAVEL
BH03	10	B	8.00	-	8.50	Brown silty clayey sandy fine to coarse GRAVEL
TP01	3	B	1.60	-	1.80	Brown fine to medium gravelly sandy silty CLAY
TP01	4	B	2.60	-	2.60	Brown silty clayey sandy fine to coarse GRAVEL with cobbles
TP02	3	B	1.40	-	1.60	Brown fine to coarse gravelly sandy clayey SILT
TP02	4	B	2.00	-	2.20	Brown silty clayey sandy fine to coarse GRAVEL with cobbles
TP03	4	B	2.40	-	2.60	Brown fine to coarse gravelly sandy silty CLAY
				-		
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GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	65265	
Project Name	Garswllt WWTW	
Date Tested	24/03/2023	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
BH01A	2	B	0.90	-	1.00	20	35	20	15	80	CL/I Low/Inter. Plasticity
BH01A	4	B	2.00	-	2.50	20	36	19	17	90	CI Intermediate Plasticity
BH02A	1	B	1.80	-		19	35	20	15	80	CL/I Low/Inter. Plasticity
BH02A	2	B	2.00	-	2.50	24	37	20	17	92	CI Intermediate Plasticity
BH03	5	B	3.00	-	3.50	34	54	32	22	95	MH High Plasticity
BH03	6	B	4.00	-	4.50	36	61	36	25	98	MH High Plasticity
BH03	7	B	5.00	-	5.50	49	73	40	33	97	MV Very High Plasticity
TP01	3	B	1.60	-	1.80	24	33	20	13	94	CL Low Plasticity
TP02	3	B	1.40	-	1.60	42	68	37	31	79	MH High Plasticity
				-							
				-							
				-							
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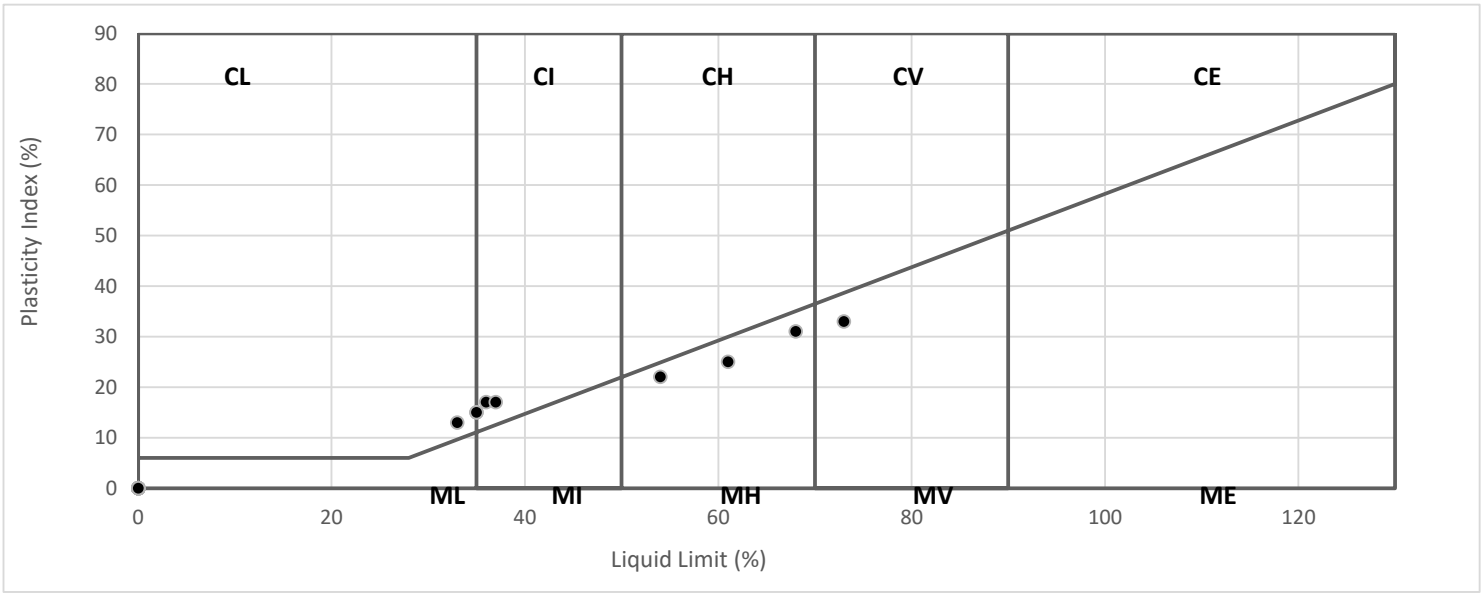
Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:2015+A1:2020



Operator
Ethan Harper

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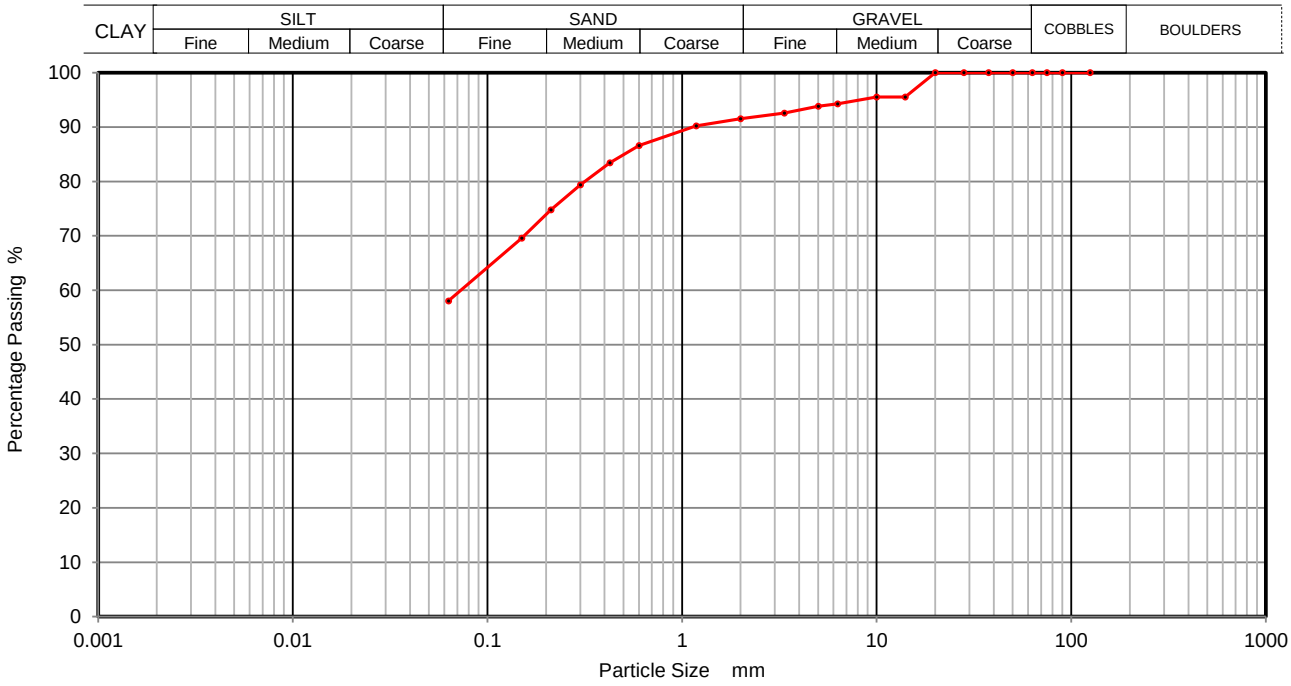
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH01A
Project Name	Garswllt WWTW	Sample No.	1
Soil Description	*See sample description sheet	Depth Top	0.20
		Depth Base	0.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	96		
10	96		
6.3	94		
5	94		
3.35	93		
2	92		
1.18	90		
0.6	87		
0.425	83		
0.3	79		
0.212	75		
0.15	70		
0.063	58		

Sample Proportions	% dry mass
Cobbles	0
Gravel	8
Sand	34
Silt and Clay	58

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

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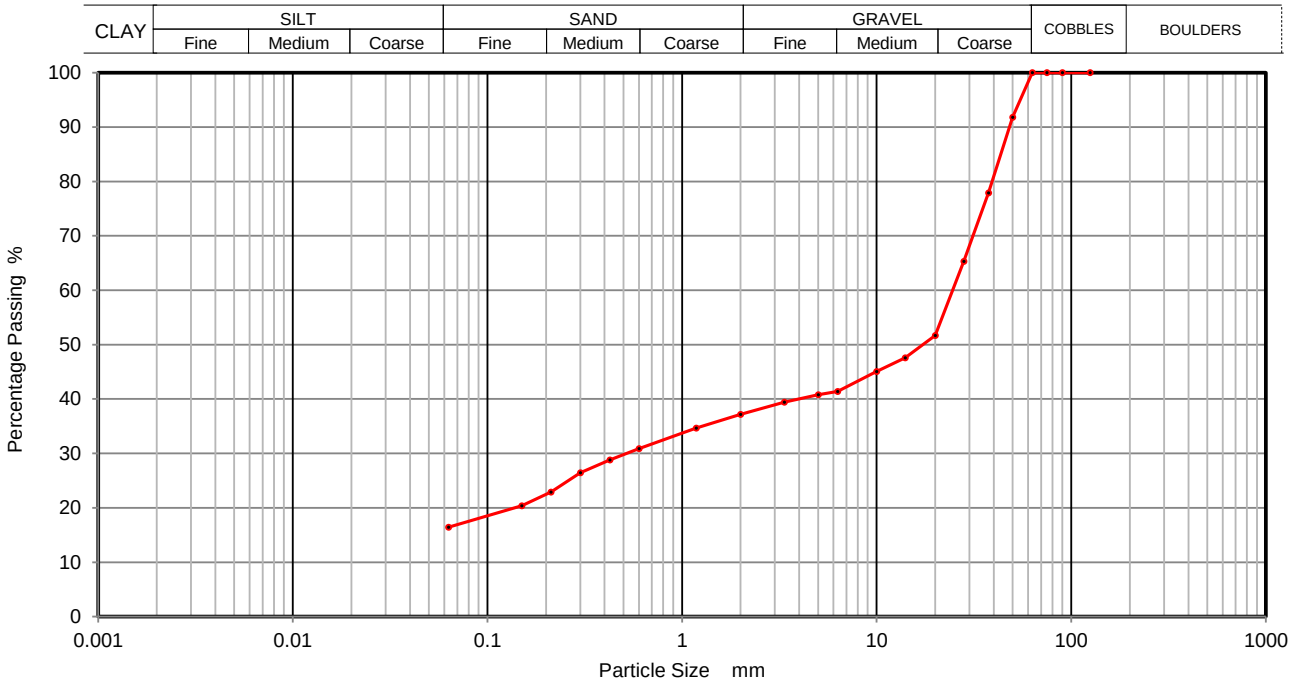
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH01A
Project Name	Garswllt WWTW	Sample No.	3
Soil Description	*See sample description sheet	Depth Top	1.20
		Depth Base	1.70
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	92		
37.5	78		
28	65		
20	52		
14	48		
10	45		
6.3	41		
5	41		
3.35	39		
2	37		
1.18	35		
0.6	31		
0.425	29		
0.3	26		
0.212	23		
0.15	20		
0.063	16		

Sample Proportions	% dry mass
Cobbles	0
Gravel	63
Sand	21
Silt and Clay	16

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

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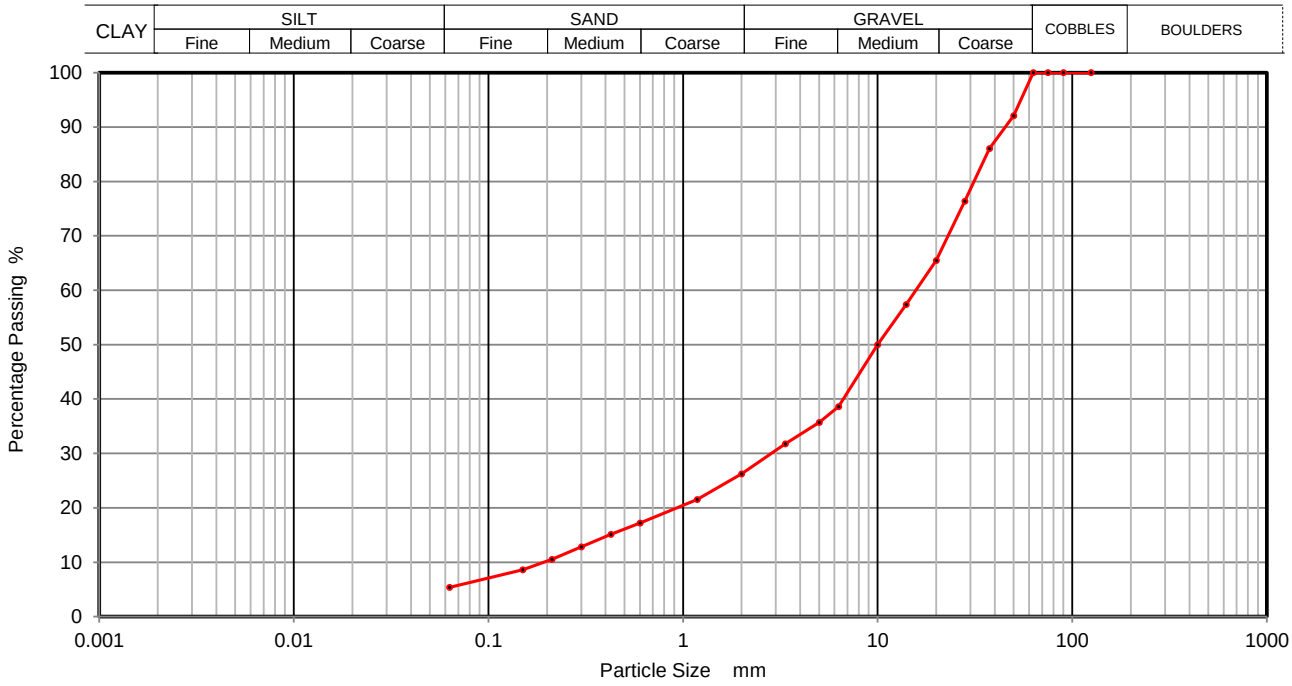
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH01A
Project Name	Garswllt WWTW	Sample No.	6
Soil Description	*See sample description sheet	Depth Top	4.00
		Depth Base	4.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	92		
37.5	86		
28	76		
20	65		
14	57		
10	50		
6.3	39		
5	36		
3.35	32		
2	26		
1.18	22		
0.6	17		
0.425	15		
0.3	13		
0.212	10		
0.15	9		
0.063	5		

Sample Proportions	% dry mass
Cobbles	0
Gravel	74
Sand	21
Silt and Clay	5

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

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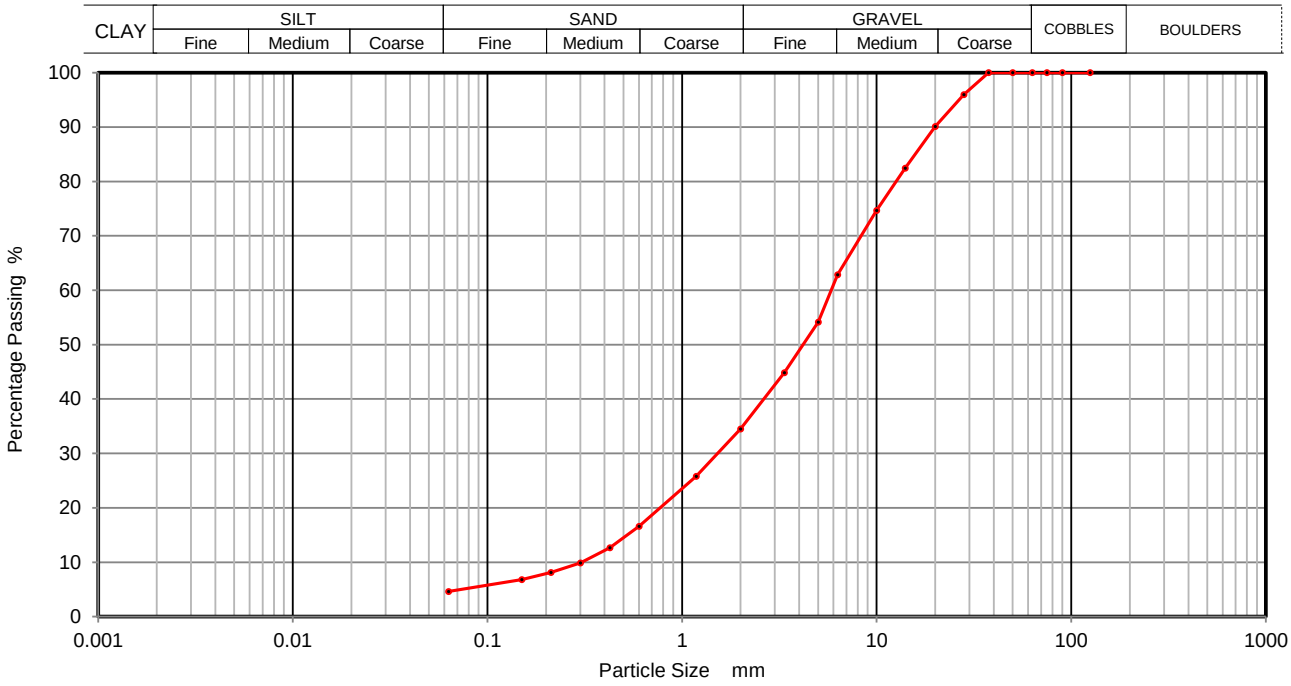
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH01A
Project Name	Garswllt WWTW	Sample No.	8
Soil Description	*See sample description sheet	Depth Top	6.00
		Depth Base	6.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	96		
20	90		
14	82		
10	75		
6.3	63		
5	54		
3.35	45		
2	34		
1.18	26		
0.6	17		
0.425	13		
0.3	10		
0.212	8		
0.15	7		
0.063	5		

Sample Proportions	% dry mass
Cobbles	0
Gravel	66
Sand	29
Silt and Clay	5

Remarks

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Operator
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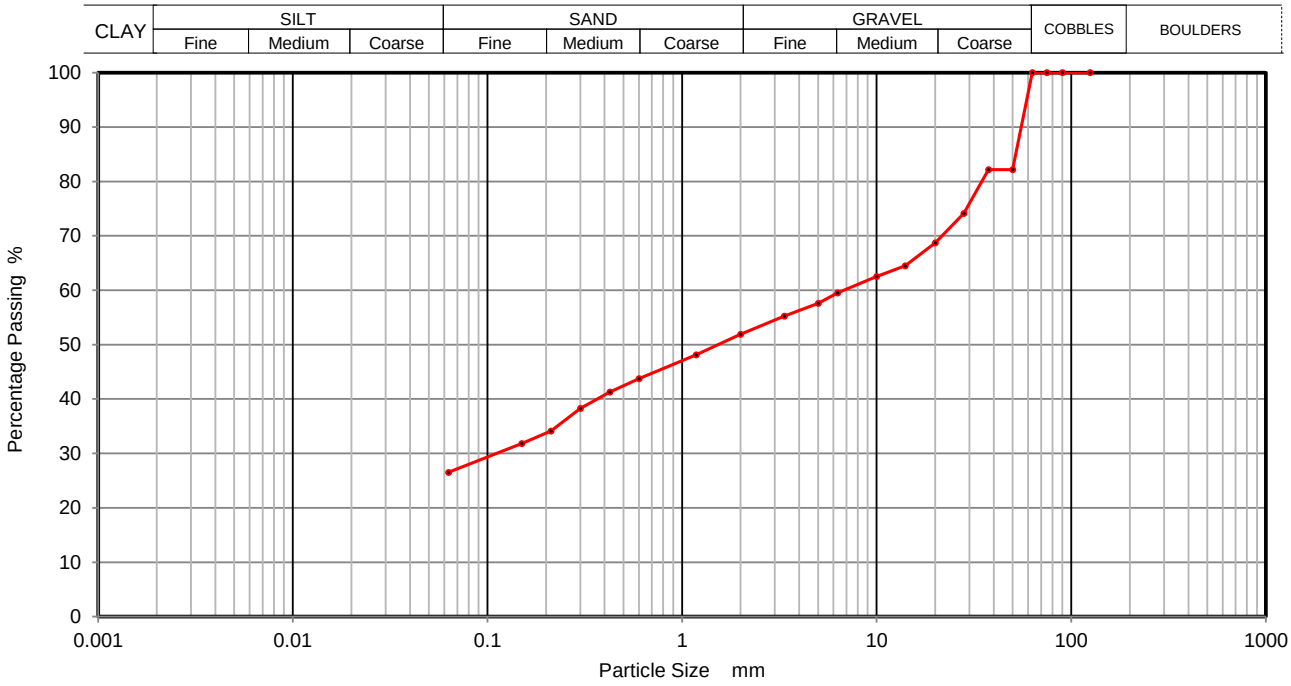
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH02
Project Name	Garswllt WWTW	Sample No.	2
Soil Description	*See sample description sheet	Depth Top	0.50
		Depth Base	1.00
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	82		
37.5	82		
28	74		
20	69		
14	64		
10	63		
6.3	60		
5	58		
3.35	55		
2	52		
1.18	48		
0.6	44		
0.425	41		
0.3	38		
0.212	34		
0.15	32		
0.063	27		

Sample Proportions	% dry mass
Cobbles	0
Gravel	48
Sand	25
Silt and Clay	27

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

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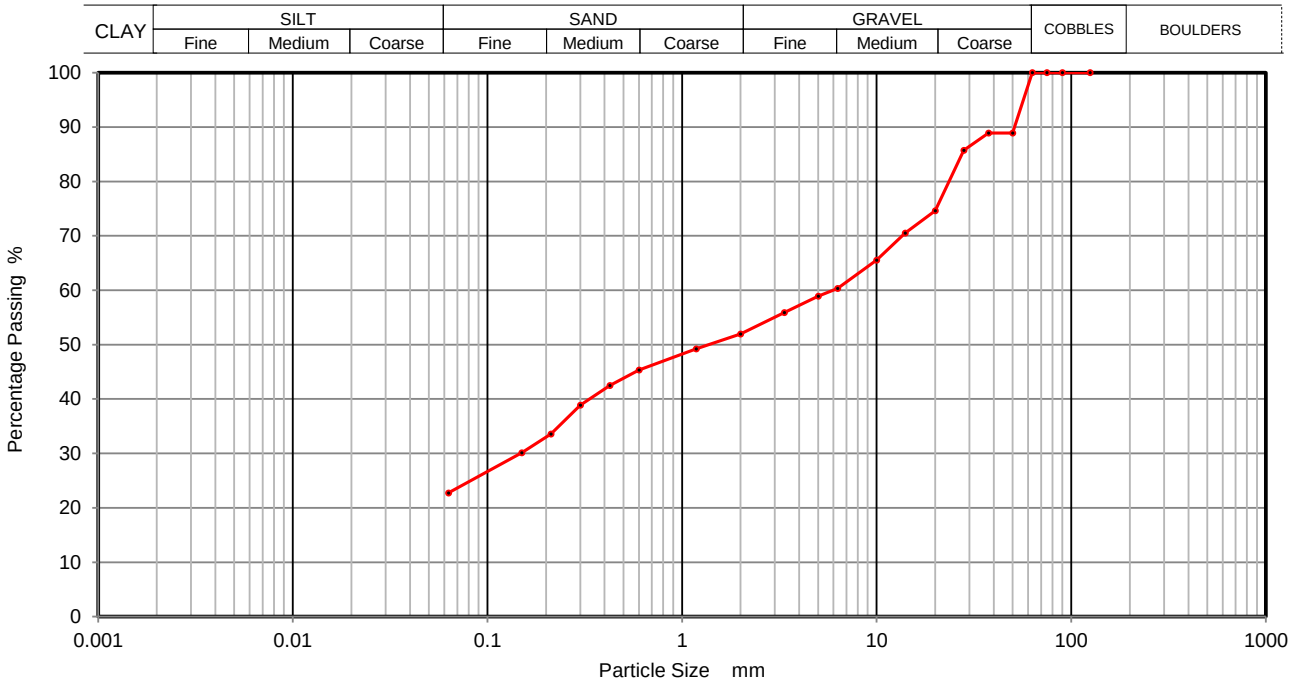
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH02A
Project Name	Garswllt WWTW	Sample No.	1
Soil Description	*See sample description sheet	Depth Top	1.20
		Depth Base	1.70
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	89		
37.5	89		
28	86		
20	75		
14	71		
10	66		
6.3	60		
5	59		
3.35	56		
2	52		
1.18	49		
0.6	45		
0.425	43		
0.3	39		
0.212	34		
0.15	30		
0.063	23		

Sample Proportions	% dry mass
Cobbles	0
Gravel	48
Sand	29
Silt and Clay	23

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

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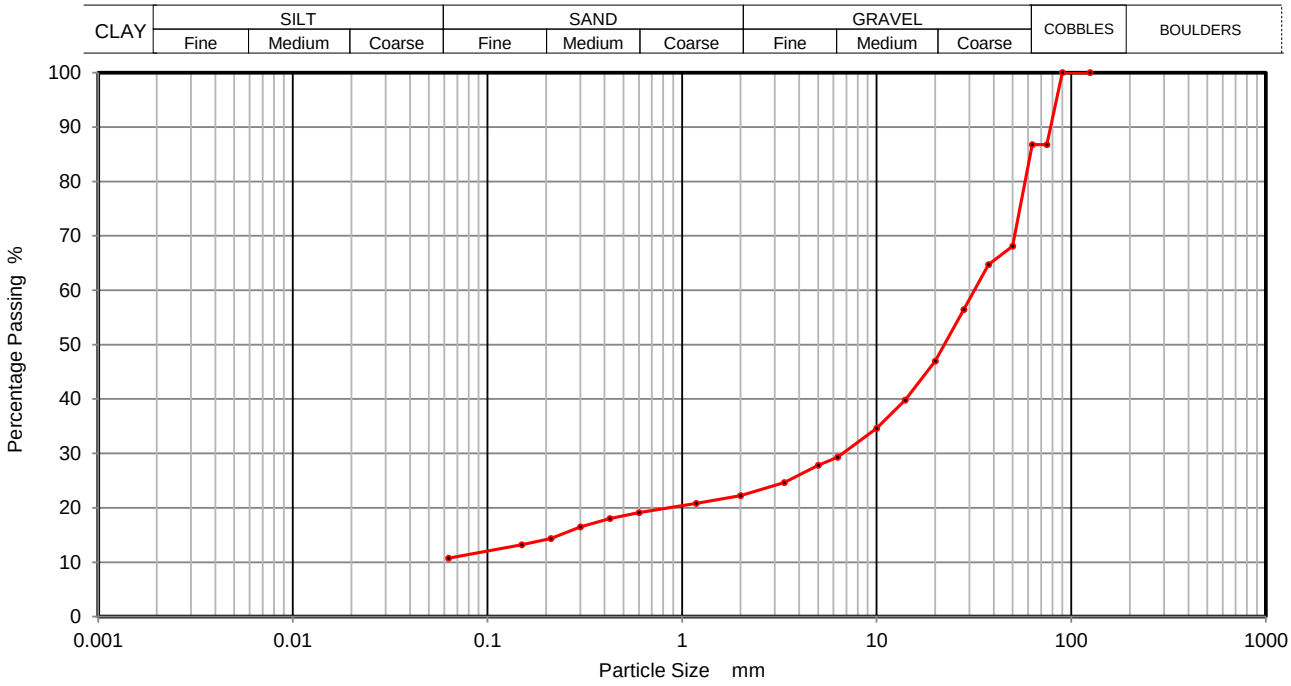
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH02A
Project Name	Garswllt WWTW	Sample No.	3
Soil Description	*See sample description sheet	Depth Top	3.00
		Depth Base	3.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	87		
63	87		
50	68		
37.5	65		
28	56		
20	47		
14	40		
10	35		
6.3	29		
5	28		
3.35	25		
2	22		
1.18	21		
0.6	19		
0.425	18		
0.3	16		
0.212	14		
0.15	13		
0.063	11		

Sample Proportions	% dry mass
Cobbles	13
Gravel	65
Sand	11
Silt and Clay	11

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
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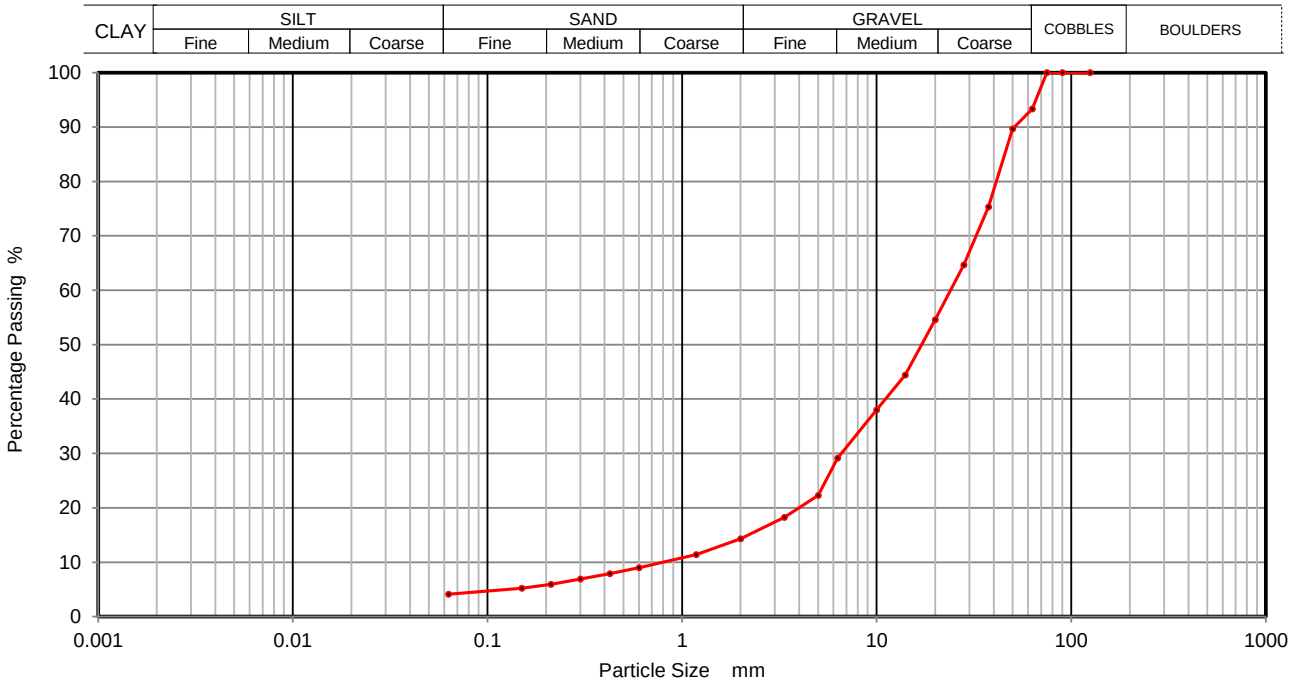
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH02A
Project Name	Garswllt WWTW	Sample No.	4
Soil Description	*See sample description sheet	Depth Top	4.00
		Depth Base	4.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	93		
50	90		
37.5	75		
28	65		
20	55		
14	44		
10	38		
6.3	29		
5	22		
3.35	18		
2	14		
1.18	11		
0.6	9		
0.425	8		
0.3	7		
0.212	6		
0.15	5		
0.063	4		

Sample Proportions	% dry mass
Cobbles	7
Gravel	79
Sand	10
Silt and Clay	4

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
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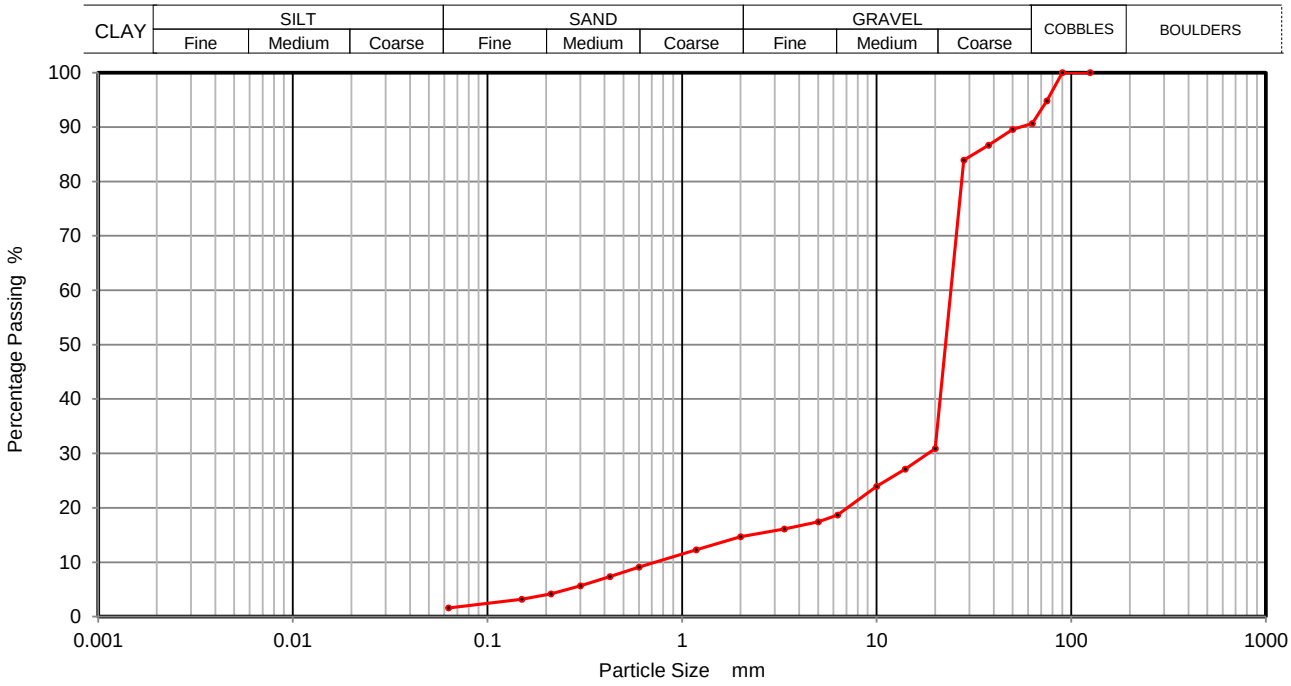
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH02A
Project Name	Garswllt WWTW	Sample No.	6
Soil Description	*See sample description sheet	Depth Top	6.00
		Depth Base	6.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	95		
63	91		
50	90		
37.5	87		
28	84		
20	31		
14	27		
10	24		
6.3	19		
5	17		
3.35	16		
2	15		
1.18	12		
0.6	9		
0.425	7		
0.3	6		
0.212	4		
0.15	3		
0.063	2		

Sample Proportions	% dry mass
Cobbles	9
Gravel	76
Sand	13
Silt and Clay	2

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

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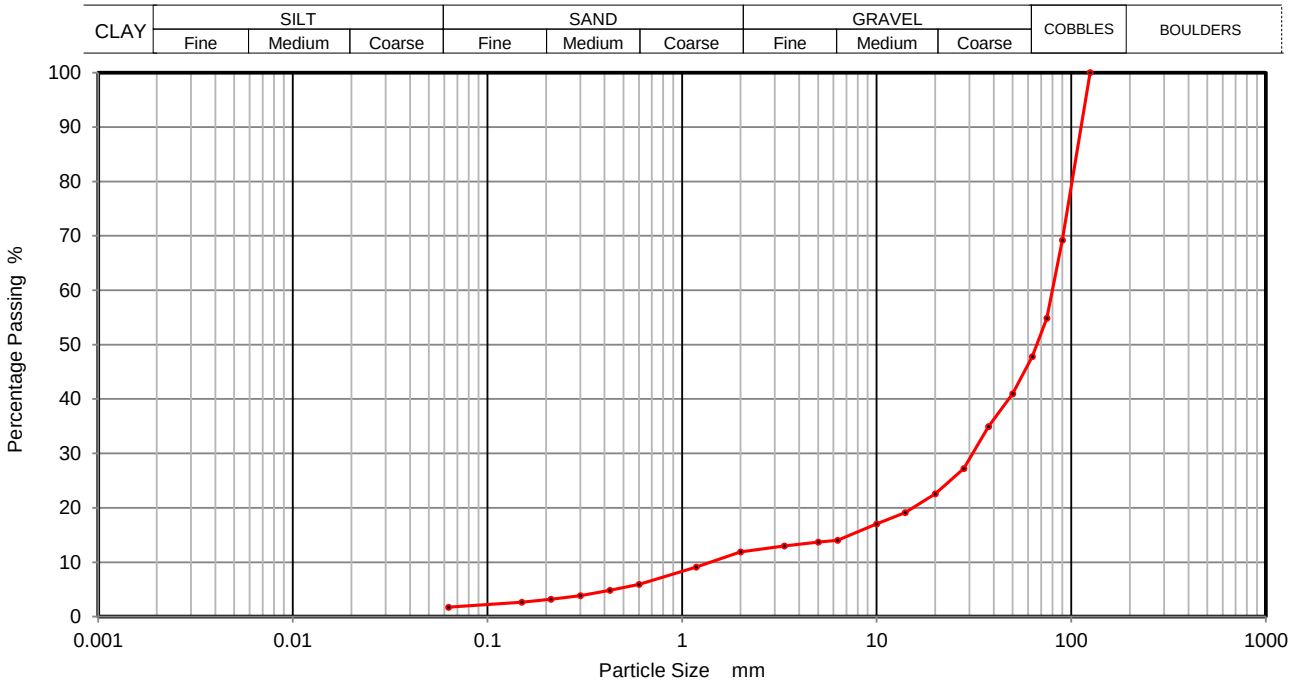
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH03
Project Name	Garswllt WWTW	Sample No.	2
Soil Description	*See sample description sheet	Depth Top	0.50
		Depth Base	1.00
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	69		
75	55		
63	48		
50	41		
37.5	35		
28	27		
20	23		
14	19		
10	17		
6.3	14		
5	14		
3.35	13		
2	12		
1.18	9		
0.6	6		
0.425	5		
0.3	4		
0.212	3		
0.15	3		
0.063	2		

Sample Proportions	% dry mass
Cobbles	52
Gravel	36
Sand	10
Silt and Clay	2

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
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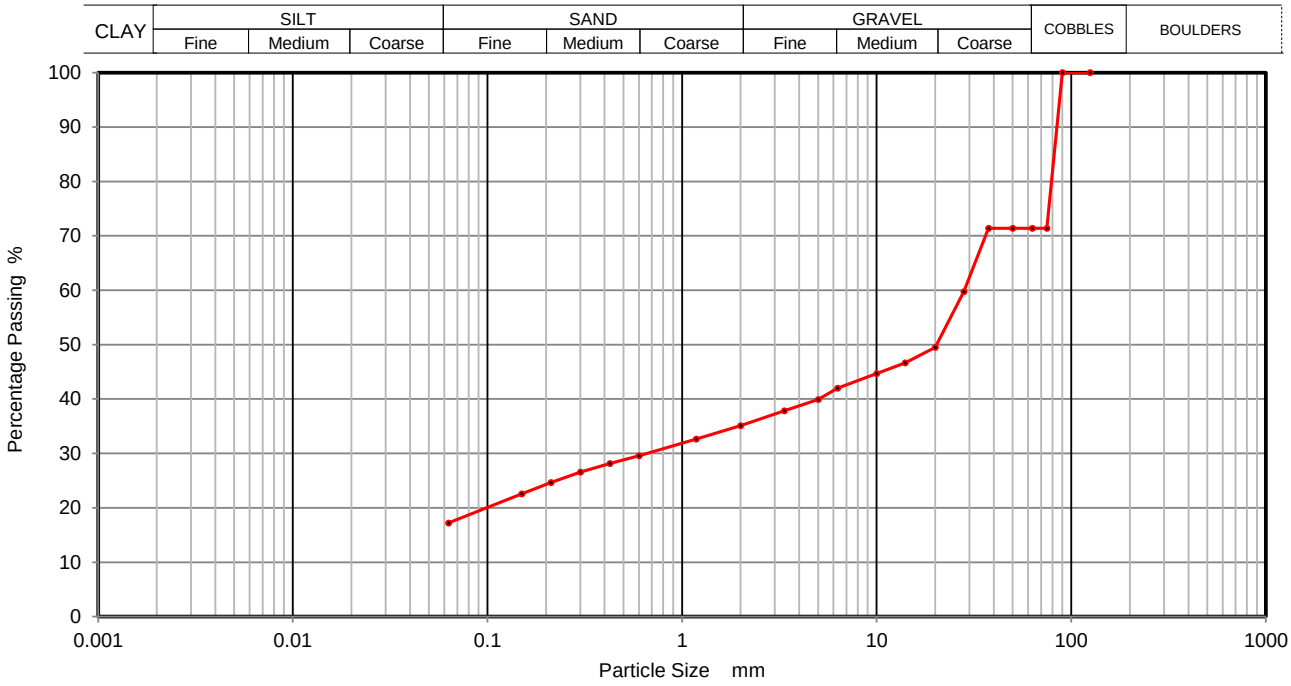
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH03
Project Name	Garswllt WWTW	Sample No.	3
Soil Description	*See sample description sheet	Depth Top	1.20
		Depth Base	1.70
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	71		
63	71		
50	71		
37.5	71		
28	60		
20	49		
14	47		
10	45		
6.3	42		
5	40		
3.35	38		
2	35		
1.18	33		
0.6	30		
0.425	28		
0.3	27		
0.212	25		
0.15	23		
0.063	17		

Sample Proportions	% dry mass
Cobbles	29
Gravel	36
Sand	18
Silt and Clay	17

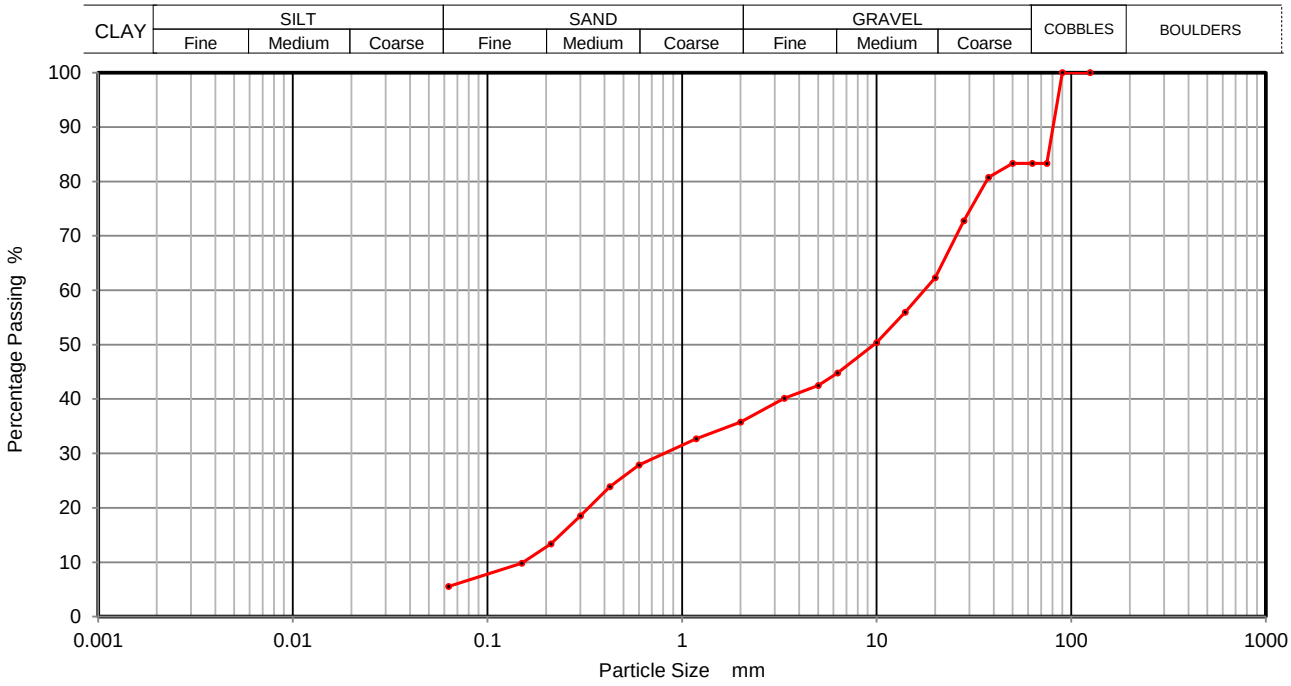
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH03
Project Name	Garswllt WWTW	Sample No.	8
Soil Description	*See sample description sheet	Depth Top	6.00
		Depth Base	6.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	83		
63	83		
50	83		
37.5	81		
28	73		
20	62		
14	56		
10	50		
6.3	45		
5	43		
3.35	40		
2	36		
1.18	33		
0.6	28		
0.425	24		
0.3	19		
0.212	13		
0.15	10		
0.063	6		

Sample Proportions	% dry mass
Cobbles	17
Gravel	47
Sand	30
Silt and Clay	6

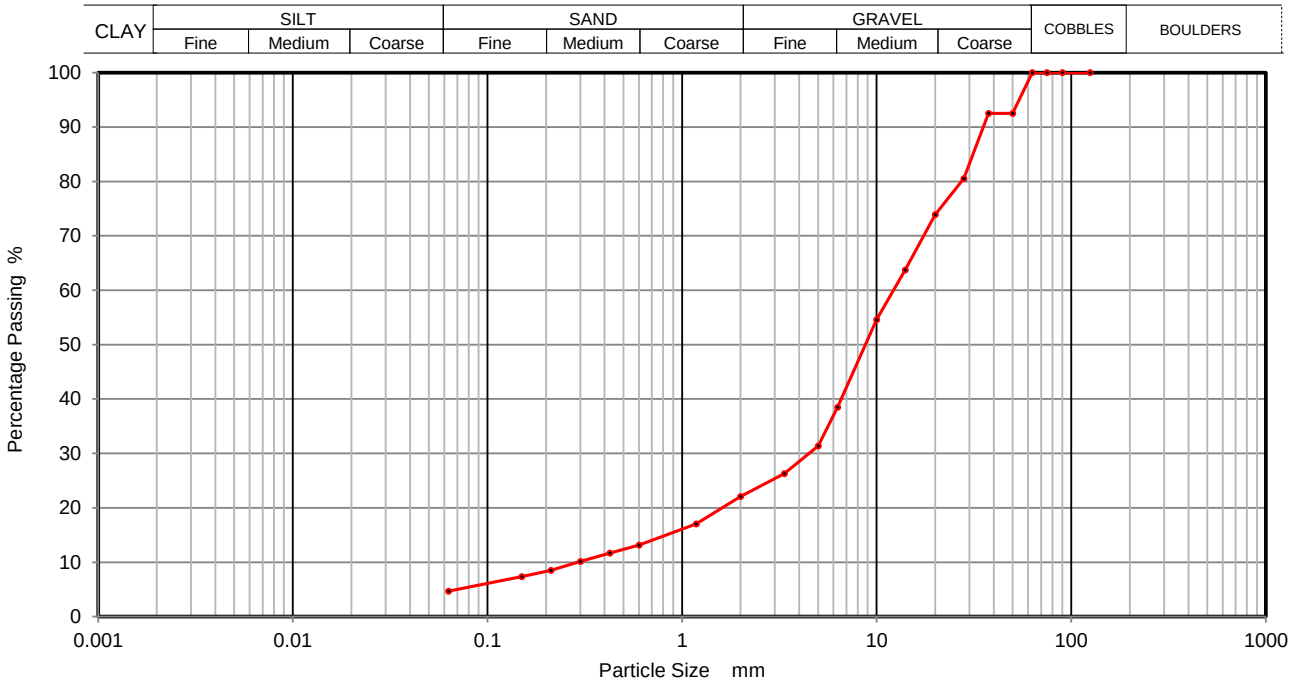
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH03
Project Name	Garswllt WWTW	Sample No.	9
Soil Description	*See sample description sheet	Depth Top	7.00
		Depth Base	7.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	92		
37.5	92		
28	81		
20	74		
14	64		
10	55		
6.3	38		
5	31		
3.35	26		
2	22		
1.18	17		
0.6	13		
0.425	12		
0.3	10		
0.212	8		
0.15	7		
0.063	5		

Sample Proportions	% dry mass
Cobbles	0
Gravel	78
Sand	17
Silt and Clay	5

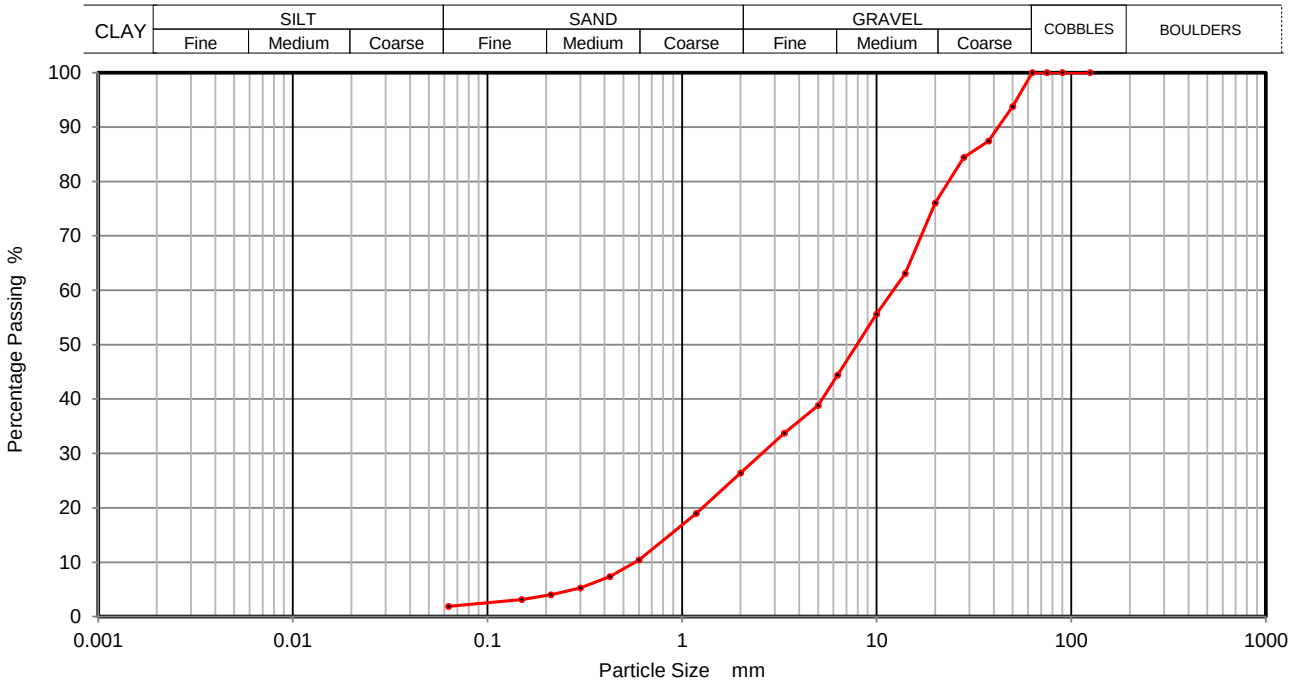
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	BH03
Project Name	Garswllt WWTW	Sample No.	10
Soil Description	*See sample description sheet	Depth Top	8.00
		Depth Base	8.50
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	94		
37.5	87		
28	84		
20	76		
14	63		
10	56		
6.3	44		
5	39		
3.35	34		
2	26		
1.18	19		
0.6	10		
0.425	7		
0.3	5		
0.212	4		
0.15	3		
0.063	2		

Sample Proportions	% dry mass
Cobbles	0
Gravel	74
Sand	24
Silt and Clay	2

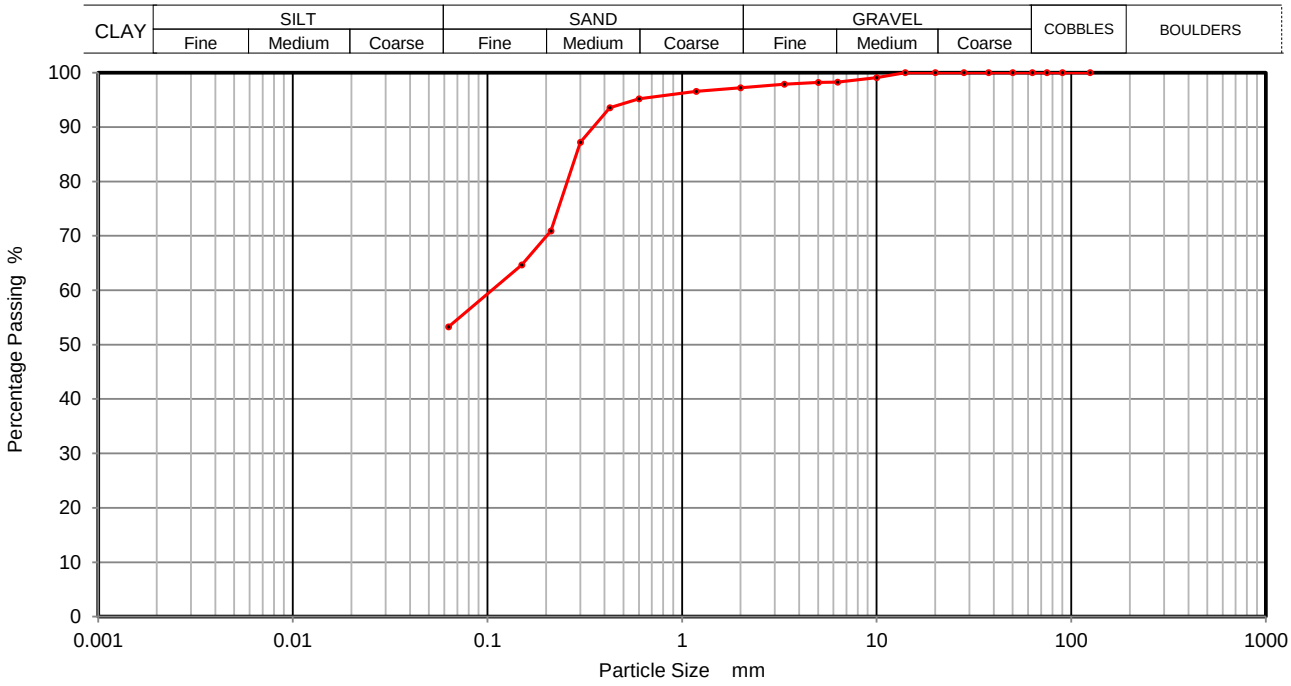
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	TP01
Project Name	Garswllt WWTW	Sample No.	3
Soil Description	*See sample description sheet	Depth Top	1.60
		Depth Base	1.80
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	98		
3.35	98		
2	97		
1.18	97		
0.6	95		
0.425	94		
0.3	87		
0.212	71		
0.15	65		
0.063	53		

Sample Proportions	% dry mass
Cobbles	0
Gravel	3
Sand	44
Silt and Clay	53

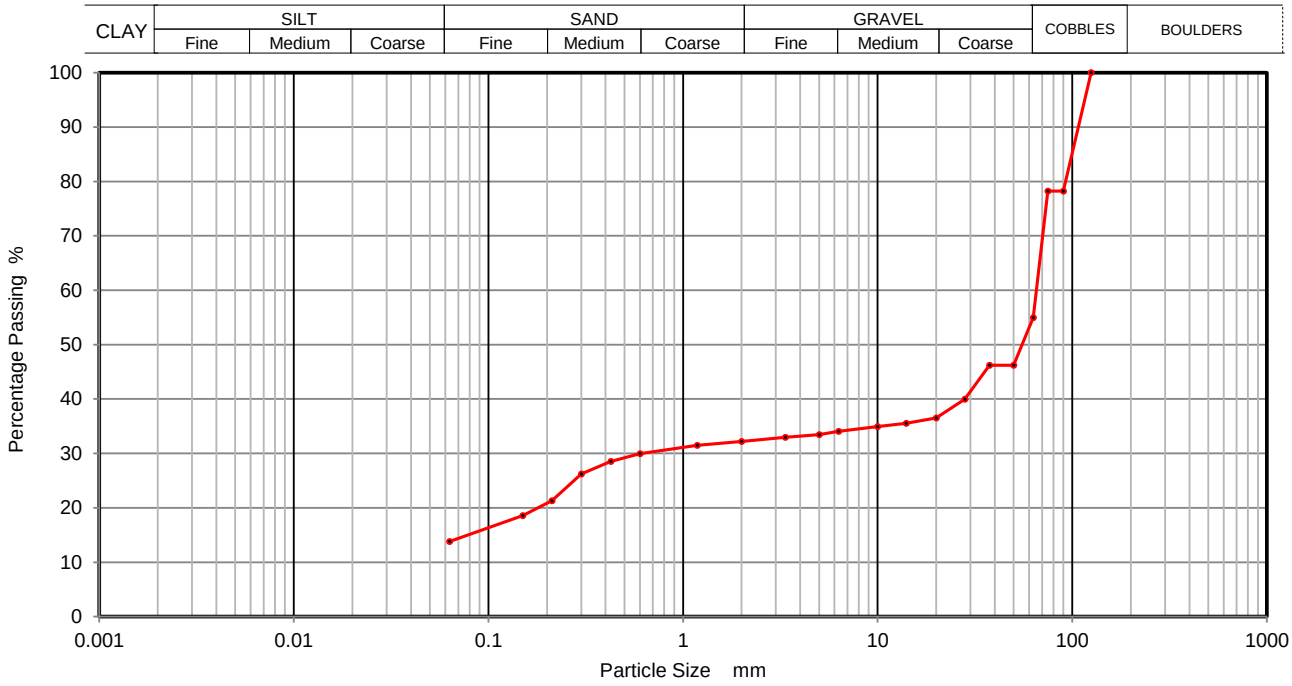
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	TP01
Project Name	Garswllt WWTW	Sample No.	4
Soil Description	*See sample description sheet	Depth Top	2.60
		Depth Base	3.00
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	78		
75	78		
63	55		
50	46		
37.5	46		
28	40		
20	36		
14	36		
10	35		
6.3	34		
5	33		
3.35	33		
2	32		
1.18	31		
0.6	30		
0.425	29		
0.3	26		
0.212	21		
0.15	19		
0.063	14		

Sample Proportions	% dry mass
Cobbles	45
Gravel	23
Sand	18
Silt and Clay	14

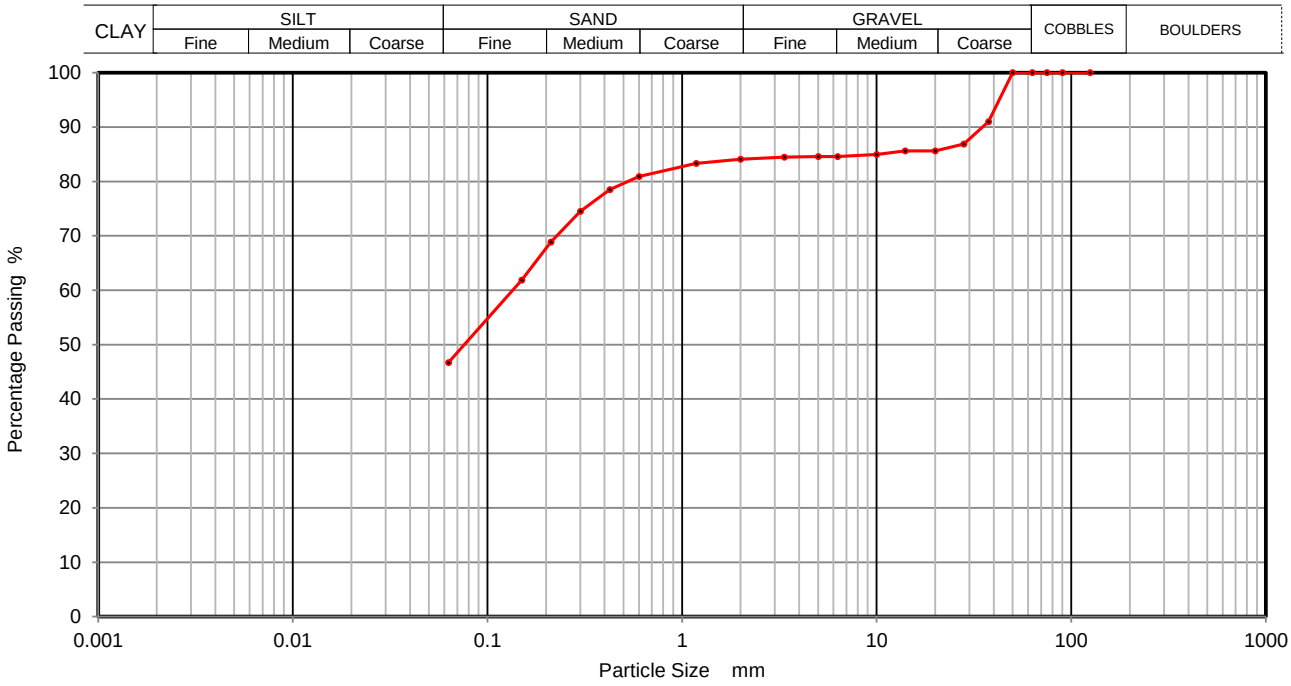
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	TP02
Project Name	Garswllt WWTW	Sample No.	3
Soil Description	*See sample description sheet	Depth Top	1.40
		Depth Base	1.60
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	91		
28	87		
20	86		
14	86		
10	85		
6.3	85		
5	85		
3.35	84		
2	84		
1.18	83		
0.6	81		
0.425	79		
0.3	75		
0.212	69		
0.15	62		
0.063	47		

Sample Proportions	% dry mass
Cobbles	0
Gravel	16
Sand	37
Silt and Clay	47

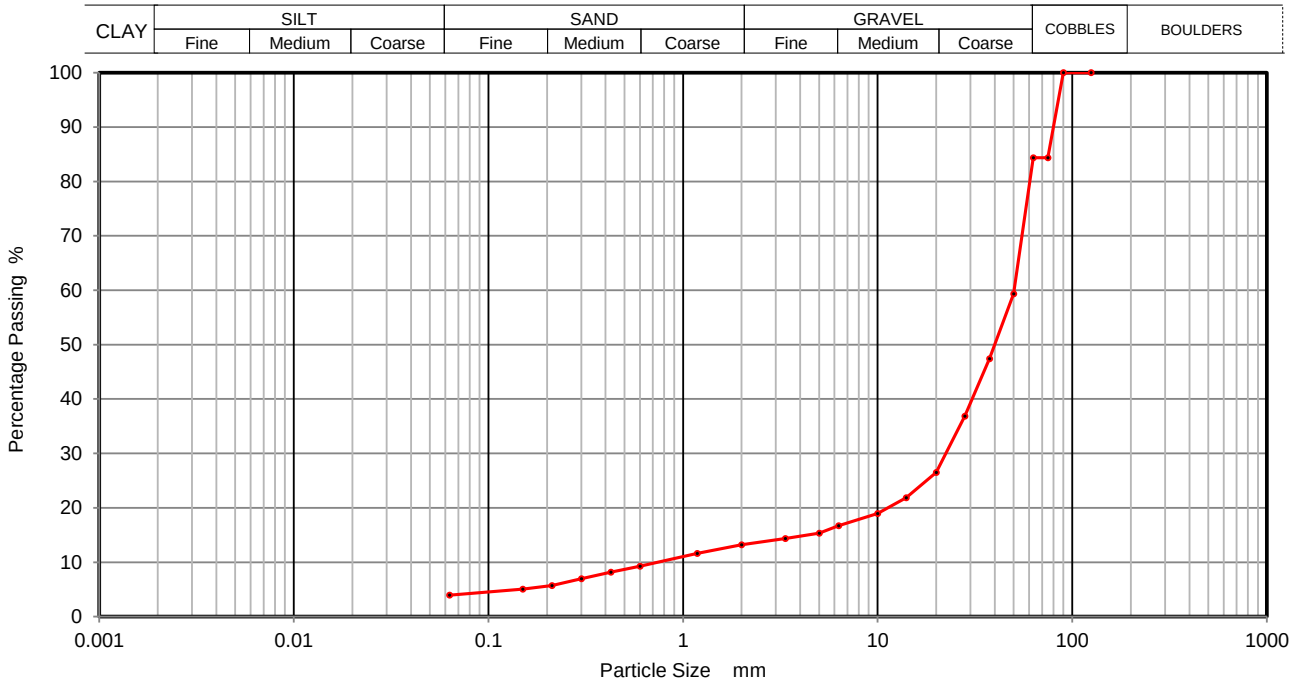
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	TP02
Project Name	Garswllt WWTW	Sample No.	4
Soil Description	*See sample description sheet	Depth Top	2.00
		Depth Base	2.20
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	84		
63	84		
50	59		
37.5	47		
28	37		
20	27		
14	22		
10	19		
6.3	17		
5	15		
3.35	14		
2	13		
1.18	12		
0.6	9		
0.425	8		
0.3	7		
0.212	6		
0.15	5		
0.063	4		

Sample Proportions	% dry mass
Cobbles	16
Gravel	71
Sand	9
Silt and Clay	4

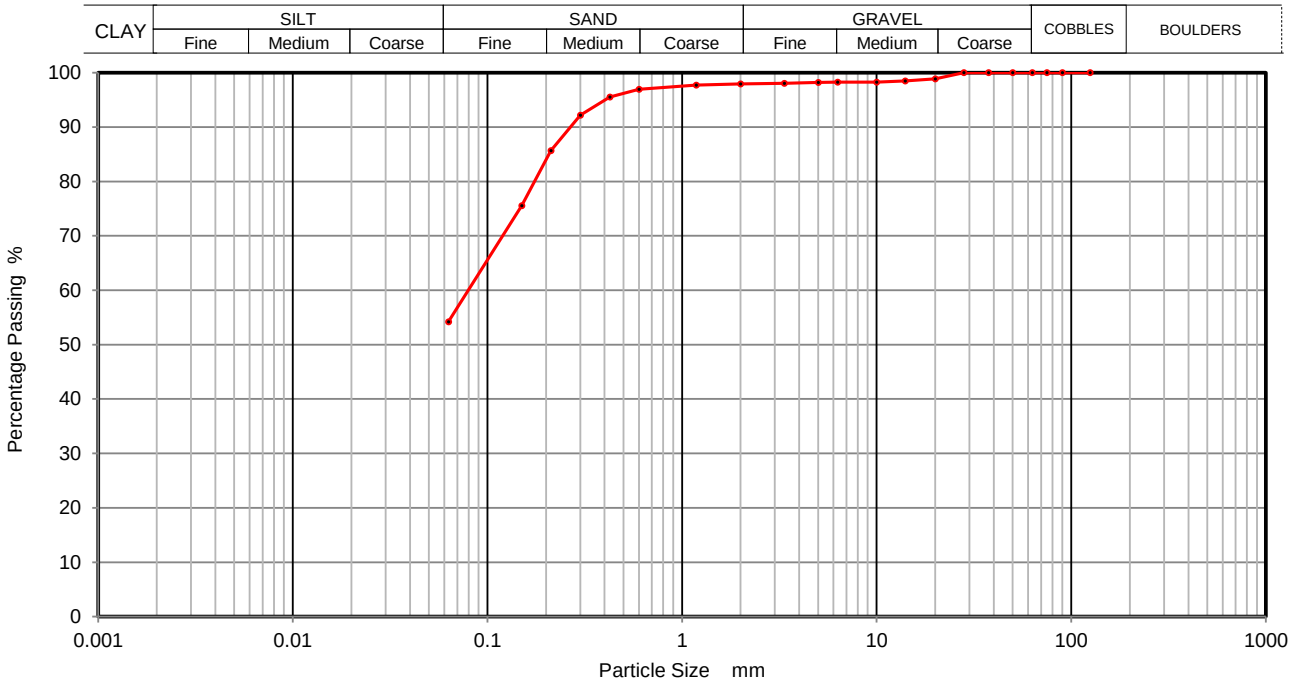
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	65265
		Borehole/Pit No.	TP03
Project Name	Garswllt WWTW	Sample No.	4
Soil Description	*See sample description sheet	Depth Top	2.40
		Depth Base	2.60
Date Tested	29/03/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	98		
10	98		
6.3	98		
5	98		
3.35	98		
2	98		
1.18	98		
0.6	97		
0.425	96		
0.3	92		
0.212	86		
0.15	76		
0.063	54		

Sample Proportions	% dry mass
Cobbles	0
Gravel	2
Sand	44
Silt and Clay	54

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

2531

ANALYTICAL TEST REPORT

Contract no: 120832

Contract name: Garswllt WWTW

Client reference: Q1031

Clients name: Geo Site and Testing Services

Clients address: Unit 3 and 4 Heol Aur
Dafen Industrial Estate, Dafen
Llanelli, Carmarthenshire
SA14 8QN

Samples received: 23 March 2023

Analysis started: 23 March 2023

Analysis completed: 03 April 2023

Report issued: 03 April 2023

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing

Approved by:

Samantha Rogerson
Reporting Manager

Chemtech Environmental Limited

SOILS

Lab number			120832-1	120832-2	120832-3	120832-4	120832-5	120832-6
Sample id			BH01A	BH01A	BH02A	BH02A	BH03	BH03
Depth (m)			0.20-0.50	0.90-1.00	1.20-1.70	2.80	0.50-1.00	1.90
Sample Type			B1	B2	B1	D2	B2	D1
Date sampled			-	-	-	-	-	-
Test	**Method**	**Units**						
pH	CE004 [U]	units	7.7	8.3	8.0	8.0	8.4	7.8
Magnesium (2:1 water soluble)	CE061	mg/l Mg	2.6	3.7	3.2	<1	<1	1.7
Chloride (2:1 water soluble)	CE049 [U]	mg/l Cl	6.6	5.2	3.4	9.5	1.9	3.5
Nitrate (2:1 water soluble)	CE049 [U]	mg/l NO_3	<1	<1	<1	<1	5.0	<1
Sulphate (2:1 water soluble)	CE061 [U]	mg/l SO_4	<10	72	83	122	41	36
Sulphate (acid extractable)	CE062 [U]	mg/kg SO_4	383	284	356	568	277	287
Sulphate (acid extractable)	CE062 [U]	% w/w SO_4	0.04	0.03	0.04	0.06	0.03	0.03
Sulphur (total)	CE119	mg/kg S	454	371	361	371	203	331
Sulphur (total)	CE119	% w/w S	0.05	0.04	0.04	0.04	0.02	0.03
Total Organic Carbon (TOC)	CE197	% w/w C	-	-	-	-	-	-
Estimate of OMC (calculated from TOC)	CE197	% w/w	-	-	-	-	-	-

Chemtech Environmental Limited

SOILS

Lab number			120832-7	120832-8	120832-9	120832-10	120832-11
Sample id			BH03	BH03	BH03	BH03	TP03
Depth (m)			3.00-3.50	3.80	4.00-4.50	6.80	1.50
Sample Type			B5	D3	B6	D6	D3
Date sampled			-	-	-	-	-
Test	**Method**	**Units**					
pH	CE004 U	units	7.9	-	8.3	7.7	7.7
Magnesium (2:1 water soluble)	CE061	mg/l Mg	<1	-	<1	<1	2.1
Chloride (2:1 water soluble)	CE049 U	mg/l Cl	5.0	-	6.8	3.0	2.4
Nitrate (2:1 water soluble)	CE049 U	mg/l NO_3	<1	-	1.0	<1	<1
Sulphate (2:1 water soluble)	CE061 U	mg/l SO_4	19	-	82	12	41
Sulphate (acid extractable)	CE062 U	mg/kg SO_4	223	-	572	<100	349
Sulphate (acid extractable)	CE062 U	% w/w SO_4	0.02	-	0.06	<0.01	0.03
Sulphur (total)	CE119	mg/kg S	234	-	1411	199	302
Sulphur (total)	CE119	% w/w S	0.02	-	0.14	0.02	0.03
Total Organic Carbon (TOC)	CE197	% w/w C	-	1.6	6.0	-	-
Estimate of OMC (calculated from TOC)	CE197	% w/w	-	2.8	10.3	-	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO_3
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO_4
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	100	mg/kg SO4
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	0.01	% w/w SO4
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		0.01	% w/w S
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
120832-1	BH01A	0.20-0.50	Y	All (NSD)
120832-2	BH01A	0.90-1.00	Y	All (NSD)
120832-3	BH02A	1.20-1.70	Y	All (NSD)
120832-4	BH02A	2.80	Y	All (NSD)
120832-5	BH03	0.50-1.00	Y	All (NSD)
120832-6	BH03	1.90	Y	All (NSD)
120832-7	BH03	3.00-3.50	Y	All (NSD)
120832-9	BH03	4.00-4.50	Y	All (NSD)
120832-10	BH03	6.80	Y	All (NSD)
120832-11	TP03	1.50	Y	All (NSD)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.
For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones, where applicable.

Laboratory Report

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES A PHENNA GROUP COMPANY

Contract Number: 66173

Client Ref: **Q1031**
Client PO:

Date Received: **27-04-2023**
Date Completed: **15-05-2023**
Report Date: **15-05-2023**

Client: **Quantum Geotechnic Ltd**
Plas Newydd
Llanedi
Pontarddulais
Swansea
SA4 0FQ

This report has been checked and approved by:

B. Evans

Brendan Evans
Office Administrator

Contract Title: **Garswllt WWTW**
For the attention of: **Arwel Jones**

Test Description	Qty
Moisture Content of Soil BS1377 : Part 2 : Clause 3.2 : 1990 - * UKAS	5
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	5
PSD Wet & Dry Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	25
PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected) BS 1377:1990 - Part 2 : 9.4 - * UKAS	8
BRE Full Suite **includes pH, water & acid soluble sulphate, total sulphur, magnesium, chloride and nitrate** Sub-contracted Test	1
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (Human Resources/ Health and Safety Manager)

GEO Site & Testing Services Ltd
Units 3-4, Heol Aur, Dafen, Llanelli, Carmarthenshire, Wales SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL
GEOTECHNICAL SITE & TESTING LABORATORIES

NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.3 & 5.3)

Contract Number	66173
Project Name	Garswllt WWTW
Date Tested	04/05/2023

DESCRIPTIONS

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
BH-SD-01	4	B	2.00	-	2.50	Brown slightly clayey/silty fine to coarse GRAVEL
BH-SD-01		SPTLS	21.00	-		Black fine to medium gravelly silty CLAY
BH-SD-01		SPTLS	24.00	-		Black fine to medium gravelly silty CLAY
BH-SD-04		SPTLS	3.00	-		Black silty CLAY
BH-SD-04	7	B	5.50	-	5.80	Black PEAT (with rootlets)
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		

Operator
Aaron Hodge

NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.3 & 5.3)

Contract Number	66173
Project Name	Garswllt WWTW
Date Tested	04/05/2023

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
BH-SD-01	4	B	2.00	-	2.50	7.6		NP		20	
BH-SD-01		SPTLS	21.00	-		24	56	29	27	90	CH High Plasticity
BH-SD-01		SPTLS	24.00	-		24	57	24	33	97	CH High Plasticity
BH-SD-04		SPTLS	3.00	-		41	55	25	30	100	CH High Plasticity
BH-SD-04	7	B	5.50	-	5.80	313		NP		16	
				-							
				-							
				-							
				-							
				-							
				-							
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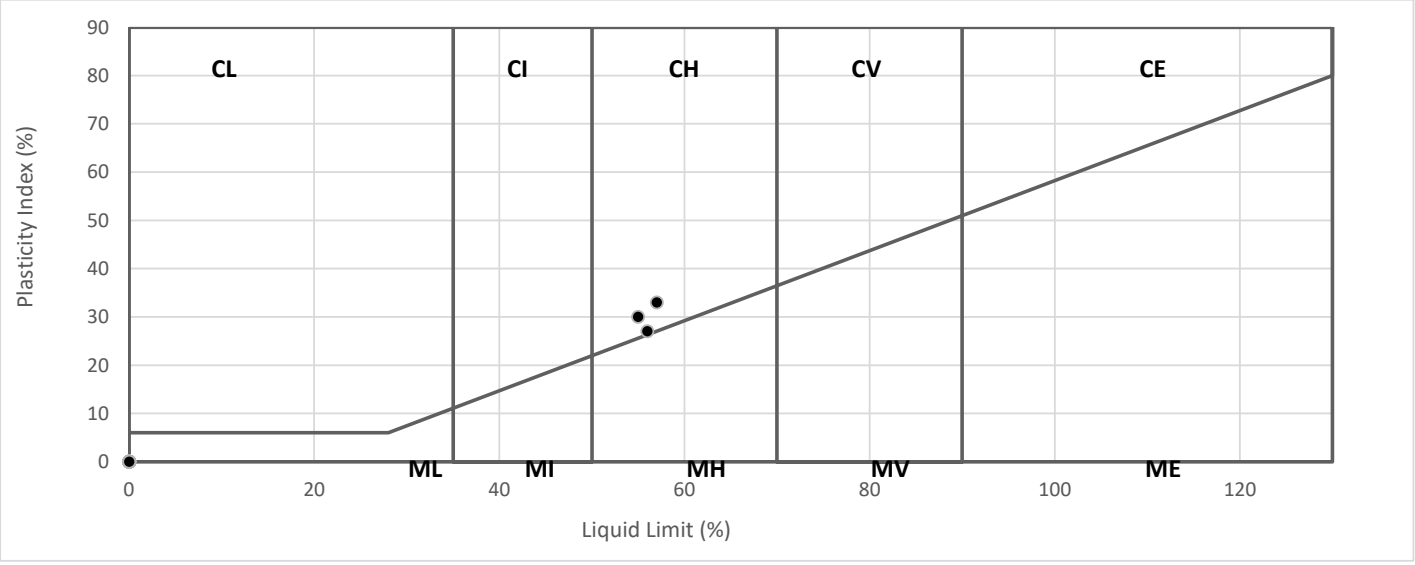
				-							
				-							
				-							
				-							
				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

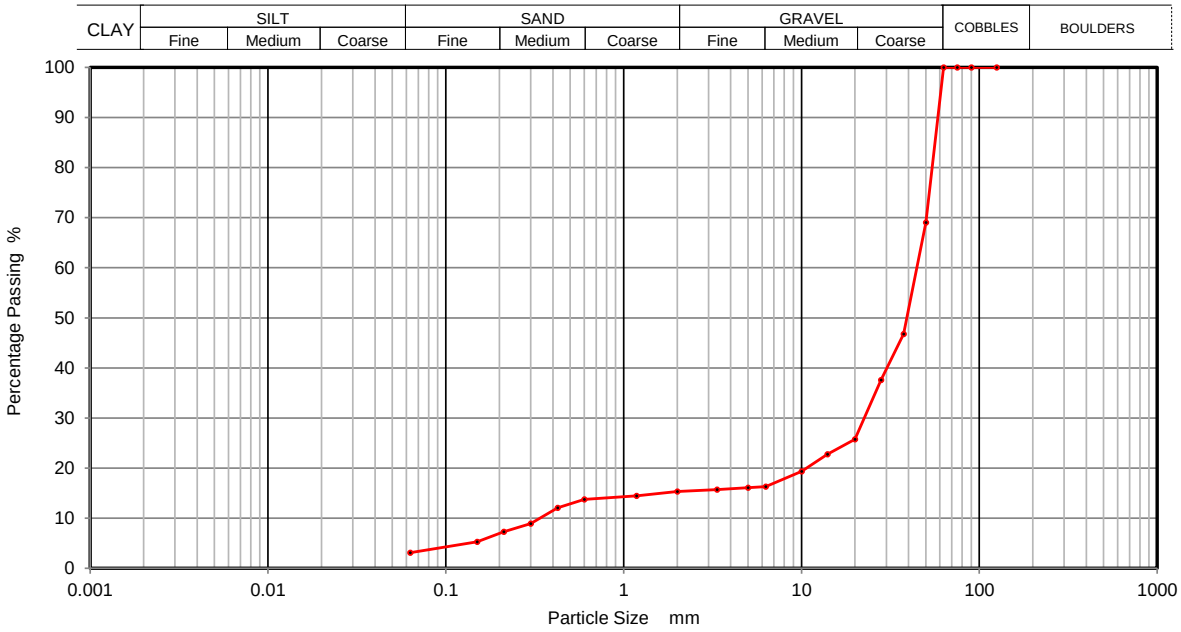
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:2015+A1:2020



Operator
Aaron Hodge

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-01
Project Name	Garswllt WWTW	Sample No.	6
Soil Description	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL	Depth Top	3.00
		Depth Base	4.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	69		
37.5	47		
28	38		
20	26		
14	23		
10	19		
6.3	16		
5	16		
3.35	16		
2	15		
1.18	14		
0.6	14		
0.425	12		
0.3	9		
0.212	7		
0.15	5		
0.063	3		

Sample Proportions	% dry mass
Cobbles	0
Gravel	85
Sand	12
Silt and Clay	3

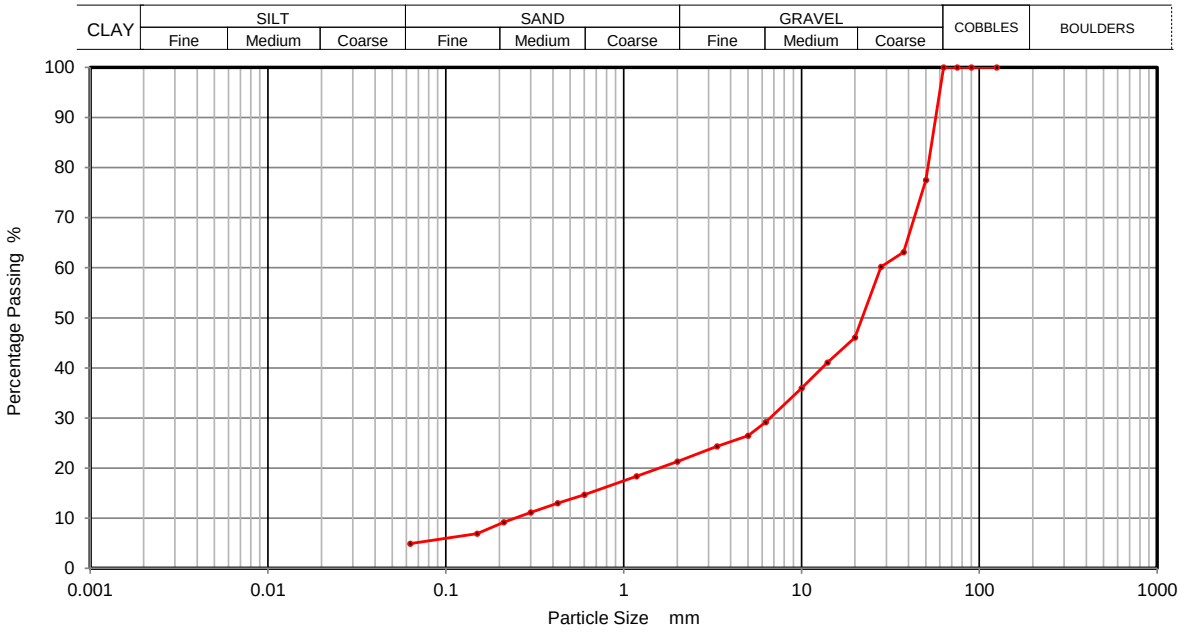
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-01
Project Name	Garswllt WWTW	Sample No.	8
Soil Description	Brown clayey/silty fine to coarse sandy fine to coarse GRAVEL	Depth Top	6.00
		Depth Base	7.30
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	77		
37.5	63		
28	60		
20	46		
14	41		
10	36		
6.3	29		
5	26		
3.35	24		
2	21		
1.18	18		
0.6	15		
0.425	13		
0.3	11		
0.212	9		
0.15	7		
0.063	5		

Sample Proportions	% dry mass
Cobbles	0
Gravel	79
Sand	16
Silt and Clay	5

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
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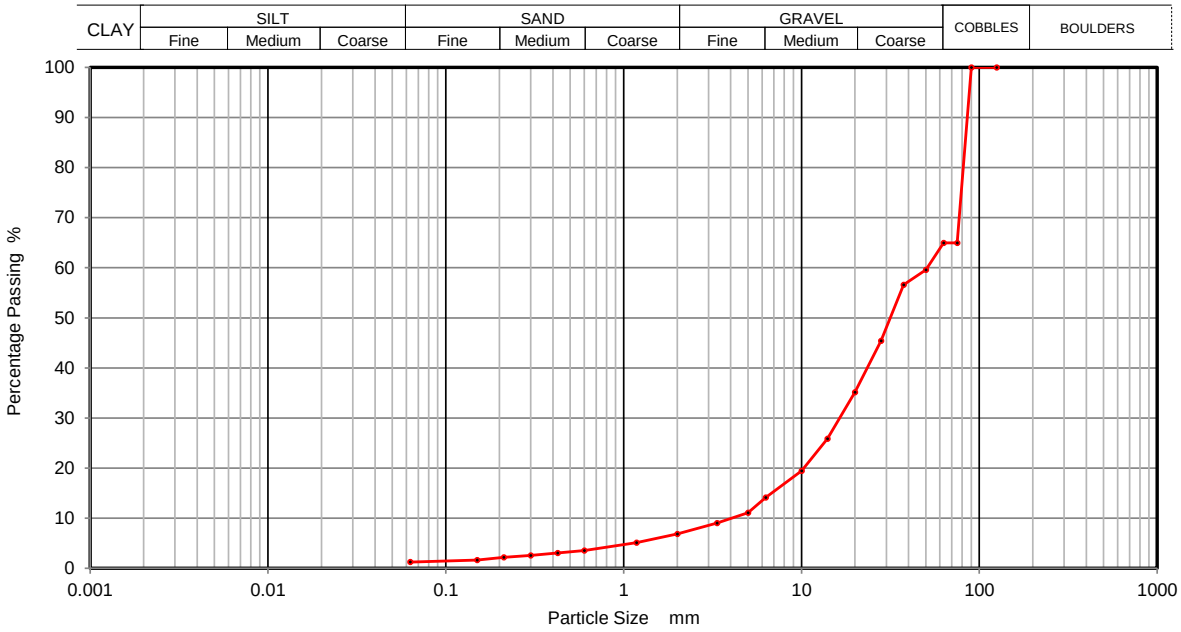
GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-01
Project Name	Garswllt WWTW	Sample No.	11
Soil Description	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	10.50
		Depth Base	12.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	65		
63	65		
50	60		
37.5	57		
28	45		
20	35		
14	26		
10	19		
6.3	14		
5	11		
3.35	9		
2	7		
1.18	5		
0.6	4		
0.425	3		
0.3	3		
0.212	2		
0.15	2		
0.063	1		

Sample Proportions	% dry mass
Cobbles	35
Gravel	58
Sand	6
Silt and Clay	1

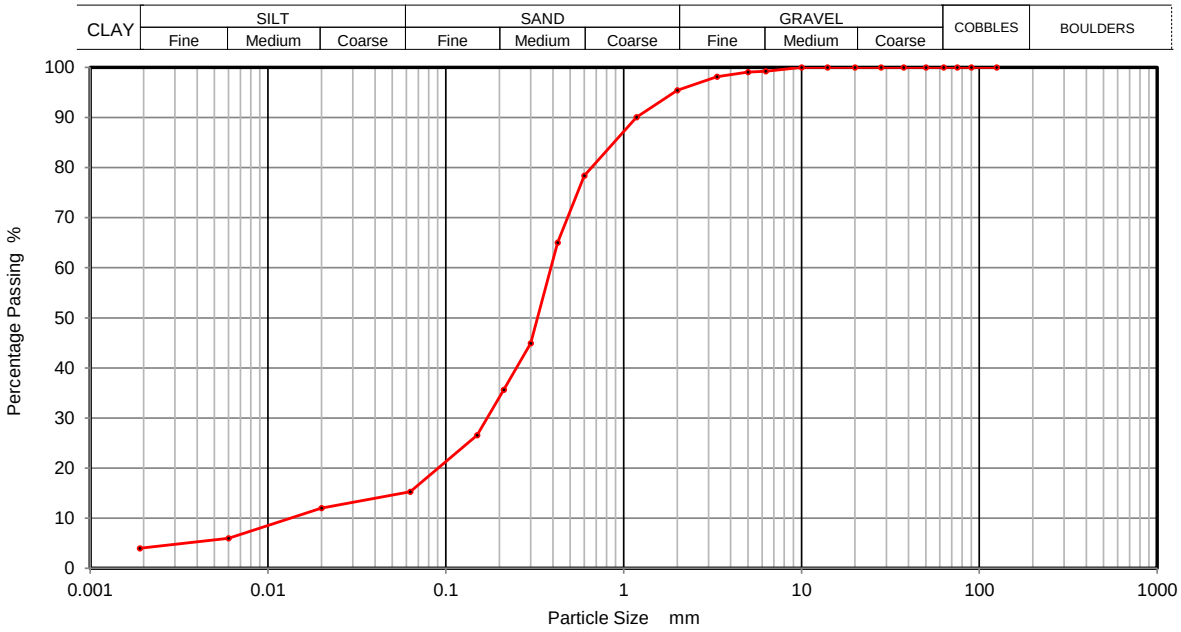
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**	Contract Number	66173
		Borehole/Pit No.	BH-SD-01
Project Name	Garswllt WWTW	Sample No.	14
Soil Description	Brown slightly clayey fine to medium gravelly silty fine to coarse SAND	Depth Top	14.30
		Depth Base	14.70
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	12
90	100	0.0060	6
75	100	0.0020	4
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	98		
2	95		
1.18	90		
0.6	78		
0.425	65		
0.3	45		
0.212	36		
0.15	27		
0.063	15		

Sample Proportions	% dry mass
Cobbles	0
Gravel	5
Sand	80
Silt	11
Clay	4

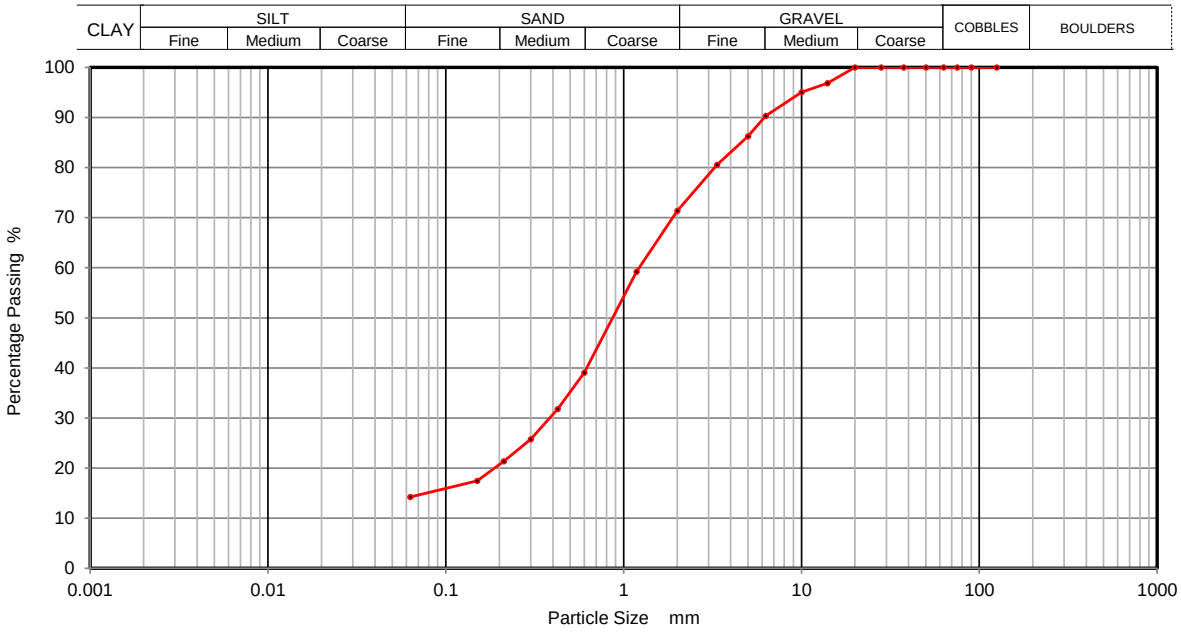
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-01
Project Name	Garswllt WWTW	Sample No.	18
Soil Description	Grey silty/clayey fine to medium gravelly fine to coarse SAND	Depth Top	16.50
		Depth Base	18.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	95		
6.3	90		
5	86		
3.35	81		
2	71		
1.18	59		
0.6	39		
0.425	32		
0.3	26		
0.212	21		
0.15	17		
0.063	14		

Sample Proportions	% dry mass
Cobbles	0
Gravel	29
Sand	57
Silt and Clay	14

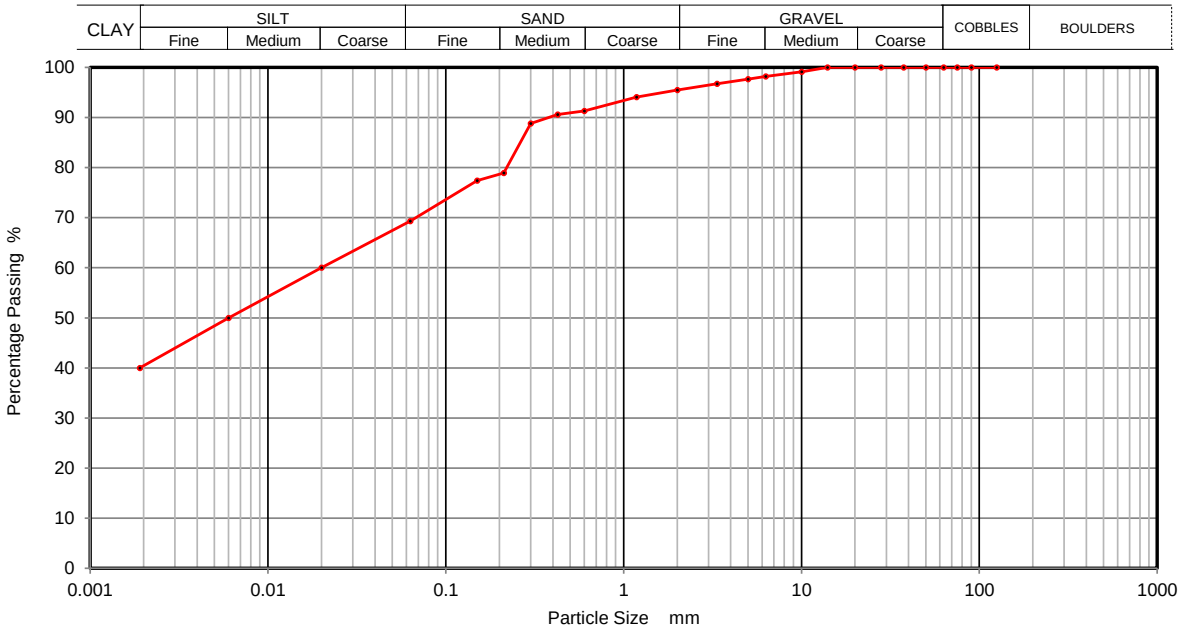
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**	Contract Number	66173
		Borehole/Pit No.	BH-SD-01
Project Name	Garswllt WWTW	Sample No.	21
Soil Description	Grey fine to medium gravelly fine to coarse sandy silty CLAY	Depth Top	20.70
		Depth Base	21.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	60
90	100	0.0060	50
75	100	0.0020	40
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	98		
3.35	97		
2	95		
1.18	94		
0.6	91		
0.425	91		
0.3	89		
0.212	79		
0.15	77		
0.063	69		

Sample Proportions	% dry mass
Cobbles	0
Gravel	5
Sand	26
Silt	29
Clay	40

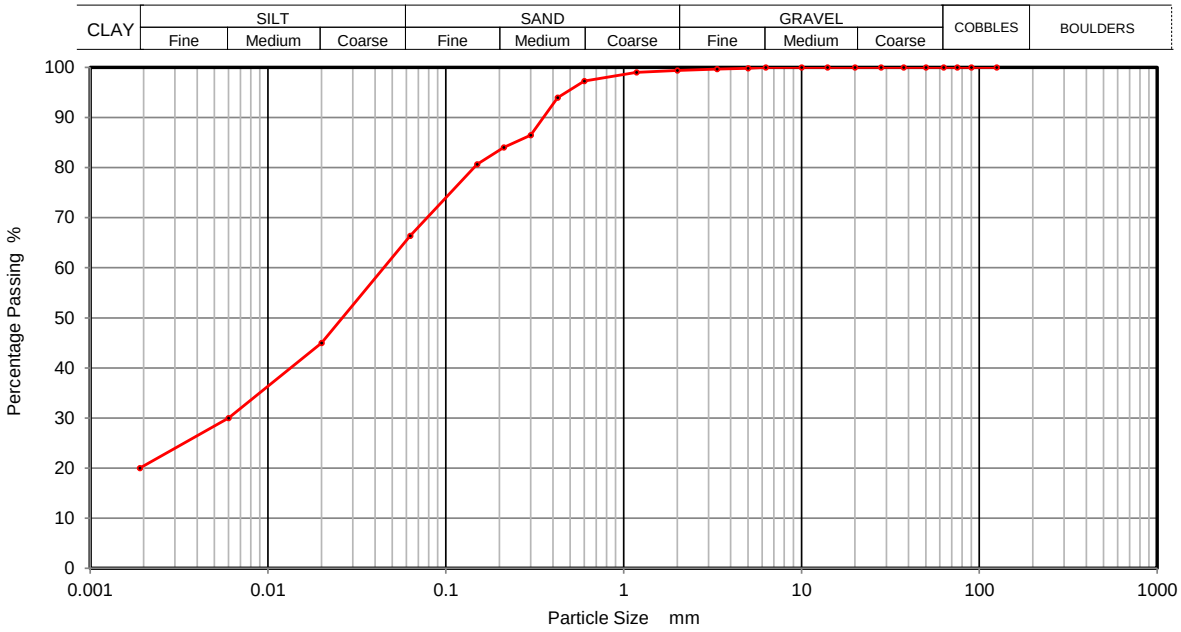
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**	Contract Number	66173
		Borehole/Pit No.	BH-SD-01
Project Name	Garswllt WWTW	Sample No.	23
Soil Description	Grey slightly gravelly fine to coarse sandy clayey SILT	Depth Top	23.00
		Depth Base	24.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	45
90	100	0.0060	30
75	100	0.0020	20
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	97		
0.425	94		
0.3	86		
0.212	84		
0.15	81		
0.063	66		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	33
Silt	46
Clay	20

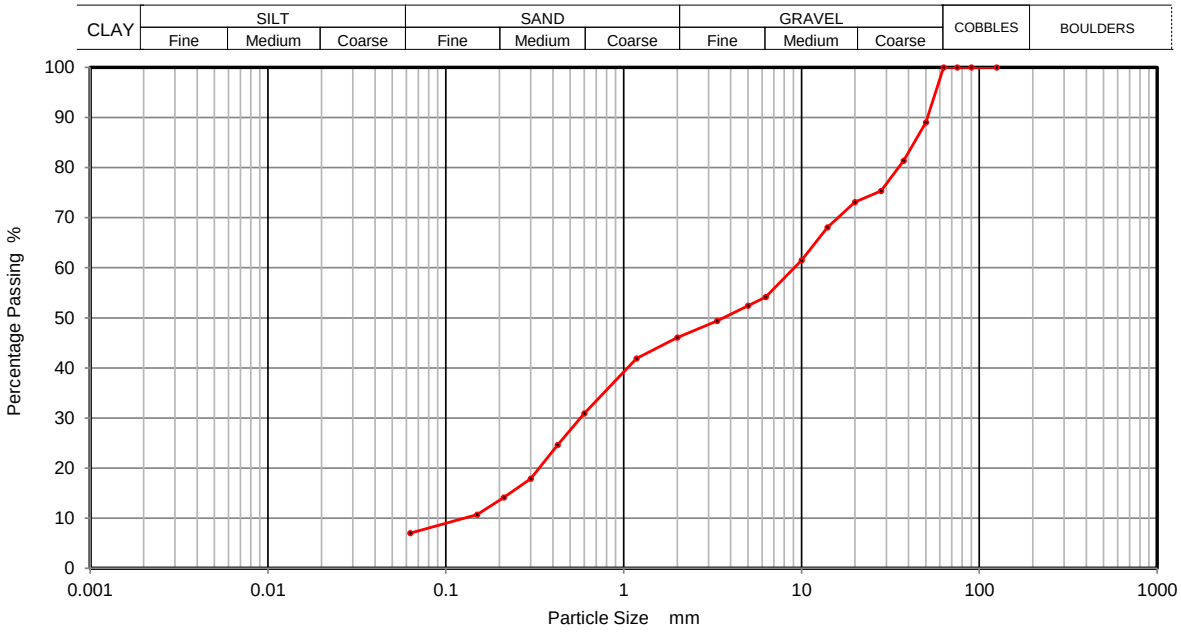
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-02
Project Name	Garswllt WWTW	Sample No.	8
Soil Description	Grey brown silty/clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	7.50
		Depth Base	8.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	89		
37.5	81		
28	75		
20	73		
14	68		
10	61		
6.3	54		
5	52		
3.35	49		
2	46		
1.18	42		
0.6	31		
0.425	25		
0.3	18		
0.212	14		
0.15	11		
0.063	7		

Sample Proportions	% dry mass
Cobbles	0
Gravel	54
Sand	39
Silt and Clay	7

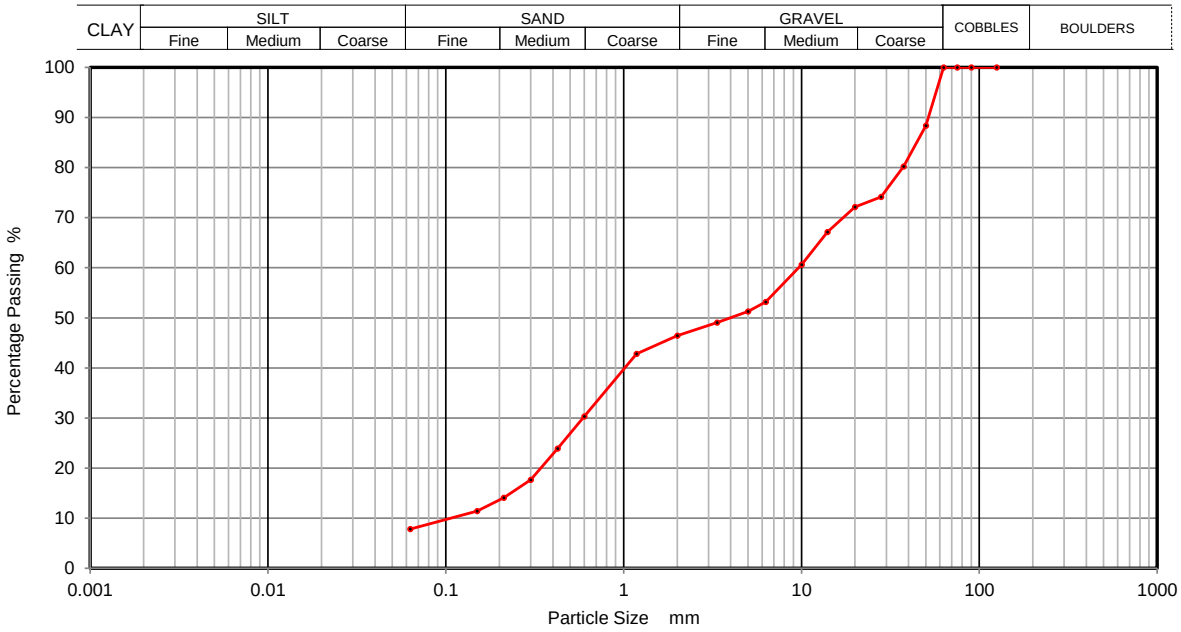
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-02
Project Name	Garswllt WWTW	Sample No.	11
Soil Description	Brown clayey/silty fine to coarse sandy fine to coarse GRAVEL	Depth Top	12.00
		Depth Base	12.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	88		
37.5	80		
28	74		
20	72		
14	67		
10	61		
6.3	53		
5	51		
3.35	49		
2	46		
1.18	43		
0.6	30		
0.425	24		
0.3	18		
0.212	14		
0.15	11		
0.063	8		

Sample Proportions	% dry mass
Cobbles	0
Gravel	54
Sand	38
Silt and Clay	8

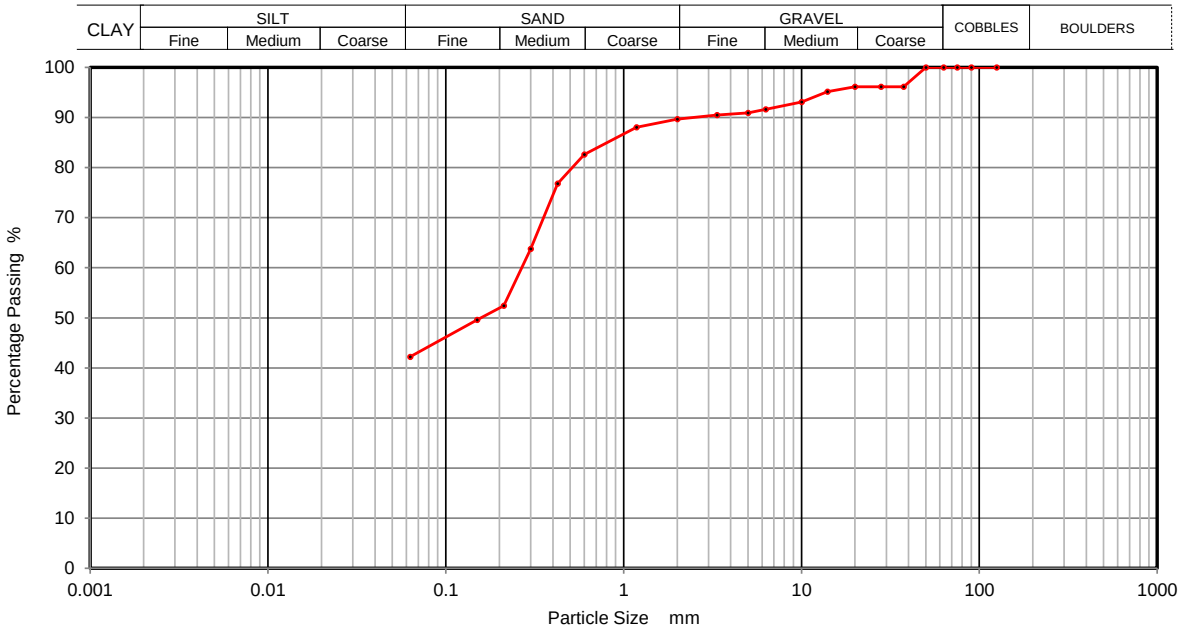
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-02
Project Name	Garswllt WWTW	Sample No.	15
Soil Description	Brown fine to coarse gravelly fine to coarse sandy SILT/CLAY	Depth Top	15.50
		Depth Base	16.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	96		
28	96		
20	96		
14	95		
10	93		
6.3	92		
5	91		
3.35	90		
2	90		
1.18	88		
0.6	83		
0.425	77		
0.3	64		
0.212	52		
0.15	50		
0.063	42		

Sample Proportions	% dry mass
Cobbles	0
Gravel	10
Sand	48
Silt and Clay	42

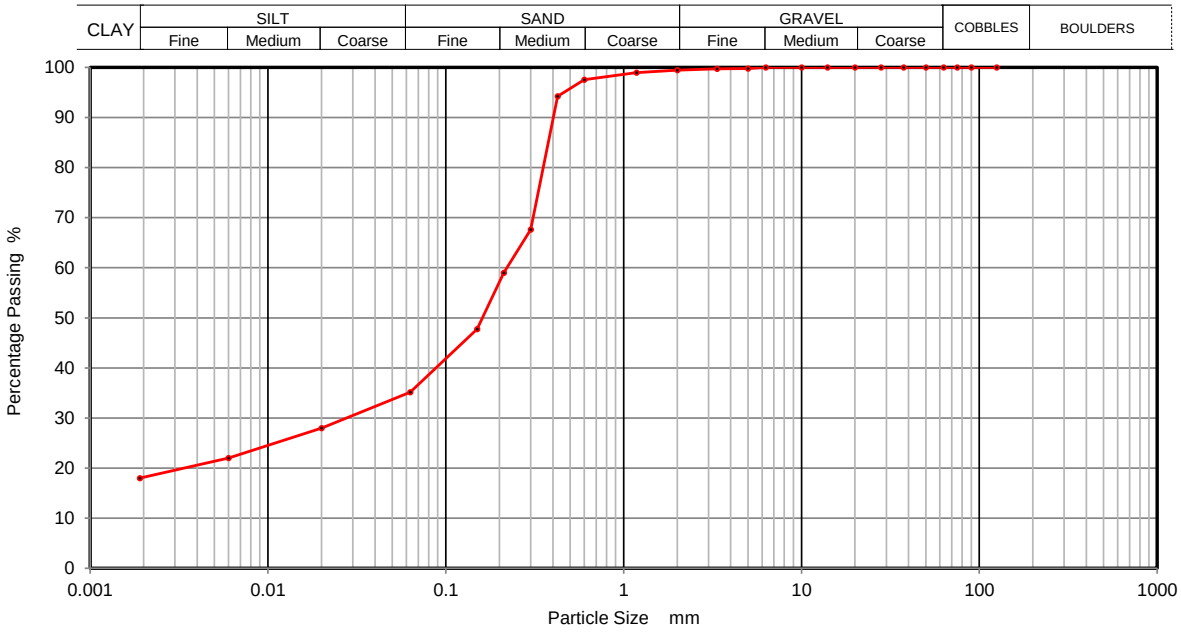
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**	Contract Number	66173
		Borehole/Pit No.	BH-SD-03
Project Name	Garswllt WWTW	Sample No.	3
Soil Description	Brown slightly gravelly fine to coarse sandy silty CLAY	Depth Top	1.50
		Depth Base	2.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	28
90	100	0.0060	22
75	100	0.0020	18
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	98		
0.425	94		
0.3	68		
0.212	59		
0.15	48		
0.063	35		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	64
Silt	17
Clay	18

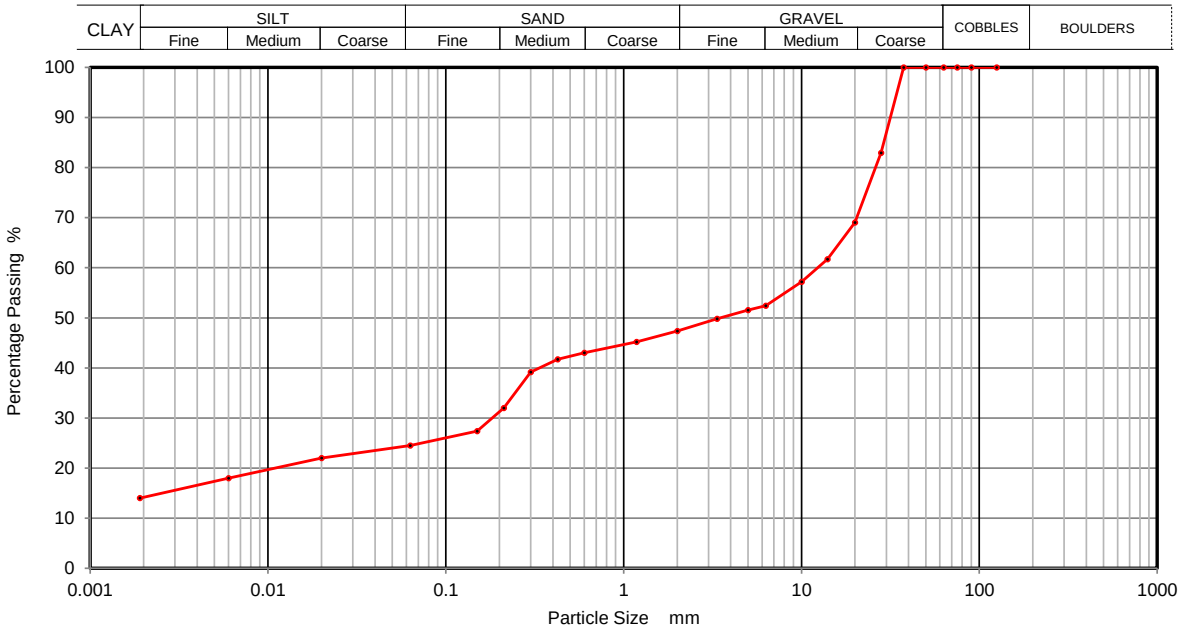
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**	Contract Number	66173
		Borehole/Pit No.	BH-SD-03
Project Name	Garswllt WWTW	Sample No.	4
Soil Description	Brown silty clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	3.00
		Depth Base	4.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	22
90	100	0.0060	18
75	100	0.0020	14
63	100		
50	100		
37.5	100		
28	83		
20	69		
14	62		
10	57		
6.3	52		
5	52		
3.35	50		
2	47		
1.18	45		
0.6	43		
0.425	42		
0.3	39		
0.212	32		
0.15	27		
0.063	25		

Sample Proportions	% dry mass
Cobbles	0
Gravel	53
Sand	22
Silt	11
Clay	14

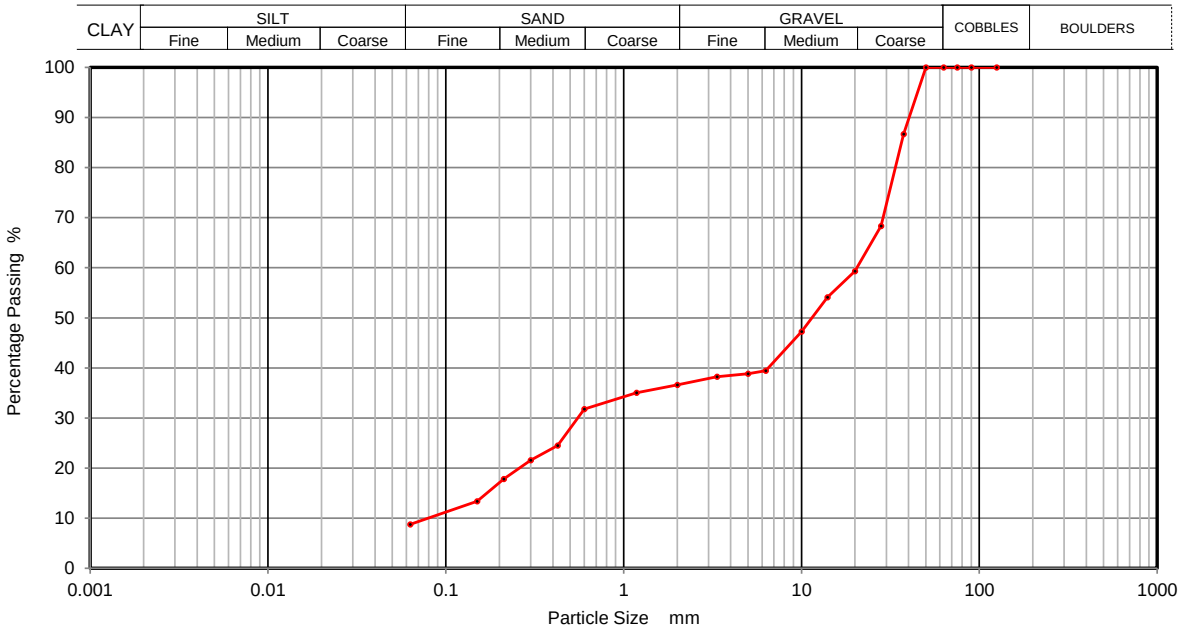
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-03
Project Name	Garswllt WWTW	Sample No.	7
Soil Description	Brown clayey/silty fine to coarse sandy fine to coarse GRAVEL	Depth Top	8.00
		Depth Base	9.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	87		
28	68		
20	59		
14	54		
10	47		
6.3	39		
5	39		
3.35	38		
2	37		
1.18	35		
0.6	32		
0.425	25		
0.3	22		
0.212	18		
0.15	13		
0.063	9		

Sample Proportions	% dry mass
Cobbles	0
Gravel	63
Sand	28
Silt and Clay	9

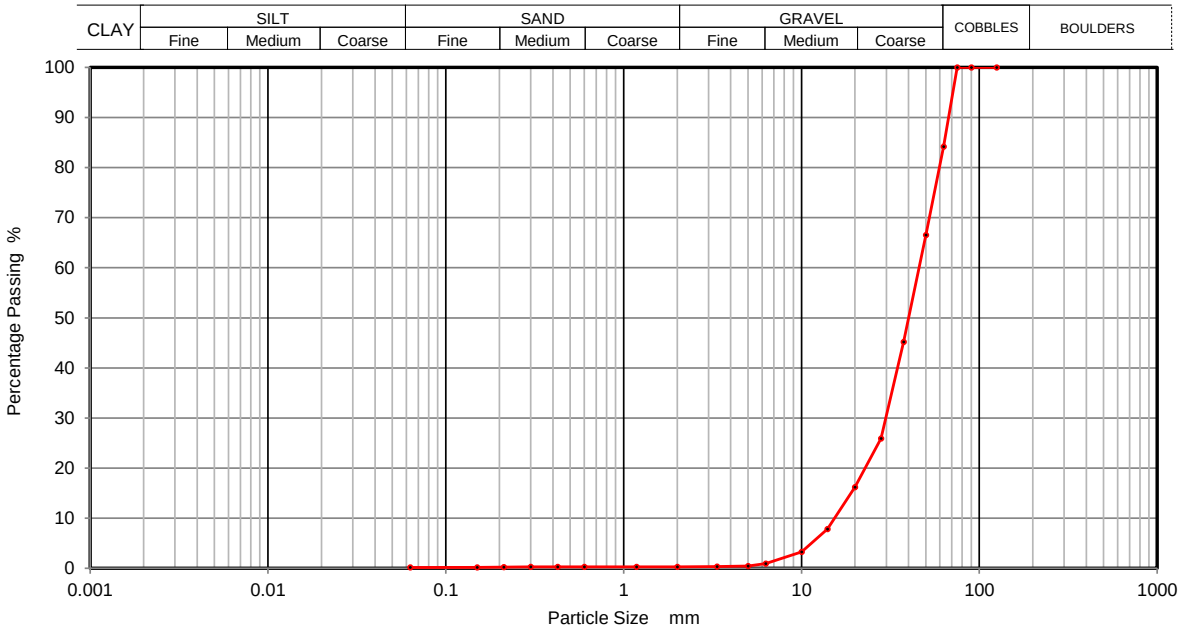
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-03
Project Name	Garswllt WWTW	Sample No.	10
Soil Description	Grey brown fine to coarse GRAVEL (with cobbles)	Depth Top	12.50
		Depth Base	13.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	84		
50	67		
37.5	45		
28	26		
20	16		
14	8		
10	3		
6.3	1		
5	0		
3.35	0		
2	0		
1.18	0		
0.6	0		
0.425	0		
0.3	0		
0.212	0		
0.15	0		
0.063	0		

Sample Proportions	% dry mass
Cobbles	16
Gravel	84
Sand	0
Silt and Clay	0

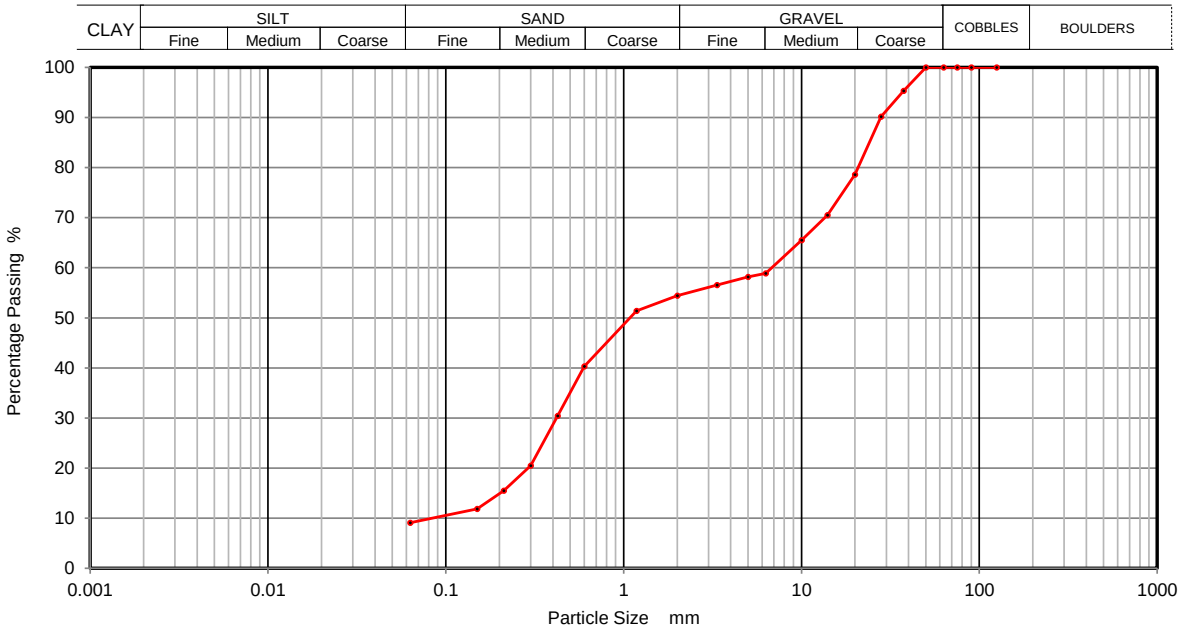
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-03
Project Name	Garswllt WWTW	Sample No.	12
Soil Description	Grey silty/clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	16.50
		Depth Base	17.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	95		
28	90		
20	79		
14	71		
10	65		
6.3	59		
5	58		
3.35	57		
2	54		
1.18	51		
0.6	40		
0.425	30		
0.3	20		
0.212	16		
0.15	12		
0.063	9		

Sample Proportions	% dry mass
Cobbles	0
Gravel	46
Sand	45
Silt and Clay	9

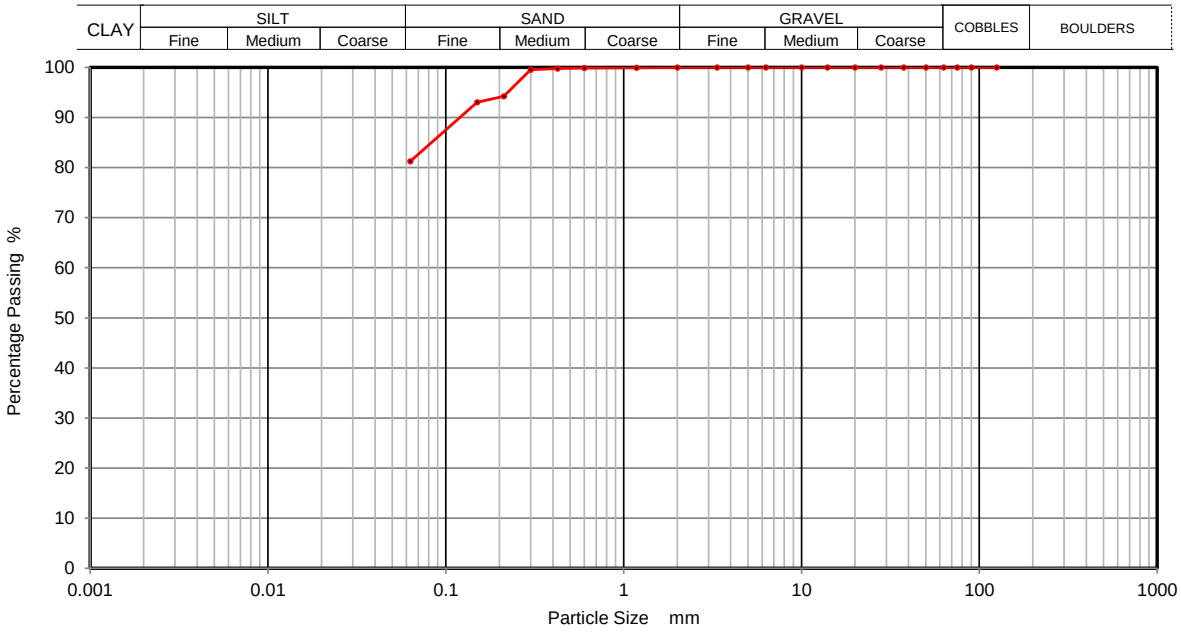
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-03
Project Name	Garswllt WWTW	Sample No.	13
Soil Description	Grey fine to coarse sandy SILT/CLAY	Depth Top	18.50
		Depth Base	19.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	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	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	94		
0.15	93		
0.063	81		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	19
Silt and Clay	81

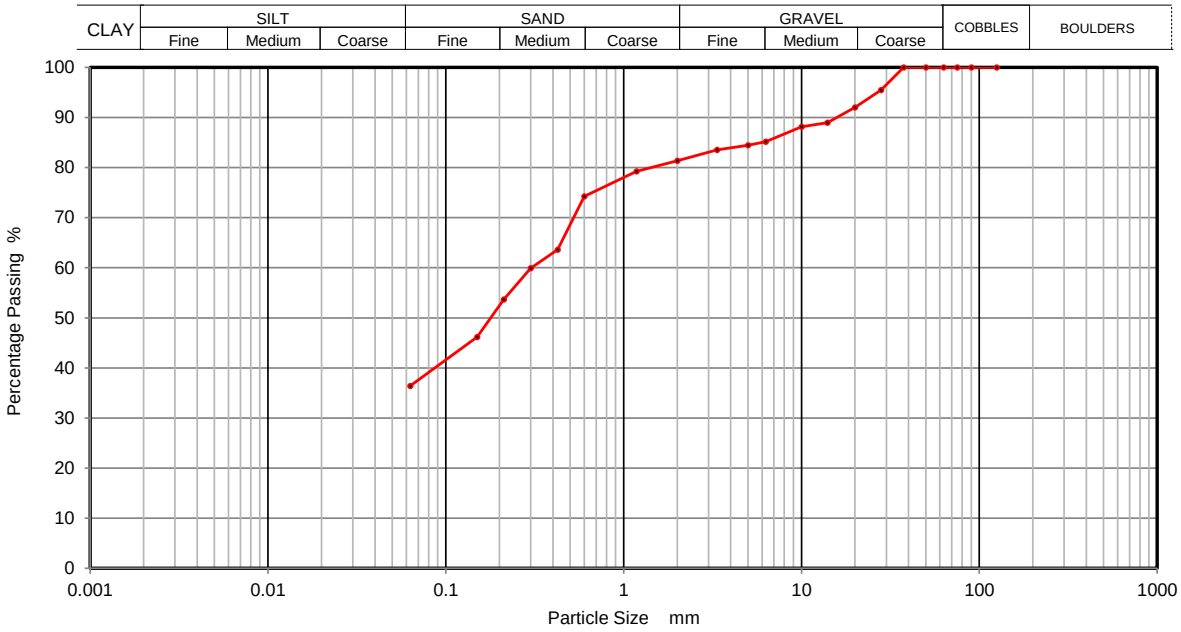
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	2
Soil Description	Brown fine to coarse gravelly fine to coarse sandy SILT/CLAY	Depth Top	0.50
		Depth Base	1.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	92		
14	89		
10	88		
6.3	85		
5	84		
3.35	84		
2	81		
1.18	79		
0.6	74		
0.425	64		
0.3	60		
0.212	54		
0.15	46		
0.063	36		

Sample Proportions	% dry mass
Cobbles	0
Gravel	19
Sand	45
Silt and Clay	36

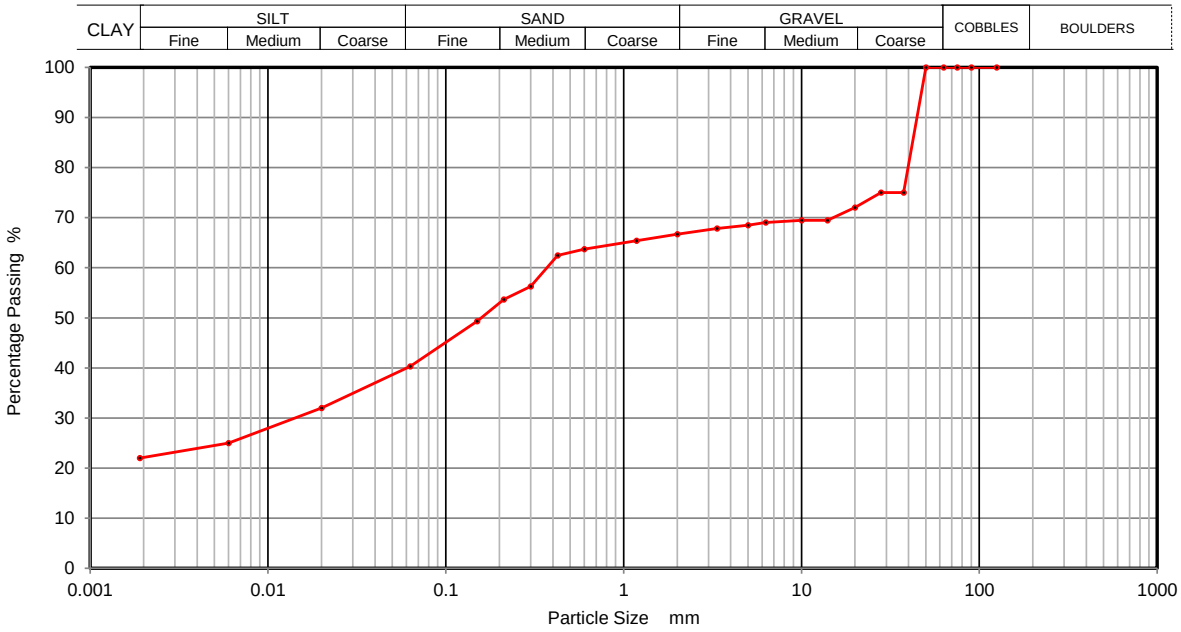
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	4
Soil Description	Brown fine to coarse sandy fine to coarse gravelly silty CLAY	Depth Top	2.00
		Depth Base	2.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	32
90	100	0.0060	25
75	100	0.0020	22
63	100		
50	100		
37.5	75		
28	75		
20	72		
14	69		
10	69		
6.3	69		
5	69		
3.35	68		
2	67		
1.18	65		
0.6	64		
0.425	62		
0.3	56		
0.212	54		
0.15	49		
0.063	40		

Sample Proportions	% dry mass
Cobbles	0
Gravel	33
Sand	27
Silt	18
Clay	22

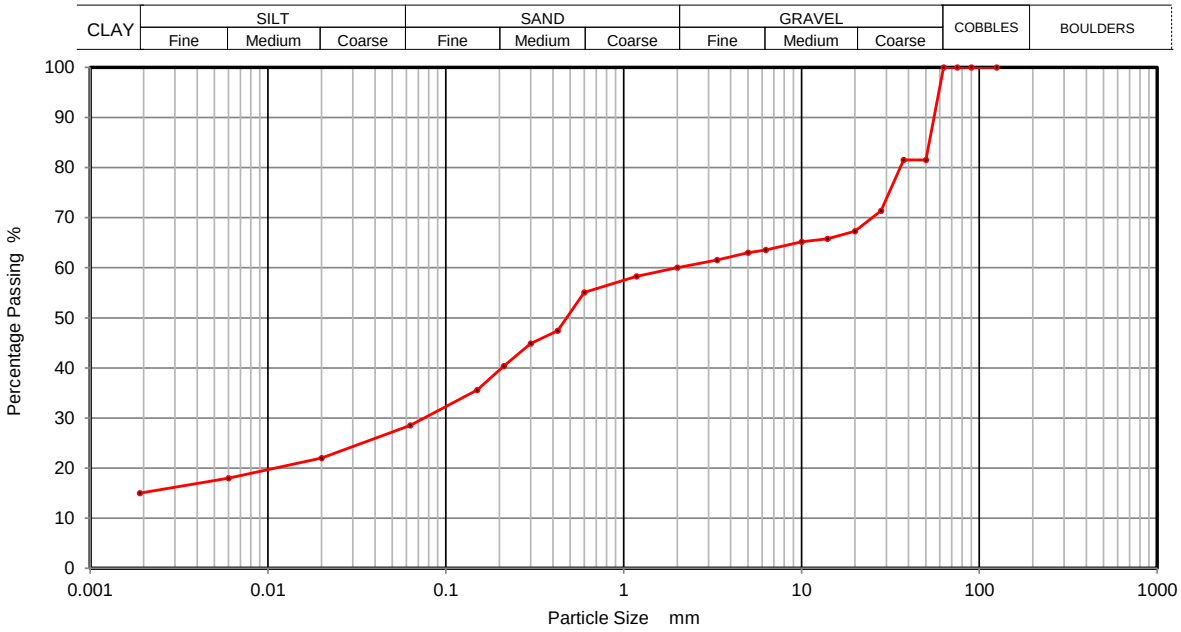
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	1
Soil Description	Brown silty clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	3.00
		Depth Base	
Date Tested	04/05/2023	Sample Type	D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	22
90	100	0.0060	18
75	100	0.0020	15
63	100		
50	82		
37.5	82		
28	71		
20	67		
14	66		
10	65		
6.3	64		
5	63		
3.35	62		
2	60		
1.18	58		
0.6	55		
0.425	47		
0.3	45		
0.212	40		
0.15	36		
0.063	29		

Sample Proportions	% dry mass
Cobbles	0
Gravel	40
Sand	31
Silt	14
Clay	15

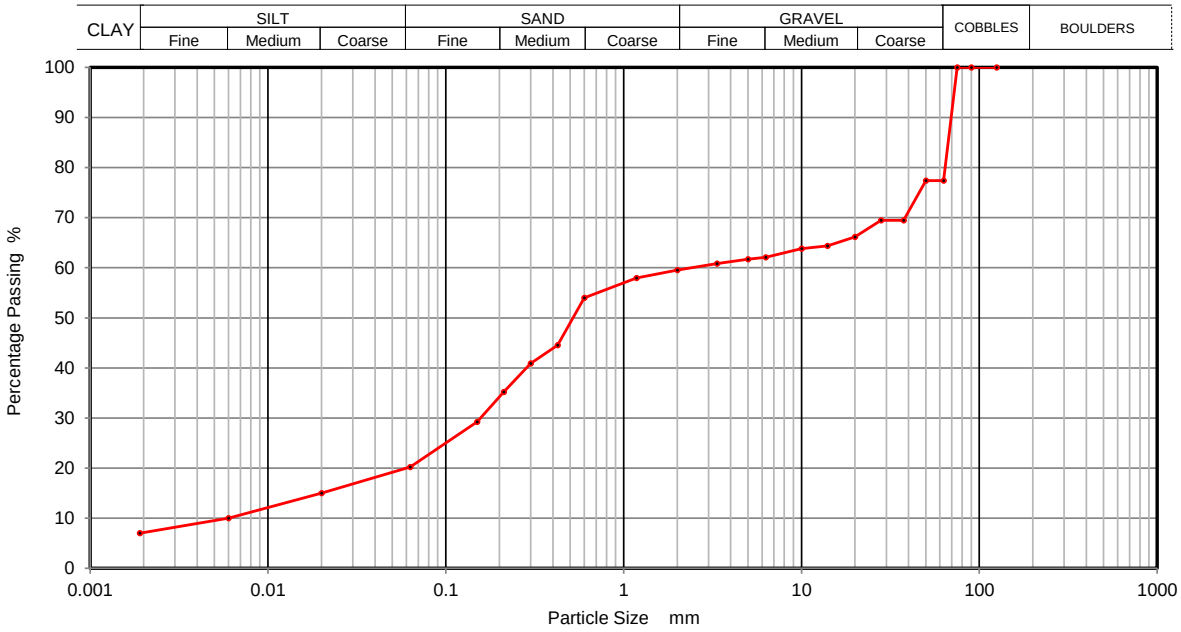
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	5
Soil Description	Brown clayey silty fine to coarse gravelly fine to coarse SAND (with cobbles)	Depth Top	3.50
		Depth Base	4.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	15
90	100	0.0060	10
75	100	0.0020	7
63	77		
50	77		
37.5	69		
28	69		
20	66		
14	64		
10	64		
6.3	62		
5	62		
3.35	61		
2	60		
1.18	58		
0.6	54		
0.425	45		
0.3	41		
0.212	35		
0.15	29		
0.063	20		

Sample Proportions	% dry mass
Cobbles	23
Gravel	17
Sand	40
Silt	13
Clay	7

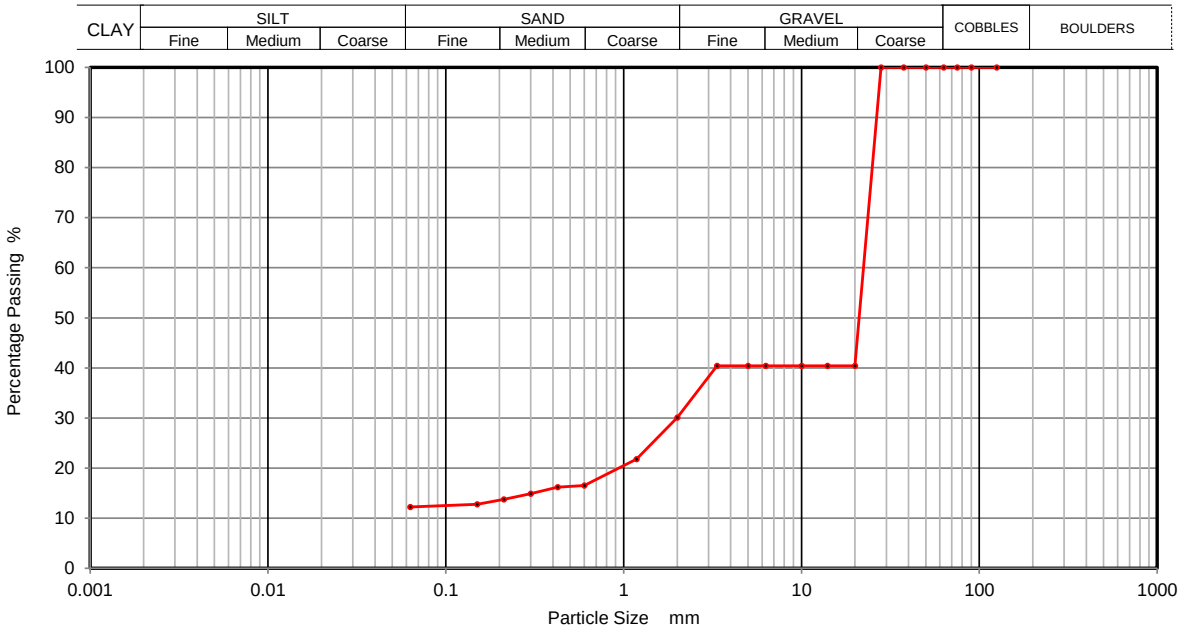
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	7
Soil Description	Black PEAT (with rootlets)	Depth Top	5.50
		Depth Base	5.80
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	40		
14	40		
10	40		
6.3	40		
5	40		
3.35	40		
2	30		
1.18	22		
0.6	17		
0.425	16		
0.3	15		
0.212	14		
0.15	13		
0.063	12		

Sample Proportions	% dry mass
Cobbles	0
Gravel	70
Sand	18
Silt and Clay	12

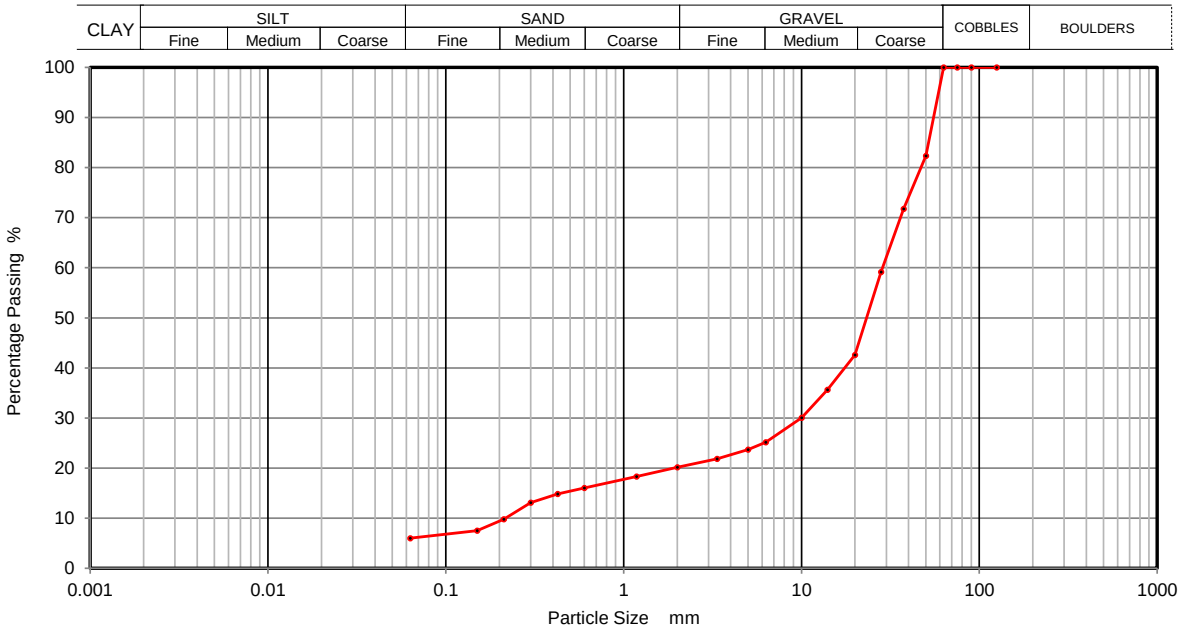
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	8
Soil Description	Brown clayey/silty fine to coarse sandy fine to coarse GRAVEL	Depth Top	6.00
		Depth Base	7.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	82		
37.5	72		
28	59		
20	43		
14	36		
10	30		
6.3	25		
5	24		
3.35	22		
2	20		
1.18	18		
0.6	16		
0.425	15		
0.3	13		
0.212	10		
0.15	7		
0.063	6		

Sample Proportions	% dry mass
Cobbles	0
Gravel	80
Sand	14
Silt and Clay	6

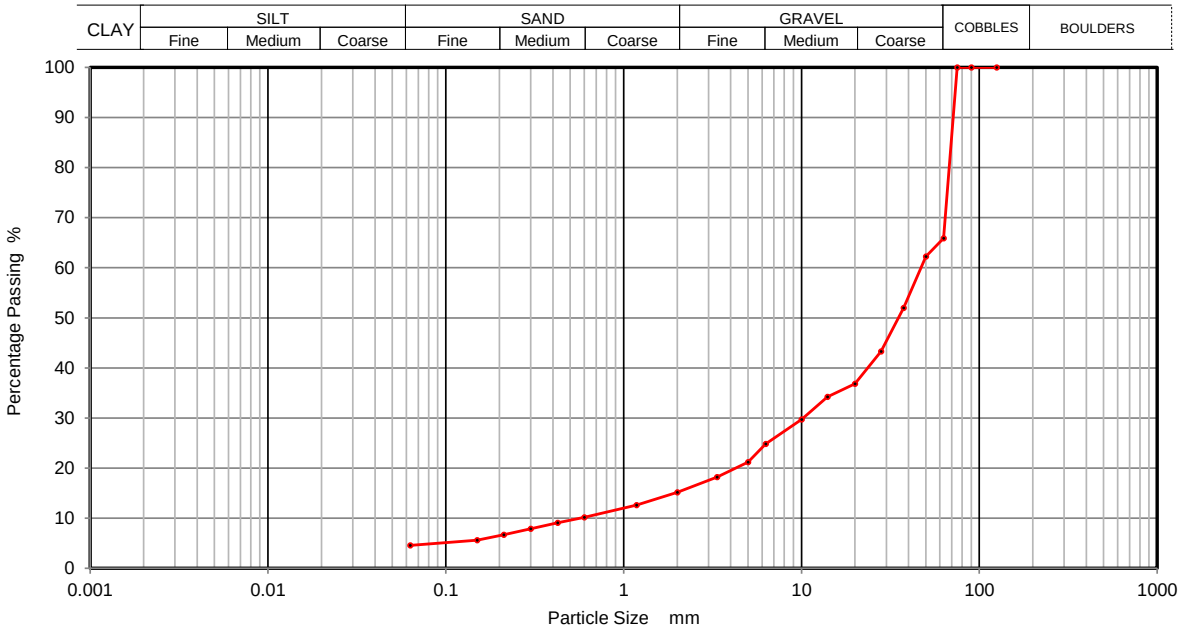
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	9
Soil Description	Brown clayey/silty fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	7.50
		Depth Base	8.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	66		
50	62		
37.5	52		
28	43		
20	37		
14	34		
10	30		
6.3	25		
5	21		
3.35	18		
2	15		
1.18	13		
0.6	10		
0.425	9		
0.3	8		
0.212	7		
0.15	6		
0.063	5		

Sample Proportions	% dry mass
Cobbles	34
Gravel	51
Sand	10
Silt and Clay	5

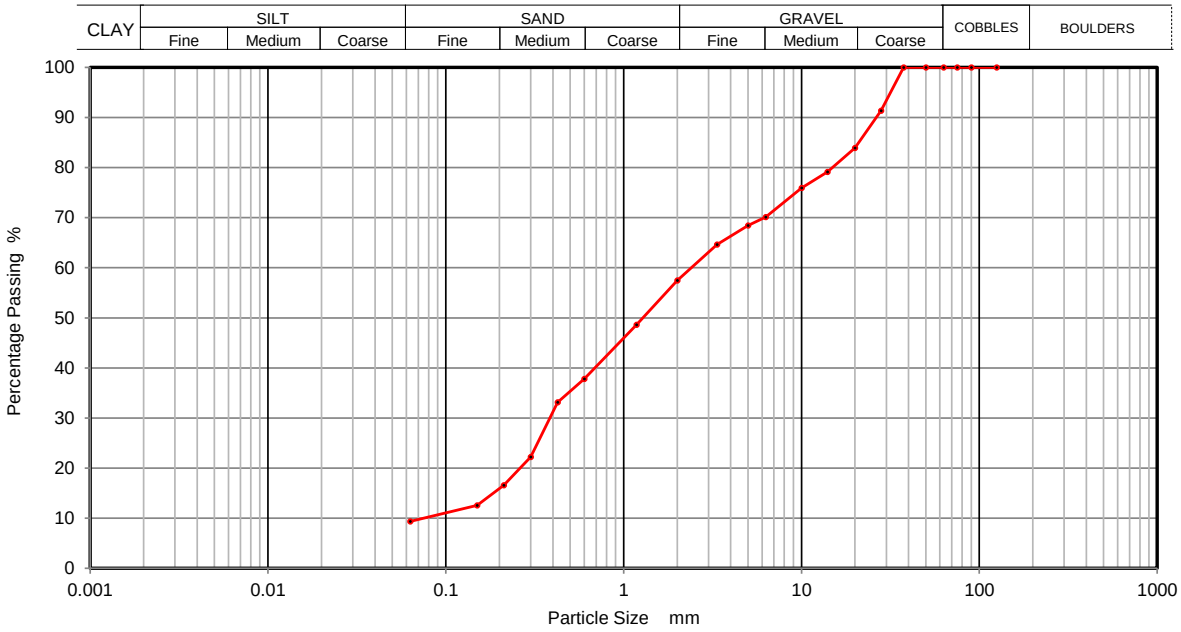
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	14
Soil Description	Grey brown clayey/silty fine to coarse gravelly fine to coarse SAND	Depth Top	15.00
		Depth Base	16.00
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	91		
20	84		
14	79		
10	76		
6.3	70		
5	68		
3.35	65		
2	57		
1.18	49		
0.6	38		
0.425	33		
0.3	22		
0.212	17		
0.15	13		
0.063	9		

Sample Proportions	% dry mass
Cobbles	0
Gravel	43
Sand	48
Silt and Clay	9

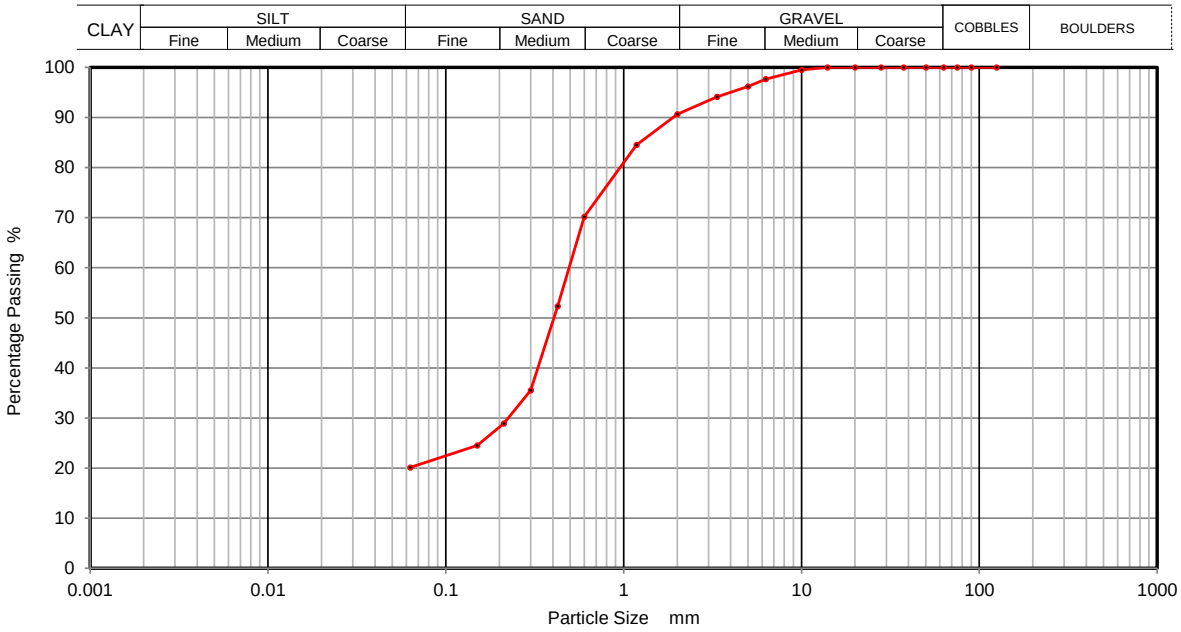
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	66173
		Borehole/Pit No.	BH-SD-04
Project Name	Garswllt WWTW	Sample No.	16
Soil Description	Grey fine to medium gravelly clayey/silty fine to coarse SAND	Depth Top	18.50
		Depth Base	19.50
Date Tested	04/05/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	96		
3.35	94		
2	91		
1.18	85		
0.6	70		
0.425	52		
0.3	36		
0.212	29		
0.15	25		
0.063	20		

Sample Proportions	% dry mass
Cobbles	0
Gravel	9
Sand	71
Silt and Clay	20

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING
2788

2531

ANALYTICAL TEST REPORT

Contract no: 122299

Contract name: Garswllt WWTW

Client reference: Q1031

Clients name: Geo Site and Testing Services

Clients address: Unit 3 and 4 Heol Aur
Dafen Industrial Estate, Dafen
Llanelli, Carmarthenshire
SA14 8QN

Samples received: 03 May 2023

Analysis started: 03 May 2023

Analysis completed: 12 May 2023

Report issued: 12 May 2023

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing

Approved by:

Abbie Neasham-Bourn

Senior Reporting Administrator

Chemtech Environmental Limited

SOILS

Lab number			122299-1
Sample id			BH-SD-01
Depth (m)			2.00-2.50
Sample Type			B4
Date sampled			-
Test	**Method**	**Units**	
pH	CE004 [U]	units	8.4
Magnesium (2:1 water soluble)	CE061	mg/l Mg	1.1
Chloride (2:1 water soluble)	CE049 [U]	mg/l Cl	4.1
Nitrate (2:1 water soluble)	CE049 [U]	mg/l NO_3	<1
Sulphate (2:1 water soluble)	CE061 [U]	mg/l SO_4	<10
Sulphate (acid extractable)	CE062 [U]	mg/kg SO_4	244
Sulphate (acid extractable)	CE062 [U]	% w/w SO_4	0.02
Sulphur (total)	CE119	mg/kg S	<100
Sulphur (total)	CE119	% w/w S	<0.01

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO_3
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO_4
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	100	mg/kg SO4
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	0.01	% w/w SO4
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		0.01	% w/w S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
122299-1	BH-SD-01	2.00-2.50	Y	All (NSD)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.
For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones, where applicable.

APPENDIX VIII – **CHEMICAL LABORATORY TEST RESULTS**

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-07505-1
Initial Date of Issue:	20-Mar-2023
Client	Quantum Geotechnic Ltd
Client Address:	Plas Newydd Llanedi Pontarddulais Swansea SA4 0FQ
Contact(s):	Phil Darby
Project	Q1031 Garnswllt WWTW
Quotation No.:	Q22-29520
Date Received:	06-Mar-2023
Order No.:	
Date Instructed:	07-Mar-2023
No. of Samples:	9
Turnaround (Wkdays):	10
Results Due:	20-Mar-2023
Date Approved:	20-Mar-2023
Approved By:	

Details:	Stuart Henderson, Technical Manager

Results - Leachate

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd				**Chemtest Job No.:**		23-07505	23-07505	23-07505
Quotation No.: Q22-29520				**Chemtest Sample ID.:**		1601740	1601743	1601746
Order No.:				Client Sample Ref.:		3	2	
				Sample Location:		TP03	BH02	Filter Bed
				Sample Type:		SOIL	SOIL	SOIL
				Top Depth (m):		1.0	0.5	0.4
				Date Sampled:		01-Mar-2023	01-Mar-2023	01-Mar-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
pH	U	1010	2:1		N/A	8.4	8.5	7.1
Chloride	U	1220	2:1	mg/l	1.0	2.1	1.4	< 1.0
Fluoride	U	1220	2:1	mg/l	0.050	0.21	0.35	0.46
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.086	0.065	0.093
Sulphate	U	1220	2:1	mg/l	1.0	19	5.5	1.9
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	23	36	16
Magnesium	U	1455	2:1	mg/l	0.20	3.5	1.4	0.73
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	14	3.0	0.50
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	30	< 10	< 10
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	5.8	13	< 5.0
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	1.9	0.53
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	6.7	4.6	1.3
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	12	< 0.50	1.7
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	12	7.1	0.75
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	2.1	0.76	0.94
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	1.2	0.94	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	2.1	3.4	0.63
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	5.9	< 0.50	0.62
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	< 2.5	< 2.5	4.6
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	22	12	400
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20	< 20	< 20
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	< 0.030	< 0.030

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-07505	23-07505	23-07505	23-07505
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1601739	1601741	1601744	1601745
Order No.:			Client Sample Ref.:		2	4	3	4
			Sample Location:		TP03	TP03	BH02	BH02A
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.3	1.5	1.0	2.0
			Date Sampled:		01-Mar-2023	01-Mar-2023	01-Mar-2023	01-Mar-2023
			Asbestos Lab:		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
ACM Type	U	2192		N/A	-			-
Asbestos Identification	U	2192		N/A	No Asbestos Detected			No Asbestos Detected
Moisture	N	2030	%	0.020	47	20	14	14
Soil Colour	N	2040		N/A	Brown			Brown
Other Material	N	2040		N/A	Stones			Stones
Soil Texture	N	2040		N/A	Loam			Loam
pH	U	2010		4.0	7.7	8.0	8.3	8.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	4.2			< 0.40
Magnesium (Water Soluble)	N	2120	g/l	0.010		< 0.010	< 0.010	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	0.024	< 0.010
Total Sulphur	U	2175	%	0.010	0.12	0.066	0.076	0.054
Chloride (Water Soluble)	U	2220	g/l	0.010		< 0.010	0.022	
Nitrate (Water Soluble)	N	2220	g/l	0.010		0.011	< 0.010	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50			< 0.50
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01	< 0.01	
Iron (Total)	N	2430	mg/kg	100	22000			9500
Sulphate (Total)	U	2430	%	0.010	0.16			0.041
Sulphate (Acid Soluble)	U	2430	%	0.010		0.060	0.051	
Arsenic	U	2455	mg/kg	0.5	11			7.8
Barium	U	2455	mg/kg	0	140			25
Beryllium	U	2455	mg/kg	0.5	1.4			0.7
Cadmium	U	2455	mg/kg	0.10	0.85			0.19
Chromium	U	2455	mg/kg	0.5	47			7.9
Manganese	U	2455	mg/kg	1.0	940			310
Molybdenum	U	2455	mg/kg	0.5	2.2			0.7
Antimony	N	2455	mg/kg	2.0	< 2.0			< 2.0
Copper	U	2455	mg/kg	0.50	87			15
Mercury	U	2455	mg/kg	0.05	0.40			< 0.05
Nickel	U	2455	mg/kg	0.50	40			11
Lead	U	2455	mg/kg	0.50	77			16
Selenium	U	2455	mg/kg	0.25	1.2			0.50
Vanadium	U	2455	mg/kg	0.5	14			7.5
Zinc	U	2455	mg/kg	0.50	250			36
Chromium (Trivalent)	N	2490	mg/kg	1.0	47			7.9
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50			< 0.50
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05			< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05			< 0.05

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-07505	23-07505	23-07505	23-07505
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1601739	1601741	1601744	1601745
Order No.:			Client Sample Ref.:		2	4	3	4
			Sample Location:		TP03	TP03	BH02	BH02A
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.3	1.5	1.0	2.0
			Date Sampled:		01-Mar-2023	01-Mar-2023	01-Mar-2023	01-Mar-2023
			Asbestos Lab:		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05			< 0.05
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05			< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25			< 0.25
Aliphatic EPH >C10-C12	U	2690	mg/kg	2.00	9.3			3.5
Aliphatic EPH >C12-C16	U	2690	mg/kg	1.00	18			4.0
Aliphatic EPH >C16-C21	U	2690	mg/kg	2.00	140			7.3
Aliphatic EPH >C21-C35	U	2690	mg/kg	3.00	1300			23
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	150			< 10
Total Aliphatic EPH >C10-C35	U	2690	mg/kg	5.00	1500			37
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05			< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05			< 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05			< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25			< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	6.7			< 1.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	16			3.3
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	180			18
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	820			61
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	170			3.0
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	1000			84
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50			< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	2500			120
Fraction of Organic Carbon	U	2625		0.0010	0.090			0.035
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0			< 1.0
Bromomethane	U	2760	µg/kg	20	< 20			< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0			< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0			< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0			< 1.0

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-07505	23-07505	23-07505	23-07505
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1601739	1601741	1601744	1601745
Order No.:			Client Sample Ref.:		2	4	3	4
			Sample Location:		TP03	TP03	BH02	BH02A
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.3	1.5	1.0	2.0
			Date Sampled:		01-Mar-2023	01-Mar-2023	01-Mar-2023	01-Mar-2023
			Asbestos Lab:		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0			< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0			< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0			< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0			< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10			< 10
Toluene	U	2760	µg/kg	1.0	< 1.0			1.3
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10			< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10			< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0			< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10			< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0			< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0			< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0			< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0			< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50			< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50			< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0			< 1.0

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-07505	23-07505	23-07505	23-07505
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1601739	1601741	1601744	1601745
Order No.:			Client Sample Ref.:		2	4	3	4
			Sample Location:		TP03	TP03	BH02	BH02A
			Sample Type:		SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.3	1.5	1.0	2.0
			Date Sampled:		01-Mar-2023	01-Mar-2023	01-Mar-2023	01-Mar-2023
			Asbestos Lab:		DURHAM			DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0			< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0			< 1.0
Naphthalene	U	2800	mg/kg	0.10	0.18			< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10			< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Phenanthrene	U	2800	mg/kg	0.10	0.36			< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Fluoranthene	U	2800	mg/kg	0.10	0.44			< 0.10
Pyrene	U	2800	mg/kg	0.10	0.33			< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10			< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10			< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0			< 2.0
Resorcinol	U	2920	mg/kg	0.020	< 0.020			< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020			< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020			< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020			< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020			< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020			< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10			< 0.10

Results - Single Stage WAC

Project: Q1031 Garnswllt WWTW

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-07505						
Chemtest Sample ID:	1601738						
Sample Ref:	1						
Sample ID:							
Sample Location:	TP03						
Top Depth(m):	0.05						
Bottom Depth(m):							
Sampling Date:	01-Mar-2023						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	10	3	5	6
Loss On Ignition	2610	U	%	19	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	360	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.024	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0042	0.042	0.5	2	25
Barium	1455	U	0.034	0.34	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.012	0.12	0.5	10	70
Copper	1455	U	0.056	0.56	2	50	100
Mercury	1455	U	0.00013	0.0013	0.01	0.2	2
Molybdenum	1455	U	0.013	0.13	0.5	10	30
Nickel	1455	U	0.021	0.21	0.4	10	40
Lead	1455	U	0.014	0.14	0.5	10	50
Antimony	1455	U	0.0028	0.028	0.06	0.7	5
Selenium	1455	U	0.0028	0.028	0.1	0.5	7
Zinc	1455	U	0.038	0.38	4	50	200
Chloride	1220	U	3.7	37	800	15000	25000
Fluoride	1220	U	0.17	1.7	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	98	970	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	18	180	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	34

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: Q1031 Garnswllt WWTW

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-07505						
Chemtest Sample ID:	1601742						
Sample Ref:	1						
Sample ID:							
Sample Location:	BH02						
Top Depth(m):	0.2						
Bottom Depth(m):							
Sampling Date:	01-Mar-2023						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	2.5	3	5	6
Loss On Ignition	2610	U	%	5.5	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0006	0.0064	0.5	2	25
Barium	1455	U	0.008	0.080	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0008	0.0080	0.5	10	70
Copper	1455	U	0.0027	0.027	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0031	0.031	0.5	10	30
Nickel	1455	U	0.0006	0.0062	0.4	10	40
Lead	1455	U	0.0006	0.0056	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0009	0.0092	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.025	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.20	2.0	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	100	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.4	74	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	31

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

Test Methods

SOP	Title	Parameters included	Method summary
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-07569-1		
Initial Date of Issue:	16-Mar-2023		
Client	Quantum Geotechnic Ltd		
Client Address:	Plas Newydd Llanedi Pontarddulais Swansea SA4 0FQ		
Contact(s):	Phil Darby		
Project	Q1031 Garnswllt WWTW		
Quotation No.:	Q22-29520	**Date Received:**	06-Mar-2023
Order No.:		**Date Instructed:**	07-Mar-2023
No. of Samples:	11		
Turnaround (Wkdays):	7	**Results Due:**	15-Mar-2023
Date Approved:	16-Mar-2023		
Approved By:			

Details:	Stuart Henderson, Technical Manager

Results - Leachate

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd				**Chemtest Job No.:**		23-07569	23-07569	23-07569	23-07569	23-07569
Quotation No.: Q22-29520				**Chemtest Sample ID.:**		1602105	1602107	1602109	1602113	1602115
Order No.:				Client Sample Ref.:		1	3	1	1	3
				Sample Location:		BH01A	BH01A	TP01	TP02	TP02
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.20	1.00	0.20	0.20	1.00
				Date Sampled:		28-Feb-2023	28-Feb-2023	01-Mar-2023	01-Mar-2023	01-Mar-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**					
pH	U	1010	2:1		N/A	8.3	8.3	8.3	8.5	8.4
Chloride	U	1220	2:1	mg/l	1.0	1.8	1.1	1.5	< 1.0	1.2
Fluoride	U	1220	2:1	mg/l	0.050	0.23	0.39	0.71	0.36	0.48
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.12	0.078	0.078	0.23	0.86
Sulphate	U	1220	2:1	mg/l	1.0	3.3	5.5	15	1.5	11
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	47	36	28	28	24
Magnesium	U	1455	2:1	mg/l	0.20	1.4	1.1	0.99	0.75	1.5
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	0.88	2.5	3.3	1.8	19
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	< 10	< 10	< 10	< 10	< 10
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	32	17	8.9	6.7	9.3
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	0.94	1.8	6.3	0.75	< 0.50
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	4.2	2.0	4.2	1.8	6.9
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	1.0	< 0.50	< 0.50	< 0.50	2.9
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	2.8	6.5	12	4.6	7.2
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	0.65	< 0.50	1.1	< 0.50	8.3
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	1.2	1.4	1.0	0.73	1.3
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.4	2.1	2.4	1.3	1.4
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.72
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	9.0	< 5.0	13	31	28
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20	< 20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20	< 20	< 20	< 20	< 20
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-07569	23-07569	23-07569
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1602106	1602111	1602116
Order No.:			Client Sample Ref.:		2	3	4
			Sample Location:		BH01A	TP01	TP02
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.00	1.50
			Date Sampled:		28-Feb-2023	01-Mar-2023	01-Mar-2023
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	11	14	20
Soil Colour	N	2040		N/A	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand
pH	U	2010		4.0	8.4	8.3	8.5
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	0.48	2.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	0.024	< 0.010
Total Sulphur	U	2175	%	0.010	0.091	0.14	0.18
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Iron (Total)	N	2430	mg/kg	100	20000	14000	6200
Sulphate (Total)	U	2430	%	0.010	0.047	0.075	0.041
Arsenic	U	2455	mg/kg	0.5	5.9	18	1.8
Barium	U	2455	mg/kg	0	44	98	53
Beryllium	U	2455	mg/kg	0.5	0.9	0.9	< 0.5
Cadmium	U	2455	mg/kg	0.10	< 0.10	0.24	0.50
Chromium	U	2455	mg/kg	0.5	18	9.7	3.6
Manganese	U	2455	mg/kg	1.0	400	860	280
Molybdenum	U	2455	mg/kg	0.5	0.8	0.7	1.1
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Copper	U	2455	mg/kg	0.50	13	150	7.1
Mercury	U	2455	mg/kg	0.05	< 0.05	0.06	< 0.05
Nickel	U	2455	mg/kg	0.50	23	43	5.0
Lead	U	2455	mg/kg	0.50	14	24	11
Selenium	U	2455	mg/kg	0.25	0.72	0.47	< 0.25
Vanadium	U	2455	mg/kg	0.5	19	7.3	3.3
Zinc	U	2455	mg/kg	0.50	31	100	190
Chromium (Trivalent)	N	2490	mg/kg	1.0	18	9.7	3.6
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.10	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.50	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.10	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.10	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.10	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12	U	2690	mg/kg	2.00	2.7	2.6	< 2.0
Aliphatic EPH >C12-C16	U	2690	mg/kg	1.00	4.4	3.2	2.6

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-07569	23-07569	23-07569
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1602106	1602111	1602116
Order No.:			Client Sample Ref.:		2	3	4
			Sample Location:		BH01A	TP01	TP02
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.00	1.50
			Date Sampled:		28-Feb-2023	01-Mar-2023	01-Mar-2023
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aliphatic EPH >C16-C21	U	2690	mg/kg	2.00	4.3	2.5	< 2.0
Aliphatic EPH >C21-C35	U	2690	mg/kg	3.00	15	9.5	4.1
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35	U	2690	mg/kg	5.00	26	18	9.8
Aromatic VPH >C5-C7	U	2780	mg/kg	0.10	< 0.05	< 0.05	< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.10	< 0.05	< 0.05	< 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.10	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.50	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	2.3	2.5	2.3
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	12	13	13
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	45	31	6.9
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	2.8	3.6	< 1.0
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	60	47	23
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	87	65	33
Fraction of Organic Carbon	U	2625		0.0010	0.043	0.045	0.081
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-07569	23-07569	23-07569
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1602106	1602111	1602116
Order No.:			Client Sample Ref.:		2	3	4
			Sample Location:		BH01A	TP01	TP02
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.00	1.50
			Date Sampled:		28-Feb-2023	01-Mar-2023	01-Mar-2023
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Naphthalene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-07569	23-07569	23-07569
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1602106	1602111	1602116
Order No.:			Client Sample Ref.:		2	3	4
			Sample Location:		BH01A	TP01	TP02
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.00	1.50
			Date Sampled:		28-Feb-2023	01-Mar-2023	01-Mar-2023
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Resorcinol	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10

Results - Single Stage WAC

Project: Q1031 Garnswllt WWTW

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-07569						
Chemtest Sample ID:	1602110						
Sample Ref:	2						
Sample ID:							
Sample Location:	TP01						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:	01-Mar-2023						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	3.9	3	5	6
Loss On Ignition	2610	U	%	6.9	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.010	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0033	0.034	0.5	2	25
Barium	1455	U	0.006	0.060	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.011	0.11	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0005	0.0052	0.5	10	30
Nickel	1455	U	0.0017	0.017	0.4	10	40
Lead	1455	U	0.0006	0.0055	0.5	10	50
Antimony	1455	U	0.0008	0.0079	0.06	0.7	5
Selenium	1455	U	0.0007	0.0074	0.1	0.5	7
Zinc	1455	U	0.003	0.031	4	50	200
Chloride	1220	U	1.4	14	800	15000	25000
Fluoride	1220	U	0.16	1.6	10	150	500
Sulphate	1220	U	4.1	41	1000	20000	50000
Total Dissolved Solids	1020	N	64	640	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.2	52	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	15

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: Q1031 Garnswllt WWTW

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-07569						
Chemtest Sample ID:	1602112						
Sample Ref:	4						
Sample ID:							
Sample Location:	TP01						
Top Depth(m):	1.70						
Bottom Depth(m):							
Sampling Date:	01-Mar-2023						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	1.8	3	5	6
Loss On Ignition	2610	U	%	4.3	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	27	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	< 0.0002	< 0.0020	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0050	2	50	100
Mercury	1455	U	0.00006	0.00060	0.01	0.2	2
Molybdenum	1455	U	0.0078	0.078	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0015	0.015	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.025	4	50	200
Chloride	1220	U	4.1	41	800	15000	25000
Fluoride	1220	U	0.16	1.6	10	150	500
Sulphate	1220	U	1.4	14	1000	20000	50000
Total Dissolved Solids	1020	N	92	910	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.4	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	16

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: Q1031 Garnswllt WWTW

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-07569						
Chemtest Sample ID:	1602114						
Sample Ref:	2						
Sample ID:							
Sample Location:	TP02						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:	01-Mar-2023						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	7.8	3	5	6
Loss On Ignition	2610	U	%	5.6	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	220	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		7.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0070	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0017	0.017	0.5	2	25
Barium	1455	U	0.009	0.086	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0009	0.0091	0.5	10	70
Copper	1455	U	0.0027	0.027	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0041	0.041	0.5	10	30
Nickel	1455	U	0.0006	0.0057	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	0.0006	0.0062	0.06	0.7	5
Selenium	1455	U	0.0012	0.012	0.1	0.5	7
Zinc	1455	U	0.003	0.032	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.34	3.4	10	150	500
Sulphate	1220	U	2.2	22	1000	20000	50000
Total Dissolved Solids	1020	N	78	780	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.8	58	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-08021-1		
Initial Date of Issue:	22-Mar-2023		
Client	Quantum Geotechnic Ltd		
Client Address:	Plas Newydd Llanedi Pontarddulais Swansea SA4 0FQ		
Contact(s):	Phil Darby		
Project	Q1031 Ganswllt WWTW		
Quotation No.:	Q22-29520	**Date Received:**	09-Mar-2023
Order No.:		**Date Instructed:**	14-Mar-2023
No. of Samples:	5		
Turnaround (Wkdays):	7	**Results Due:**	22-Mar-2023
Date Approved:	22-Mar-2023		
Approved By:			

Details:	Stuart Henderson, Technical Manager

Results - Leachate

Project: Q1031 Ganswllt WWTW

Client: Quantum Geotechnic Ltd				**Chemtest Job No.:**		23-08021
Quotation No.: Q22-29520				**Chemtest Sample ID.:**		1604418
Order No.:				Client Sample Ref.:		2
				Sample Location:		BH03
				Sample Type:		SOIL
				Top Depth (m):		0.5
				Date Sampled:		06-Mar-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**	
pH	U	1010	2:1		N/A	8.8
Chloride	U	1220	2:1	mg/l	1.0	< 1.0
Fluoride	U	1220	2:1	mg/l	0.050	0.12
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	< 0.050
Sulphate	U	1220	2:1	mg/l	1.0	2.2
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	15
Magnesium	U	1455	2:1	mg/l	0.20	0.53
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	1.3
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	< 10
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	< 5.0
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	0.61
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	0.95
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	1.5
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	1.1
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	0.53
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.4
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	3.6
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	110
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030

Results - Soil

Project: Q1031 Ganswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-08021	23-08021	23-08021
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1604419	1604421	1604422
Order No.:			Client Sample Ref.:		3	5	6
			Sample Location:		BH03	BH03	BH03
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.0	2.0	4.0
			Date Sampled:		06-Mar-2023	06-Mar-2023	06-Mar-2023
			Asbestos Lab:		COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
ACM Type	U	2192		N/A	-		-
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected
Moisture	N	2030	%	0.020	9.3	19	34
Soil Colour	N	2040		N/A	Brown		Brown
Other Material	N	2040		N/A	Stones		Stones
Soil Texture	N	2040		N/A	Sand		Clay
pH	U	2010		4.0	8.8	8.2	8.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40		1.6
Magnesium (Water Soluble)	N	2120	g/l	0.010		< 0.010	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	0.035	0.049
Total Sulphur	U	2175	%	0.010	0.076	0.038	0.16
Chloride (Water Soluble)	U	2220	g/l	0.010		0.012	
Nitrate (Water Soluble)	N	2220	g/l	0.010		< 0.010	
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50		< 0.50
Ammonium (Water Soluble)	U	2220	g/l	0.01		0.02	
Iron (Total)	N	2430	mg/kg	100	80000		5800
Sulphate (Total)	U	2430	%	0.010	0.054		0.061
Sulphate (Acid Soluble)	U	2430	%	0.010		0.044	
Arsenic	U	2455	mg/kg	0.5	21		2.4
Barium	U	2455	mg/kg	0	100		38
Beryllium	U	2455	mg/kg	0.5	1.4		< 0.5
Cadmium	U	2455	mg/kg	0.10	0.87		0.12
Chromium	U	2455	mg/kg	0.5	20		3.4
Manganese	U	2455	mg/kg	1.0	1900		190
Molybdenum	U	2455	mg/kg	0.5	1.4		< 0.5
Antimony	N	2455	mg/kg	2.0	< 2.0		< 2.0
Copper	U	2455	mg/kg	0.50	47		12
Mercury	U	2455	mg/kg	0.05	0.07		0.09
Nickel	U	2455	mg/kg	0.50	41		3.9
Lead	U	2455	mg/kg	0.50	42		26
Selenium	U	2455	mg/kg	0.25	1.8		0.26
Vanadium	U	2455	mg/kg	0.5	21		2.1
Zinc	U	2455	mg/kg	0.50	270		52
Chromium (Trivalent)	N	2490	mg/kg	1.0	20		3.4
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05		< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05		< 0.05

Results - Soil

Project: Q1031 Ganswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-08021	23-08021	23-08021
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1604419	1604421	1604422
Order No.:			Client Sample Ref.:		3	5	6
			Sample Location:		BH03	BH03	BH03
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.0	2.0	4.0
			Date Sampled:		06-Mar-2023	06-Mar-2023	06-Mar-2023
			Asbestos Lab:		COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05		< 0.05
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05		< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25		< 0.25
Aliphatic EPH >C10-C12	U	2690	mg/kg	2.00	5.3		96
Aliphatic EPH >C12-C16	U	2690	mg/kg	1.00	2.9		190
Aliphatic EPH >C16-C21	U	2690	mg/kg	2.00	< 2.0		310
Aliphatic EPH >C21-C35	U	2690	mg/kg	3.00	< 3.0		500
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10		24
Total Aliphatic EPH >C10-C35	U	2690	mg/kg	5.00	12		1100
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05		< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05		< 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05		< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25		< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	27		37
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0		31
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	4.1		44
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	3.0		860
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	1.2		7.0
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	35		970
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50		< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	47		2100
Fraction of Organic Carbon	U	2625		0.0010	0.021		0.060
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0		< 1.0
Bromomethane	U	2760	µg/kg	20	< 20		< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0		< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0		< 1.0

Results - Soil

Project: Q1031 Ganswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-08021	23-08021	23-08021
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1604419	1604421	1604422
Order No.:			Client Sample Ref.:		3	5	6
			Sample Location:		BH03	BH03	BH03
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.0	2.0	4.0
			Date Sampled:		06-Mar-2023	06-Mar-2023	06-Mar-2023
			Asbestos Lab:		COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0		< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0		< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0		< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10
Toluene	U	2760	µg/kg	1.0	< 1.0		69
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10		< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10		< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0		< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10		< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0		< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0		1.7
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0		< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0		< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0		< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0		< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50		< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		2.8
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0		< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0		3.7
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0		33
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50		< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0		< 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0		< 1.0

Results - Soil

Project: Q1031 Ganswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-08021	23-08021	23-08021
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1604419	1604421	1604422
Order No.:			Client Sample Ref.:		3	5	6
			Sample Location:		BH03	BH03	BH03
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.0	2.0	4.0
			Date Sampled:		06-Mar-2023	06-Mar-2023	06-Mar-2023
			Asbestos Lab:		COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0		< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0		< 1.0
Naphthalene	U	2800	mg/kg	0.10	0.20		0.81
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10		< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10		0.53
Fluorene	U	2800	mg/kg	0.10	< 0.10		0.58
Phenanthrene	U	2800	mg/kg	0.10	0.15		1.8
Anthracene	U	2800	mg/kg	0.10	0.11		0.40
Fluoranthene	U	2800	mg/kg	0.10	0.15		1.4
Pyrene	U	2800	mg/kg	0.10	0.16		1.1
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10		0.59
Chrysene	U	2800	mg/kg	0.10	< 0.10		0.65
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10		0.84
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10		0.28
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10		0.54
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10		0.56
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10		0.25
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10		0.40
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0		11
Resorcinol	U	2920	mg/kg	0.020	< 0.020		< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020		< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020		0.080
Xylenols	U	2920	mg/kg	0.020	< 0.020		0.17
1-Naphthol	N	2920	mg/kg	0.020	< 0.020		0.11
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020		< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10		0.36

Results - Single Stage WAC

Project: Q1031 Ganswllt WWTW

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-08021						
Chemtest Sample ID:	1604417						
Sample Ref:	1						
Sample ID:							
Sample Location:	BH03						
Top Depth(m):	0.2						
Bottom Depth(m):							
Sampling Date:	06-Mar-2023						
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	5.5	3	5	6
Loss On Ignition	2610	U	%	1.1	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		10.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.018	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1455	U	0.0007	0.0074	0.5	2	25
Barium	1455	U	0.022	0.22	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.015	0.15	0.5	10	70
Copper	1455	U	0.025	0.25	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.044	0.44	0.5	10	30
Nickel	1455	U	0.0031	0.031	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	0.0006	0.0058	0.06	0.7	5
Selenium	1455	U	0.013	0.13	0.1	0.5	7
Zinc	1455	U	< 0.003	< 0.025	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.28	2.8	10	150	500
Sulphate	1220	U	9.8	98	1000	20000	50000
Total Dissolved Solids	1020	N	810	8100	4000	60000	100000
Phenol Index	1920	U	0.039	0.39	1	-	-
Dissolved Organic Carbon	1610	U	7.8	78	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.0

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememrnt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

Test Methods

SOP	Title	Parameters included	Method summary
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-11514-1		
Initial Date of Issue:	24-Apr-2023		
Client	Quantum Geotechnic Ltd		
Client Address:	Plas Newydd Llanedi Pontarddulais Swansea SA4 0FQ		
Contact(s):	Arwel Jones		
Project	Q1031 GARNSWLLT		
Quotation No.:	Q22-29520	**Date Received:**	06-Apr-2023
Order No.:		**Date Instructed:**	14-Apr-2023
No. of Samples:	3		
Turnaround (Wkdays):	7	**Results Due:**	24-Apr-2023
Date Approved:	24-Apr-2023		
Approved By:			

Details:	Stuart Henderson, Technical Manager

Results - Water

Project: Q1031 GARNSWLLT

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-11514	23-11514	23-11514
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1619814	1619815	1619816
Order No.:			Client Sample Ref.:		EW1	EW1	EW1
			Sample Location:		BH1	BH2	BH3
			Sample Type:		WATER	WATER	WATER
			Top Depth (m):		1.51	1.38	3.93
			Bottom Depth (m):		8.71	8.34	8.6
			Date Sampled:		04-Apr-2023	04-Apr-2023	04-Apr-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
pH	U	1010		N/A	8.1	7.9	8.0
Total Dissolved Solids	N	1020	mg/l	1.0	300	370	310
Alkalinity (Bicarbonate)	U	1220	mg CaCO3/l	10	230	300	310
Chloride	U	1220	mg/l	1.0	22	16	12
Fluoride	U	1220	mg/l	0.050	0.14	0.15	0.16
Ammoniacal Nitrogen	U	1220	mg/l	0.050	6.9	17	49
Nitrate as NO3	U	1220	mg/l	0.50	< 0.50	< 0.50	< 0.50
Sulphur	N	1220	mg/l	1.0	7.0	3.7	< 1.0
Sulphate	U	1220	mg/l	1.0	21	11	< 1.0
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Magnesium (Dissolved)	U	1455	mg/l	0.20	6.7	7.8	6.2
Sodium (Dissolved)	U	1455	mg/l	1.50	18	21	6.7
Calcium (Total)	N	1455	mg/l	5.0	73	62	30
Total Hardness as CaCO3	U	1270	mg/l	15	190	180	92
Arsenic (Dissolved)	U	1455	µg/l	0.20	0.73	0.67	1.8
Boron (Dissolved)	U	1455	µg/l	10.0	37	31	45
Barium (Dissolved)	U	1455	µg/l	5.00	55	49	46
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50	1.0	0.59	2.5
Iron (Dissolved)	N	1455	µg/l	5.0	9.1	22	16
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	µg/l	0.50	1000	30	420
Molybdenum (Dissolved)	U	1455	µg/l	0.20	0.90	0.75	0.63
Nickel (Dissolved)	U	1455	µg/l	0.50	0.80	1.6	2.6
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	µg/l	0.50	0.94	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	0.62
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	9.2	7.3	6.9
Chromium (Trivalent)	N	1490	µg/l	20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: Q1031 GARNSWLLT

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-11514	23-11514	23-11514
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1619814	1619815	1619816
Order No.:			Client Sample Ref.:		EW1	EW1	EW1
			Sample Location:		BH1	BH2	BH3
			Sample Type:		WATER	WATER	WATER
			Top Depth (m):		1.51	1.38	3.93
			Bottom Depth (m):		8.71	8.34	8.6
			Date Sampled:		04-Apr-2023	04-Apr-2023	04-Apr-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10

Results - Water

Project: Q1031 GARNSWLLT

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-11514	23-11514	23-11514
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1619814	1619815	1619816
Order No.:			Client Sample Ref.:		EW1	EW1	EW1
			Sample Location:		BH1	BH2	BH3
			Sample Type:		WATER	WATER	WATER
			Top Depth (m):		1.51	1.38	3.93
			Bottom Depth (m):		8.71	8.34	8.6
			Date Sampled:		04-Apr-2023	04-Apr-2023	04-Apr-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: Q1031 GARNSWLLT

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-11514	23-11514	23-11514
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1619814	1619815	1619816
Order No.:			Client Sample Ref.:		EW1	EW1	EW1
			Sample Location:		BH1	BH2	BH3
			Sample Type:		WATER	WATER	WATER
			Top Depth (m):		1.51	1.38	3.93
			Bottom Depth (m):		8.71	8.34	8.6
			Date Sampled:		04-Apr-2023	04-Apr-2023	04-Apr-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0
Resorcinol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	0.0060
Phenol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Cresols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
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I/S	Insufficient Sample
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<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
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None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-12011-1		
Initial Date of Issue:	24-Apr-2023		
Client	Quantum Geotechnic Ltd		
Client Address:	Plas Newydd Llanedi Pontarddulais Swansea SA4 0FQ		
Contact(s):	Arwel Jones		
Project	Q1031 Garnswllt WWTW		
Quotation No.:	Q22-29520	**Date Received:**	13-Apr-2023
Order No.:		**Date Instructed:**	14-Apr-2023
No. of Samples:	2		
Turnaround (Wkdays):	7	**Results Due:**	24-Apr-2023
Date Approved:	24-Apr-2023		
Approved By:			

Details:	Stuart Henderson, Technical Manager

Results - Water

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12011	23-12011
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1622014	1622015
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHSD01	BHSD02
			Sample Type:		WATER	WATER
			Top Depth (m):		1.54	1.58
			Bottom Depth (m):		16.60	13.77
			Date Sampled:		11-Apr-2023	11-Apr-2023
			Time Sampled:		10:00	10:20
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
pH	U	1010		N/A	8.0	7.5
Total Dissolved Solids	N	1020	mg/l	1.0	290	210
Alkalinity (Bicarbonate)	U	1220	mg CaCO3/l	10	130	150
Chloride	U	1220	mg/l	1.0	21	35
Fluoride	U	1220	mg/l	0.050	0.11	0.13
Ammoniacal Nitrogen	U	1220	mg/l	0.050	3.4	< 0.050
Nitrate as NO3	U	1220	mg/l	0.50	6.0	22
Sulphur	N	1220	mg/l	1.0	6.0	10
Sulphate	U	1220	mg/l	1.0	18	30
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050
Magnesium (Dissolved)	U	1455	mg/l	0.20	4.9	< 0.20
Sodium (Dissolved)	U	1455	mg/l	1.50	25	< 1.5
Calcium (Total)	N	1455	mg/l	5.0	110	35
Total Hardness as CaCO3	U	1270	mg/l	15	180	< 15
Arsenic (Dissolved)	U	1455	µg/l	0.20	0.89	< 0.20
Boron (Dissolved)	U	1455	µg/l	10.0	43	< 10
Barium (Dissolved)	U	1455	µg/l	5.00	21	< 5.0
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	0.79
Copper (Dissolved)	U	1455	µg/l	0.50	2.0	< 0.50
Iron (Dissolved)	N	1455	µg/l	5.0	< 5.0	< 5.0
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	µg/l	0.50	6.9	< 0.50
Molybdenum (Dissolved)	U	1455	µg/l	0.20	1.8	0.22
Nickel (Dissolved)	U	1455	µg/l	0.50	1.0	0.65
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	0.73	< 0.50
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	10	< 2.5
Chromium (Trivalent)	N	1490	µg/l	20	< 20	< 20
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	

Results - Water

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12011	23-12011
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1622014	1622015
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHSD01	BHSD02
			Sample Type:		WATER	WATER
			Top Depth (m):		1.54	1.58
			Bottom Depth (m):		16.60	13.77
			Date Sampled:		11-Apr-2023	11-Apr-2023
			Time Sampled:		10:00	10:20
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10

Results - Water

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12011	23-12011
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1622014	1622015
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHSD01	BHSD02
			Sample Type:		WATER	WATER
			Top Depth (m):		1.54	1.58
			Bottom Depth (m):		16.60	13.77
			Date Sampled:		11-Apr-2023	11-Apr-2023
			Time Sampled:		10:00	10:20
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10

Results - Water

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12011	23-12011
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1622014	1622015
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHSD01	BHSD02
			Sample Type:		WATER	WATER
			Top Depth (m):		1.54	1.58
			Bottom Depth (m):		16.60	13.77
			Date Sampled:		11-Apr-2023	11-Apr-2023
			Time Sampled:		10:00	10:20
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0
Resorcinol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Phenol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Cresols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	mg/l	0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-12950-1		
Initial Date of Issue:	26-Apr-2023		
Client	Quantum Geotechnic Ltd		
Client Address:	13A Bishops Court Gardens Clyst St Mary Exeter EX5 1DH		
Contact(s):	Jim Dennis		
Project	Q1031 Garnswllt WWTW		
Quotation No.:	Q22-29520	**Date Received:**	20-Apr-2023
Order No.:		**Date Instructed:**	20-Apr-2023
No. of Samples:	4		
Turnaround (Wkdays):	7	**Results Due:**	28-Apr-2023
Date Approved:	26-Apr-2023		
Approved By:			

Details:	Stuart Henderson, Technical Manager

Results - Leachate

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd				**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520				**Chemtest Sample ID.:**		1626272	1626274
				Client Sample ID.:		2	4
				Sample Location:		BH-SD-02	BH-SD-02
				Sample Type:		SOIL	SOIL
				Top Depth (m):		0.50	2.00
				Date Sampled:		05-Apr-2023	05-Apr-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
pH	U	1010	2:1		N/A	7.6	8.0
Chloride	U	1220	2:1	mg/l	1.0	8.0	1.6
Fluoride	U	1220	2:1	mg/l	0.050	0.23	0.32
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.21	0.54
Sulphate	U	1220	2:1	mg/l	1.0	96	180
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	66	110
Magnesium	U	1455	2:1	mg/l	0.20	5.0	7.7
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	0.40	1.1
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	23	77
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	45	66
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	1.5	1.7
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	3.0	690
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	2.3	9.2
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	0.60	1.5
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	2.3
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.0	0.88
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	0.61
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	4.9	10
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	< 5.0	7.5
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20	< 20
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	< 0.030

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1626273	1626278
			Client Sample ID.:		3	8
			Sample Location:		BH-SD-02	BH-SD-02
			Sample Type:		SOIL	SOIL
			Top Depth (m):		1.00	5.80
			Date Sampled:		05-Apr-2023	05-Apr-2023
			Asbestos Lab:		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	
Moisture	N	2030	%	0.020	14	
Soil Colour	N	2040		N/A	Brown	
Other Material	N	2040		N/A	Stones	
Soil Texture	N	2040		N/A	Sand	
pH	U	2010		4.0	7.8	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.66	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.20	
Total Sulphur	U	2175	%	0.010	0.089	
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50	
Iron (Total)	N	2430	mg/kg	100	23000	
Sulphate (Total)	U	2430	%	0.010	0.17	
Arsenic	U	2455	mg/kg	0.5	10	
Barium	U	2455	mg/kg	0	150	
Beryllium	U	2455	mg/kg	0.5	1.2	
Cadmium	U	2455	mg/kg	0.10	0.73	
Chromium	U	2455	mg/kg	0.5	90	
Manganese	U	2455	mg/kg	1.0	2900	
Molybdenum	U	2455	mg/kg	0.5	1.3	
Antimony	N	2455	mg/kg	2.0	< 2.0	
Copper	U	2455	mg/kg	0.50	25	
Mercury	U	2455	mg/kg	0.05	0.07	
Nickel	U	2455	mg/kg	0.50	19	
Lead	U	2455	mg/kg	0.50	57	
Selenium	U	2455	mg/kg	0.25	0.56	
Vanadium	U	2455	mg/kg	0.5	69	
Zinc	U	2455	mg/kg	0.50	140	
Chromium (Trivalent)	N	2490	mg/kg	1.0	90	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	[B] 0.12	[B] < 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	[B] < 0.25	[B] < 0.25
Aliphatic EPH >C10-C12	U	2690	mg/kg	2.00	[B] 2.2	[B] < 2.0
Aliphatic EPH >C12-C16	U	2690	mg/kg	1.00	[B] 15	[B] 16

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1626273	1626278
			Client Sample ID.:		3	8
			Sample Location:		BH-SD-02	BH-SD-02
			Sample Type:		SOIL	SOIL
			Top Depth (m):		1.00	5.80
			Date Sampled:		05-Apr-2023	05-Apr-2023
			Asbestos Lab:		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic EPH >C16-C21	U	2690	mg/kg	2.00	[B] 26	[B] 35
Aliphatic EPH >C21-C35	U	2690	mg/kg	3.00	[B] 22	[B] 88
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	[B] < 10	[B] < 10
Total Aliphatic EPH >C10-C35	U	2690	mg/kg	5.00	[B] 65	[B] 140
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00		[B] 140
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	[B] < 0.25	[B] < 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	[B] 1.3	[B] 1.8
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	[B] 4.0	[B] 3.4
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	[B] 13	[B] 5.2
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	[B] 32	[B] 3.9
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	[B] 2.3	[B] 1.3
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	[B] 50	[B] 14
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00		[B] 16
Total VPH >C5-C10	U	2780	mg/kg	0.50	[B] < 0.50	[B] < 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	[B] 110	[B] 150
Total EPH >C10-C40	N	2690	mg/kg	10.00		[B] 150
Fraction of Organic Carbon	U	2625		0.0010	0.026	
Dichlorodifluoromethane	U	2760	µg/kg	1.0	[B] < 1.0	
Chloromethane	U	2760	µg/kg	1.0	[B] < 1.0	
Vinyl Chloride	U	2760	µg/kg	1.0	[B] < 1.0	
Bromomethane	U	2760	µg/kg	20	[B] < 20	
Chloroethane	U	2760	µg/kg	2.0	[B] < 2.0	
Trichlorofluoromethane	U	2760	µg/kg	1.0	[B] < 1.0	
1,1-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	
1,1-Dichloroethane	U	2760	µg/kg	1.0	[B] < 1.0	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	[B] < 5.0	
Trichloromethane	U	2760	µg/kg	1.0	[B] < 1.0	
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	[B] < 1.0	
Tetrachloromethane	U	2760	µg/kg	1.0	[B] < 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	[B] < 1.0	
Benzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2-Dichloroethane	U	2760	µg/kg	2.0	[B] < 2.0	
Trichloroethene	N	2760	µg/kg	1.0	[B] < 1.0	

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1626273	1626278
			Client Sample ID.:		3	8
			Sample Location:		BH-SD-02	BH-SD-02
			Sample Type:		SOIL	SOIL
			Top Depth (m):		1.00	5.80
			Date Sampled:		05-Apr-2023	05-Apr-2023
			Asbestos Lab:		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
1,2-Dichloropropane	U	2760	µg/kg	1.0	[B] < 1.0	
Dibromomethane	U	2760	µg/kg	1.0	[B] < 1.0	
Bromodichloromethane	U	2760	µg/kg	5.0	[B] < 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	
Toluene	U	2760	µg/kg	1.0	[B] 1.5	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	
1,1,2-Trichloroethane	U	2760	µg/kg	10	[B] < 10	
Tetrachloroethene	U	2760	µg/kg	1.0	[B] < 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	[B] < 2.0	
Dibromochloromethane	U	2760	µg/kg	10	[B] < 10	
1,2-Dibromoethane	U	2760	µg/kg	5.0	[B] < 5.0	
Chlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	[B] < 2.0	
Ethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	[B] < 1.0	
o-Xylene	U	2760	µg/kg	1.0	[B] < 1.0	
Styrene	U	2760	µg/kg	1.0	[B] < 1.0	
Tribromomethane	U	2760	µg/kg	1.0	[B] < 1.0	
Isopropylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
Bromobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	[B] < 50	
N-Propylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
2-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	[B] < 1.0	
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	[B] 1.7	
N-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	[B] < 50	
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
Hexachlorobutadiene	N	2760	µg/kg	1.0	[B] < 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	[B] < 2.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[B] < 1.0	

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1626273	1626278
			Client Sample ID.:		3	8
			Sample Location:		BH-SD-02	BH-SD-02
			Sample Type:		SOIL	SOIL
			Top Depth (m):		1.00	5.80
			Date Sampled:		05-Apr-2023	05-Apr-2023
			Asbestos Lab:		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Naphthalene	U	2800	mg/kg	0.10	< 0.10	
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	
Fluorene	U	2800	mg/kg	0.10	< 0.10	
Phenanthrene	U	2800	mg/kg	0.10	0.17	
Anthracene	U	2800	mg/kg	0.10	< 0.10	
Fluoranthene	U	2800	mg/kg	0.10	0.20	
Pyrene	U	2800	mg/kg	0.10	0.18	
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	
Chrysene	U	2800	mg/kg	0.10	< 0.10	
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	
Resorcinol	U	2920	mg/kg	0.020	< 0.020	
Phenol	U	2920	mg/kg	0.020	< 0.020	
Cresols	U	2920	mg/kg	0.020	< 0.020	
Xylenols	U	2920	mg/kg	0.020	< 0.020	
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020	
Total Phenols	U	2920	mg/kg	0.10	< 0.10	

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1626273		3	BH-SD-02	05-Apr-2023	B	Amber Glass 250ml
1626273		3	BH-SD-02	05-Apr-2023	B	Amber Glass 60ml
1626273		3	BH-SD-02	05-Apr-2023	B	Plastic Tub 500g
1626278		8	BH-SD-02	05-Apr-2023	B	Amber Glass 250ml
1626278		8	BH-SD-02	05-Apr-2023	B	Amber Glass 60ml
1626278		8	BH-SD-02	05-Apr-2023	B	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-12951-1
Initial Date of Issue:	28-Apr-2023
Client	Quantum Geotechnic Ltd
Client Address:	Plas Newydd Llanedi Pontarddulais Swansea SA4 0FQ
Contact(s):	Arwel Jones
Project	Q1031 GARNSWLLT WTW

Quotation No.:		**Date Received:**	20-Apr-2023
Order No.:		**Date Instructed:**	24-Apr-2023
No. of Samples:	2		
Turnaround (Wkdays):	5	**Results Due:**	28-Apr-2023
Date Approved:	28-Apr-2023		

Approved By:

Details: Stuart Henderson, Technical Manager

Results - Water

Project: Q1031 GARNSWLLT WTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12951	23-12951
Quotation No.:			**Chemtest Sample ID.:**		1626280	1626281
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHD003	BHD004
			Sample Type:		WATER	WATER
			Top Depth (m):		2.14	4.03
			Bottom Depth (m):		11.76	14.85
			Date Sampled:		18-Apr-2023	18-Apr-2023
			Time Sampled:		10:00	10:10
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
pH	U	1010		N/A	6.5	6.6
Total Dissolved Solids	N	1020	mg/l	1.0	210	240
Alkalinity (Bicarbonate)	U	1220	mg CaCO3/l	10	150	220
Chloride	U	1220	mg/l	1.0	36	14
Fluoride	U	1220	mg/l	0.050	0.18	0.19
Ammoniacal Nitrogen	U	1220	mg/l	0.050	0.10	27
Nitrate as NO3	U	1220	mg/l	0.50	5.6	< 0.50
Sulphur	N	1220	mg/l	1.0	10	< 1.0
Sulphate	U	1220	mg/l	1.0	30	1.5
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050
Magnesium (Dissolved)	U	1455	mg/l	0.20	4.5	6.5
Sodium (Dissolved)	U	1455	mg/l	1.50	14	9.3
Calcium (Total)	N	1455	mg/l	5.0	59	60
Total Hardness as CaCO3	U	1270	mg/l	15	160	120
Arsenic (Dissolved)	U	1455	µg/l	0.20	0.22	0.74
Boron (Dissolved)	U	1455	µg/l	10.0	33	40
Barium (Dissolved)	U	1455	µg/l	5.00	45	94
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50	0.69	3.0
Iron (Dissolved)	N	1455	µg/l	5.0	< 5.0	< 5.0
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	µg/l	0.50	1700	970
Molybdenum (Dissolved)	U	1455	µg/l	0.20	1.7	0.54
Nickel (Dissolved)	U	1455	µg/l	0.50	2.0	2.7
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	0.72	< 0.50
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	4.5	46
Chromium (Trivalent)	N	1490	µg/l	20	[B] < 20	[B] < 20
Chromium (Hexavalent)	U	1490	µg/l	20	[B] < 20	[B] < 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10

Results - Water

Project: Q1031 GARNSWLLT WTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12951	23-12951
Quotation No.:			**Chemtest Sample ID.:**		1626280	1626281
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHD003	BHD004
			Sample Type:		WATER	WATER
			Top Depth (m):		2.14	4.03
			Bottom Depth (m):		11.76	14.85
			Date Sampled:		18-Apr-2023	18-Apr-2023
			Time Sampled:		10:00	10:10
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10

Results - Water

Project: Q1031 GARNSWLLT WTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12951	23-12951
Quotation No.:			**Chemtest Sample ID.:**		1626280	1626281
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHD003	BHD004
			Sample Type:		WATER	WATER
			Top Depth (m):		2.14	4.03
			Bottom Depth (m):		11.76	14.85
			Date Sampled:		18-Apr-2023	18-Apr-2023
			Time Sampled:		10:00	10:10
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10

Results - Water

Project: Q1031 GARNSWLLT WTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12951	23-12951
Quotation No.:			**Chemtest Sample ID.:**		1626280	1626281
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHD003	BHD004
			Sample Type:		WATER	WATER
			Top Depth (m):		2.14	4.03
			Bottom Depth (m):		11.76	14.85
			Date Sampled:		18-Apr-2023	18-Apr-2023
			Time Sampled:		10:00	10:10
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0
Resorcinol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Phenol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Cresols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	mg/l	0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	mg/l	0.0050	0.0060	< 0.0050
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-12950-1		
Initial Date of Issue:	26-Apr-2023		
Client	Quantum Geotechnic Ltd		
Client Address:	13A Bishops Court Gardens Clyst St Mary Exeter EX5 1DH		
Contact(s):	Jim Dennis		
Project	Q1031 Garnswllt WWTW		
Quotation No.:	Q22-29520	**Date Received:**	20-Apr-2023
Order No.:		**Date Instructed:**	20-Apr-2023
No. of Samples:	4		
Turnaround (Wkdays):	7	**Results Due:**	28-Apr-2023
Date Approved:	26-Apr-2023		
Approved By:			

Details:	Stuart Henderson, Technical Manager

Results - Leachate

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd				**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520				**Chemtest Sample ID.:**		1626272	1626274
				Client Sample ID.:		2	4
				Sample Location:		BH-SD-02	BH-SD-02
				Sample Type:		SOIL	SOIL
				Top Depth (m):		0.50	2.00
				Date Sampled:		05-Apr-2023	05-Apr-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
pH	U	1010	2:1		N/A	7.6	8.0
Chloride	U	1220	2:1	mg/l	1.0	8.0	1.6
Fluoride	U	1220	2:1	mg/l	0.050	0.23	0.32
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.21	0.54
Sulphate	U	1220	2:1	mg/l	1.0	96	180
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	66	110
Magnesium	U	1455	2:1	mg/l	0.20	5.0	7.7
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	0.40	1.1
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	23	77
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	45	66
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	1.5	1.7
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	3.0	690
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	2.3	9.2
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	0.60	1.5
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	2.3
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.0	0.88
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	0.61
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	4.9	10
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	< 5.0	7.5
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20	< 20
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	< 0.030

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1626273	1626278
			Client Sample ID.:		3	8
			Sample Location:		BH-SD-02	BH-SD-02
			Sample Type:		SOIL	SOIL
			Top Depth (m):		1.00	5.80
			Date Sampled:		05-Apr-2023	05-Apr-2023
			Asbestos Lab:		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
ACM Type	U	2192		N/A	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected	
Moisture	N	2030	%	0.020	14	
Soil Colour	N	2040		N/A	Brown	
Other Material	N	2040		N/A	Stones	
Soil Texture	N	2040		N/A	Sand	
pH	U	2010		4.0	7.8	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.66	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.20	
Total Sulphur	U	2175	%	0.010	0.089	
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50	
Iron (Total)	N	2430	mg/kg	100	23000	
Sulphate (Total)	U	2430	%	0.010	0.17	
Arsenic	U	2455	mg/kg	0.5	10	
Barium	U	2455	mg/kg	0	150	
Beryllium	U	2455	mg/kg	0.5	1.2	
Cadmium	U	2455	mg/kg	0.10	0.73	
Chromium	U	2455	mg/kg	0.5	90	
Manganese	U	2455	mg/kg	1.0	2900	
Molybdenum	U	2455	mg/kg	0.5	1.3	
Antimony	N	2455	mg/kg	2.0	< 2.0	
Copper	U	2455	mg/kg	0.50	25	
Mercury	U	2455	mg/kg	0.05	0.07	
Nickel	U	2455	mg/kg	0.50	19	
Lead	U	2455	mg/kg	0.50	57	
Selenium	U	2455	mg/kg	0.25	0.56	
Vanadium	U	2455	mg/kg	0.5	69	
Zinc	U	2455	mg/kg	0.50	140	
Chromium (Trivalent)	N	2490	mg/kg	1.0	90	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	[B] 0.12	[B] < 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	[B] < 0.25	[B] < 0.25
Aliphatic EPH >C10-C12	U	2690	mg/kg	2.00	[B] 2.2	[B] < 2.0
Aliphatic EPH >C12-C16	U	2690	mg/kg	1.00	[B] 15	[B] 16

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1626273	1626278
			Client Sample ID.:		3	8
			Sample Location:		BH-SD-02	BH-SD-02
			Sample Type:		SOIL	SOIL
			Top Depth (m):		1.00	5.80
			Date Sampled:		05-Apr-2023	05-Apr-2023
			Asbestos Lab:		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic EPH >C16-C21	U	2690	mg/kg	2.00	[B] 26	[B] 35
Aliphatic EPH >C21-C35	U	2690	mg/kg	3.00	[B] 22	[B] 88
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	[B] < 10	[B] < 10
Total Aliphatic EPH >C10-C35	U	2690	mg/kg	5.00	[B] 65	[B] 140
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00		[B] 140
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	[B] < 0.25	[B] < 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	[B] 1.3	[B] 1.8
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	[B] 4.0	[B] 3.4
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	[B] 13	[B] 5.2
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	[B] 32	[B] 3.9
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	[B] 2.3	[B] 1.3
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	[B] 50	[B] 14
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00		[B] 16
Total VPH >C5-C10	U	2780	mg/kg	0.50	[B] < 0.50	[B] < 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	[B] 110	[B] 150
Total EPH >C10-C40	N	2690	mg/kg	10.00		[B] 150
Fraction of Organic Carbon	U	2625		0.0010	0.026	
Dichlorodifluoromethane	U	2760	µg/kg	1.0	[B] < 1.0	
Chloromethane	U	2760	µg/kg	1.0	[B] < 1.0	
Vinyl Chloride	U	2760	µg/kg	1.0	[B] < 1.0	
Bromomethane	U	2760	µg/kg	20	[B] < 20	
Chloroethane	U	2760	µg/kg	2.0	[B] < 2.0	
Trichlorofluoromethane	U	2760	µg/kg	1.0	[B] < 1.0	
1,1-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	
1,1-Dichloroethane	U	2760	µg/kg	1.0	[B] < 1.0	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	
Bromochloromethane	U	2760	µg/kg	5.0	[B] < 5.0	
Trichloromethane	U	2760	µg/kg	1.0	[B] < 1.0	
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	[B] < 1.0	
Tetrachloromethane	U	2760	µg/kg	1.0	[B] < 1.0	
1,1-Dichloropropene	U	2760	µg/kg	1.0	[B] < 1.0	
Benzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2-Dichloroethane	U	2760	µg/kg	2.0	[B] < 2.0	
Trichloroethene	N	2760	µg/kg	1.0	[B] < 1.0	

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1626273	1626278
			Client Sample ID.:		3	8
			Sample Location:		BH-SD-02	BH-SD-02
			Sample Type:		SOIL	SOIL
			Top Depth (m):		1.00	5.80
			Date Sampled:		05-Apr-2023	05-Apr-2023
			Asbestos Lab:		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
1,2-Dichloropropane	U	2760	µg/kg	1.0	[B] < 1.0	
Dibromomethane	U	2760	µg/kg	1.0	[B] < 1.0	
Bromodichloromethane	U	2760	µg/kg	5.0	[B] < 5.0	
cis-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	
Toluene	U	2760	µg/kg	1.0	[B] 1.5	
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	
1,1,2-Trichloroethane	U	2760	µg/kg	10	[B] < 10	
Tetrachloroethene	U	2760	µg/kg	1.0	[B] < 1.0	
1,3-Dichloropropane	U	2760	µg/kg	2.0	[B] < 2.0	
Dibromochloromethane	U	2760	µg/kg	10	[B] < 10	
1,2-Dibromoethane	U	2760	µg/kg	5.0	[B] < 5.0	
Chlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	[B] < 2.0	
Ethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	[B] < 1.0	
o-Xylene	U	2760	µg/kg	1.0	[B] < 1.0	
Styrene	U	2760	µg/kg	1.0	[B] < 1.0	
Tribromomethane	U	2760	µg/kg	1.0	[B] < 1.0	
Isopropylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
Bromobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2,3-Trichloropropane	N	2760	µg/kg	50	[B] < 50	
N-Propylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
2-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
4-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0	
Tert-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
Sec-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
4-Isopropyltoluene	U	2760	µg/kg	1.0	[B] < 1.0	
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	[B] 1.7	
N-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	[B] < 50	
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	
Hexachlorobutadiene	N	2760	µg/kg	1.0	[B] < 1.0	
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	[B] < 2.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[B] < 1.0	

Results - Soil

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12950	23-12950
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1626273	1626278
			Client Sample ID.:		3	8
			Sample Location:		BH-SD-02	BH-SD-02
			Sample Type:		SOIL	SOIL
			Top Depth (m):		1.00	5.80
			Date Sampled:		05-Apr-2023	05-Apr-2023
			Asbestos Lab:		DURHAM	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Naphthalene	U	2800	mg/kg	0.10	< 0.10	
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	
Fluorene	U	2800	mg/kg	0.10	< 0.10	
Phenanthrene	U	2800	mg/kg	0.10	0.17	
Anthracene	U	2800	mg/kg	0.10	< 0.10	
Fluoranthene	U	2800	mg/kg	0.10	0.20	
Pyrene	U	2800	mg/kg	0.10	0.18	
Benzo[a]anthracene	U	2800	mg/kg	0.10	< 0.10	
Chrysene	U	2800	mg/kg	0.10	< 0.10	
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	< 0.10	
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	< 0.10	
Benzo[a]pyrene	U	2800	mg/kg	0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	< 0.10	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	< 0.10	
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	
Resorcinol	U	2920	mg/kg	0.020	< 0.020	
Phenol	U	2920	mg/kg	0.020	< 0.020	
Cresols	U	2920	mg/kg	0.020	< 0.020	
Xylenols	U	2920	mg/kg	0.020	< 0.020	
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020	
Total Phenols	U	2920	mg/kg	0.10	< 0.10	

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-11514-1		
Initial Date of Issue:	24-Apr-2023		
Client	Quantum Geotechnic Ltd		
Client Address:	Plas Newydd Llanedi Pontarddulais Swansea SA4 0FQ		
Contact(s):	Arwel Jones		
Project	Q1031 GARNSWLLT		
Quotation No.:	Q22-29520	**Date Received:**	06-Apr-2023
Order No.:		**Date Instructed:**	14-Apr-2023
No. of Samples:	3		
Turnaround (Wkdays):	7	**Results Due:**	24-Apr-2023
Date Approved:	24-Apr-2023		
Approved By:			

Details:	Stuart Henderson, Technical Manager

Results - Water

Project: Q1031 GARNSWLLT

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-11514	23-11514	23-11514
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1619814	1619815	1619816
Order No.:			Client Sample Ref.:		EW1	EW1	EW1
			Sample Location:		BH1	BH2	BH3
			Sample Type:		WATER	WATER	WATER
			Top Depth (m):		1.51	1.38	3.93
			Bottom Depth (m):		8.71	8.34	8.6
			Date Sampled:		04-Apr-2023	04-Apr-2023	04-Apr-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
pH	U	1010		N/A	8.1	7.9	8.0
Total Dissolved Solids	N	1020	mg/l	1.0	300	370	310
Alkalinity (Bicarbonate)	U	1220	mg CaCO3/l	10	230	300	310
Chloride	U	1220	mg/l	1.0	22	16	12
Fluoride	U	1220	mg/l	0.050	0.14	0.15	0.16
Ammoniacal Nitrogen	U	1220	mg/l	0.050	6.9	17	49
Nitrate as NO3	U	1220	mg/l	0.50	< 0.50	< 0.50	< 0.50
Sulphur	N	1220	mg/l	1.0	7.0	3.7	< 1.0
Sulphate	U	1220	mg/l	1.0	21	11	< 1.0
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Magnesium (Dissolved)	U	1455	mg/l	0.20	6.7	7.8	6.2
Sodium (Dissolved)	U	1455	mg/l	1.50	18	21	6.7
Calcium (Total)	N	1455	mg/l	5.0	73	62	30
Total Hardness as CaCO3	U	1270	mg/l	15	190	180	92
Arsenic (Dissolved)	U	1455	µg/l	0.20	0.73	0.67	1.8
Boron (Dissolved)	U	1455	µg/l	10.0	37	31	45
Barium (Dissolved)	U	1455	µg/l	5.00	55	49	46
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50	1.0	0.59	2.5
Iron (Dissolved)	N	1455	µg/l	5.0	9.1	22	16
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	µg/l	0.50	1000	30	420
Molybdenum (Dissolved)	U	1455	µg/l	0.20	0.90	0.75	0.63
Nickel (Dissolved)	U	1455	µg/l	0.50	0.80	1.6	2.6
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	µg/l	0.50	0.94	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	0.62
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	9.2	7.3	6.9
Chromium (Trivalent)	N	1490	µg/l	20	< 20	< 20	< 20
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: Q1031 GARNSWLLT

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-11514	23-11514	23-11514
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1619814	1619815	1619816
Order No.:			Client Sample Ref.:		EW1	EW1	EW1
			Sample Location:		BH1	BH2	BH3
			Sample Type:		WATER	WATER	WATER
			Top Depth (m):		1.51	1.38	3.93
			Bottom Depth (m):		8.71	8.34	8.6
			Date Sampled:		04-Apr-2023	04-Apr-2023	04-Apr-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	< 10
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10

Results - Water

Project: Q1031 GARNSWLLT

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-11514	23-11514	23-11514
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1619814	1619815	1619816
Order No.:			Client Sample Ref.:		EW1	EW1	EW1
			Sample Location:		BH1	BH2	BH3
			Sample Type:		WATER	WATER	WATER
			Top Depth (m):		1.51	1.38	3.93
			Bottom Depth (m):		8.71	8.34	8.6
			Date Sampled:		04-Apr-2023	04-Apr-2023	04-Apr-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10

Results - Water

Project: Q1031 GARNSWLLT

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-11514	23-11514	23-11514
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1619814	1619815	1619816
Order No.:			Client Sample Ref.:		EW1	EW1	EW1
			Sample Location:		BH1	BH2	BH3
			Sample Type:		WATER	WATER	WATER
			Top Depth (m):		1.51	1.38	3.93
			Bottom Depth (m):		8.71	8.34	8.6
			Date Sampled:		04-Apr-2023	04-Apr-2023	04-Apr-2023
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0
Resorcinol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	0.0060
Phenol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Cresols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-12011-1		
Initial Date of Issue:	24-Apr-2023		
Client	Quantum Geotechnic Ltd		
Client Address:	Plas Newydd Llanedi Pontarddulais Swansea SA4 0FQ		
Contact(s):	Arwel Jones		
Project	Q1031 Garnswllt WWTW		
Quotation No.:	Q22-29520	**Date Received:**	13-Apr-2023
Order No.:		**Date Instructed:**	14-Apr-2023
No. of Samples:	2		
Turnaround (Wkdays):	7	**Results Due:**	24-Apr-2023
Date Approved:	24-Apr-2023		
Approved By:			

Details:	Stuart Henderson, Technical Manager

Results - Water

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12011	23-12011
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1622014	1622015
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHSD01	BHSD02
			Sample Type:		WATER	WATER
			Top Depth (m):		1.54	1.58
			Bottom Depth (m):		16.60	13.77
			Date Sampled:		11-Apr-2023	11-Apr-2023
			Time Sampled:		10:00	10:20
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
pH	U	1010		N/A	8.0	7.5
Total Dissolved Solids	N	1020	mg/l	1.0	290	210
Alkalinity (Bicarbonate)	U	1220	mg CaCO3/l	10	130	150
Chloride	U	1220	mg/l	1.0	21	35
Fluoride	U	1220	mg/l	0.050	0.11	0.13
Ammoniacal Nitrogen	U	1220	mg/l	0.050	3.4	< 0.050
Nitrate as NO3	U	1220	mg/l	0.50	6.0	22
Sulphur	N	1220	mg/l	1.0	6.0	10
Sulphate	U	1220	mg/l	1.0	18	30
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050	< 0.050	< 0.050
Magnesium (Dissolved)	U	1455	mg/l	0.20	4.9	< 0.20
Sodium (Dissolved)	U	1455	mg/l	1.50	25	< 1.5
Calcium (Total)	N	1455	mg/l	5.0	110	35
Total Hardness as CaCO3	U	1270	mg/l	15	180	< 15
Arsenic (Dissolved)	U	1455	µg/l	0.20	0.89	< 0.20
Boron (Dissolved)	U	1455	µg/l	10.0	43	< 10
Barium (Dissolved)	U	1455	µg/l	5.00	21	< 5.0
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	0.79
Copper (Dissolved)	U	1455	µg/l	0.50	2.0	< 0.50
Iron (Dissolved)	N	1455	µg/l	5.0	< 5.0	< 5.0
Mercury (Dissolved)	U	1455	µg/l	0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	µg/l	0.50	6.9	< 0.50
Molybdenum (Dissolved)	U	1455	µg/l	0.20	1.8	0.22
Nickel (Dissolved)	U	1455	µg/l	0.50	1.0	0.65
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Antimony (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50	0.73	< 0.50
Vanadium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5	10	< 2.5
Chromium (Trivalent)	N	1490	µg/l	20	< 20	< 20
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	

Results - Water

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12011	23-12011
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1622014	1622015
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHSD01	BHSD02
			Sample Type:		WATER	WATER
			Top Depth (m):		1.54	1.58
			Bottom Depth (m):		16.60	13.77
			Date Sampled:		11-Apr-2023	11-Apr-2023
			Time Sampled:		10:00	10:20
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5	< 5	< 5
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5	< 5	< 5
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10

Results - Water

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12011	23-12011
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1622014	1622015
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHSD01	BHSD02
			Sample Type:		WATER	WATER
			Top Depth (m):		1.54	1.58
			Bottom Depth (m):		16.60	13.77
			Date Sampled:		11-Apr-2023	11-Apr-2023
			Time Sampled:		10:00	10:20
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Bromodichloromethane	U	1760	µg/l	5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5	< 5	< 5
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10

Results - Water

Project: Q1031 Garnswllt WWTW

Client: Quantum Geotechnic Ltd			**Chemtest Job No.:**		23-12011	23-12011
Quotation No.: Q22-29520			**Chemtest Sample ID.:**		1622014	1622015
Order No.:			Client Sample Ref.:		EW1	EW1
			Sample Location:		BHSD01	BHSD02
			Sample Type:		WATER	WATER
			Top Depth (m):		1.54	1.58
			Bottom Depth (m):		16.60	13.77
			Date Sampled:		11-Apr-2023	11-Apr-2023
			Time Sampled:		10:00	10:20
Determinand	**Accred.**	**SOP**	**Units**	**LOD**		
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	µg/l	2.0	< 2.0	< 2.0
Resorcinol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Phenol	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Cresols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	mg/l	0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	mg/l	0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1270	Total Hardness of Waters	Total hardness	Calculation applied to calcium and magnesium results, expressed as mg l-1 CaCO3 equivalent.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

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