HEOL TABOR, CWMAVON,

PORT TALBOT, SA12 9PR

Phase II:

Ground Investigation Interpretative Report

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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

Rotary Probe Boreholes, Windowless Sample Boreholes and Machine Excavated Trial Pits techniques for ground investigation have been employed within the project. All Exploratory Hole operations, sampling and logging of soils, rocks and in-situ testing complies with the recommendations of the British Code of Practice BS 5930: 2015+A1 2020 'Site Investigations', British Code of Practice BS 10175: 2011 +A1:2013 'Investigation of Potentially Contaminated Sites' and BS 1377: 1990, 'Methods of Test for Soils for Engineering Purposes'.

0.3 Routine Sampling

Representative bulk disturbed 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. All samples are returned from site to QGL's facility 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 Tests within Windowless Sample Boreholes
- Soakaway Tests within selected Trial Pits

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. Unless otherwise instructed or detailed within the Contract, all soil and/or rock samples not tested will be discarded 28 days after submission of the approved final report.

EXECUTIVE SUMMARY

The following highlights the key findings, conclusions and recommendations obtained from the following Ground Investigation Report.

1	An intrusive ground investigation has been undertaken on a Plot of land off Helo Tabor, Cwmavon.
2	The Ground investigation was scoped / designed by Spencer Quantum Ltd and delivered by Spencer Quantum Ltd in November 2023. The Ground Investigation comprised Windowless Sample Boreholes with Standard Penetration Testing and Machine Excavated Trial Pits with Soakaway Testing to provide information for foundation design and to allow sampling for Geo-Environmental assessment. Geotechnical and Geo-Environmental Laboratory tests were also undertaken. Rotary Probe holes were drilled across the site to provide information to assess the risk from unrecorded shallow mine workings and Trial Trenches were undertaken to investigate the presence of a recorded mine entry.
3	The proposed development plans are for the construction of 6 No. residential properties.
4	A Phase I Preliminary Risk Assessment (PRA) has been undertaken prior to the intrusive investigation (Report Ref: Q0353/PRA, October 2020). The PRA concluded: **Environmental Summary:** • Historical mapping does show mining legacy on the site study area in the form of a mine adit and associated railway connection to sidings directly south of the site. • Potentially contaminative historical land uses have been recorded in the surrounding area. • The Enviro+Geo Insight® report indicates Low Risk of flooding for the site. • Radon levels are estimated to be between 3 and 5%. This indicates that basic radon protective measures are required. • South Wales Lower Coal Measures bedrock is mapped below the site and classified as a 'Secondary A' aquifer. **Geotechnical Summary:** • British Geological Survey shows there to be no Superficial Deposits on site. The Solid Geology of the area can be summarised as coal bearing mudstones/ siltstones with seatearths and minor sandstones with thin coal seams. • Buried foundations and structures are not anticipated on the site • Shrink Swell Clays -Very Low (On-Site) • Running Sands – Very Low (On-Site) • Compressible Deposits – Negligible (On-Site) • Collapsible Deposits – Very Low (On-Site) • Landslides – Very Low (On-Site) • Ground Dissolution of Soluble Rocks – Negligible (On-Site) • High Risk from recorded mine workings and recorded mine entries • High risk from unrecorded shallow coal mine workings (On-Site)
5	At the time of the works, the site is an of hardstanding and scrub

6	The ground investigation works revealed that the site study area is overlain by variable Made Ground to depths of between 0.8 and 4.0mbgl over cohesive Glacial Till and granular Glacial Deposits. The depth of Made Ground was greatest in the central and northern areas of the site. Bedrock was proven at depths between 6.25m and 10.00m in the rotary boreholes. Voids, anticipated to be associated with historic shallow mine workings were located at depths of 10.25-12.00mbgl and 11.00-12.25mbgl below the central area of the site. Groundwater was encountered locally within Superficial Deposits; during the intrusive investigation within BH01 at 1.2mbgl, BH06 at 4.5mbgl, TP04 at 1.7mbgl and TP05 at 1.9mbgl, and during the post fieldwork monitoring within WS03 at depths of between 2.0 and 2.41mbgl. Groundwater was measured during the post fieldwork monitoring in BH01 between 24.2 and 26.54mbgl, and in BH06 between 21.52 and 22.53mbgl. All other exploratory holes and monitoring standpipes were dry.
7	Due to its potentially variable, loose and soft nature, the Made Ground encountered will not provide a suitable founding stratum in its current form. The proposed development should found on the firm Glacial Till or medium dense to dense Glacial Deposits. These deposits should offer an allowable bearing capacity in excess of 100kN/m^2. Given the variation in thickness across the site, traditional shallow strip foundations will be suitable for structures in the southern area of the site. Trench Fill or a piled foundation solution will be required for structures in the northern area of the site. Alternatively, the existing Made Ground may be excavated and replaced by an Engineered Fill and a shallow raft foundation solution utilised. It is recommended the founding strata is inspected by a competent person and any soft spots encountered be replaced with a suitably compacted engineered fill.
8	The Made Ground was found to contain potentially significantly elevated Arsenic concentrations, which may pose a risk to future site users. The elevated Arsenic concentrations are assumed to be within the Made Ground site wide. To remove / reduce the risk to future site users, it is recommended the potentially contaminated Made Ground is excavated in areas of proposed soft landscaping and disposed of off-site, or a suitably designed capping layer installed above the potentially contaminated material to remove the potential contamination pathway. Remedial measures should be undertaken in accordance with a suitable mediation strategy and a Validation report completed. A single sample of Made Ground was found to contain potentially mobile contaminations at potentially significant concentrations. Due to the industrial history of the area, the absence of a significant groundwater body below the site and the proven relatively impermeable nature of the soils on-site, the risk to controlled water bodies is considered to be negligible. Although soakaway testing found the soils to not be suitable for soakaway testing, it is still recommended soakaway drainage is not used for the scheme as it would increase the potential for contaminant mobilisation. It is unlikely post construction that any overland flow will come into contact with potentially contaminated soils and flow into the surface water on-site. There is an increased potential for this to occur during construction and therefore during construction, overland flow of surface water should be managed to prevent any surface or groundwater from entering surface water drain on-site. The investigation to date revealed a low-risk potential for elevated gas generation. From monitoring a characteristic situation of CS2 is indicated, with protective measures recommended to suit. Based on the relevant guidelines, it is recommended that the ground gas monitoring regime be extended by a minimum of 3 months to confirm the gas screening value and characterisation of the site.

9	The intrusive investigation revealed a series of worked and un-worked coal seam(s) below the site study area. The two seam(s) interpreted to have been encountered are the **'Big'** (Void / Worked & Intact) and **'Upper Six Feet'** (Unworked / Intact). The voids interpreted to be historic mine workings within the Big coal seam pose a significant risk to the proposed development in the northern area of the site, as there is insufficient rock cover to theorectically prevent surface void migration. To reduce the potential risk to the proposed development within the identified high-risk area of the site, suitable remediation is required. A negligible risk from shallow mine workings has been established for the southern area of the site. The Trial Trenches were undertaken within the area of the site identified by the Coal Authority as potentially containing a Mine Entry 278192-003, did not identify the mine entry or any evidence indicating its presence. Natural superficial deposits were encountered within each Trial Trench at shallow depths. Further consideration of the information gained from the ground investigation as a whole identifies a deeper zone of Made Ground' within the central area of the site, which may indicate the potential unlocated Mine Entry to be present within this area of the site. This coincides with the location of a Coal Level from the 1899 mapping contained within the PRA. As no structures or voids have been identified, the findings suggest the Mine Entry has been removed however, given some uncertainty exists relating to the location of the unlocated Mine Entry, it would be considered prudent to undertake further trenching in the central area of the site to further investigate the presence, location and nature of the Mine Entry, to asses any risk and the requirement for remedial measures.

1.0 INTRODUCTION

1.1 General

Upon the instructions of Mr Wayne Goodridge (Client), Spencer Quantum Ltd (SQL) has been commissioned to undertake a Ground Investigation for a proposed residential development at a Plot of land off Heol Tabor, Cwmavon, Port Talbot, SA12 9PR.

In this interpretative report, a factual account of the fieldwork and the strata encountered including groundwater observations are detailed. Guidance and recommendations on geotechnical issues are provided along with details on any remedial or mitigative measures deemed necessary.

This report should be read in conjunction with:

- QGL Phase I Preliminary Risk Assessment (Report Ref: *Q0353/PRA*)

1.2 Purpose of Ground Investigation

The QGL Phase I Exploratory Investigation Report (Report Ref: Q0353/GIR) recommended a ground investigation should be undertaken to establish if potential contaminants are present at significantly elevated concentrations and to establish geotechnical parameters for proposed foundation design. There is also a requirement to identify any legacy mine features in the form of worked coal seam(s), the identification of any un-worked coal and to locate or confirm the absence of a mine entry mapped within the vicinity of the site. Ground gas/ Groundwater monitoring standpipes were installed and a gas assessment undertaken.

The intrusive investigation undertaken by Spencer Quantum Ltd comprised 4 No. Windowless Sample Boreholes including SPTs, Shallow (soil) ground gas/ ground water monitoring standpipes. 6 No. Rotary Probe Boreholes with standpipe installations, 5 No. Machine Excavated Trial Pits and 4 No Machine Excavated Trial Trenches (mine adit investigation).

2.0 SITE DETAIL

2.1 Site Description

The area under review is currently un-used scrubland adjacent to the road Heol Tabor. The surrounding area is occupied by residential dwellings with an area of immature woodland to the north. The development plans are for a proposed new residential development.

The approximate National Grid Reference of the site is SS 78212 92729 with a nearby postcode of SA12 9PR.

An Ordnance Survey extract of the site from current on-line mapping is presented below.

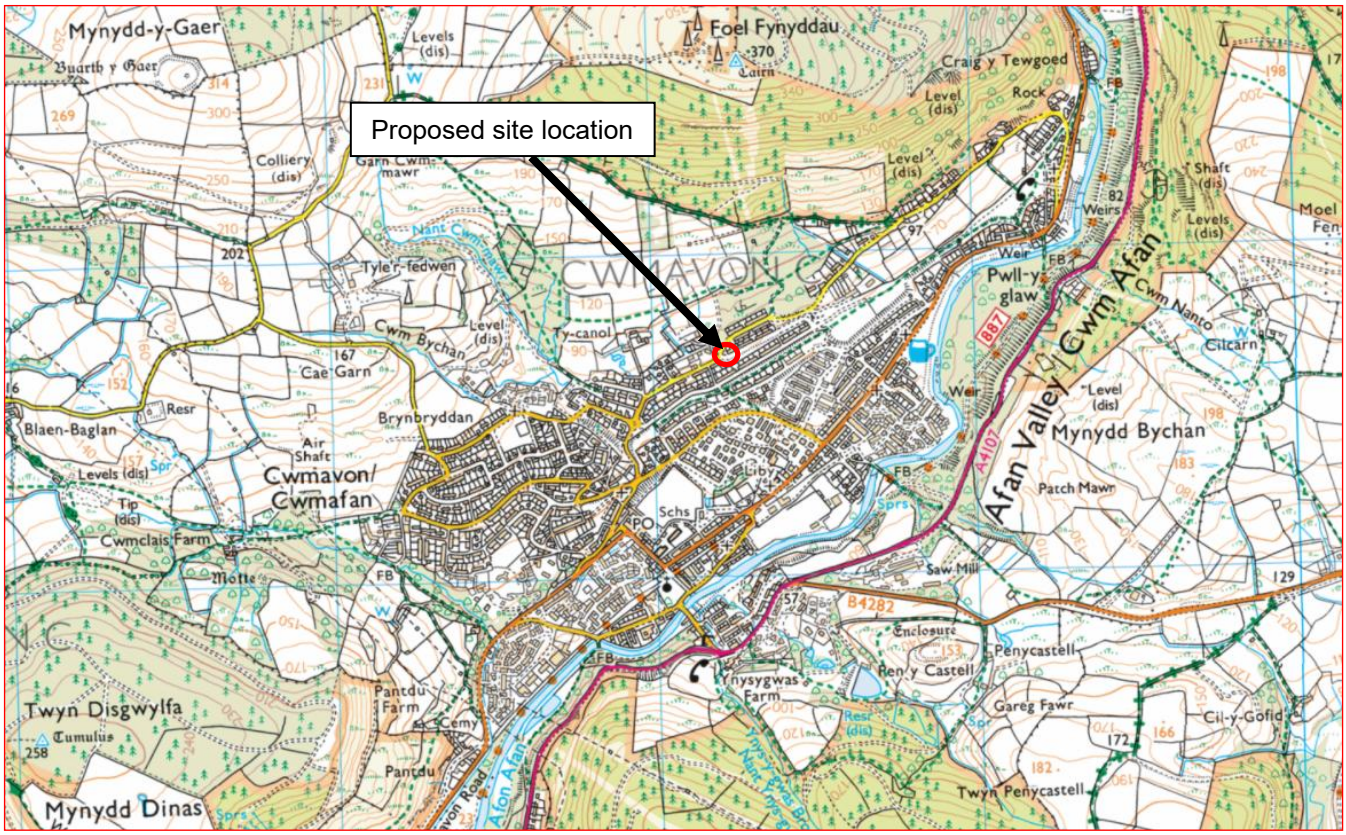


Figure 1: Proposed site location ©Ordnance Survey

2.2 Published Geology

Details of the geology of the site are provided by British Geological Survey (BGS) Sheet 247 'Swansea', Solid edition at 1:50,000 scale, and BGS's online resource Geology of Britain Viewer.

There are no mapped superficial deposits within the site study area, however, the presence of superficial geology cannot be ruled out.

The geological mapping indicates the site to be underlain by strata from the South Wales Middle Coal Measures Formation. The lithology comprises grey, productive coal bearing mudstone/ siltstones with seat earths and minor sandstones. The dip angle/ direction of the strata is 35 degrees to the north. There is also one named fault (Gnoll Fault) 1.5km west of the site study area trending northwest-southeast with a downthrow of 200 yards to the west.

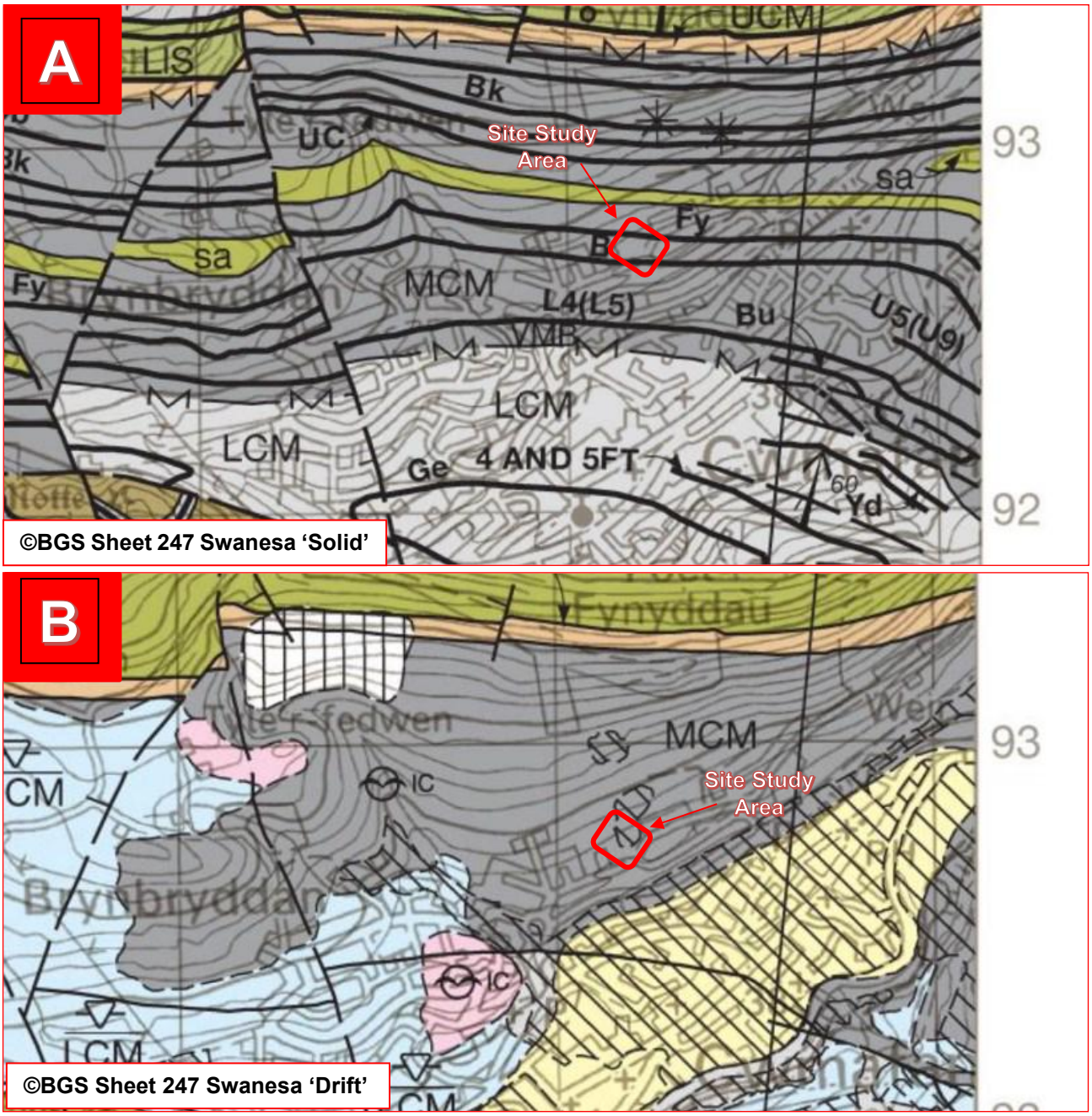


Figure 2: Illustration of the site study area 'Solid' and 'Drift' Geology using BGS Sheet 247

2.3 Hydrogeology and Hydrology

The report indicates the site not to be underlain by a “Superficial Aquifer”.

The report indicates the closest “Secondary A” aquifer at 121m (S) assigned to the superficial deposits. This meaning permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formally classified as minor aquifers.

Bedrock on-site has been identified as ‘Secondary A’ aquifer which is described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly as minor aquifers.

A surface water drain is present in the western area of the site.

2.4 Statutory Service Information

A complete set of Service plans were provided by the Client prior to starting the site works. QGL undertook full Cable Avoidance Tool (CAT) scans of each exploratory hole location before breaking the ground. Safe digging practices in accordance with HS(G)47 were employed when breaking and excavating grounds with all traceable services demarcated prior to works commencing.

3.0 FIELDWORK

3.1 General

In November 2023, Spencer Quantum Ltd (SQL) undertook a Ground Investigation at the proposed development site at land off Heol Tabor, Cwmavon. Site supervision and attendance by an Engineering Geologist from SQL was undertaken on a part time basis of the site works and subsequent reinstatement works of all exploratory hole locations. All Site Personnel were inducted by SQL and briefed of the pertinent Risk Assessments and Method Statements relating to the tasks to be undertaken. No incidents or near misses were recorded during the fieldworks, with the works being incident free.

No deviations from the Standards and Procedures adopted for the works were recorded.

All exploratory hole locations were subject to the hand excavation of a 1.2m deep service/ utility inspection pit prior to any drilling. Also, each area of investigation was fully CAT ('Cable Avoidance Tool') scanned prior to breaking ground.

A summary of the fieldworks completed is outlined below.

Standard Geotechnical and Geo-Environmental Investigation

- 4 No. Windowless Sample Boreholes
- 5 No. Machine Excavated Trial Pits
- 2 No. Soakaway Tests

Shallow Mie Working and Mine Entry Investigation

- 6 No. Rotary Probe Boreholes
- 5 No. Machine Excavated Trial Pits

Ground Gas Assessment

- 4 No. Ground Gas / Water Monitoring Installations

3.2 Exploratory Hole Locations

The exploratory hole locations were set out by a SQL Engineering Geologist at locations specified by SQL to obtain as best coverage of the site and where access could be gained with the investigation equipment. An Exploratory Hole Location Plan is presented as Figure 1 in Appendix I.

The sampling strategy was designed in accordance with CLR4 and BS10175:2011+A2:2017. A combination of sampling approaches were utilized. A targeted approach was applied based on the historically mapped coal-level/ adit, railway sidings, tip and building, whilst a non-targeted sampling strategy was applied across the

remainder of the site, to investigate possible site wide Made Ground.

3.3 Rotary Probe Boreholes

A total of 6 No. Rotary Percussive Boreholes (BH01-06) were undertaken during the site works to investigate any risk associated with historic shallow mine workings. The Rotary Probe Boreholes were drilled using a Comacchio 450 drill rig. All rotary probe boreholes were kept open using an ODEX system of 115mm casing. A combination of drilling systems were used to progress the boreholes through rock, with water flush used to clear the hole of returns and debris.

A summary of the Rotary Percussive Boreholes including termination details is presented in Table 1. A complete set of Engineering Geologist's Rotary Percussive Borehole logs are presented within Appendix II.

Table 1: Rotary Percussive Borehole Detail

Exploratory Hole ID	Terminated Depth (m.bgl)	Reason for Termination
BH01	30.00	Scheduled Depth
BH02	32.25	Scheduled Depth
BH03	14.00	Collapsing Backfilled Workings
BH04	30.00	Scheduled Depth
BH05	30.00	Scheduled Depth
BH06	30.50	Scheduled Depth

3.4 Machine Excavated Trial Pits/ Trenches

5 No. machine excavated trial pits (TP01 – TP05) were undertaken across the site. These were excavated using a 3T tracked excavator.

The trial pitting method of investigation allows direct sampling of the near surface deposits for identification purposes, as well as assessment of any salient features, foundations and Made Ground or disturbed ground. The trial pits were logged in accordance with BS5930:2015+A1:2020; BS EN ISO 14688-1:2018 and BS EN ISO 14688-2:2018, and supervised at all times by an Engineering Geologist from QGL. All the trial pits were backfilled with compacted layers of arisings upon completion.

Details of the Trial Pits, including final depths in metres below ground level (m bgl), are provided in Table 2.

Table 2: Trial Pit Detail

Exploratory Hole ID	Trial Pit Type	Terminated Depth (mbgl)	Reason for Termination
TP01	Machine Excavated	1.80	Scheduled Depth
TP02	Machine Excavated	2.00	Scheduled Depth
TP03	Machine Excavated	1.80	Scheduled Depth
TP04	Machine Excavated	2.00	Scheduled Depth
TP05	Machine Excavated	2.00	Scheduled Depth

A set of Engineer's trial pit logs and photographs are presented within Appendix III.

A series of Trial Trenches were excavated using a 15t tracked excavator to investigate the presence of potential Mine Entry 278192-003 as shown in the PRA and Coal Authority Report. The Trial Trenches were undertaken within the area of the site in which the Coal Authority Report indicates the Mine Entry to be located. Two sets of Trial Trenches were excavated perpendicular to the direction of the mine entry. The Trenches were extended for a total length of 9m at an orientation of 45°. Superficial deposits were encountered within each Trial Trench at shallow depths.

A set of Engineer's trial trench logs and photographs are presented within Appendix IV.

3.5 Windowless Sample Boreholes

A total of 4 No. Windowless Sample Boreholes (WS01-WS04) were undertaken on site. Windowless Sampling techniques involve a sampler dynamically driven down to depth using sampling tubes, nominally 116mm in diameter and reducing as depth increases. This technique allows a relatively undisturbed sample of soil to be taken in a plastic liner, or alternatively sub sampled as a disturbed jar sample. Within competent granular-cohesive soils the portable equipment used for Windowless Sampling is limited by the nature of the ground and robustness of the driving tool. The recovered sample liners were subsequently split and logged on site in accordance with BS5930: 2018; BS EN ISO 14688-1:2018 and BS EN ISO 14688-2:2018, by a Quantum Engineering Geologist. Each Windowless Sample location was reinstated with Bentonite and surface replaced as per pre-existing or a secure cover where installations were made.

The sequence of deposits encountered during the investigation is detailed within the Engineering Geologist's logs presented within Appendix III. The logs highlight the nature of the soils encountered and provide descriptions of the strata revealed at the site. Details of the Windowless Sample Boreholes, including final

depths in metres below ground level (m bgl) are summarised below in Table 3.

Table 3: *Windowless Sample Borehole Summary*

Exploratory Hole ID	Terminated Depth (m.bgl)	Reason for Termination
WS01	6.60	Refusal
WS02	5.50	Refusal
WS03	5.00	Refusal
WS04	5.00	Refusal

A set of Engineer's Windowless Sample Borehole logs and photographs are presented within Appendix V.

3.6 Standard Penetration Tests (SPTs)

Standard penetration tests (SPTs) were undertaken at 1.0m intervals in the windowless sample boreholes up to refusal.

This is a dynamic test as described in BS1377:1990 - Part 9 and is a measure of the density of the soil or rock. 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 solid 60° cone.

SPT results can be found on the corresponding borehole logs in Appendix V.

3.7 Soakaway Tests

Soakaway testing was performed in selected trial pits in accordance with BRE Digest 365 guidelines. Trial Pits TP02 and TP05 were subjected to soakaway testing which involved filling of the pits with clean water and recording the time it takes for the water to drain at set intervals.

The tests certificates for the Soakaway Tests can be found in Appendix VI with Table 4 outlining the tests undertaken.

Table 4: *Soakaway Test details*

Exploratory Hole ID	Test Depth (mbgl)	Strata Identified
TP02	0.4-2.0	Made Ground and Glacial Till
TP05	1.35-2.0	Made Ground and Glacial Till

3.8 Land gas and Groundwater Standpipe Installations

50mm internal diameter standpipes were installed in selected boreholes for the purposes of land gas and groundwater monitoring and sampling.

Monitoring standpipes consist of plastic pipework set in filter aggregate (pea gravel) forming a well. The filter is sealed at one or both ends by use of bentonite pellets which 'go off' and become watertight. Parts of the pipe itself are slotted, allowing the infiltration of groundwater which can then be accessed through the pipe from ground level. Slotted sections are covered by 'geo-sock' to reduce the intrusion of silt into the standpipes and the range of depths at which the groundwater is intercepted is known as the 'response zone'.

Standpipes were installed using a combination of 1m and 3m lengths of pipework (threaded at either end) fitted together and lowered into the borehole. The boreholes were then filled with either pea gravel or bentonite pellets (depending on which zone or level) and cemented in place at ground level with a steel flush cover.

Each standpipe installation was designed by the Investigation Supervisor and instructed on site, after the completion of each borehole. All standpipe installations were sealed above the response zone by a minimum of 0.50m of bentonite pellets.

A summary of the pipe installation details is presented in Table 5.

Table 5: *Borehole Installation Details*

Exploratory Hole ID	Installation Pipe ID	Standpipe Diameter (Internal mm)	Response Zone (mbgl)		Total Standpipe Length (m)
			Top	Bottom	
BH01	A	50	10.00	30.00	30.00
BH02	A	50	10.00	30.00	30.00
BH06	A	50	10.00	30.00	30.00
WS01	A	50	2.60	5.60	5.60
WS02	A	50	2.00	5.00	5.00

4.0 LABORATORY TESTING

4.1 General

The laboratory testing was scheduled by SQL and comprised several geotechnical, geo-chemical and environmental tests on selected soil and soil derived leachate samples obtained during the investigation.

4.2 Geotechnical Laboratory Testing

All the geotechnical soil testing work was carried out in accordance with the procedures stipulated in the various sections of BS 1377:1990 Parts 1 - 9 Methods of test for soils for civil engineering purposes. Table 6 details the tests undertaken.

Table 6: Geotechnical Tests Undertaken

Type of Test	No of Tests
Moisture Content of Soil	5
4 Point Liquid & Plastic Limit	4
PSD: Sedimentation by Pipette	2
Water Soluble Sulphate 2:1 extract	4
pH Value of Soil	4

A full set of geotechnical laboratory test certificates are provided within Appendix VII.

4.3 Geo-Environmental Laboratory Testing

Geo-environmental testing was carried out on selected soil and soil leachate derived samples gained from the ground investigation. The purpose of the testing is to gain a holistic view of any raised levels of contaminants that may exist onsite. Table 7 below details Geo-environmental tests undertaken on selected soil samples.

Table 7: Geo-environmental tests undertaken on soil and soil leachate samples

Heavy Metals			
• Arsenic • Cadmium • Mercury • Zinc	• Barium • Chromium (VI) • Nickel	• Beryllium • Copper • Selenium	• Boron • Lead • Vanadium
Inorganics			
• pH • Sulphur • Free Cyanide	• Total Sulphate • Organic Matter (soil only) • Asbestos (soil only)	• Soluble Sulphate • Total Cyanide	• Sulphide • Complex Cyanide
Poly Aromatic Hydrocarbons			
• Naphthalene • Phenanthrene • Benzo(a)anthracene • Benzo(a)pyrene	• Acenaphthylene • Anthracene • Chrysene • Indeno(1,2,3-cd) pyrene	• Acenaphthene • Fluoranthene • Benzo(b)fluoranthene • Dibenz(a,h)anthracene	• Fluorene • Pyrene • Benzo(k)fluoranthene • Benzo(ghi)perylene
Total Petroleum Hydrocarbons			

TPH-CWG Aliphatic Split:	• EC5 – EC6	• EC6 – EC8	• EC8 – EC10
• EC10 – EC12	• EC12 – EC16	• EC16 – EC21	• EC21 – EC35
TPH-CWG Aromatic Split:	• EC5 – EC7	• EC7 – EC8	• EC8 – EC10
• EC10 – EC12	• EC12 – EC16	• EC16 – EC21	• EC21 – EC35
Aromatic, Monoaromatics & Oxygenates			
• Phenol	• Benzene	• Toluene	• Ethylbenzene
• p & m - xylene	• o - xylene	• MTBE	
Additional Tests for Soil Leachate			
• Hardness			
Specialist Tests			
• Organochlorine Pesticides	• Organonitrogen Pesticides	• Organophosphorus Pesticides	

A full set of geo-environmental laboratory test certificates are provided within Appendix VIII.

5.0 GROUND CONDITIONS ENCOUNTERED

5.1 General

The sequence of deposits encountered during the investigation is detailed within the Engineering Geologist's logs presented within Appendix I, II, III and IV. The following sections summarise the findings of the exploratory holes.

5.2 Ground Conditions

5.2.1 Overview of Strata Encountered

The site study area is underlain by Made Ground of variable thickness, Glacial Till (cohesive) and Glacial Deposits (granular) overlying Bedrock containing Intact Coal and Voids, believed to be Mine Workings.

Table 8 summarises ground conditions encountered.

Table 8: Generalised Stratigraphic Sequence Encountered Across Site

Strata	Depth Ranges (mbgl)	
	From	To
MADE GROUND – Re-Worked Natural	GL	2.30
MADE GROUND – Colliery Spoil (Granular)	GL	4.00
SUPERFICIAL DRIFT - Glacial Till (Cohesive)	GL	9.75+
SUPERFICIAL DRIFT - Glacial Deposits (Granular)	0.40	5.00+
BEDROCK - South Wales Lower Coal Measures Formation inc. intact Coal and Voids	5.50	32.25+

G.L. = Ground Level

+ = Base of Strata not proven

Indicative Cross Sections of the ground conditions below the site are presented in Appendix I.

Made Ground

- ***Re-Worked Natural***

Re-worked natural (Made Ground) was observed within exploratory holes undertaken in the southeast area of

the site. The general lithological description of the re-worked natural was soft to firm dark grey and brown gravelly SILT/CLAY. Gravel is fine to coarse subangular to subrounded sandstone. The re-worked natural was generally observed to depths of less than 1.00m, however it was identified to a depth of 2.30m in WS02.

- ***Colliery Spoil***

Colliery Spoil (Made Ground) was observed within the Trial Pits. The general lithological description of the Colliery Spoil was black clayey sandy angular to subangular fine to coarse GRAVEL of mudstone and coal. The Colliery Spoil, where present, was observed between 0.4 and 1.80mbgl within the Trial Pits. Although no samples were collected from the Rotary Boreholes, the drillers descriptions record Colliery Spoil to depths of between 1.2 and 4.0mbgl, with the exception of BH5, where no Colliery Spoil was recorded. Of potential significance is the Colliery Spoil recorded between 3.25 and 4.0mbgl in BH03, which is recorded below brown Clay, which may be Glacial Till.

Superficial Deposits

- ***Glacial Deposits (Granular)***

Superficial deposits interpreted to be Glacial Deposits which are predominantly granular in nature were observed within WS04, TP01, TP03 and TP04. They were observed between 0.40 and 5.00mbgl and were generally described as a brown slightly silty sandy subangular to subrounded fine to coarse GRAVEL of sandstone and brown silty gravely SAND.

- ***Glacial Till (Cohesive)***

The Glacial Till (cohesive) was encountered between 0.00 and 9.75mbgl within each Window Sample Borehole and Trial Pit, with the exception of TP01, TP03 and TP04. The Glacial Till (cohesive) was generally described as a firm orangish brown to grey silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular to sub-rounded mudstone siltstone sandstone coal.

Rotary probe boreholes proved a maximum depth of Glacial Till of 9.75m in BH02.

Bedrock (Solid Geology)

The underlying bedrock geology that occupies the site study area is that of the South Wales Lower Coal Measures Formation. The strata was generally described as mudstone, sandstone and coal(s). The South Wales Lower Coal Measures Formation was observed from 5.50 to 32.25mbgl. The base of the strata was not encountered.

Legacy Coal Mining Features

The intrusive investigation did reveal a series of worked and un-worked coal seam(s) below the site study area. The two seam(s) in question are the **'Upper Six Feet'** (Un-worked/ Intact) and **'Big'** (*Open/ Void/ Intact*).

(1) **'Upper Six Feet':** (Un-worked/ Intact)

- Observable Thickness = 1.00-1.70m

- Depth = 19.00-20.50mbgl (BH04), 18.50-19.50mbgl (BH05), 8.50-10.20 (BH06)
- No Observable Voids

(2) **‘Big’:** (Open/Void/Intact)

- Observable Thickness = 1.25-1.75m
- Depth 19.50-21.00mbgl (BH01- Intact), 11.00-12.25mbgl (BH02- **Void**), 10.25-12.00mbgl (BH03- **Void**)
- Void, Open, Dry, Intact
- Loss of Flush Returns

5.2.2 Groundwater Conditions

Groundwater was encountered locally within the Superficial Deposits during the site works. Groundwater was encountered at 1.2mbgl within BH01, at 4.5mbgl in BH06, at 1.7mbgl in TP4 and at 1.9mbgl in TP05.

Subsequent monitoring of the standpipe installations in the boreholes drilled recorded groundwater levels in WS03 at depths of between 2.0 and 2.41mbgl, 24.2 and 26.54mbgl in BH01, 21.52 and 22.53mbgl in BH06. BH02 and WS01 standpipes were found to be dry on each return monitoring visit.

It should be noted that groundwater levels are subject to diurnal, seasonal and climatic conditions or may vary due to other causes.

5.2.3 Buried Structures

No buried structures were identified during the ground investigation.

5.2.4 Visual & Olfactory Evidence of Soil Contamination

No visual or olfactory evidence of soil contamination was encountered during the fieldworks.

5.2.5 Visual & Olfactory Evidence of Groundwater & Surface Water Contamination

No visual or olfactory evidence of groundwater contamination was encountered during the fieldworks.

6.0 GEOTECHNICAL ENGINEERING APPRAISAL

6.1 General

The purpose of this Ground Investigation and subsequent reporting is to determine and assess the existing ground conditions on site in preparation for the proposed residential development.

6.2 Engineering Properties of Strata

The site study area is underlain by Made Ground over Glacial Till and / or Glacial Deposits. Bedrock encountered was strata of the South Wales Lower Coal Measures Formation, with voids identified within the 'Big' coal seam.

6.2.1 Standard Penetration Tests (SPTs)

Results of the in situ SPT tests were corrected (to N_{60} values) using the equipment's energy ratio (E_r) found on their corresponding calibration certificates (in accordance with BS EN ISO 22476-3). SPT values are summarised in Table 9.

Table 9: Summary of SPT 'N' values vs depth and ground type

Test Depth (m)	WS01 N value	WS02 N value	WS03 N value	WS04 N value
1.00	3	16	28	10
2.00	3	15	30	18
3.00	24	21	40	19
4.00	21	24	27	46
5.00	28	27	26	50
5.50	n/a	50	n/a	n/a
6.60	50	n/a	n/a	n/a

- Made Ground

- Natural Ground

6.2.2 Geotechnical Testing

The results of geotechnical testing undertaken on samples of each stratum is summarised in Table 10:

Table 10: Summary of Laboratory/In-situ Test Results

Made Ground		Range	Average	No. Tests
Particle Size Distribution	Cobbles (%) Gravel (%) Sand (%) Silt/ Clay (%)	0 6 - 67 22 - 39 11 - 29	0 43 30 17	6
Standard Penetration Test	N Value	3 – 16	10	2

Natural soils – Glacial Deposits (Granular)		Range	Average	No. Tests
Particle Size Distribution	Cobbles (%) Gravel (%) Sand (%) Silt/ Clay (%)	0 - 10 43 - 70 19 - 29 8 - 28	3 54 23 19	3
Standard Penetration Test	N Value	19 – 50+	38	3

Natural soils – Glacial Till (Cohesive)		Range	Average	No. Tests
Moisture Content	(%)	17 – 27	22	2
Atterberg Limits	Liquid Limit (%) Plastic Limit (%) Plasticity Index (%) Modified PI (%)	32 – 52 15 – 23 17 – 29 15 – 29	42 19 23 22	2
Particle Size Distribution	Cobbles (%) Gravel (%) Sand (%) Silt/ Clay (%)	0 40 19 41	0 40 19 41	1
Standard Penetration Test	N Value	3 – 40	23	13

Note: Oversize material (>75mm) would have been removed as part of the PSD test procedure, prior to sieving, and therefore the presence of any large cobbles or boulders would not be revealed by the test results.

6.2.3 Strata Summary

Made Ground

The Particle Size Distribution classification testing performed on selected Made Ground samples indicate the Made Ground deposits to generally be predominately Gravel with a relatively high proportion of the minor sand and silt / clay constituents. The results indicate the Made Ground to generally be silty / clayey sandy Gravel, consistent with the logged findings of the exploratory holes.

The measured SPT 'N' values indicate the Made Ground deposits to range between very loose and medium dense.

Due to the potential variability of Made Ground, no design parameters are provided.

Glacial Deposits (Granular)

The Particle Size Distribution classification testing performed on selected Granular Glacial Deposit samples indicate the strata to be slightly clayey to clayey, slightly sandy to sandy Gravel, generally consistent with the logged findings of the exploratory holes.

SPT tests undertaken within the granular Glacial Deposits measured SPT 'N' values of between 19 and in excess of 50+, corrected to values of between 25 and 68+. The SPT 'N' values indicate the Deposits, which were identified as predominately granular in nature to be medium dense to very dense. It should be noted high SPT 'N' values may be due to encountering cobbles or boulders during the test, potentially resulting in elevated 'N' values.

Following interpretation of the available information within this section and observation of the field descriptions/data, the design parameters have been determined using SPT results due to the high granular content.

Based on the aforementioned information it is recommended that the following peak effective shear strength parameters are used in general for the Granular Glacial Deposits: -

Φ' = 36˚
c' = 0kN/m^2

Glacial Till (Cohesive)

The Particle Size Distribution classification testing performed on selected soil samples indicate the strata to be very gravelly slightly sandy Clay, generally consistent with the Engineers description.

Plasticity Limit (PL) and Liquid Limit (LL) testing was also undertaken on the fine soil deposits. The results recorded Low and High Clay with Plasticity Index (PI) ranging from 17 to 29. The calculated Modified Plasticity Index ranges between 15 and 29. This indicates that there is a medium to high potential for swelling and shrinking of the shallow cohesive soils due to moisture content change.

SPT tests undertaken within the cohesive Glacial Till deposits measured SPT 'N' values of between 3 and 40, corrected to values of between 4 and 54 when taking into account the energy ratio of the test equipment

The SPT 'N' values and Plasticity Index of the Cohesive Glacial Till indicate undrained shear strengths of between 20 and 270kN/m^2 after Stroud (1974), which can be described as Low to Very High shear strength. The average SPT 'N' value of 23 (correlated to 32), indicate an average undrained shear strength of 160/N/m^2.

Further analysis indicates the SPT 'N' value of 3 is a potential anomaly, located at the top of the deposits in WS1.

6.3 Earthworks

6.3.1 Site Preparation

Earthworks shall be carried out in accordance with BS 6031: 2009 Code of Practice for Earthworks. Workmanship for excavation shall comply with BS 8000: Part 1, sections 3.1, 3.2 and 3.3.

Prior to commencing any earthworks / groundwork for the development, any live services on and in the vicinity of the site should be accurately located and protected, or if required diverted.

Any exposed formations should be protected from the effects of the weather, site traffic, or water in order to prevent deterioration of this surface. It is recommended that any exposed formations be protected with a minimum thickness of up to 200mm of suitable granular material or a thin layer of blinding concrete, which should be placed immediately after excavation and exposure.

Depending on the foundation option adopted for the scheme, physical treatment in the form of proof rolling, excavating hard spots, re-engineering of the superficial deposits may be required. This however would need further discussion depending on the foundation opted for.

6.3.2 Excavation Plant

From observations made during the investigation, it is considered that excavations within the near surface Made Ground and Glacial Deposits should be possible with the correct capacity/size 360 tracked excavators, utilising suitable excavating buckets.

6.3.3 Stability of Excavation Sides

Due to the granular nature of the Made Ground and Glacial Deposits encountered across the site, excavations within these deposits may experience instability issues. If excavation sides are to remain open, they should be battered back to a suitably designed safe angle. Where site constraints do not allow this, alternative methods of stabilising the excavations will be required.

Reference should be made to CIRIA Report No. 97 ‘Trenching Practise’ and BS 8004 ‘Foundations’ for guidance on excavation works.

6.3.4 Control of Groundwater

Care should be taken when low plastic soils, such as tills when wet, as they can slurry up and become unworkable. Tills often contain water-bearing granular layers or lenses which assist the slurry up process. All earthworks should be undertaken with the possible presence of water in mind, likely as run-off from rainfall and steps taken to minimise its impact.

If excavations are to extend below the noted water levels, sump pumping should control any surface water ingress or groundwater that may be encountered. It should be noted that groundwater levels are subject to diurnal, seasonal, and climatic conditions or may vary spatially across the site due to other causes, and it is

recommended that groundwater control is undertaken in accordance with appropriate guidance such as CIRIA Report C515 (2000).

6.3.5 Drainage Considerations

Soakaway testing in accordance with BRE 365 was undertaken within the Glacial Till and Made Ground deposits in selected Trial Pits. The findings of the tests are summarised in Table 11. In summary, very little if any reduction in water levels were observed during the test period indicating extremely low soil infiltration rates, typical of the predominately cohesive nature of the strata encountered.

Table 11: Summary of Soakaway Test Results

Exploratory Hole ID	Test No.	Test Depth (mbgl)	Permeability Result Recorded (m/sec)	Comment
TP02	1	0.4-2.0	Insufficient reduction in water level over test period to calculate soil infiltration rate	No reduction in water level over the 300 minute test period
TP05	1	1.35	Insufficient reduction in water level over test period to calculate soil infiltration rate	No reduction in water level below 1.55mbgl over the 300 minute test period

Based on the above permeability calculations, soakaways are not considered feasible within the shallow soils revealed onsite (i.e. <2.0mbgl). Alternative consideration should be given to mains drainage or attenuation cells construction as well as investigation of the deeper lying soils / rock.

The soakaway test certificates are presented within Appendix VI.

6.4 Preliminary Geotechnical Assessment

6.4.1 Foundation Recommendations

The shallow ground conditions across the site study area identified mainly Glacial Deposits overlain by a variable thickness of Made Ground. It is not advisable to found within this Made Ground without treatment. Made Ground can cause problems owing to poor compaction, deleterious material and variability within the fill leading to differential settlements. Where the Made Ground contacts the locally adjacent Glacial Deposits ground problems can occur in the form of differential settlement. Alternatively, a sudden rise in the water table can cause swelling of some soils and a sudden reduction of the water table can also arise problems within the founding solution.

Based on the variations in the depth of the Made Ground across the site, it is recommended a combination of founding options are considered for the development.

The shallow ground conditions within the southern half of the site comprise Glacial Deposits, which will provide a suitable founding stratum, at relatively shallow depths. Reinforced Strip foundations would be a suitable option, founded on the Glacial Deposits offering an allowable bearing capacity of 100kPa.

As the potential for localised soft spots within the cohesive Glacial Till has been identified, it is recommended the founding strata is inspected by a competent person and any soft spots encountered be replaced with a suitably compacted engineered fill.

Made Ground up to depths of 4.00m was encountered in the central and northern areas of the site, possibly associated with the surface excavation of the **'Big'** coal seam. Therefore, traditional shallow foundations will NOT be suitable in these areas of the site without the correct treatment, ground preparation and additional in-situ testing to justify the Made Ground deposits which could offer an allowable bearing capacity of 50kN/m^2. Alternatively deeper foundation solutions should be used such as trench fill or mini piles to transfer the loading to the underlying natural Glacial Deposits, which provide an allowable bearing capacity in excess of 100kN/m^2.

The recommendations provided are subject to the appropriate treatment of the shallow mine workings identified below the northern area of the site.

As discussed within Section 6.5, the potential exists for an unidentified mine entry to be present in the central area of the site, subject to the findings of further investigation, a reinforced raft foundation may be required for any of the proposed properties that may be found to be within the potential influence zone of this mine entry.

6.4.2 Floor Slabs

The type of floor slab will be dictated by the site preparation and foundation solutions opted for and as such whether a reinforced ground bearing or suspended floor slab is applicable cannot be determined at this stage.

6.4.3 Foundation Concrete Class Designation

The Aggressive Chemical Environment for Concrete (ACEC) classification for the site has been assessed according to the guidelines within BRE Special Digest 1 (2005). For classification purposes, based on the BRE guidance, the groundwater must be classed as 'mobile' unless proven to be 'static' over a 24hr period. The pH values of soil samples taken from the site range between 7.1 to 8.0 indicating near neutral to alkaline conditions. The levels of water-soluble sulphate ($S0_4$) content of the tested soils ranged between <10 and 220mg/l.

Based on the above, the Design Sulphate (DS) class for the site is DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification is AC-1, assuming mobile groundwater conditions.

6.5 Updated Coal Mining Risk Assessment

6.5.1 Shallow Mine Workings Discussion

The intrusive investigation did reveal a series of worked and un-worked coal seam(s) below the site study area. The three seam(s) in question are anticipated to be the **'Big'** (Open/ Void/ Intact) and the **'Upper Six Feet'** (Un-worked/ Intact).

The historic mine workings have been interpreted to be within the Big Seam, close to the central area of the site; voids within BH02 between 11.0 and 12.25mbgl and within BH03 between 10.25 and 12.0mbgl were encountered, below 1.25m and 4.0m of rock cover respectively. It is anticipated the Big Seam was also encountered below the north western area of the site in BH01 between 19.50 and 21.00mbgl as un-worked coal. The investigation indicates either the mine workings are localized or extend northwards, with BH01 encountering a pillar within the workings.

As the Coal Authority Coal Mining Report 51002309812001 and Coal Authority Interactive viewer reviewed as part of the PRA did not confirm the presence of shallow mine workings below the site, it is not anticipated any relevant abandonment plans will be available however, it is recommended enquiries are made with the Coal Authority to confirm if any relevant mine abandonment plans are available to further understand the extent and nature of the associated mine workings. At this point, it should be assumed mine workings within the Big Seam extend below the entire northern area of the site,

Healy and Head (in CIRIA C758 Construction Over Abandoned Mineworkings) presented data that the extent to which a void may migrate from the roof of any workings is governed by the structure and form of deformation and disintegration of the roof material. The geometry of collapse they proposed, could be due to rectangular collapse, wedge collapse or conical collapse. The maximum height of potential collapse is then related to the bulking factor as discussed, for the three differing modes of failure. From the data presented in CIRCA C758, for the lowest bulking factor and the worst-case failure type (Conical), the height to which a void may migrate is 10 times the seam or working thickness. At the maximum seam thickness reported 1.75m, then collapse may migrate 17.5m above such a void before becoming arrested. Based on this theory, the void associated with suspected workings within the '**Big Seam'** may migrate to the surface across the northern area of the site.

Based on our assessment, an insufficient thickness of dependable strata is considered to exist above the identified voids and therefore, a risk of surface void migration from historic workings in the Big Seam below the northern area of the site exists. A negligible risk from shallow mine workings exists in the southern area of the site. An indicative drawing showing zones at high risk is presented in Figure 3.

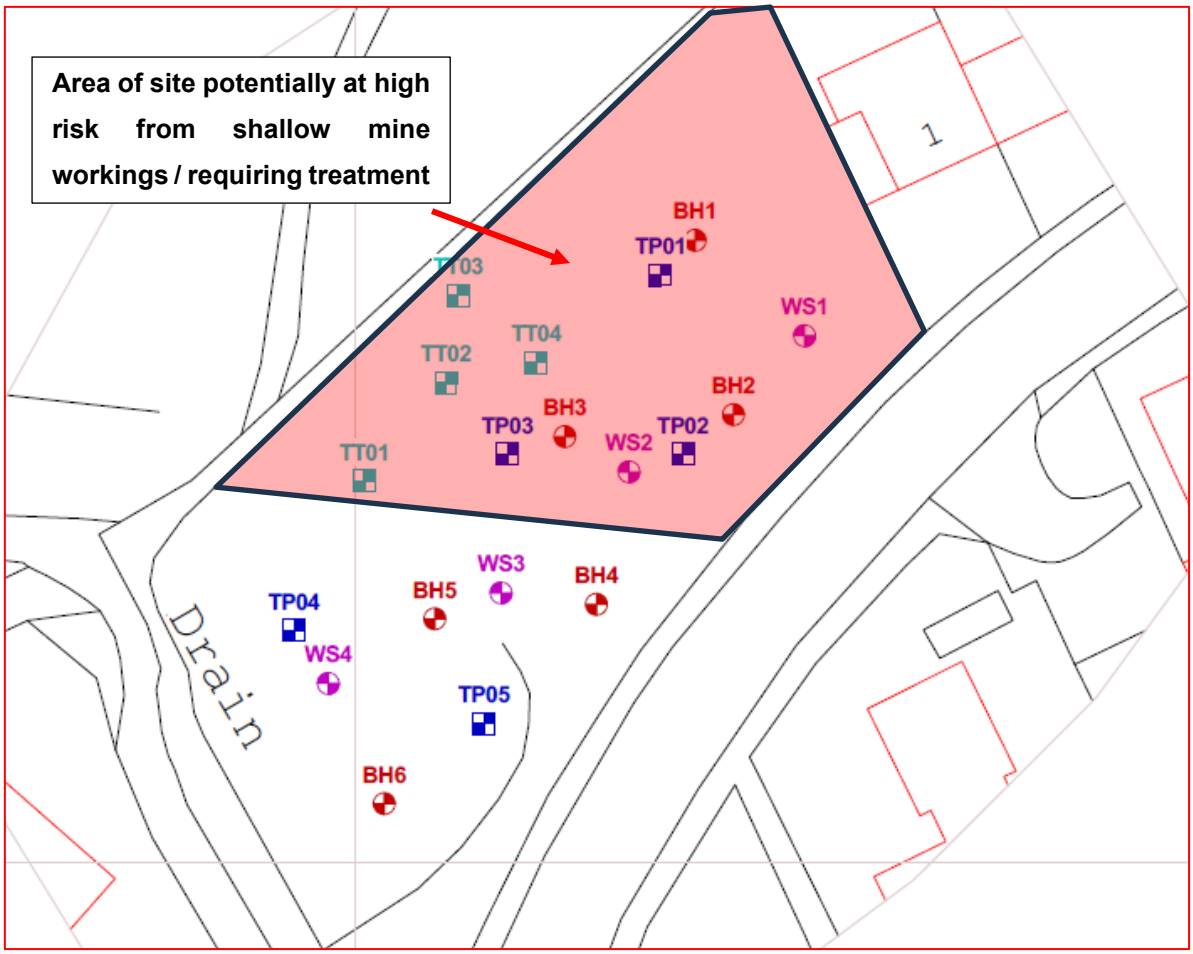


Figure 3: Indicative area of site potentially at risk from shallow mine workings.

Treatment

To reduce the potential risk to the proposed development within the identified high-risk area of the site, a suitable remediation plan is required.

A suitably designed program of drilling and grouting comprising a grid of boreholes should be drilled into the identified mine workings and grout injected into the 'worked zone' through the boreholes. Although gas concentrations within the mine workings during the fieldwork and post fieldwork monitoring were not found to be significantly elevated, the treatment design, working methods and monitoring arrangements should consider any risk to the workforce, public and surrounding properties. No water was identified within the shallow mine workings and is unlikely to pose a risk to the grouting operations, controlled waters etc. However, monitoring during the grouting program should be undertaken to ensure problematic groundwater conditions are not present. Permission from the Coal Authority will be required to undertake the remedial operations.

6.5.2 Mine Entries Discussion

The Trial Trenches undertaken within the area of the site identified by the Coal Authority as potentially containing Mine Entry 278192-003, did not identify the mine entry or any evidence indicating its presence. Natural superficial deposits were encountered within each Trial Trench at shallow depths.

Further consideration of the information gained from the ground investigation as a whole, identifies a deeper zone of Made Ground' within the central area of the site (within BH03, BH04 & WS02), illustrated within Cross Section 1 and Cross Section 2 within Appendix I. Based on the recorded orientation of the Mine Entry of 12°, this information indicates the potential for a currently unidentified Mine Entry to be present within this area of the site, which coincides with the location of a Coal Level from the 1899 mapping contained within the PRA.

No evidence of typical lining associated with Mine Entries or possible associated voids have been identified and it may be the structure has been removed and is only evident through the deeper zone of Made Ground and possibly the strata described as Colliery Spil between 3.25 and 4.0mbgl in BH03, underlying strata described as Brown Clay. If the Mine Entry is present, within the central area of the site, it is recommended the grouting program includes the area of the Mine Entry to remove the risk of future ground collapse / movement in the area, and proposed structures within this area of the site utilize a reinforced raft foundation system to reduce the risk from associated differential settlement.

Given uncertainty exists relating to the location of the Mine Entry, it would be considered prudent to undertake further trenching in the central area of the site (area of BH03, BH04 & WS02) to further investigate the presence, location and nature of the Mine Entry, to asses any risk and the requirement for the suggested remedial measures.

7.0 GEO-ENVIRONMENTAL CONSIDERATIONS

7.1 General

The following Section assesses the findings of the geo-environmental laboratory test results from samples obtained during the ground investigation. The risks to human health and the environment are both considered herein. The following assessment is solely based on the results of laboratory testing of soil samples obtained during the intrusive investigation.

7.2 Human Health Risk Assessment Criteria

For the purposes of Spencer Quantum Ltd assessments, the most recent and applicable SGVs, GACs, SU4Ls and C4SLs are used based on site end use and development and overall suitability. These are all referenced within the text. SU4Ls take precedence in SQL assessments. Where these are not available or suitable, C4SLs are adopted.

By adopting the CLEA approach to human health risk assessment as defined in CLR11, a human health risk assessment has been undertaken for the proposed development adopting the most applicable model of **Residential with Plant Uptake** threshold values.

The assessment criteria used in this assessment is that presented by LQM/CIEH in their publication *The LQM/CIEH S4ULs for Human Health Risk Assessment (2015)*. The *S4ULs* (Suitable for Use Levels) used have been derived in accordance with UK legislation, national as well as Environment Agency policy and using a modified version of the Environment Agency CLEA software and available guidance provided to the contaminated land practitioner community for the purpose of deriving Generic Assessment Criteria (GAC).

The LQM/CIEH S4ULs are intended for use in assessing potential risks posed to human health by contaminants in soil and as transparently derived and cautious 'trigger values' above which further assessment or remedial action may be necessary. By using the LQM/CIEH S4AULs, Quantum Geotechnical acknowledges *Copyright Land Quality Management Ltd reproduced with permission; Publication Number S4AUL3409. All Rights Reserved.*

7.3 Soil Sample Test Results Comparisons

The results of chemical laboratory testing on 14 No. selected soil samples from the shallow lying soils are presented and discussed within this Section.

7.3.1 Heavy Metal and Inorganic Compounds

The results of levels of potential contaminants have been compared to generic assessment criteria as

described above, for Residential end use with plant uptake. The test certificates are included in Appendix VIII. The concentrations of heavy metal and inorganic compounds are summarised in the table 12 below.

Table 12: *Summary of Heavy Metals and Inorganic Soil Test Results*

Determinant	Results Range (mg/kg)	*LQM/CIEH (2015)* GAC (mg/kg) Residential with plant uptake End Use [(1)]	Exceedances
Arsenic	18 - 63	37	7 TP01 at 0.3mbgl TP01 at 0.5mbgl TP01 at 1.0mbgl TP02 at 2.0mbgl TP02 at 1.0mbgl TP03 at 0.6mbgl TP04 at 0.3mbgl
Cadmium	0.10 - 0.51	11	0
Chromium	7.70 - 150	910	0
Copper	24- 390	2,400	0
Lead[3]	22 - 150	200	0
Mercury	<0.05 - 0.22	40	0
Nickel	19 - 74	130	0
Zinc	47 - 230	3,700	0

Notes:

(1). GAC from LQM/CIEH S4ULs 2015. (2). GAC from LQM/CIEH 2009 & 2015. (3). GAC from DEFRA C4SL. (4). GAC from at Risk adopting most sensitive end use for acute risk.

7.3.2 Polycyclic Aromatic Hydrocarbons

The results of levels of potential Polycyclic Aromatic Hydrocarbon contaminants have been compared to generic assessment criteria as described, for Residential with plant uptake End Use. The concentrations of speciated Polycyclic Aromatic Hydrocarbon are summarised and compared in Table 13.

Table 13: *Summary of Polycyclic Aromatic Hydrocarbon Soil Test Results*

Determinant	Site Results Range (mg/kg)	*LQM/CIEH (2015)* GAC [(1)] Residential with plant uptake End Use (mg/kg)	
		1% SOM	Exceedances
Total Organic Carbon	0.94 - 73		
Acenaphthene	<0.10 - 0.12	210	0
Acenaphthylene	<0.10	170	0
Anthracene	<0.10 - 0.35	2,400	0
Benzo(a)anthracene	<0.10 - 1.40	7.20	0
Benzo(a)pyrene	<0.10 – 1.10	2.20	0
Benzo(b)fluoranthene	<0.10 – 2.00	2.60	0
Benzo(ghi)perylene	<0.10 – 0.74	320	0
Benzo(k)fluoranthene	<0.10 – 0.59	77	0
Chrysene	<0.10 – 1.50	15	0
Dibenz(a,h)anthracene	<0.10 – 0.16	0.24	0
Fluoranthene	<0.10 – 2.40	280	0
Fluorene	<0.10 – 0.20	170	0

Indeno(1,2,3-cd)pyrene	<0.10 – 0.87	27	0
Naphthalene	<0.10 – 1.20	2.30	0
Phenanthrene	<0.10 – 2.50	95	0
Pyrene	<0.10 – 1.80	620	0

Notes: (1). GAC from LQM/CIEH S4ULs 2015.

7.3.3 Total Petroleum Hydrocarbons

The results of levels of potential petroleum hydrocarbon contaminants have been compared to generic assessment criteria as described, for a Residential with Plant Uptake End Use and for a Soil Organic Matter (SOM) content of 1% due to lowest recorded value of 0.94%. The concentrations of speciated Petroleum Hydrocarbons are summarised and compared in Table 14.

Table 14: *Summary of Petroleum Hydrocarbon Soil Test Results*

Determinand	Site Results Range (mg/kg)	*LQM/CIEH (2015)* GAC (mg/kg) Residential with plant uptake End Use [1]	
		1% SOM	Exceedances
TPH – Aliphatic EC5-6	<1.0	42	0
TPH – Aliphatic >EC6-8	<1.0	100	0
TPH – Aliphatic >EC8-10	<1.0	17	0
TPH – Aliphatic >EC10-12	<2.0-2.90	130	0
TPH – Aliphatic >EC12-16	<1.0-8.50	1,100	0
TPH – Aliphatic >EC16-21	<2.0-21.0	6,500	0
TPH – Aliphatic >EC21-35	<3.0-130.0	6,500	0
TPH – Aromatic >EC5-7	<1.0	70	0
TPH – Aromatic >EC7-8	<1.0	130	0
TPH – Aromatic >EC8-10	<1.0	34	0
TPH – Aromatic >EC10-12	<1.0	74	0
TPH – Aromatic >EC12-16	<1.0	140	0
TPH – Aromatic >EC16-21	<2.0-28.0	260	0
TPH – Aromatic >EC21-35	<2.0-85.0	1,100	0

Notes: (1). GAC from LQM/CIEH S4ULs 2015. (2). GAC for C16 – C35 only quoted. NA – Not available

7.3.4 BTEX Compounds

Not Required.

7.3.5 Total Phenols

Total Phenols (monohydric) recorded values of <0.1mg/kg.

7.3.6 Volatile Organic Compounds (VOC) & Semi Volatile Organic Compounds (SVOC)

The results of levels of potential VOC's & SVOC's have been compared to generic assessment criteria as described, for a Residential with plant uptake end use for a Soil Organic Matter (SOM) content of 1%. The concentrations of VOC's & SVOC's are summarised and compared in the Table 15.

Table 15: Summary of VOC's Soil Test Results

Determinand	Site Results Range (mg/kg)	*LQM/CIEH (2015)*, CL:AIRE 2010 Generic Assessment Criteria Residential with plant uptake End Use (mg/kg)	
		1% SOM	Exceedances
Chloromethane	<1.0	*0.0083*	0
Chloroethane	<1.0	*8.30*	0
Bromomethane	<1.0	NYS	-
Vinyl Chloride	<1.0	NYS	-
Trichlorofluoromethane	<1.0	NYS	-
1,1-dichloroethene	<1.0	*0.23*	0
1,2,2-Trifluoroethane	<1.0	NYS	-
Cis-1,2-dichloroethene	<1.0	*0.11*	0
MTBE (Methyl Tertiary Butyl Ether)	<1.0	*49*	0
1,1-dichloroethane	<1.0	*2.40*	0
2,2-Dichloropropane	<1.0	NYS	-
Trichloromethane	<1.0	*NYS*	-
1,1,1-Trichloromethane	<1.0	NYS	-
1,2-dichloroethane	<1.0	*NYS*	-
1,1-Dichloropropene	<1.0	NYS	-
Trans-1,2-dichloroethene	<1.0	0.19	0
Benzene	<1.0	0.087	0
Tetrachloromethane	<1.0	*NYS*	-
Trichloroethene	<1.0	*NYS*	-
Dibromomethane	<1.0	NYS	-
Bromodichloromethane	<1.0	*0.016*	0
Cis-1,3-dichloropropene	<1.0	NYS	-
Trans-1,3-dichloropropene	<1.0	NYS	-
Toluene	<1.0	130	0
1,1,2-Trichloroethane	<1.0	*0.60*	0
1,2-Dichloropropane	<1.0	0.024	0
Dibromochloromethane	<1.0	NYS	-
Tetrachloroethene	<1.0	NYS	-
1,2-Dibromoethene	<1.0	NYS	-
Chlorobenzene	<1.0	*NYS*	-
1,1,1,2-Tetrachloroethane	<1.0	NYS	-
Ethylbenzene	<1.0	47	0
p & m-xylene	<1.0	59	0
Styrene	<1.0	*8.10*	0

Notes :- 1. CLEA (2009) SGV's (Underlined) derived from Soil Guideline Values Science Report SC050021 and are based on a sandy loam soil as defined in Environment Agency (2009b) and 6% soil organic matter (SOM). 2. SGV's derived from CLEA 2002 in Normal Font. 3. SGV's derived from LQM/CIEH GAC in *Italics*. 4. NYS - Not Yet Specified. **5.** Petroleum Hydrocarbons should be assessed as Aliphatic and Aromatic compounds (C5 - C70), for 1%, 2.5% & 5% Soil Organic Matter Content respectively (SOM). For individual petroleum hydrocarbon compounds/fractions, refer to LQM/CIEH GAC document. 6. NT = Not Tested 7. SGV's derived from CL:AIRE GAC in *Italics*.

The measured VOC's & SVOC's from the soil samples tested fell below the relevant GAC for Residential with plant uptake land use and/or below the laboratory test detection limit.

7.4 Environmental Risk Assessment

The following section presents the findings of the groundwater test results and provides assessment in relation to risks to the environment, particularly controlled waters.

7.4.1 Test Criteria

The risk to controlled waters, i.e., nearby watercourses and groundwater, is defined by the potential for any contaminants present on site to leach from the soils beneath the site and into the groundwater body.

Samples of the Made Ground were tested using the soil leachate method to determine if any potential contaminants held within the soils are leachable. The result ranges are presented together with the threshold levels given by the Environmental Quality Standards (EQS) guideline values (coastal & estuarine version) and as a secondary reference, the United Kingdom Drinking Water Standards (UKDWS).

7.4.2 Soil Leachate Test Results Comparisons

Table 16 presents the summarised findings of the soil leachate testing undertaken. The test certificates are included in Appendix VIII.

Table 16: *Summary of Soil Leachate Chemical Analysis*

Determinant	Units	Site Results Range (µg/l) Groundwater –	Environmental Quality Standards – Coastal & Estuarine water[1]	UK Drinking Water Standards[2]	Exceedances
Arsenic	µg/l	0.50 - 7.80	25	10	0
Cadmium	µg/l	<0.11	5	5	0
Chromium	µg/l	<0.50 – 2.10	15[3]	50	0
Copper	µg/l	<0.50 – 27.0	5[3]	2000	1 WS01 at 1.3mbgl
Lead	µg/l	<0.50 – 1.80	25[3]	10	0
Mercury	µg/l	<0.05	1	1	0
Nickel	µg/l	<0.05 - 9.20	30[3]	20	0
Zinc	µg/l	4.1 - 39	40[3]	5000	0

[1]Figures for Environmental Quality Standards (EQS) are Annual Average Concentrations derived from the Environment Agency [2]UK Drinking Water Standards taken from; Water Supply (Water Quality) Regulations 1989 (SI 1989/1147) (as amended), and Water Supply (Water Quality) Regulations 2000 (SI 2000/3184) (as amended). [3]Hardness Banding to be applied, average hardness utilised of 25mg$CaCO_3$/l– using Table 2b: EGS for hardness related List 2 dangerous substances, EC Dangerous Substances Directive (76/464/EEC). NT – Not Tested. I/S – Insufficient Sample, NYS – Not Yet Specified

7.5 Recommendations on Contaminated Land Appraisal

7.5.1 Human Health Risk of Site End Users

The ground investigation and subsequent testing has revealed raised contaminants within the Made Ground on site.

Arsenic concentrations within seven samples of Made Ground from TP01 at 0.30 and 0.50m, TP02 at 0.30m and 1.00m, TP03 at 0.30m TP04 at 0.30mbgl, TP05 at 2.0mbgl were above the relevant assessment criteria. No other exceedances were identified in the laboratory testing results.

No Asbestos was detected in the laboratory testing.

Risk to Construction Workers

The geo-environmental laboratory testing showed raised potential contamination concentrations within the Made Ground deposits, therefore a risk to construction operatives from chemical contaminants from the shallow ground may exist.

Operatives working with, or likely to come into contact with Made Ground with the potential to harness raised concentrations of contaminants, should observe particular precautions concerning personal hygiene. They should be issued with the appropriate personal protective equipment and should be instructed in safe working methods.

In addition, instructions should be issued in the recognition of potentially hazardous materials including oily and odorous soil and water and also any discoloured or fibrous substances for example. Operatives should be warned to avoid contact between hands and mouth before washing. The consumption of food must be confined to designated clean areas with suitable welfare including washing facilities should be provided.

Risk to Future Site Users

Based on the laboratory test results from the intrusive investigation, elevated concentrations of Arsenic are present within the Made Ground which may pose a significant risk to future site users.

Although no statistical analysis has been undertaken, the spread of potentially significantly elevated contaminant concentrations within the Made Ground can be considered to be site wide.

Options available to remove / reduce the risk to future site users from the identified potential contaminant source (Made Ground) include:

- Excavation of the potential contamination source in areas of proposed soft landscaping and disposal off-site.
- The installation of a suitably designed capping layer above the potentially contaminated material to remove the potential contamination pathway. Within areas of soft landscaping the cover system may be an appropriate thickness of clean soil, designed in accordance with BRE 465, cover Systems for Land Regeneration. Areas of hardstanding, such as paving and floor slabs, will effectively cap the potential contamination source and remove the potential contamination pathway in these areas of the development and as such, no further remedial measures will be required in areas of hardstanding.

Remedial measures should be undertaken in line with a suitable Remediation Strategy, a quality assurance program followed and a Verification Report produced upon completion of the remedial works

Alternatively additional assessment may be undertaken to further assess the potential risk to future site users and the need for the remedial measures. This would involve carrying out accessibility testing on samples of potentially contaminated Made Ground and undertaking a site specific assessment.

Summary Assessment of Risk to Controlled Waters

The risk to controlled waters, i.e. nearby water courses, is defined by the potential for any contaminants present on site to leach from the soils beneath the site, or to migrate from underground storage apparatus.

Potentially significantly elevated Copper concentrations were measured within the soil leachate of one of the samples of Made Ground from WS01.

Based on the findings of the ground investigation, the potential for leachate generation which may contain elevated concentrations of Copper exists however, given the extensive current and historical land uses in the area, the presence of relatively impermeable strata below the site (as proven by the soakaway testing) and the absence of nearby groundwater bodies, the risk of potential leachate generation from the Made Ground present on site on controlled waters is considered to be low.

It is unlikely post construction that any overland flow will come into contact with potentially contaminated soils and flow into the surface water on-site. There is an increased potential for this to occur during construction and therefore during construction, overland flow of surface water should be managed to prevent any surface or groundwater from entering surface water drain on-site.

7.6 Ground Gas Monitoring Results

Three post-fieldwork monitoring ground gas visits have been undertaken to allow a preliminary assessment to be undertaken. Appendix V presents the monitoring records with the results discussed below.

The results show CH_4 concentrations of 0.0%v/v and CO_2 concentrations of 1.6%v/v. Maximum measured flow rate was recorded as 0.0l/hr whilst O_2 levels ranged between 18.1 and 20.6%v/v. Carbon Monoxide (CO) recorded 0ppm and H_2S recorded at 0ppm.

The potential risks posed by any recorded presence of potentially harmful gases can be assessed on a semi-quantitative basis by reference to the guidance in documents CIRIA 665 and BS8485. The assessment comprises multiplying the maximum measured steady gas flow rate (expressed as litres per hour) by the maximum steady gas concentration (expressed as percentage-by-volume; divided by 100) to derive a Gas Screening Value (GSV). Where no flow is found, the detection limit of the instrument can be used to derive a

GSV. The GSV calculated using this approach is 0.00l/hr, i.e., characteristic situation 1.

Based on the ground gas monitoring findings to date, the site is classified as Characteristic Situation 1, based on CIRIA C665 guidance are no ground gas protective measures are required.

7.7 Revised Conceptual Site Model

The Conceptual Site Model (CSM) is a representation of the current understanding of the site and its surrounding environment with regards to geology, groundwater, surface waters, and potential contamination on-site and adjacent off-site and any migration pathways.

The potential risks to the proposed development and adjacent land have been assessed by consideration of the potential pollution linkages. For a risk to exist there must be a source of contamination, a receptor that may be harmed, and a pathway by which the receptor could be exposed to the contaminant. Only when all three factors are present (i.e. source, pathway, and receptor) can a pollution linkage, and consequently an unacceptable risk, exist. The CSM considers all three elements and the potential for pollution linkages that may exist. If no linkage is identified, then there is no or negligible risk.

The CSM established as part of the PRA has been revised based on the findings of the Ground Investigation.

Sources

Made Ground which has been found to contain potentially significant Arsenic concentrations and has been identified as a potential contamination source on site.

A single sample of Made Ground has been identified as containing potentially significantly elevated concentrations mobile contaminants.

Slightly elevated CO_2 concentrations of ground gas have been measured during post fieldwork monitoring.

Receptors

Considering the proposed site end use (Residential), a number of receptors have been identified at risk during and subsequent to the proposed development (on-site). These are summarised as follows:

On-site

- Future site users – construction workers (during development), Residential Homeowners
- Surface water drain on site

No controlled waters were identified that may be at risk from potentially mobile contaminants.

Pathways

Completing the pollutant linkage between source and receptor are pathways – the way in which they are connected. The type of sources identified have a range of ways of contaminating the receptors, and typically

fall into the following categories:

- Direct contact – including dermal contact and ingestion
- Consumption of plant material (vegetable patch etc) grown on site
- Gaseous Phase migration

Considering sources and receptors on-site, a pathway exists: on-site to on-site. A visual representation of the complete model and each pollutant linkage is provided as Figure 4 below.

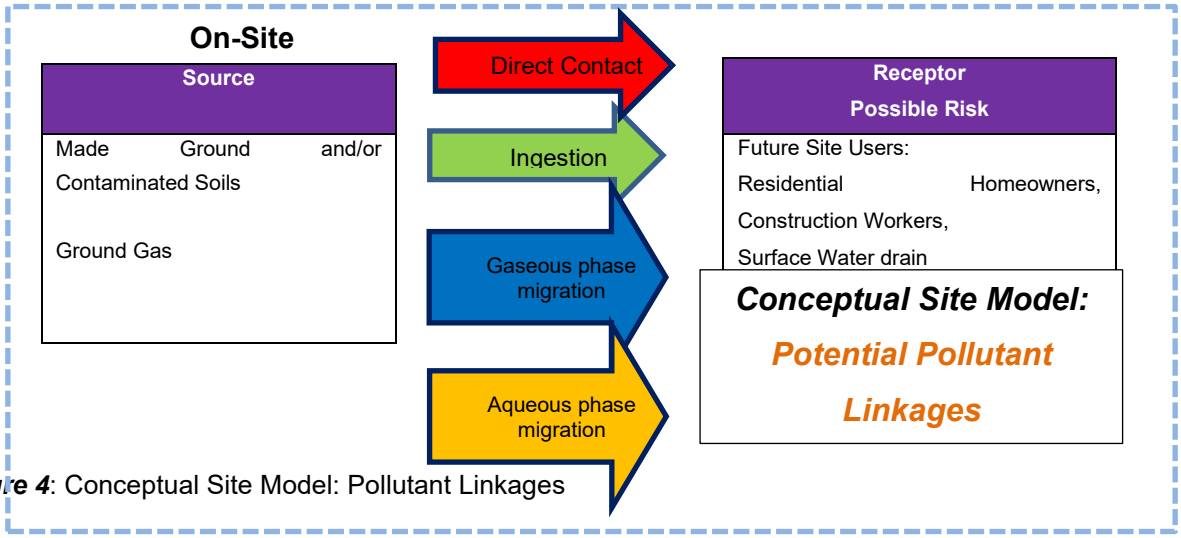


Figure 4: Conceptual Site Model: Pollutant Linkages

The remedial measures recommended within Section 7.5.1 and 7.6 would remove either the contamination source or contamination pathway and as such, remove the risk to future site users.

8.0 REFERENCES

British Geological Survey:

- British Geological Survey (BGS) Sheet 247 'Swansea' 1:50,000.
- Geological Sheet SN-51-SE 1:10,560
- BGS Lexicon of Named Rock Units (www.bgs.ac.uk/lexicon)
- BGS Geology of Britain Viewer (www.bgs.ac.uk)

Specialist Publications:-

- British Code of Practice BS 5930:2015+A1:2020 *'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 10175:2011 *'Code of Practice for Investigation of Potentially Contaminated Sites'*
- British Code of Practice BS EN ISO 14688-1:2018 Geotechnical investigation and testing. Identification and classification of soil. Identification and description
- British Code of Practice BS EN ISO 14688-2:2018 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
- BRE (2005) Special Digest 1:2005, 3rd Edition, Concrete in aggressive ground. BRE, Garston.
- BS 6031: 2009 Code of Practice for Earthworks.
- ICE UK Specification for Ground Investigation Second Edition.
- Specification for Highways Works Series 600 Earthworks
- Environment Agency Science Report SC050021/*[various]* (2009) *Soil Guideline Values*
- LQM/CIEH Publication S4UL3409 (2015) *'Generic Assessment Criteria for Human Health Risk Assessment'*
- World Health Organisation (2011) *'Guidelines for drinking-water quality, 4th edition'*
- Statutory Instruments (UK Legislation) 2016 No. 614 *'The Water Supply (Water Quality) Regulations'* retrieved from www.legislation.gov.uk/2016/614
- Statutory Instruments (UK Legislation) 2015 No. 1623 *'The Water Framework Directive (Standards and Classification) Directions (England and Wales)'*
- CIRIA C665 (2007) Assessing risks posed by hazardous ground gases to buildings.

Site Study Area Report(s):-

- QGL Phase I Preliminary Risk Assessment (Report Ref: *Q0353/PRA*)

APPENDIX I – SITE PLANS & FIGURES

1 Location Plan

1 : 1250

2 Proposed Site Plan

1 : 500

NOTES:

North

GARETH OWEN
CONCEPT DESIGNS

DRAWING STATUS
Outline Planning

PROJECT
Land at Heol Tabor, Cwmavon

TITLE
Location Plan & Proposed Site Plan

CLIENT
Mr W Goodridge

DRAWN BY	DATE
Gareth Owen	19.08.20

SCALE (@A3)	PROJECT NO.
As indicated	GOCD WG01

DRAWING NO.	REV
A100	B

GO CONCEPT DESIGNS LTD, 9 DARWIN RD, PORT TALBOT, SA12 6BT
gareth@goconceptdesigns.co.uk

© Iplan Architecture Ltd.

plot areas

plot 1 | 700.00m^2
plot 2 | 400.00m^2
plot 3 | 370.00m^2
plot 4 | 350.00m^2
plot 5 | 426.00m^2

proposed site layout
scale | 1:250

N
W E
S

Station coordinates

Station	Easting	Northing	Level
3	278212.840	192676.583	70.615
4	278229.520	192705.489	72.575
5	278239.985	192722.440	73.779
6	278251.846	192734.088	74.614

ABBREVIATIONS

AV	– Air valve	P	– Post
B	– Bollard	PS	– Paving
BB	– Bellisha beacon	P/R	– Post/rail fence
BH	– Bore hole	P/W	– Post/wire fence
BM	– Site bench mark	RE	– Rodding eye
BT	– British telecom	RW	– Retaining wall
B/W	– Barbed wire fence	RS	– Road Sign
CAM	– Camera	SAP	– Sapling
CB	– Phone box	SC	– Stop Cock
CDP	– Cable draw pit	SE	– Services entry point
CL	– Cover level	SL	– Step Level
Conc	– Concrete	SOF	– Soffit level
C/B	– Closed board fence	SP	– Sign Post
C/I	– Corrugated fence	SV	– Stop Valve
DP	– Down pipe	TAC	– Tactile Paving
DK	– Drop kerb	TH	– Trial Hole
EIC	– Electric inspection cover	T.O.W	– Top of Wall
EL	– Eaves level	TP	– Telegraph Pole
EP	– Electricity pole	TS	– Traffic signal
ER	– Earthing rod	TSC	– Traffic signal cover
FL	– Floor level	TV	– Cable television
FH	– Fire hydrant	UTL	– Unable To Lift
FP	– Flag pole	VP	– Vent Pipe
G	– Gulley	WL	– Water Level
G12	– Tree girth (m)	WM	– Water Meter
GV	– Gas valve	△	– Survey Station
IC	– Inspection cover	ø	– Pipe Diameter(m)
IL	– Invert Level		
I/R	– Iron Railings		
JB	– Junction box		
KO	– Kerb outlet		
LB	– Letter box		
LP	– Lamp post		
Mkr	– Utility marker		
NP	– Street Name Plate		
OSBM	– Ordnance Survey bench mark		
O/B	– Open board fence		

LINE TYPES

Building
Kerbs, Walls
Fences
Iron railings
Top of banks
Bottom of banks
Hedges
Overhead Wires
Change of surface

Survey Details
1. OS grid & datum determined by GPS
2. North arrow indicates approximate North.
3. Scale factor 1.00000
4. Contour interval 0.5m
5. All internal manhole details to be checked prior to site works

grassed lawned areas
permeable tarmacadam
rainwater garden
2600x4800mm car parking spaces x 2
concrete slab patio and paths
1800mm timber close boarded fencing
1200mm timber close boarded fencing
location of wildlife tunnels
boundary planting - max. height 600mm
tree planting - max. height 4000mm

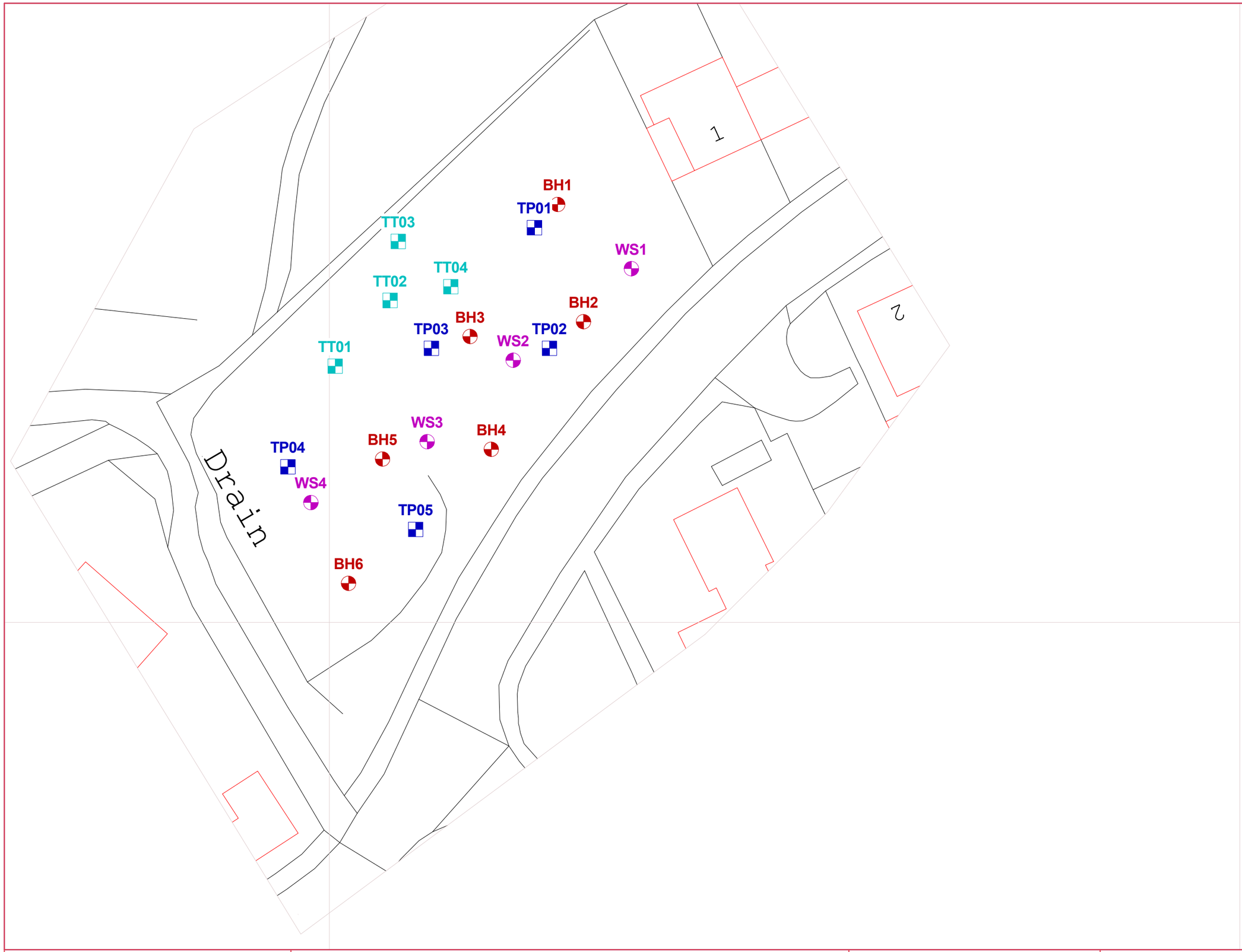
Catling's Land Surveys
A Passion for Mapping.
47 Heol Las, Ynysmeudwy, Pontardawe, Swansea, SA8 4PR
Tel / Mobile 07790 588323
email: adrian@catlingslandsurveys.co.uk

revision
a
b
c
d
e
f
g

IPLAN ARCHITECTURE

planning

project	drawing	date
LAND @ HEOL TABOR, CWMAVON, NEATH PORT TALBOT	PROPOSED SITE LAYOUT	JULY 2024
client	**drawing no.**	**scale**
WAYNE GOODRIDGE	24.291.03	1 | 250 @ A2
www.iplanarchitecture.co.uk	hello@iplanarchitecture.co.uk	07765 660189



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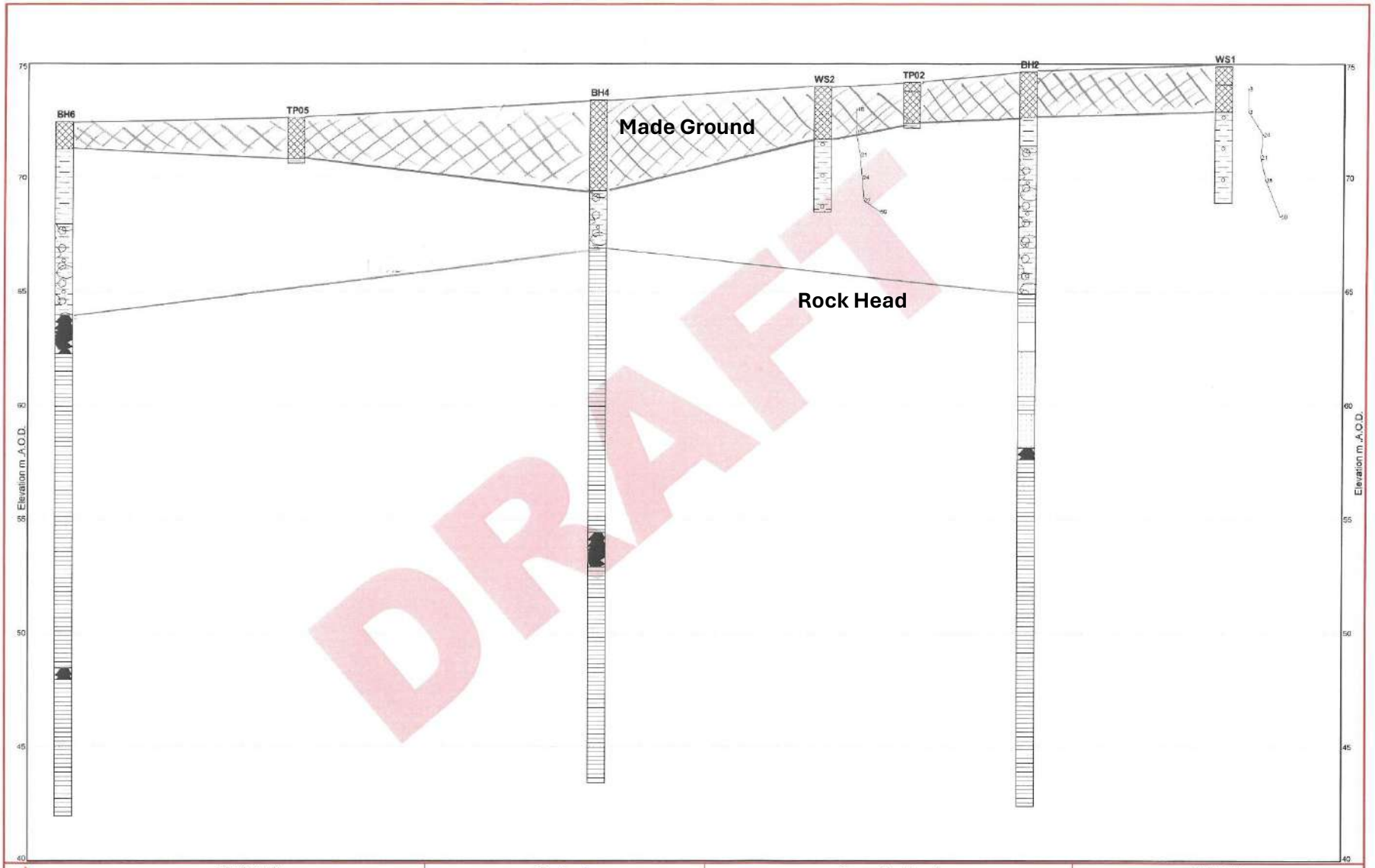
KEY

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

PROJECT	DRAWING TITLE:	JOB NO.	FIGURE NO.
LAND OFF HEOL TABOR	EXPLORATORY HOLE LOCATION PLAN	Q1218	1
		DATE 08/02/24	SCALE 1:400



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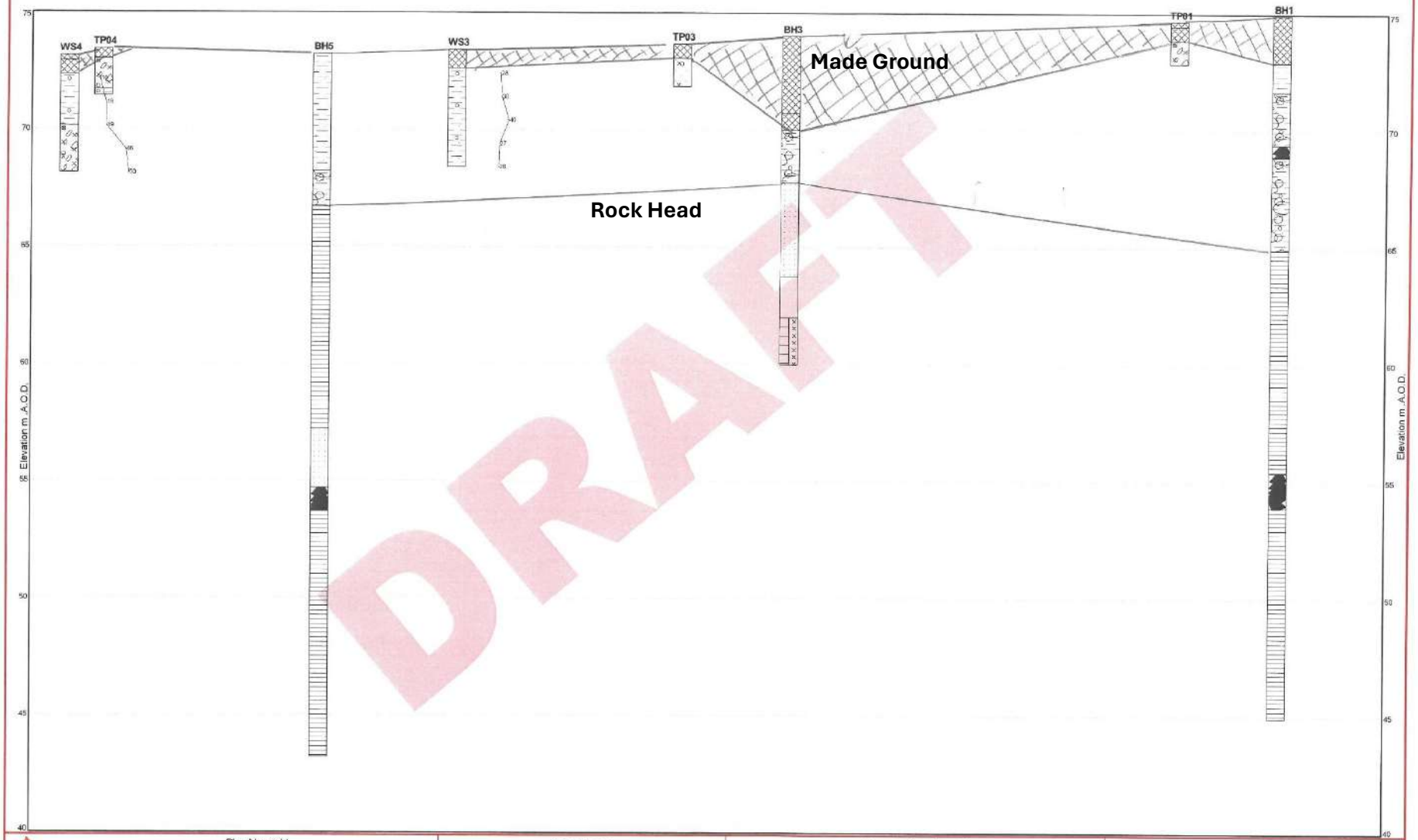
Project: Land off Heol Tabor		Cross Section 1	CLIENT Wayne Goodridge
Job No.: Q1218	Date : 20/03/24	Horizontal Scale: 139, Vertical Scale: 152	Figure No.: 1



DRAFT

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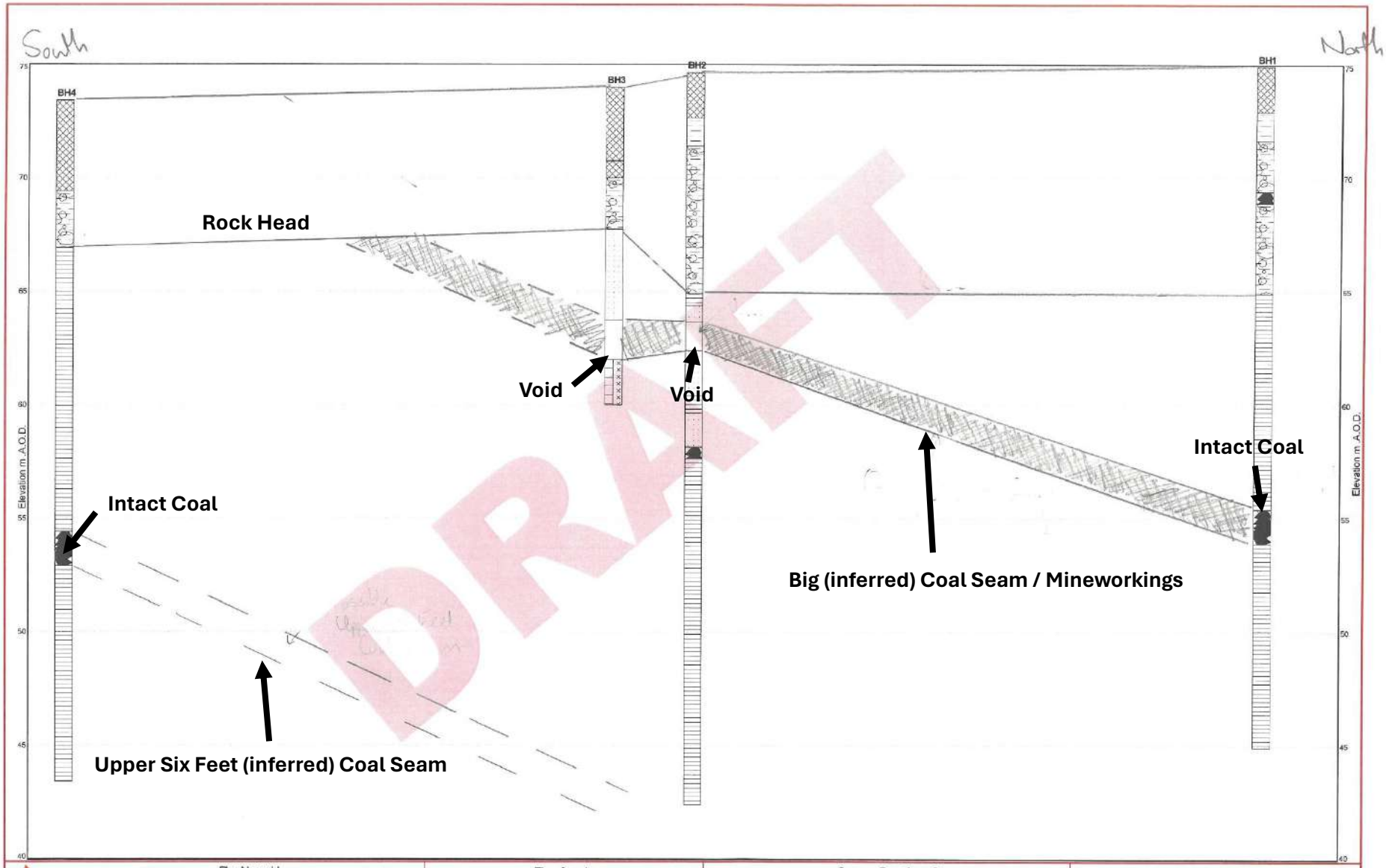
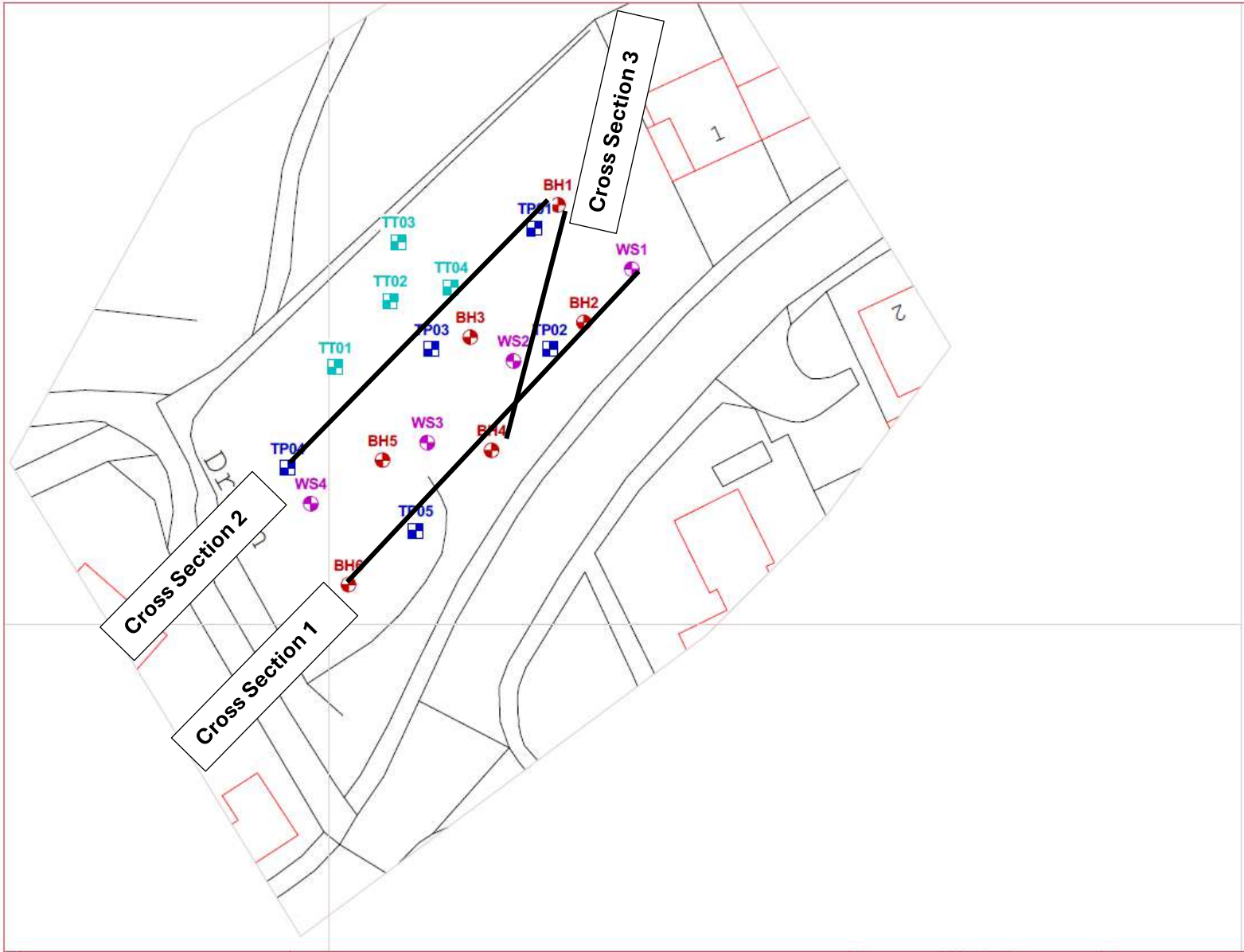
Project: Land off Heol Tabor		Cross Section 2	CLIENT Wayne Goodridge
Job No.: Q1218	Date : 20/03/24	Horizontal Scale: 125, Vertical Scale: 152	Figure No.: 2



Quantum	Plas Newydd Swansea Tel: 01554744880 Fax: E-mail: enquiries@quantumgeotechnic.co.uk	Project: Land off Heol Tabor	Cross Section 3	CLIENT Wayne Goodridge
		Job No.: Q1218 / Date : 20/03/24	Horizontal Scale: 78, Vertical Scale: 152	Figure No.: 3



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

PROJECT	DRAWING TITLE:	JOB NO.	FIGURE NO.
LAND OFF HEOL TABOR	EXPLORATORY HOLE LOCATION PLAN	Q1218	1
		DATE 08/02/24	SCALE 1:400

APPENDIX II – ROTARY PROBEHOLE LOGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH1

Dates : 14/11/23 - 14/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.93 m A.O.D.
Level to Ordnance Datum

Coordinates: 278225.08 E
192745.93 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
0									(2.00)	Drillers Description; COLLIERY SPOIL.				
2.00									(1.25)	Drillers Description; Brown CLAY.		72.93		
3.25									(2.25)	Drillers Description; BOULDER CLAY.		71.68		
5.50									(0.50)	Drillers Description; COAL.		69.43		
6.00									(4.00)	Drillers Description; BOULDER CLAY.		68.93		

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
14/11/2023 08:00	0.00		

Casing

Depth	Diam.
10.00	115.00

Groundwater

Struck	Rose To	Behaviour	Sealed
1.20	1.20	Moderate groundwater strike.	2.25

Flush

Depth	Type	Returns
0.00 - 10.00	Mist	100
10.00 - 30.00	Water	100

Plant: Commchio 450
Remarks:

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Swansea
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email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	1 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH1

Dates : 14/11/23 - 14/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.93 m A.O.D.
Level to Ordnance Datum

Coordinates: 278225.08 E
192745.93 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
10									10.00	Drillers Description; MUDSTONE with interbedded sandstone.		64.93		
11														
12														
13														
14														
15									(9.50)					
16														
17														
18														
19														
									19.50	Drillers Description; COAL.		55.43		

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant: Commchio 450
Remarks:

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Swansea
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email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
RM/MW	R.Morgan	2 Of 4	10	

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH1

Dates : 14/11/23 - 14/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.93 m A.O.D.
Level to Ordnance Datum

Coordinates: 278225.08 E
192745.93 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
20									(1.50)	Drillers Description; COAL.				
21									21.00	Drillers Description; MUDSTONE with interbedded sandstone.		53.93		
22														
23														
24														
25									(9.00)					
26														
27														
28														
29														

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
14/11/2023 17:00	30.00	10.00	

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns

Plant: Commchio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	3 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH1

Dates : 14/11/23 - 14/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.93 m A.O.D.
Level to Ordnance Datum

Coordinates: 278225.08 E
192745.93 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
30									30.00			44.93		
31														
32														
33														
34														
35														
36														
37														
38														
39														

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant: Commchio 450
Remarks:

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	4 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH2

Dates : 15/11/23 - 16/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.64 m A.O.D.
Level to Ordnance Datum

Coordinates: 278227.92 E
192733.05 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
0									(2.00)	Drillers Description; COLLIERY SPOIL.				
2									2.00 (1.25)	Drillers Description; Brown CLAY.		72.64		
3									3.25 (6.50)	Drillers Description; BOULDER CLAY.		71.39		
									9.75	Description on next page		64.89		

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
15/11/2023 08:00	0.00		
15/11/2023 17:00	8.50	8.50	
16/11/2023 08:00	8.50	8.50	

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns
0.00 - 9.75	Mist	100
9.75 - 11.00	Water	100

Plant: Commachio 450
Remarks:

Quantum Geotech
Plas Newydd
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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	1 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH2

Dates : 15/11/23 - 16/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.64 m A.O.D.
Level to Ordnance Datum

Coordinates: 278227.92 E
192733.05 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
10									(0.50)	Drillers Description; MUDSTONE.				
									10.25	Drillers Description; SANDSTONE.		64.39		
									(0.75)					
11									11.00	Drillers Description; VOID- Freefall of hammer, loss of flush returns.		63.64		
									(1.25)					
12									12.25	Drillers Description; Hard strata- no flush returns.		62.39		
13									(2.00)					
14									14.25	Drillers Description; MUDSTONE.		60.39		
									(0.75)					
15									15.00	Drillers Description; SANDSTONE.		59.64		
16									(1.50)					
									16.50	Drillers Description; COAL.		58.14		
									(0.50)					
17									17.00	Drillers Description; MUDSTONE with interbedded sandstone.		57.64		
18														
19														

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water

Casing

Depth	Diam.
13.00	115.00

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns
11.00 - 12.25	Water	0
12.25 - 32.25	Water	100

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	2 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH2

Dates : 15/11/23 - 16/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.64 m A.O.D.
Level to Ordnance Datum

Coordinates: 278227.92 E
192733.05 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
20										Drillers Description; MUDSTONE with interbedded sandstone.				
21														
22														
23														
24														
									(15.25)					
25														
26														
27														
28														
29														

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	3 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH2

Dates : 15/11/23 - 16/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.64 m A.O.D.
Level to Ordnance Datum

Coordinates: 278227.92 E
192733.05 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
30										Drillers Description; MUDSTONE with interbedded sandstone.				
31														
32														
									32.25			42.39		
33														
34														
35														
36														
37														
38														
39														

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
16/11/2023 17:00	32.25	13.00	

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	4 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH3

Dates : 17/11/23 - 17/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.00 m A.O.D.
Level to Ordnance Datum

Coordinates: 278215.46 E
192731.43 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
0									(3.25)	Drillers Description; Brown CLAY.			
1													
2													
3													
									3.25 (0.75)	Drillers Description; COLLIERY SPOIL.		70.75	
4									4.00 (2.25)	Drillers Description; BOULDER CLAY.		70.00	
5													
6									6.25 (4.00)	Drillers Description; SANDSTONE.		67.75	
7													
8													
9													

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns
0.00 - 6.25	Mist	100
6.25 - 10.25	Water	100

Plant: Commchio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	1 Of 2	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH3

Dates : 17/11/23 - 17/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.00 m A.O.D.
Level to Ordnance Datum

Coordinates: 278215.46 E
192731.43 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
10													
									10.25	Drillers Description; VOID- Freefall of hammer, loss of flush returns.		63.75	
11									(1.75)				
12									12.00	Drillers Description; Hard strata - no returns to log.		62.00	
13									(2.00)				
14									14.00			60.00	
15													
16													
17													
18													
19													

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns
10.25 - 12.00	Water	0
12.00 - 14.00	Water	0

Plant: Commchio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
RM/MW	R.Morgan	2 Of 2	10	

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH4

Dates : 17/11/23 - 17/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.42 m A.O.D.
Level to Ordnance Datum

Coordinates: 278217.79 E
192719.03 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
0										Drillers Description; COLLIERY SPOIL.			
1													
2									(4.00)				
3													
4									4.00	Drillers Description; BOULDER CLAY.		69.42	
5									(2.50)				
6													
									6.50	Drillers Description; MUDSTONE with interbedded sandstone.		66.92	
7													
8													
9													

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
17/11/2023 08:00	0.00		

Casing

Depth	Diam.
7.00	115.00

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns
0.00 - 6.50	Mist	100
6.50 - 30.00	Water	100

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	1 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH4

Dates : 17/11/23 - 17/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.42 m A.O.D.
Level to Ordnance Datum

Coordinates: 278217.79 E
192719.03 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
10										Drillers Description; MUDSTONE with interbedded sandstone.			
11													
12													
13									(12.50)				
14													
15													
16													
17													
18													
19									19.00 (1.50)	Drillers Description; COAL.		54.42	

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
RM/MW	R.Morgan	2 Of 4	10	

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH4

Dates : 17/11/23 - 17/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.42 m A.O.D.
Level to Ordnance Datum

Coordinates: 278217.79 E
192719.03 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
20										Drillers Description; COAL.			
									20.50	Drillers Description; MUDSTONE with interbedded sandstone.		52.92	
21													
22													
23													
24													
25									(9.50)				
26													
27													
28													
29													

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
17/11/2023 17:00	30.00	7.00	

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	3 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH4

Dates : 17/11/23 - 17/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.42 m A.O.D.
Level to Ordnance Datum

Coordinates: 278217.79 E
192719.03 N
Co-ordinates to National Grid

m B.G.L.	Run Details				Fractures		Samples		Strata				Water
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	
30									30.00			43.42	
31													
32													
33													
34													
35													
36													
37													
38													
39													

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	4 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH5

Dates : 20/11/23 - 20/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.20 m A.O.D.
Level to Ordnance Datum

Coordinates: 278205.84 E
192717.96 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
0										Drillers Description; Brown sandy CLAY.			
1													
2													
									(5.00)				
3													
4													
5									5.00	Drillers Description; BOULDER CLAY.		68.20	
									(1.50)				
6									6.50	Drillers Description; MUDSTONE.		66.70	
7													
8													
9													

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
20/11/2023 08:00	0.00		

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns
0.00 - 6.50	Mist	100
6.50 - 30.00	Water	100

Plant: Commchio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	1 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH5

Dates : 20/11/23 - 20/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.20 m A.O.D.
Level to Ordnance Datum

Coordinates: 278205.84 E
192717.96 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
10										Drillers Description; MUDSTONE.			
11									(9.50)				
12													
13													
14													
15													
16									16.00	Drillers Description; SANDSTONE with interbedded mudstone.		57.20	
17									(2.50)				
18													
									18.50	Drillers Description; COAL.		54.70	
19									(1.00)				
									19.50	Drillers Description; MUDSTONE with interbedded sandstone.		53.70	

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant: Commchio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	2 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH5

Dates : 20/11/23 - 20/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.20 m A.O.D.
Level to Ordnance Datum

Coordinates: 278205.84 E
192717.96 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
20										Drillers Description; MUDSTONE with interbedded sandstone.			
21													
22													
23													
24													
									(10.50)				
25													
26													
27													
28													
29													

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns
20/11/2023 17:00	30.00	7.00										

Plant: Commchio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	3 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH5

Dates : 20/11/23 - 20/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.20 m A.O.D.
Level to Ordnance Datum

Coordinates: 278205.84 E
192717.96 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water
30									30.00			43.20	
31													
32													
33													
34													
35													
36													
37													
38													
39													

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant: Commchio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	4 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH6

Dates : 21/11/23 - 21/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 72.46 m A.O.D.
Level to Ordnance Datum

Coordinates: 278202.11 E
192704.30 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
0									(1.20)	Drillers Description; Colliery Spoil.				
1.20									(3.30)	Drillers Description; Brown sandy CLAY.		71.26		
4.50									(4.00)	Drillers Description; Boulder CLAY.		67.96		
8.50									(1.70)	Drillers Description; COAL.		63.96		

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
21/11/2023 08:00	0.00		

Casing

Depth	Diam.
9.00	115.00

Groundwater

Struck	Rose To	Behaviour	Sealed
4.50	4.00	Moderate groundwater strike.	5.00

Flush

Depth	Type	Returns
0.00 - 8.50	Mist	100
8.50 - 30.00	Water	100

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	1 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH6

Dates : 21/11/23 - 21/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 72.46 m A.O.D.
Level to Ordnance Datum

Coordinates: 278202.11 E
192704.30 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
10									10.20	Drillers Description; MUDSTONE with interbedded sandstone.		62.26		
11														
12														
13														
14														
15														
16														
17									(13.80)					
18														
19														

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
RM/MW	R.Morgan	2 Of 4	10	

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH6

Dates : 21/11/23 - 21/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 72.46 m A.O.D.
Level to Ordnance Datum

Coordinates: 278202.11 E
192704.30 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
20										Drillers Description; MUDSTONE with interbedded sandstone.				
21														
22														
23														
24									24.00 (0.50)	Drillers Description; COAL.		48.46		
									24.50	Drillers Description; MUDSTONE with interbedded sandstone.		47.96		
25														
26														
27									(6.00)					
28														
29														

Hole Progress / Water Obs: Date / Time	H. Depth	C. Depth	Water	Casing: Depth	Diam.	Groundwater: Struck	Rose To	Behaviour	Sealed	Flush: Depth	Type	Returns

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	3 Of 4	10

All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Borehole No.
BH6

Dates : 21/11/23 - 21/11/23

Location :

Job Number : Q1218

Engineer :

Ground Level : 72.46 m A.O.D.
Level to Ordnance Datum

Coordinates: 278202.11 E
192704.30 N
Co-ordinates to National Grid

m B.G.L.	Run Details: Core Run	TCR %	SCR %	RQD %	Fractures: Min Avg Max	FI	Samples: Depth	Type No. Blows	Strata: Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	Water	Install/ Backfill
30										Drillers Description; MUDSTONE with interbedded sandstone.				
									30.50			41.96		
31														
32														
33														
34														
35														
36														
37														
38														
39														

Hole Progress / Water Obs

Date / Time	H. Depth	C. Depth	Water
21/11/2023 17:00	30.50	9.00	

Casing

Depth	Diam.

Groundwater

Struck	Rose To	Behaviour	Sealed

Flush

Depth	Type	Returns

Plant: Commachio 450
Remarks:

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Operator:	Logged By.	Sheet No.	m Per Page
RM/MW	R.Morgan	4 Of 4	10

All measurements in metres unless otherwise stated

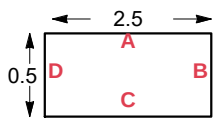
AGS

APPENDIX III – TRIAL PIT LOGS

Contract : Land off Heol Tabor Client : Wayne Goodridge		Trial Pit No. TP01
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.66 m A.O.D. *Level to Ordnance Datum* Coordinates: 278222.53 E 192743.38 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Red. Level A.O.D.	WATER
					0.20	Grey slightly sandy angular to subangular fine to coarse GRAVEL of limestone and brick. (MADE GROUND)			
	0.20 - 0.80	B1			0.20	Black to dark brown silty sandy CLAY. (MADE GROUND)		74.46	
	0.30 -	ES1							
	0.50 -	ES2			0.60				
					0.80	Brown slightly silty sandy subangular subrounded fine to coarse GRAVEL of sandstone. (GLACIAL DEPOSITS)		73.86	
	0.90 - 1.40	B2							
1	1.00 -	ES3							
					1.00				
	1.40 - 1.80	B3							
					1.80			72.86	

PLAN



Groundwater: No groundwater encountered

Stability: Stable

Shoring: None

Remarks:

Equipment Used: 2.5 Tonne excavator

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Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	1 Of 2	3	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trial Pit No. TP01
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.66 m A.O.D. *Level to Ordnance Datum* Coordinates: 278222.53 E 192743.38 N *Co-ordinates to National Grid*	

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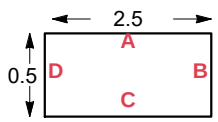
Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
QGL	T.Goodrick	2 Of 2			

Contract : Land off Heol Tabor Client : Wayne Goodridge		Trial Pit No. TP02
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.19 m A.O.D. *Level to Ordnance Datum* Coordinates: 278224.18 E 192730.13 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Red. Level A.O.D.	WATER
	0.00 - 0.40	B1			0.40	Black to dark grey silty sandy angular to subangular fine to coarse GRAVEL of limestone, sandstone, brick and concrete. (MADE GROUND)			
	0.30 -	ES1							
	0.50 - 1.00	B2			0.40	Black clayey sandy angular to subangular fine to coarse GRAVEL of mudstone and coal. (MADE GROUND - COLLIERY SPOIL)		73.79	
	0.50 -	ES2							
1	1.00 - 1.50	B3			1.40				
	1.00 -	ES3							
	1.80 - 2.00	B4			1.80	Firm grey mottled orangish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone. (GLACIAL DEPOSITS)		72.39	
2	2.00 -	ES4			0.20				
					2.00			72.19	

PLAN



Groundwater: No Groundwater Encountered

Stability: stable

Shoring: none

Remarks: 1.) Soakaway test undertaken from 0.40m.

Equipment Used: 2.5 Tonne excavator

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QGL	T.Goodrick	1 Of 2	3		

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trial Pit No. TP02
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.19 m A.O.D. *Level to Ordnance Datum* Coordinates: 278224.18 E 192730.13 N *Co-ordinates to National Grid*	

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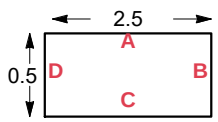
Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
QGL	T.Goodrick	2 Of 2			

Contract : Land off Heol Tabor Client : Wayne Goodridge		Trial Pit No. TP03
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 73.65 m A.O.D. *Level to Ordnance Datum* Coordinates: 278211.21 E 192730.13 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Red. Level A.O.D.	WATER
	0.10 - 0.50	B1				Black to orange sandy angular to subangular fine to coarse GRAVEL of mudstone, brick and coal. (MADE GROUND - COLLIERY SPOIL)			
	0.30 -	ES1			0.60				
	0.50 -	ES2							
	0.60 - 1.20	B2			0.60	Brown silty gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of sandstone. (GLACIAL DEPOSITS)		73.05	
1	1.00 -	ES3							
	1.20 - 1.80	B3			1.20				
					1.80			71.85	

PLAN



Groundwater: No Groundwater Encountered

Stability: stable

Shoring: none

Remarks:

Equipment Used: 2.5 Tonne excavator

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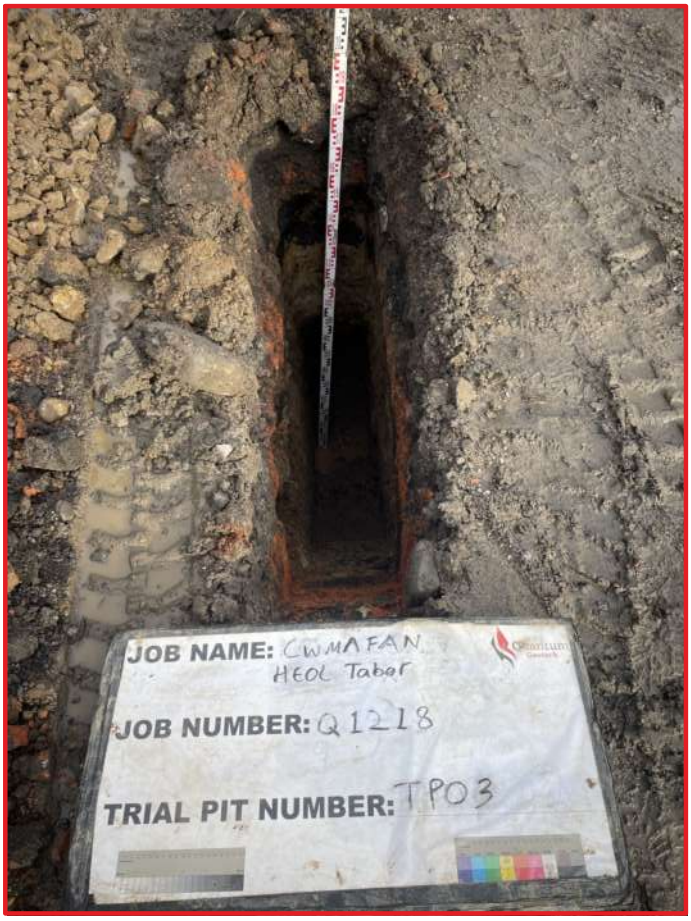
Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	1 Of 2	3	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trial Pit No. TP03
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 73.65 m A.O.D. *Level to Ordnance Datum* Coordinates: 278211.21 E 192730.13 N *Co-ordinates to National Grid*	



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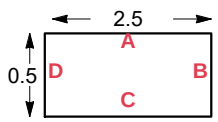
Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
QGL	T.Goodrick	2 Of 2			

Contract : Land off Heol Tabor Client : Wayne Goodridge		Trial Pit No. TP04
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 73.43 m A.O.D. *Level to Ordnance Datum* Coordinates: 278195.45 E 192717.10 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Red. Level A.O.D.	WATER
	0.00 - 0.40	B1			0.40	Black sandy angular to subangular fine to coarse GRAVEL of slag coal. (MADE GROUND - COLLIERY SPOIL)			
	0.30 -	ES1							
	0.50 - 1.50	B2			0.40	Brown slightly silty sandy subangular subrounded fine to coarse GRAVEL of sandstone. (GLACIAL DEPOSITS)		73.03	
	0.50 -	ES2							
1	1.00 -	ES3			1.30				
	1.70 - 2.00	B3			1.70	Brown slightly clayey sandy subangular subrounded fine to coarse GRAVEL of sandstone. (GLACIAL DEPOSITS)		71.73	1 1
2					0.30 2.00			71.43	

PLAN



Groundwater: standing water level at .7mbgl

Stability: stable

Shoring: none

Remarks:

Equipment Used: 2.5 Tonne excavator

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QGL	T.Goodrick	1 Of 2	3		

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trial Pit No. TP04
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 73.43 m A.O.D. *Level to Ordnance Datum* Coordinates: 278195.45 E 192717.10 N *Co-ordinates to National Grid*	

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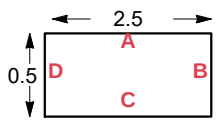
Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	2 Of 2		All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge		Trial Pit No. TP05
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 72.63 m A.O.D. *Level to Ordnance Datum* Coordinates: 278209.48 E 192710.22 N *Co-ordinates to National 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
						Black sandy angular to subangular fine to coarse GRAVEL of slag coal. (MADE GROUND - COLLIERY SPOIL)			
	0.20 - 1.00	B1							
	0.30 -	ES1							
	0.50 -	ES2							
					1.80				
1	1.00 - 1.80	B2							
	1.00 -	ES3							
	1.80 - 2.00	B3			1.80	Brown sandy CLAY. (GLACIAL TILL)		70.83	1
					0.20				
2	2.00 -	ES4			2.00			70.63	

PLAN



Groundwater: standing water level at 1.9mbgl

Stability: stable

Shoring: none

Remarks: 1.) Soakaway test undertaken from 1.35m.

Equipment Used: 2.5 Tonne excavator

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Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
QGL	T.Goodrick	1 Of 2	3		

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trial Pit No. TP05
Dates : 19/12/23 - 19/12/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 72.63 m A.O.D. *Level to Ordnance Datum* Coordinates: 278209.48 E 192710.22 N *Co-ordinates to National Grid*	

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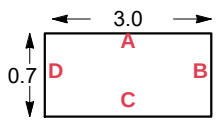
Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
QGL	T.Goodrick	2 Of 2			

APPENDIX IV – TRIAL TRENCH LOGS

Contract : Land off Heol Tabor Client : Wayne Goodridge		Trench No. TT01
Dates : 14/11/23 - 14/11/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 73.41 m A.O.D. *Level to Ordnance Datum* Coordinates: 278200.64 E 192728.16 N *Co-ordinates to National Grid*

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Red. Level A.O.D.	WATER
					0.50	Drak grey sandy angular to subangular fine to coarse GRAVEL of mudstone with a medium cobble content of brick and mudstone. (MADE GROUND)			
1					0.50	Brown silty gravelly fine to coarse SAND with a medium cobble content of sandstone. Gravel is angular to subangular fine to coarse of sandstone. (GLACIAL DEPOSITS)		72.91	
2					3.50				
3									
4					4.00			69.41	

PLAN



Groundwater:

Stability: unstable when encountering surface water

Shoring: none

Remarks: 1.) Trial trench to investigate possible mine shaft adit,
2.) Unstable from ground level upon surface water flowing into pit.

Equipment Used: 15 Tonne excavator

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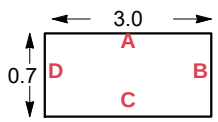
Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	1 Of 1	4.5	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trench No. TT02
Dates : 14/11/23 - 14/11/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.58 m A.O.D. *Level to Ordnance Datum* Coordinates: 278206.67 E 192735.39 N *Co-ordinates to National Grid*	

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Red. Level A.O.D.	WATER
					0.40	Drak grey sandy angular to subangular fine to coarse GRAVEL of mudstone with a medium cobble content of brick and mudstone. (MADE GROUND)			
					0.40	Brown silty gravelly fine to coarse SAND with a medium cobble content of sandstone. Gravel is angular to subangular fine to coarse of sandstone. (GLACIAL DEPOSITS)		74.18	
1									
2									
					3.60				
3									
4					4.00			70.58	

PLAN



Groundwater:

Stability: unstable when encountering surface water

Shoring: None

Remarks: 1.) Trial trench to investigate possible mine shaft adit,
2.) Unstable from ground level upon surface water flowing into pit.

Equipment Used: 15 Tonne excavator

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Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	1 Of 2	4.5	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trench No. TT02
Dates : 14/11/23 - 14/11/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.58 m A.O.D. *Level to Ordnance Datum* Coordinates: 278206.67 E 192735.39 N *Co-ordinates to National Grid*	

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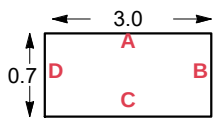
Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
QGL	T.Goodrick	2 Of 2	4.5		

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trench No. TT03
Dates : 14/11/23 - 14/11/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 76.02 m A.O.D. *Level to Ordnance Datum* Coordinates: 278207.56 E 192741.88 N *Co-ordinates to National Grid*	

m B.G.L.	Samples Depth	Samples Type No.	Tests Depth	Tests Test Results	Strata Depth (Thickness)	Description	Legend	Red. Level A.O.D.	WATER
					0.40	Drak grey sandy angular to subangular fine to coarse GRAVEL of mudstone with a medium cobble content of brick and mudstone. (MADE GROUND)			
					0.40	Brown silty gravelly fine to coarse SAND with a medium cobble content of sandstone. Gravel is angular to subangular fine to coarse of sandstone. (GLACIAL DEPOSITS)		75.62	
1									
2									
					3.60				
3									
4					4.00			72.02	

PLAN



Groundwater:

Stability: unstable when encountering surface water

Shoring: None

Remarks: 1.) Trial trench to investigate possible mine shaft adit,
2.) Unstable from ground level upon surface water flowing into pit.

Equipment Used: 15 Tonne excavator

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Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	1 Of 2	4.5	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trench No. TT03
Dates : 14/11/23 - 14/11/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 76.02 m A.O.D. *Level to Ordnance Datum* Coordinates: 278207.56 E 192741.88 N *Co-ordinates to National Grid*	

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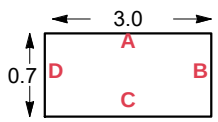
Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
QGL	T.Goodrick	2 Of 2	4.5		

Contract : Land off Heol Tabor Client : Wayne Goodridge		Trench No. TT04
Dates : 14/11/23 - 14/11/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.13 m A.O.D. *Level to Ordnance Datum* Coordinates: 278213.34 E 192736.91 N *Co-ordinates to National 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
					0.40	Drak grey sandy angular to subangular fine to coarse GRAVEL of mudstone with a medium cobble content of brick and mudstone. (MADE GROUND)			
					0.40	Brown silty gravelly fine to coarse SAND with a medium cobble content of sandstone. Gravel is angular to subangular fine to coarse of sandstone. (GLACIAL DEPOSITS)		73.73	
1									
2									
					3.60				
3									
4					4.00			70.13	

PLAN



Groundwater:

Stability: unstable when encountering surface water

Shoring: none

Remarks: 1.) Trial trench to investigate possible mine shaft adit,
2.) Unstable from ground level upon surface water flowing into pit.

Equipment Used: 15 Tonne Excavator

Quantum Geotech
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Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	1 Of 3	4.5	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trench No. TT04
Dates : 14/11/23 - 14/11/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.13 m A.O.D. *Level to Ordnance Datum* Coordinates: 278213.34 E 192736.91 N *Co-ordinates to National Grid*	

Quantum Geotech
Plas Newydd, Llanedi, Pontarddulais, Swansea
SA4 0FQ
Tel: 01554 744880
email: enquiries@quantumgeotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	2 Of 3	4.5	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Trench No. TT04
Dates : 14/11/23 - 14/11/23 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.13 m A.O.D. *Level to Ordnance Datum* Coordinates: 278213.34 E 192736.91 N *Co-ordinates to National Grid*	

Quantum Geotech
Plas Newydd, Llanedi, Pontarddulais, Swansea
SA4 0FQ
Tel: 01554 744880
email: enquiries@quantumgeotech.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	
QGL	T.Goodrick	3 Of 3	4.5	All measurements in metres unless otherwise stated

AGS

APPENDIX V – WINDOWLESS SAMPLE BOREHOLE LOGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Window Sample No.

WS1

Dates : 30/11/24 - 30/11/24

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.91 m A.O.D.
Level to Ordnance Datum

Coordinates: 278233.17 E
192738.88 N
Co-ordinates to National Grid

Samples Depth	Samples Type No.	Sample Run Diam. (mm)	Sample Run Recovery (%)	Tests Depth	Tests SPT & Hand Vane Results	STRATA Depth (Thickness)	STRATA DESCRIPTION	Legend	Red. Level . A.O.D.	Water	Install/ Backfill
0.50	ES 1					(0.80)	MADE GROUND - Soft to firm dark grey and brown gravelly SILT / CLAY. Gravel is fine to coarse sub-rounded to sub-angular sandstone.				
1.30	ES 2			1.00	SPT (C) 3 (1-0-**1-1-0-1**)	0.80 (1.20)	MADE GROUND - Black sandy slightly gravelly SILT. Gravel is fine to coarse angular clinker and occasional coal. Sand is fine to coarse.		74.11		
				2.00	SPT (C) 3 (1-0-**1-1-1-0**)	2.00	Firm greyish brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded sandstone. Sand is fine to coarse.		72.91		
				3.00	SPT (C) 24 (2-2-**3-4-7-10**)						
				4.00	SPT (C) 21 (4-4-**2-7-7-5**)	(4.00)					
				5.00	SPT (C) 28 (1-6-**7-7-7-7**)						
						6.00	Terminated at 6.0mbgl upon refusal		68.91		
				6.60	SPT (C) 50/116mm (15-10/60mm-**27-23/41mm**-)						

Equipment used: Dando Terrier
Remarks:

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
RM	T.Goodrick	1 Of 1	8	

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Borehole No. **WS1**
Dates : 30/11/24 - 30/11/24 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.91 m A.O.D. *Level to Ordnance Datum* Coordinates: 278233.17 E 192738.88 N *Co-ordinates to National Grid*	

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated
RM	T.Goodrick	1 Of 1	2	

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Window Sample No.

WS2

Dates : 30/11/24 - 30/11/24

Location :

Job Number : Q1218

Engineer :

Ground Level : 74.00 m A.O.D.
Level to Ordnance Datum

Coordinates: 278220.19 E
192728.82 N
Co-ordinates to National Grid

Samples Depth	Samples Type No.	Sample Run Diam. (mm)	Sample Run Recovery (%)	Tests Depth	Tests SPT & Hand Vane Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	Legend	Red. Level . A.O.D.	Water
0.50	ES 1						MADE GROUND - Soft to firm dark grey and brown gravelly SILT / CLAY. Gravel is fine to coarse sub-rounded to sub-angular sandstone.			
1				1.00	SPT (C) 16 (2-4-**2-4-5-5**)	(2.30)				
2				2.00	SPT (C) 15 (7-5-**4-4-2-5**)					
						2.30	Firm greyish brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded sandstone. Sand is fine to coarse.		71.70	
3				3.00	SPT (C) 21 (2-2-**4-4-4-9**)					
4				4.00	SPT (C) 24 (2-3-**4-9-4-7**)	(3.20)				
5				5.00	SPT (C) 27 (4-7-**9-9-4-5**)					
				5.50	SPT (C) 50/126mm (14-11/29mm-**27-23/51mm**-)	5.50	Terminated at 5.5mbgl upon refusal		68.50	

Equipment used: Dando Terrier
Remarks:

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	
RM	T.Goodrick	1 Of 1	8	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor Client : Wayne Goodridge			Borehole No. **WS2**
Dates : 30/11/24 - 30/11/24 Location :	Job Number : Q1218 Engineer :	Ground Level : 74.00 m A.O.D. *Level to Ordnance Datum* Coordinates: 278220.19 E 192728.82 N *Co-ordinates to National Grid*	

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	
RM	T.Goodrick	1 Of 1	2	All measurements in metres unless otherwise stated

AGS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Window Sample No.

WS3

Dates : 1/12/24 - 1/12/24

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.40 m A.O.D.
Level to Ordnance Datum

Coordinates: 278210.74 E
192719.87 N
Co-ordinates to National Grid

Samples		Sample Run		Tests		STRATA				
Depth	Type No.	Diam. (mm)	Recovery (%)	Depth	SPT & Hand Vane Results	Depth (Thick-ness)	DESCRIPTION	Legend	Red. Level . A.O.D.	Water
0.50	ES 1					(0.80)	MADE GROUND - Soft to firm dark grey and brown gravelly SILT / CLAY. Gravel is fine to coarse sub-rounded to sub-angular sandstone.			
				1.00	SPT (S) 28 (1-1-**2-4-11-11**)	0.80	Firm orangeish brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded sandstone. Sand is fine to coarse.		72.60	
				2.00	SPT (S) 30 (12-8-**8-8-7-7**)		..... below 2.0mbgl greyish brown			
				3.00	SPT (S) 40 (6-6-**6-8-13-13**)	(4.20)				
				4.00	SPT (S) 27 (3-6-**7-6-6-8**)					
				5.00	SPT (C) 26 (4-7-**6-6-7-7**)	5.00	Terminated at 5.0mbgl upon refusal		68.40	

Equipment used:
Remarks:

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
		1 Of 1	8		

Contract : Land off Heol Tabor Client : Wayne Goodridge			Borehole No. **WS3**
Dates : 1/12/24 - 1/12/24 Location :	Job Number : Q1218 Engineer :	Ground Level : 73.40 m A.O.D. *Level to Ordnance Datum* Coordinates: 278210.74 E 192719.87 N *Co-ordinates to National Grid*	

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
		1 Of 1	2		

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Window Sample No.

WS4

Dates : 1/12/24 - 1/12/24

Location :

Job Number : Q1218

Engineer :

Ground Level : 73.14 m A.O.D.
Level to Ordnance Datum

Coordinates: 278197.97 E
192713.18 N
Co-ordinates to National Grid

Samples Depth	Samples Type No.	Sample Run Diam. (mm)	Sample Run Recovery (%)	Tests Depth	Tests SPT & Hand Vane Results	STRATA Depth (Thick-ness)	STRATA DESCRIPTION	Legend	Red. Level . A.O.D.	Water
						(0.20)	MADE GROUND - Soft to firm dark grey and brown gravelly SILT / CLAY. Gravel is fine to coarse sub-rounded to sub-angular sandstone.			
						0.20			72.94	
0.50	ES 1					(0.60)	MADE GROUND - Black sandy slightly gravelly SILT. Gravel is fine to coarse anular clinker and occasional coal. Sand is fine to coarse.			
						0.80			72.34	
1				1.00	SPT (S) 10 (2-2-**3-3-3-1**)		Firm greyish brown slightly sandy gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded sandstone. Sand is fine to coarse.			
2				2.00	SPT (S) 18 (1-2-**4-5-5-4**)	(2.20)				
3				3.00	SPT (S) 19 (2-3-**3-5-6-5**)	3.00	Greyish brown silty slightly sandy GRAVEL. Gravel is fine to coarse sub-rounded to rounded sandstone. Sand is fine to coarse.		70.14	
4				4.00	SPT (S) 46 (18-13-**9-10-15-12**)	(2.00)				
5				5.00	SPT (C) 50/15mm (25/5mm-50/10mm----)	5.00	Terminated at 5.0mbgl upon refusal		68.14	

Equipment used:
Remarks:

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
		1 Of 1	8		

Contract : Land off Heol Tabor Client : Wayne Goodridge			Borehole No. **WS4**
Dates : 1/12/24 - 1/12/24 Location :	Job Number : Q1218 Engineer :	Ground Level : 73.14 m A.O.D. *Level to Ordnance Datum* Coordinates: 278197.97 E 192713.18 N *Co-ordinates to National Grid*	

Quantum Geotech
Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	AGS
		1 Of 1	2		

APPENDIX VI – SOAKAWAY TEST RECORDS

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Point Plotted
TP02,1

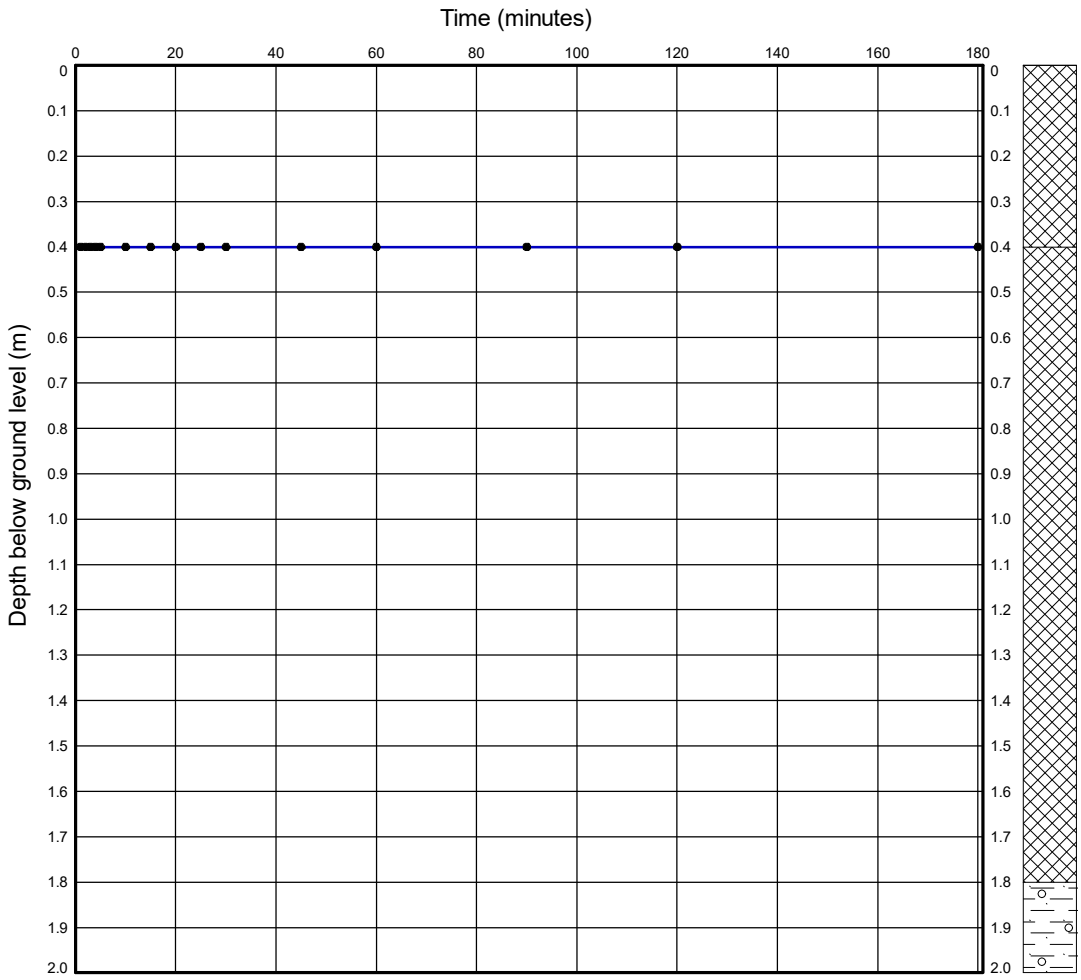
Job Number : Q1218

Engineer :

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	0.4
1.0	0.4
2.0	0.4
3.0	0.4
4.0	0.4
5.0	0.4
10.0	0.4
15.0	0.4
20.0	0.4
25.0	0.4
30.0	0.4
45.0	0.4
60.0	0.4
90.0	0.4
120.0	0.4
180.0	

Field Observations from soakaway trial pit



Remarks: Test not completed

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	2.000	m	V_{p75-25}=	m^3
Trial Pit Length	2.500	m	a_{p50}=	m^2
Trial Pit Width	1.000	m	t_{p75-25}=	minutes
Effective Depth		m		
Outflow Time		mins from 75% to 25% full		

f = m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 19/12/2023

All measurements in metres unless otherwise stated

Project File: Q1218.GPJ

Figure No. 1

Contract : Land off Heol Tabor

Client : Wayne Goodridge

Point Plotted
TP05,1

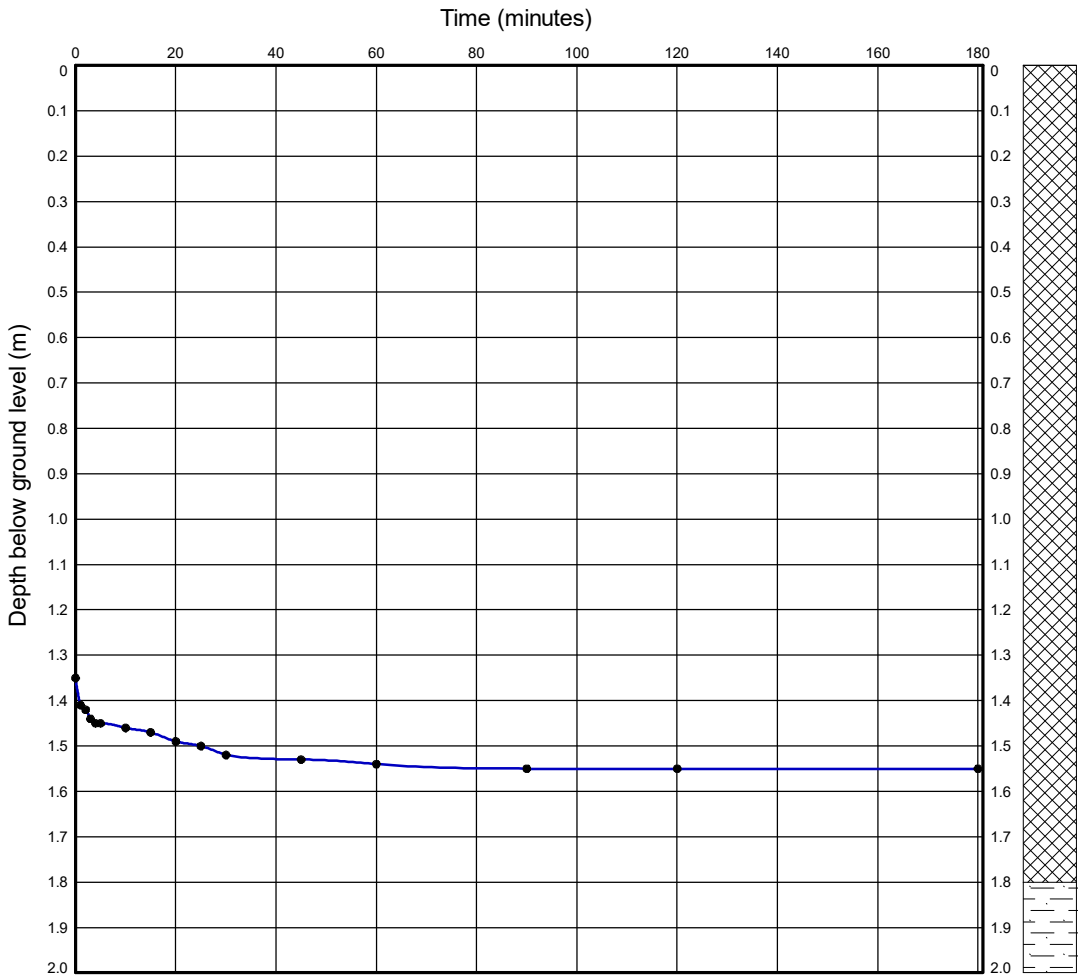
Job Number : Q1218

Engineer :

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	1.35
1.0	1.41
2.0	1.42
3.0	1.44
4.0	1.45
5.0	1.45
10.0	1.46
15.0	1.47
20.0	1.49
25.0	1.5
30.0	1.52
45.0	1.53
60.0	1.54
90.0	1.55
120.0	1.55
180.0	1.55

Field Observations from soakaway trial pit



Remarks: Test not completed

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	2.000	m	V_{p75-25}=	m^3
Trial Pit Length	2.500	m	a_{p50}=	m^2
Trial Pit Width	1.000	m	t_{p75-25}=	minutes
Effective Depth		m		
Outflow Time		mins from 75% to 25% full		

f = m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 19/12/2023

All measurements in metres unless otherwise stated

Project File: Q1218.GPJ

Figure No. 2

APPENDIX VII – GEOTECHNICAL LABORATORY TEST RESULTS

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

Final Report

Report No.:	23-40276-1		
Initial Date of Issue:	14-Dec-2023		
Re-Issue Details:			
Client	Spencer Quantum Ltd		
Client Address:	Parcau Farm Penrhiwllan Llandysul Ceredigion SA44 5NW		
Contact(s):	Phil Darby		
Project	Q1218 Heol Tabor		
Quotation No.:	Q23-32755	**Date Received:**	06-Dec-2023
Order No.:		**Date Instructed:**	07-Dec-2023
No. of Samples:	5		
Turnaround (Wkdays):	5	**Results Due:**	13-Dec-2023
Date Approved:	14-Dec-2023		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Leachate

Project: Q1218 Heol Tabor

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-40276	23-40276
Quotation No.: Q23-32755					**Chemtest Sample ID.:**	1741223	1741224
Order No.:					Client Sample Ref.:	1	2
					Sample Location:	WS01	WS01
					Sample Type:	SOIL	SOIL
					Top Depth (m):	0.50	1.30
					Date Sampled:	04-Dec-2023	04-Dec-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
pH at 20C	U	1010	10:1		4.0	8.0	7.8
Sulphate	U	1220	10:1	mg/l	1.0	< 1.0	4.8
Cyanide (Total)	U	1300	10:1	mg/l	0.050	< 0.050	< 0.050
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	1.0	7.8
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	32	54
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11	< 0.11
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	0.90	27
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	9.2
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	1.1	0.83
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	4.1	11
Chromium (Total)	N	1455	10:1	µg/l	0.50	< 0.50	< 0.50
Chromium (Hexavalent)	U	1490	10:1	µg/l	20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	10	< 10	< 10
Naphthalene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Acenaphthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Fluorene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Phenanthrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10

Results - Leachate

Project: Q1218 Heol Tabor

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-40276	23-40276
Quotation No.: Q23-32755					**Chemtest Sample ID.:**	1741223	1741224
Order No.:					Client Sample Ref.:	1	2
					Sample Location:	WS01	WS01
					Sample Type:	SOIL	SOIL
					Top Depth (m):	0.50	1.30
					Date Sampled:	04-Dec-2023	04-Dec-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**		
Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Chrysene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	10:1	µg/l	2.0	< 2.0	< 2.0
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030

Results - Soil

Project: Q1218 Heol Tabor

Client: Spencer Quantum Ltd				**Chemtest Job No.:**	23-40276	23-40276	23-40276	23-40276	23-40276
Quotation No.: Q23-32755				**Chemtest Sample ID.:**	1741223	1741224	1741225	1741226	1741227
Order No.:				Client Sample Ref.:	1	2	1	1	1
				Sample Location:	WS01	WS01	WS02	WS03	WS04
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.30	0.50	0.50	0.50
				Date Sampled:	04-Dec-2023	04-Dec-2023	04-Dec-2023	04-Dec-2023	04-Dec-2023
				Asbestos Lab:	DURHAM	DURHAM	DURHAM	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	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	14	17	10	11	18
Soil Colour	N	2040		N/A	Brown	Black	Brown	Brown	Black
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand
pH at 20C	U	2010		4.0	8.3	7.1	8.3	8.0	8.2
pH (2.5:1) at 20C	N	2010		4.0	8.3	7.1		8.0	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	2.1	0.65	0.42	< 0.40
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	0.041	< 0.010	0.041	< 0.010
Total Sulphur	U	2175	%	0.010	0.19	0.33		0.070	
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)	U	2430	%	0.010	0.023	0.031		0.024	
Arsenic	U	2455	mg/kg	0.5	27	18	26	19	31
Cadmium	U	2455	mg/kg	0.10	0.48	0.11	0.40	0.34	0.50
Chromium	U	2455	mg/kg	0.5	16	8.9	15	20	7.7
Copper	U	2455	mg/kg	0.50	120	63	120	65	210
Mercury	U	2455	mg/kg	0.05	0.22	0.12	0.13	0.07	0.05
Nickel	U	2455	mg/kg	0.50	30	25	35	22	32
Lead	U	2455	mg/kg	0.50	74	22	60	30	34
Zinc	U	2455	mg/kg	0.50	130	47	150	91	73
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12	U	2690	mg/kg	2.00	3.6	3.3	2.5	2.7	3.0
Aliphatic EPH >C12-C16	U	2690	mg/kg	1.00	1.3	1.6	1.5	1.6	1.8
Aliphatic EPH >C16-C21	U	2690	mg/kg	2.00	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Aliphatic EPH >C21-C35	U	2690	mg/kg	3.00	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35	U	2690	mg/kg	5.00	8.4	5.1	5.7	5.2	6.3
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10	< 10
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Results - Soil

Project: Q1218 Heol Tabor

Client: Spencer Quantum Ltd			**Chemtest Job No.:**		23-40276	23-40276	23-40276	23-40276	23-40276
Quotation No.: Q23-32755			**Chemtest Sample ID.:**		1741223	1741224	1741225	1741226	1741227
Order No.:			Client Sample Ref.:		1	2	1	1	1
			Sample Location:		WS01	WS01	WS02	WS03	WS04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.30	0.50	0.50	0.50
			Date Sampled:		04-Dec-2023	04-Dec-2023	04-Dec-2023	04-Dec-2023	04-Dec-2023
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	11	< 2.0	2.1	4.1	2.6
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	19	< 2.0	< 2.0	6.8	< 2.0
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	12	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	30	< 5.0	< 5.0	11	< 5.0
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	42	< 10	< 10	11	< 10
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	38	< 10	< 10	16	11
Total EPH >C10-C40	N	2690	mg/kg	10.00	50	< 10	< 10	16	11
Organic Matter	U	2625	%	0.40	31	60	27	27	73
Dichlorodifluoromethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Chloromethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Vinyl Chloride	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Bromomethane	U	2760	mg/kg	0.020	< 0.020	< 0.020			< 0.020
Chloroethane	U	2760	mg/kg	0.0020	< 0.0020	< 0.0020			< 0.0020
Trichlorofluoromethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,1-Dichloroethene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Trans 1,2-Dichloroethene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,1-Dichloroethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
cis 1,2-Dichloroethene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Bromochloromethane	U	2760	mg/kg	0.0050	< 0.0050	< 0.0050			< 0.0050
Trichloromethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,1,1-Trichloroethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Tetrachloromethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,1-Dichloropropene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Benzene	U	2760	mg/kg	0.0010	< 0.0010	0.027			< 0.0010
1,2-Dichloroethane	U	2760	mg/kg	0.0020	< 0.0020	< 0.0020			< 0.0020
Trichloroethene	N	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,2-Dichloropropane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Dibromomethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Bromodichloromethane	U	2760	mg/kg	0.0050	< 0.0050	< 0.0050			< 0.0050
cis-1,3-Dichloropropene	N	2760	mg/kg	0.010	< 0.010	< 0.010			< 0.010
Toluene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Trans-1,3-Dichloropropene	N	2760	mg/kg	0.010	< 0.010	< 0.010			< 0.010
1,1,2-Trichloroethane	U	2760	mg/kg	0.010	< 0.010	< 0.010			< 0.010

Results - Soil

Project: Q1218 Heol Tabor

Client: Spencer Quantum Ltd			**Chemtest Job No.:**		23-40276	23-40276	23-40276	23-40276	23-40276
Quotation No.: Q23-32755			**Chemtest Sample ID.:**		1741223	1741224	1741225	1741226	1741227
Order No.:			Client Sample Ref.:		1	2	1	1	1
			Sample Location:		WS01	WS01	WS02	WS03	WS04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.30	0.50	0.50	0.50
			Date Sampled:		04-Dec-2023	04-Dec-2023	04-Dec-2023	04-Dec-2023	04-Dec-2023
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Tetrachloroethene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,3-Dichloropropane	U	2760	mg/kg	0.0020	< 0.0020	< 0.0020			< 0.0020
Dibromochloromethane	U	2760	mg/kg	0.010	< 0.010	< 0.010			< 0.010
1,2-Dibromoethane	U	2760	mg/kg	0.0050	< 0.0050	< 0.0050			< 0.0050
Chlorobenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,1,1,2-Tetrachloroethane	U	2760	mg/kg	0.0020	< 0.0020	< 0.0020			< 0.0020
Ethylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
m & p-Xylene	U	2760	mg/kg	0.0010	< 0.0010	0.0033			< 0.0010
o-Xylene	U	2760	mg/kg	0.0010	< 0.0010	0.0024			< 0.0010
Styrene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Tribromomethane	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Isopropylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Bromobenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,2,3-Trichloropropane	N	2760	mg/kg	0.050	< 0.050	< 0.050			< 0.050
N-Propylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
2-Chlorotoluene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,3,5-Trimethylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
4-Chlorotoluene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Tert-Butylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,2,4-Trimethylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Sec-Butylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,3-Dichlorobenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
4-Isopropyltoluene	N	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,4-Dichlorobenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
N-Butylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,2-Dichlorobenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,2-Dibromo-3-Chloropropane	U	2760	mg/kg	0.050	< 0.050	< 0.050			< 0.050
1,2,4-Trichlorobenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Hexachlorobutadiene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
1,2,3-Trichlorobenzene	U	2760	mg/kg	0.0020	< 0.0020	< 0.0020			< 0.0020
Methyl Tert-Butyl Ether	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010			< 0.0010
Naphthalene	U	2800	mg/kg	0.10	0.32	0.33	0.37	0.19	1.2
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	0.15	< 0.10	< 0.10	< 0.10	0.16
Phenanthrene	U	2800	mg/kg	0.10	1.6	0.79	0.89	0.84	1.9
Anthracene	U	2800	mg/kg	0.10	0.28	< 0.10	0.12	0.14	0.25
Fluoranthene	U	2800	mg/kg	0.10	2.4	0.15	0.91	1.2	1.2

Results - Soil

Project: Q1218 Heol Tabor

Client: Spencer Quantum Ltd			**Chemtest Job No.:**		23-40276	23-40276	23-40276	23-40276	23-40276
Quotation No.: Q23-32755			**Chemtest Sample ID.:**		1741223	1741224	1741225	1741226	1741227
Order No.:			Client Sample Ref.:		1	2	1	1	1
			Sample Location:		WS01	WS01	WS02	WS03	WS04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.30	0.50	0.50	0.50
			Date Sampled:		04-Dec-2023	04-Dec-2023	04-Dec-2023	04-Dec-2023	04-Dec-2023
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Pyrene	U	2800	mg/kg	0.10	1.8	0.16	0.70	0.83	1.0
Benzo[a]anthracene	U	2800	mg/kg	0.10	1.4	0.18	0.40	0.61	0.52
Chrysene	U	2800	mg/kg	0.10	1.4	0.36	0.49	0.66	0.69
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	2.0	0.23	0.62	0.91	0.62
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	0.59	< 0.10	0.21	0.31	0.28
Benzo[a]pyrene	U	2800	mg/kg	0.10	1.1	< 0.10	0.39	0.68	0.48
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	0.87	< 0.10	0.25	0.48	0.32
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	0.74	< 0.10	0.27	0.46	0.35
Total Of 16 PAH's	N	2800	mg/kg	2.0	15	2.2	5.6	7.3	8.9
Total Phenols	U	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH at 20°C	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.
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
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.
2010	pH Value of Soils	pH at 20°C	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.

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
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
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

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.:	23-42509-1		
Initial Date of Issue:	09-Jan-2024		
Re-Issue Details:			
Client	Spencer Quantum Ltd		
Client Address:	Parcau Farm Penrhiwllan Llandysul Ceredigion SA44 5NW		
Contact(s):	Tyler Goodrich		
Project	Q1218		
Quotation No.:	Q23-32755	**Date Received:**	22-Dec-2023
Order No.:		**Date Instructed:**	22-Dec-2023
No. of Samples:	10		
Turnaround (Wkdays):	5	**Results Due:**	05-Jan-2024
Date Approved:	09-Jan-2024		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Leachate

Project: Q1218

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-42509	23-42509	23-42509
Quotation No.: Q23-32755					**Chemtest Sample ID.:**	1749806	1749807	1749810
Order No.:					Client Sample Ref.:	ES1	ES2	ES2
					Sample Location:	TP01	TP01	TP03
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.3	0.5	0.5
					Date Sampled:	19-Dec-2023	19-Dec-2023	19-Dec-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
pH at 20C	U	1010	10:1		4.0	6.3	6.2	6.0
Sulphate	U	1220	10:1	mg/l	1.0	5.8	2.6	1.0
Cyanide (Total)	U	1300	10:1	mg/l	0.050	< 0.050	< 0.050	< 0.050
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	0.50	4.7	2.2
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	22	18	15
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11	< 0.11	< 0.11
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	2.7	0.87
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	0.65	< 0.50
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	1.8	< 0.50
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	15	35	20
Chromium (Total)	N	1455	10:1	µg/l	0.50	< 0.50	2.1	< 0.50
Chromium (Hexavalent)	U	1490	10:1	µg/l	20	< 20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	10	< 10	< 10	< 10
Naphthalene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10

Results - Leachate

Project: Q1218

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-42509	23-42509	23-42509
Quotation No.: Q23-32755					**Chemtest Sample ID.:**	1749806	1749807	1749810
Order No.:					Client Sample Ref.:	ES1	ES2	ES2
					Sample Location:	TP01	TP01	TP03
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.3	0.5	0.5
					Date Sampled:	19-Dec-2023	19-Dec-2023	19-Dec-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	10:1	µg/l	2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030	< 0.030

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42509	23-42509	23-42509	23-42509	23-42509	23-42509	23-42509
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749806	1749807	1749808	1749809	1749810	1749811	1749812
Order No.:				Client Sample Ref.:		ES1	ES2	ES3	ES1	ES2	ES3	ES1
				Sample Location:		TP01	TP01	TP01	TP03	TP03	TP03	TP05
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.5	1.0	0.3	0.5	1.0	0.3
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**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	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture		N	2030	%	0.020	19	21	13	19	19	9.3	18
Soil Colour		N	2040		N/A	Brown	Brown	Brown	Brown	Black	Brown	Black
Other Material		N	2040		N/A	Stones	Stones and Roots	Stones and Roots	Stones	Stones	Stones	Stones
Soil Texture		N	2040		N/A	Clay	Clay	Clay	Loam	Loam	Clay	Loam
pH at 20C		M	2010		4.0	6.6	6.8	7.5	8.1	8.1	8.2	8.1
pH (2.5:1) at 20C		N	2010		4.0		6.8	7.5			8.2	
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	0.75	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	0.58
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.023	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Sulphur		U	2175	%	0.010		0.082	0.022			0.037	
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)		U	2430	%	0.010		0.090	< 0.010			< 0.010	
Arsenic		M	2455	mg/kg	0.5	52	50	37	46	36	20	34
Cadmium		M	2455	mg/kg	0.10	0.31	0.20	0.22	0.51	0.40	0.22	0.46
Chromium		M	2455	mg/kg	0.5	20	17	43	38	25	28	34
Copper		M	2455	mg/kg	0.50	81	69	52	180	140	34	120
Mercury		M	2455	mg/kg	0.05	0.19	0.08	0.06	0.07	0.07	0.05	0.16
Nickel		M	2455	mg/kg	0.50	20	19	50	42	32	54	41
Lead		M	2455	mg/kg	0.50	38	31	34	48	48	24	84
Zinc		M	2455	mg/kg	0.50	78	69	140	190	140	120	160
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	HS_2D_AL	N	2780	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12	EH_2D_AL_#1	M	2690	mg/kg	2.00	2.6	3.1	2.4	2.4	2.8	< 2.0	< 2.0
Aliphatic EPH >C12-C16	EH_2D_AL_#1	M	2690	mg/kg	1.00	1.7	1.3	1.5	1.9	< 1.0	< 1.0	< 1.0
Aliphatic EPH >C16-C21	EH_2D_AL_#1	M	2690	mg/kg	2.00	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Aliphatic EPH >C21-C35	EH_2D_AL_#1	M	2690	mg/kg	3.00	3.3	< 3.0	< 3.0	< 3.0	22	< 3.0	13
Aliphatic EPH >C35-C40	EH_2D_AL_#1	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10	< 10	< 10	14
Total Aliphatic EPH >C10-C35	EH_2D_AL_#1	M	2690	mg/kg	5.00	8.1	5.8	< 5.0	5.3	25	< 5.0	13
Total Aliphatic EPH >C10-C40	EH_2D_AL_#1	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10	25	< 10	27
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42509	23-42509	23-42509	23-42509	23-42509	23-42509	23-42509
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749806	1749807	1749808	1749809	1749810	1749811	1749812
Order No.:				Client Sample Ref.:		ES1	ES2	ES3	ES1	ES2	ES3	ES1
				Sample Location:		TP01	TP01	TP01	TP03	TP03	TP03	TP05
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.5	1.0	0.3	0.5	1.0	0.3
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C16-C21	EH_2D_AR_#1	U	2690	mg/kg	2.00	7.6	12	12	5.0	8.1	11	5.6
Aromatic EPH >C21-C35	EH_2D_AR_#1	U	2690	mg/kg	2.00	7.6	< 2.0	< 2.0	2.3	< 2.0	< 2.0	< 2.0
Aromatic EPH >C35-C40	EH_2D_AR_#1	N	2690	mg/kg	1.00	1.1	< 1.0	< 1.0	< 1.0	2.6	< 1.0	36
Total Aromatic EPH >C10-C35	EH_2D_AR_#1	U	2690	mg/kg	5.00	15	14	12	7.3	9.0	12	6.3
Total Aromatic EPH >C10-C40	EH_2D_AR_#1	N	2690	mg/kg	10.00	16	14	12	< 10	12	12	42
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35	EH_2D_Total_#1	U	2690	mg/kg	10.00	23	20	16	13	34	14	20
Total EPH >C10-C40	EH_2D_Total_#1	N	2690	mg/kg	10.00	24	20	16	13	37	14	69
Organic Matter		M	2625	%	0.40	9.4	32	1.7	17	18	2.3	58
Dichlorodifluoromethane		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Chloromethane		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Vinyl Chloride		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Bromomethane		M	2760	mg/kg	0.020	< 0.020	< 0.020		< 0.020	< 0.020		< 0.020
Chloroethane		U	2760	mg/kg	0.0020	< 0.0020	< 0.0020		< 0.0020	< 0.0020		< 0.0020
Trichlorofluoromethane		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,1-Dichloroethene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Trans 1,2-Dichloroethene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,1-Dichloroethane		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
cis 1,2-Dichloroethene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Bromochloromethane		U	2760	mg/kg	0.0050	< 0.0050	< 0.0050		< 0.0050	< 0.0050		< 0.0050
Trichloromethane		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,1,1-Trichloroethane		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Tetrachloromethane		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,1-Dichloropropene		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Benzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,2-Dichloroethane		M	2760	mg/kg	0.0020	< 0.0020	< 0.0020		< 0.0020	< 0.0020		< 0.0020
Trichloroethene		N	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,2-Dichloropropane		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Dibromomethane		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Bromodichloromethane		M	2760	mg/kg	0.0050	< 0.0050	< 0.0050		< 0.0050	< 0.0050		< 0.0050
cis-1,3-Dichloropropene		N	2760	mg/kg	0.010	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42509	23-42509	23-42509	23-42509	23-42509	23-42509	23-42509
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749806	1749807	1749808	1749809	1749810	1749811	1749812
Order No.:				Client Sample Ref.:		ES1	ES2	ES3	ES1	ES2	ES3	ES1
				Sample Location:		TP01	TP01	TP01	TP03	TP03	TP03	TP05
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.5	1.0	0.3	0.5	1.0	0.3
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Toluene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Trans-1,3-Dichloropropene		N	2760	mg/kg	0.010	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010
1,1,2-Trichloroethane		M	2760	mg/kg	0.010	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010
Tetrachloroethene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,3-Dichloropropane		U	2760	mg/kg	0.0020	< 0.0020	< 0.0020		< 0.0020	< 0.0020		< 0.0020
Dibromochloromethane		U	2760	mg/kg	0.010	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010
1,2-Dibromoethane		M	2760	mg/kg	0.0050	< 0.0050	< 0.0050		< 0.0050	< 0.0050		< 0.0050
Chlorobenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,1,1,2-Tetrachloroethane		M	2760	mg/kg	0.0020	< 0.0020	< 0.0020		< 0.0020	< 0.0020		< 0.0020
Ethylbenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
m & p-Xylene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
o-Xylene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Styrene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Tribromomethane		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Isopropylbenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Bromobenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,2,3-Trichloropropane		N	2760	mg/kg	0.050	< 0.050	< 0.050		< 0.050	< 0.050		< 0.050
N-Propylbenzene		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
2-Chlorotoluene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,3,5-Trimethylbenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
4-Chlorotoluene		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Tert-Butylbenzene		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,2,4-Trimethylbenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Sec-Butylbenzene		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,3-Dichlorobenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
4-Isopropyltoluene		N	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,4-Dichlorobenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
N-Butylbenzene		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,2-Dichlorobenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,2-Dibromo-3-Chloropropane		U	2760	mg/kg	0.050	< 0.050	< 0.050		< 0.050	< 0.050		< 0.050
1,2,4-Trichlorobenzene		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Hexachlorobutadiene		U	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
1,2,3-Trichlorobenzene		U	2760	mg/kg	0.0020	< 0.0020	< 0.0020		< 0.0020	< 0.0020		< 0.0020
Methyl Tert-Butyl Ether		M	2760	mg/kg	0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010		< 0.0010
Naphthalene		M	2800	mg/kg	0.10	0.57	0.42	< 0.10	0.37	0.27	< 0.10	0.61
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42509	23-42509	23-42509	23-42509	23-42509	23-42509	23-42509
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749806	1749807	1749808	1749809	1749810	1749811	1749812
Order No.:				Client Sample Ref.:		ES1	ES2	ES3	ES1	ES2	ES3	ES1
				Sample Location:		TP01	TP01	TP01	TP03	TP03	TP03	TP05
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.5	1.0	0.3	0.5	1.0	0.3
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Phenanthrene		M	2800	mg/kg	0.10	0.44	0.61	< 0.10	0.48	0.38	< 0.10	1.5
Anthracene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.17
Fluoranthene		M	2800	mg/kg	0.10	< 0.10	0.34	< 0.10	0.36	0.28	< 0.10	1.5
Pyrene		M	2800	mg/kg	0.10	< 0.10	0.29	< 0.10	0.45	0.25	< 0.10	1.2
Benzo[a]anthracene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.80
Chrysene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.1
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.0
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.42
Benzo[a]pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.64
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.46
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.16
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.48
Total Of 16 PAH's		N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	10
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-42509	23-42509	23-42509
Quotation No.: Q23-32755					**Chemtest Sample ID.:**	1749813	1749814	1749815
Order No.:					Client Sample Ref.:	ES2	ES3	ES4
					Sample Location:	TP05	TP05	TP05
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.5	1.0	2.0
					Date Sampled:	19-Dec-2023	19-Dec-2023	19-Dec-2023
					Asbestos Lab:		NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**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		18	12
Soil Colour		N	2040		N/A	Black	Black	Brown
Other Material		N	2040		N/A	Stones	Stones	Stones
Soil Texture		N	2040		N/A	Loam	Loam	Clay
pH at 20C		M	2010		4.0		8.1	7.8
pH (2.5:1) at 20C		N	2010		4.0		8.1	7.8
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40		< 0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010		0.010	0.012
Total Sulphur		U	2175	%	0.010		0.31	0.017
Cyanide (Total)		M	2300	mg/kg	0.50		< 0.50	< 0.50
Sulphate (Acid Soluble)		U	2430	%	0.010		0.016	0.029
Arsenic		M	2455	mg/kg	0.5		29	61
Cadmium		M	2455	mg/kg	0.10		0.31	0.50
Chromium		M	2455	mg/kg	0.5		18	150
Copper		M	2455	mg/kg	0.50		77	180
Mercury		M	2455	mg/kg	0.05		< 0.05	0.22
Nickel		M	2455	mg/kg	0.50		54	74
Lead		M	2455	mg/kg	0.50		23	150
Zinc		M	2455	mg/kg	0.50		51	200
Chromium (Hexavalent)		N	2490	mg/kg	0.50		< 0.50	< 0.50
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05		< 0.05	< 0.05
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05		< 0.05	< 0.05
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05		< 0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	HS_2D_AL	N	2780	mg/kg	0.10		< 0.10	< 0.10
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05		< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25		< 0.25	< 0.25
Aliphatic EPH >C10-C12	EH_2D_AL_#1	M	2690	mg/kg	2.00		< 2.0	< 2.0
Aliphatic EPH >C12-C16	EH_2D_AL_#1	M	2690	mg/kg	1.00		< 1.0	< 1.0
Aliphatic EPH >C16-C21	EH_2D_AL_#1	M	2690	mg/kg	2.00		< 2.0	< 2.0
Aliphatic EPH >C21-C35	EH_2D_AL_#1	M	2690	mg/kg	3.00		12	15
Aliphatic EPH >C35-C40	EH_2D_AL_#1	N	2690	mg/kg	10.00		16	16
Total Aliphatic EPH >C10-C35	EH_2D_AL_#1	M	2690	mg/kg	5.00		13	15
Total Aliphatic EPH >C10-C40	EH_2D_AL_#1	N	2690	mg/kg	10.00		29	31
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05		< 0.05	< 0.05

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42509	23-42509	23-42509
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749813	1749814	1749815
Order No.:				Client Sample Ref.:		ES2	ES3	ES4
				Sample Location:		TP05	TP05	TP05
				Sample Type:		SOIL	SOIL	SOIL
				Top Depth (m):		0.5	1.0	2.0
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:			NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**			
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05		< 0.05	< 0.05
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05		< 0.05	< 0.05
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25		< 0.25	< 0.25
Aromatic EPH >C10-C12	EH_2D_AR_#1	U	2690	mg/kg	1.00		< 1.0	< 1.0
Aromatic EPH >C12-C16	EH_2D_AR_#1	U	2690	mg/kg	1.00		< 1.0	< 1.0
Aromatic EPH >C16-C21	EH_2D_AR_#1	U	2690	mg/kg	2.00		5.5	5.6
Aromatic EPH >C21-C35	EH_2D_AR_#1	U	2690	mg/kg	2.00		< 2.0	< 2.0
Aromatic EPH >C35-C40	EH_2D_AR_#1	N	2690	mg/kg	1.00		8.2	7.4
Total Aromatic EPH >C10-C35	EH_2D_AR_#1	U	2690	mg/kg	5.00		6.8	6.7
Total Aromatic EPH >C10-C40	EH_2D_AR_#1	N	2690	mg/kg	10.00		15	14
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50		< 0.50	< 0.50
Total EPH >C10-C35	EH_2D_Total_#1	U	2690	mg/kg	10.00		19	22
Total EPH >C10-C40	EH_2D_Total_#1	N	2690	mg/kg	10.00		44	46
Organic Matter		M	2625	%	0.40		54	3.3
Dichlorodifluoromethane		U	2760	mg/kg	0.0010		< 0.0010	
Chloromethane		M	2760	mg/kg	0.0010		< 0.0010	
Vinyl Chloride		M	2760	mg/kg	0.0010		< 0.0010	
Bromomethane		M	2760	mg/kg	0.020		< 0.020	
Chloroethane		U	2760	mg/kg	0.0020		< 0.0020	
Trichlorofluoromethane		M	2760	mg/kg	0.0010		< 0.0010	
1,1-Dichloroethene		M	2760	mg/kg	0.0010		< 0.0010	
Trans 1,2-Dichloroethene		M	2760	mg/kg	0.0010		< 0.0010	
1,1-Dichloroethane		M	2760	mg/kg	0.0010		< 0.0010	
cis 1,2-Dichloroethene		M	2760	mg/kg	0.0010		< 0.0010	
Bromochloromethane		U	2760	mg/kg	0.0050		< 0.0050	
Trichloromethane		M	2760	mg/kg	0.0010		< 0.0010	
1,1,1-Trichloroethane		M	2760	mg/kg	0.0010		< 0.0010	
Tetrachloromethane		M	2760	mg/kg	0.0010		< 0.0010	
1,1-Dichloropropene		U	2760	mg/kg	0.0010		< 0.0010	
Benzene		M	2760	mg/kg	0.0010		< 0.0010	
1,2-Dichloroethane		M	2760	mg/kg	0.0020		< 0.0020	
Trichloroethene		N	2760	mg/kg	0.0010		< 0.0010	
1,2-Dichloropropane		M	2760	mg/kg	0.0010		< 0.0010	
Dibromomethane		M	2760	mg/kg	0.0010		< 0.0010	
Bromodichloromethane		M	2760	mg/kg	0.0050		< 0.0050	
cis-1,3-Dichloropropene		N	2760	mg/kg	0.010		< 0.010	

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**	23-42509	23-42509	23-42509
Quotation No.: Q23-32755				**Chemtest Sample ID.:**	1749813	1749814	1749815
Order No.:				Client Sample Ref.:	ES2	ES3	ES4
				Sample Location:	TP05	TP05	TP05
				Sample Type:	SOIL	SOIL	SOIL
				Top Depth (m):	0.5	1.0	2.0
				Date Sampled:	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**			
Toluene		M	2760	mg/kg	0.0010		< 0.0010	
Trans-1,3-Dichloropropene		N	2760	mg/kg	0.010		< 0.010	
1,1,2-Trichloroethane		M	2760	mg/kg	0.010		< 0.010	
Tetrachloroethene		M	2760	mg/kg	0.0010		< 0.0010	
1,3-Dichloropropane		U	2760	mg/kg	0.0020		< 0.0020	
Dibromochloromethane		U	2760	mg/kg	0.010		< 0.010	
1,2-Dibromoethane		M	2760	mg/kg	0.0050		< 0.0050	
Chlorobenzene		M	2760	mg/kg	0.0010		< 0.0010	
1,1,1,2-Tetrachloroethane		M	2760	mg/kg	0.0020		< 0.0020	
Ethylbenzene		M	2760	mg/kg	0.0010		< 0.0010	
m & p-Xylene		M	2760	mg/kg	0.0010		< 0.0010	
o-Xylene		M	2760	mg/kg	0.0010		< 0.0010	
Styrene		M	2760	mg/kg	0.0010		< 0.0010	
Tribromomethane		U	2760	mg/kg	0.0010		< 0.0010	
Isopropylbenzene		M	2760	mg/kg	0.0010		< 0.0010	
Bromobenzene		M	2760	mg/kg	0.0010		< 0.0010	
1,2,3-Trichloropropane		N	2760	mg/kg	0.050		< 0.050	
N-Propylbenzene		U	2760	mg/kg	0.0010		< 0.0010	
2-Chlorotoluene		M	2760	mg/kg	0.0010		< 0.0010	
1,3,5-Trimethylbenzene		M	2760	mg/kg	0.0010		< 0.0010	
4-Chlorotoluene		U	2760	mg/kg	0.0010		< 0.0010	
Tert-Butylbenzene		U	2760	mg/kg	0.0010		< 0.0010	
1,2,4-Trimethylbenzene		M	2760	mg/kg	0.0010		< 0.0010	
Sec-Butylbenzene		U	2760	mg/kg	0.0010		< 0.0010	
1,3-Dichlorobenzene		M	2760	mg/kg	0.0010		< 0.0010	
4-Isopropyltoluene		N	2760	mg/kg	0.0010		< 0.0010	
1,4-Dichlorobenzene		M	2760	mg/kg	0.0010		< 0.0010	
N-Butylbenzene		U	2760	mg/kg	0.0010		< 0.0010	
1,2-Dichlorobenzene		M	2760	mg/kg	0.0010		< 0.0010	
1,2-Dibromo-3-Chloropropane		U	2760	mg/kg	0.050		< 0.050	
1,2,4-Trichlorobenzene		M	2760	mg/kg	0.0010		< 0.0010	
Hexachlorobutadiene		U	2760	mg/kg	0.0010		< 0.0010	
1,2,3-Trichlorobenzene		U	2760	mg/kg	0.0020		< 0.0020	
Methyl Tert-Butyl Ether		M	2760	mg/kg	0.0010		< 0.0010	
Naphthalene		M	2800	mg/kg	0.10		0.82	< 0.10
Acenaphthylene		N	2800	mg/kg	0.10		< 0.10	< 0.10
Acenaphthene		M	2800	mg/kg	0.10		< 0.10	< 0.10
Fluorene		M	2800	mg/kg	0.10		< 0.10	< 0.10

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42509	23-42509	23-42509
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749813	1749814	1749815
Order No.:				Client Sample Ref.:		ES2	ES3	ES4
				Sample Location:		TP05	TP05	TP05
				Sample Type:		SOIL	SOIL	SOIL
				Top Depth (m):		0.5	1.0	2.0
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:			NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**			
Phenanthrene		M	2800	mg/kg	0.10		2.5	< 0.10
Anthracene		M	2800	mg/kg	0.10		0.35	< 0.10
Fluoranthene		M	2800	mg/kg	0.10		2.0	< 0.10
Pyrene		M	2800	mg/kg	0.10		1.6	< 0.10
Benzo[a]anthracene		M	2800	mg/kg	0.10		1.3	< 0.10
Chrysene		M	2800	mg/kg	0.10		1.5	< 0.10
Benzo[b]fluoranthene		M	2800	mg/kg	0.10		1.6	< 0.10
Benzo[k]fluoranthene		M	2800	mg/kg	0.10		< 0.10	< 0.10
Benzo[a]pyrene		M	2800	mg/kg	0.10		< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		M	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		M	2800	mg/kg	0.10		< 0.10	< 0.10
Total Of 16 PAH's		N	2800	mg/kg	2.0		12	< 2.0
Total Phenols		M	2920	mg/kg	0.10		< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH at 20°C	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.
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
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.
2010	pH Value of Soils	pH at 20°C	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.

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
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
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

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.:	23-42519-1		
Initial Date of Issue:	08-Jan-2024		
Re-Issue Details:			
Client	Spencer Quantum Ltd		
Client Address:	Parcau Farm Penrhiwllan Llandysul Ceredigion SA44 5NW		
Contact(s):	Tyler Goodrich		
Project	Q1218		
Quotation No.:	Q23-32755	**Date Received:**	22-Dec-2023
Order No.:		**Date Instructed:**	22-Dec-2023
No. of Samples:	7		
Turnaround (Wkdays):	5	**Results Due:**	05-Jan-2024
Date Approved:	08-Jan-2024		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Leachate

Project: Q1218

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-42519	23-42519	23-42519	23-42519
Quotation No.: Q23-32755					**Chemtest Sample ID.:**	1749854	1749856	1749858	1749859
Order No.:					Client Sample Ref.:	ES1	ES3	ES1	ES2
					Sample Location:	TP02	TP02	TP04	TP04
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.3	1.0	0.3	0.5
					Date Sampled:	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**				
pH at 20C	U	1010	10:1		4.0	8.9	8.4	7.9	7.6
Sulphate	U	1220	10:1	mg/l	1.0	2.0	1.5	< 1.0	< 1.0
Cyanide (Total)	U	1300	10:1	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	1.4	1.4	4.0	0.99
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	19	16	17	13
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11	< 0.11	< 0.11	< 0.11
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	1.6	1.1	3.4	1.4
Mercury (Dissolved)	U	1455	10:1	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	< 0.50	0.57	0.73
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	0.76	0.57	1.0
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	28	25	39	30
Chromium (Total)	N	1455	10:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	0.71
Chromium (Hexavalent)	U	1490	10:1	µg/l	20	< 20	< 20	< 20	< 20
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	10	< 10	< 10	< 10	< 10
Naphthalene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Leachate

Project: Q1218

Client: Spencer Quantum Ltd					**Chemtest Job No.:**	23-42519	23-42519	23-42519	23-42519
Quotation No.: Q23-32755					**Chemtest Sample ID.:**	1749854	1749856	1749858	1749859
Order No.:					Client Sample Ref.:	ES1	ES3	ES1	ES2
					Sample Location:	TP02	TP02	TP04	TP04
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.3	1.0	0.3	0.5
					Date Sampled:	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**				
Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	10:1	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42519	23-42519	23-42519	23-42519	23-42519	23-42519	23-42519
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749854	1749855	1749856	1749857	1749858	1749859	1749860
Order No.:				Client Sample Ref.:		ES1	ES2	ES3	ES4	ES1	ES2	ES3
				Sample Location:		TP02	TP02	TP02	TP02	TP04	TP04	TP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.5	1.0	2.0	0.3	0.5	1.0
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	**HWOL Code**	**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	No Asbestos Detected	No Asbestos Detected	
Moisture		N	2030	%	0.020	11		14	20	22	9.4	
Soil Colour		N	2040		N/A	Brown	Black	Black	Brown	Black	Brown	Brown
Other Material		N	2040		N/A	Stones	Stones	Stones	Stones and Roots	Stones	Stones	Stones
Soil Texture		N	2040		N/A	Clay	Clay	Clay	Clay	Loam	Clay	Clay
pH at 20C		M	2010		4.0	8.4		8.4	8.0	8.3	8.6	
pH (2.5:1) at 20C		N	2010		4.0	8.4		8.4	8.0		8.6	
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	0.47		< 0.40	0.43	< 0.40	< 0.40	
Magnesium (Water Soluble)		N	2120	g/l	0.010	< 0.010		< 0.010	< 0.010		< 0.010	
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	< 0.010		< 0.010	0.012	< 0.010	< 0.010	
Total Sulphur		U	2175	%	0.010	0.087		0.43	0.020		0.016	
Chloride (Water Soluble)		M	2220	g/l	0.010	1.4		5.3	0.45		0.028	
Nitrate (Water Soluble)		N	2220	g/l	0.010	< 0.010		< 0.010	< 0.010		< 0.010	
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	
Sulphate (Acid Soluble)		U	2430	%	0.010	0.019		0.028	< 0.010		< 0.010	
Arsenic		M	2455	mg/kg	0.5	46		63	13	46	15	
Cadmium		M	2455	mg/kg	0.10	0.73		0.61	0.10	0.53	0.17	
Chromium		M	2455	mg/kg	0.5	32		25	31	15	26	
Copper		M	2455	mg/kg	0.50	140		250	24	390	34	
Mercury		M	2455	mg/kg	0.05	0.17		0.27	0.09	0.15	0.06	
Nickel		M	2455	mg/kg	0.50	47		58	36	49	48	
Lead		M	2455	mg/kg	0.50	84		110	26	65	24	
Zinc		M	2455	mg/kg	0.50	230		230	66	84	110	
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	
Aliphatic VPH >C6-C8 (Sum)	HS_2D_AL	N	2780	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25	< 0.25		< 0.25	< 0.25	< 0.25	< 0.25	
Aliphatic EPH >C10-C12	EH_2D_AL_#1	M	2690	mg/kg	2.00	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	
Aliphatic EPH >C12-C16	EH_2D_AL_#1	M	2690	mg/kg	1.00	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	
Aliphatic EPH >C16-C21	EH_2D_AL_#1	M	2690	mg/kg	2.00	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	
Aliphatic EPH >C21-C35	EH_2D_AL_#1	M	2690	mg/kg	3.00	8.8		13	12	13	9.7	
Aliphatic EPH >C35-C40	EH_2D_AL_#1	N	2690	mg/kg	10.00	15		11	17	14	13	

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42519	23-42519	23-42519	23-42519	23-42519	23-42519	23-42519
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749854	1749855	1749856	1749857	1749858	1749859	1749860
Order No.:				Client Sample Ref.:		ES1	ES2	ES3	ES4	ES1	ES2	ES3
				Sample Location:		TP02	TP02	TP02	TP02	TP04	TP04	TP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.5	1.0	2.0	0.3	0.5	1.0
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Total Aliphatic EPH >C10-C35	EH_2D_AL_#1	M	2690	mg/kg	5.00	8.8		13	13	14	9.9	
Total Aliphatic EPH >C10-C40	EH_2D_AL_#1	N	2690	mg/kg	10.00	24		24	30	28	23	
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25	< 0.25		< 0.25	< 0.25	< 0.25	< 0.25	
Aromatic EPH >C10-C12	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic EPH >C12-C16	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	
Aromatic EPH >C16-C21	EH_2D_AR_#1	U	2690	mg/kg	2.00	6.4		5.8	6.2	6.1	5.8	
Aromatic EPH >C21-C35	EH_2D_AR_#1	U	2690	mg/kg	2.00	4.7		3.2	2.6	< 2.0	< 2.0	
Aromatic EPH >C35-C40	EH_2D_AR_#1	N	2690	mg/kg	1.00	11		8.6	9.1	9.5	7.5	
Total Aromatic EPH >C10-C35	EH_2D_AR_#1	U	2690	mg/kg	5.00	11		9.0	8.8	8.0	7.5	
Total Aromatic EPH >C10-C40	EH_2D_AR_#1	N	2690	mg/kg	10.00	22		18	18	18	15	
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	
Total EPH >C10-C35	EH_2D_Total_#1	U	2690	mg/kg	10.00	20		22	22	22	17	
Total EPH >C10-C40	EH_2D_Total_#1	N	2690	mg/kg	10.00	46		42	48	46	38	
Organic Matter		M	2625	%	0.40	15		39	4.9	63	0.94	
Dichlorodifluoromethane		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Chloromethane		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Vinyl Chloride		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Bromomethane		M	2760	mg/kg	0.020	< 0.020		< 0.020		< 0.020	< 0.020	
Chloroethane		U	2760	mg/kg	0.0020	< 0.0020		< 0.0020		< 0.0020	< 0.0020	
Trichlorofluoromethane		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,1-Dichloroethene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Trans 1,2-Dichloroethene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,1-Dichloroethane		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
cis 1,2-Dichloroethene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Bromochloromethane		U	2760	mg/kg	0.0050	< 0.0050		< 0.0050		< 0.0050	< 0.0050	
Trichloromethane		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,1,1-Trichloroethane		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Tetrachloromethane		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,1-Dichloropropene		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Benzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,2-Dichloroethane		M	2760	mg/kg	0.0020	< 0.0020		< 0.0020		< 0.0020	< 0.0020	
Trichloroethene		N	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,2-Dichloropropane		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42519	23-42519	23-42519	23-42519	23-42519	23-42519	23-42519
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749854	1749855	1749856	1749857	1749858	1749859	1749860
Order No.:				Client Sample Ref.:		ES1	ES2	ES3	ES4	ES1	ES2	ES3
				Sample Location:		TP02	TP02	TP02	TP02	TP04	TP04	TP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.5	1.0	2.0	0.3	0.5	1.0
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Dibromomethane		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Bromodichloromethane		M	2760	mg/kg	0.0050	< 0.0050		< 0.0050		< 0.0050	< 0.0050	
cis-1,3-Dichloropropene		N	2760	mg/kg	0.010	< 0.010		< 0.010		< 0.010	< 0.010	
Toluene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Trans-1,3-Dichloropropene		N	2760	mg/kg	0.010	< 0.010		< 0.010		< 0.010	< 0.010	
1,1,2-Trichloroethane		M	2760	mg/kg	0.010	< 0.010		< 0.010		< 0.010	< 0.010	
Tetrachloroethene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,3-Dichloropropane		U	2760	mg/kg	0.0020	< 0.0020		< 0.0020		< 0.0020	< 0.0020	
Dibromochloromethane		U	2760	mg/kg	0.010	< 0.010		< 0.010		< 0.010	< 0.010	
1,2-Dibromoethane		M	2760	mg/kg	0.0050	< 0.0050		< 0.0050		< 0.0050	< 0.0050	
Chlorobenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,1,1,2-Tetrachloroethane		M	2760	mg/kg	0.0020	< 0.0020		< 0.0020		< 0.0020	< 0.0020	
Ethylbenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
m & p-Xylene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
o-Xylene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Styrene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Tribromomethane		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Isopropylbenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Bromobenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,2,3-Trichloropropane		N	2760	mg/kg	0.050	< 0.050		< 0.050		< 0.050	< 0.050	
N-Propylbenzene		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
2-Chlorotoluene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,3,5-Trimethylbenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
4-Chlorotoluene		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Tert-Butylbenzene		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,2,4-Trimethylbenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Sec-Butylbenzene		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,3-Dichlorobenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
4-Isopropyltoluene		N	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,4-Dichlorobenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
N-Butylbenzene		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,2-Dichlorobenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,2-Dibromo-3-Chloropropane		U	2760	mg/kg	0.050	< 0.050		< 0.050		< 0.050	< 0.050	
1,2,4-Trichlorobenzene		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Hexachlorobutadiene		U	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
1,2,3-Trichlorobenzene		U	2760	mg/kg	0.0020	< 0.0020		< 0.0020		< 0.0020	< 0.0020	
Methyl Tert-Butyl Ether		M	2760	mg/kg	0.0010	< 0.0010		< 0.0010		< 0.0010	< 0.0010	
Naphthalene		M	2800	mg/kg	0.10	0.48		0.49	< 0.10	0.53	< 0.10	

Results - Soil

Project: Q1218

Client: Spencer Quantum Ltd				**Chemtest Job No.:**		23-42519	23-42519	23-42519	23-42519	23-42519	23-42519	23-42519
Quotation No.: Q23-32755				**Chemtest Sample ID.:**		1749854	1749855	1749856	1749857	1749858	1749859	1749860
Order No.:				Client Sample Ref.:		ES1	ES2	ES3	ES4	ES1	ES2	ES3
				Sample Location:		TP02	TP02	TP02	TP02	TP04	TP04	TP04
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.3	0.5	1.0	2.0	0.3	0.5	1.0
				Date Sampled:		19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023	19-Dec-2023
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	
Acenaphthene		M	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	
Fluorene		M	2800	mg/kg	0.10	< 0.10		0.20	< 0.10	< 0.10	< 0.10	
Phenanthrene		M	2800	mg/kg	0.10	0.76		1.6	< 0.10	1.2	< 0.10	
Anthracene		M	2800	mg/kg	0.10	0.48		0.20	< 0.10	0.11	< 0.10	
Fluoranthene		M	2800	mg/kg	0.10	0.94		1.6	< 0.10	0.38	< 0.10	
Pyrene		M	2800	mg/kg	0.10	0.86		1.3	< 0.10	0.32	< 0.10	
Benzo[a]anthracene		M	2800	mg/kg	0.10	0.55		0.68	< 0.10	0.19	< 0.10	
Chrysene		M	2800	mg/kg	0.10	0.68		1.0	< 0.10	0.46	< 0.10	
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	0.79		1.1	< 0.10	0.39	< 0.10	
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	0.25		0.38	< 0.10	0.11	< 0.10	
Benzo[a]pyrene		M	2800	mg/kg	0.10	0.37		0.66	< 0.10	< 0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	0.39		0.47	< 0.10	< 0.10	< 0.10	
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	0.34		0.47	< 0.10	0.20	< 0.10	
Total Of 16 PAH's		N	2800	mg/kg	2.0	6.9		10	< 2.0	3.9	< 2.0	
Total Phenols		M	2920	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH at 20°C	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.
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
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.
2010	pH Value of Soils	pH at 20°C	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
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt 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.

Test Methods

SOP	Title	Parameters included	Method summary
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
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

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

APPENDIX VIII – GEO-ENVIRONMENTAL LABORATORY TEST RESULTS

Laboratory Report

UKAS TESTING 2788

GSTL
GEOTECHNICAL SITE & TESTING LABORATORIES
A PHENNA GROUP COMPANY

Contract Number: 71142

Client Ref: **Q1218**
Client PO: **Q1218**

Client: **Spencer Quantum Ltd**

Contract Title: **Heol Tabor, Cwmavon**
For the attention of: **Tyler Goodrick**

Date Received: **08-02-2024**
Date Completed: **23-02-2024**
Report Date: **23-02-2024**

This report has been checked and approved by:

B. Evans

Brendan Evans
Office Administrator

Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	2
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	2
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	10
BRE Suite D Brownfield Site (pyrite present) **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

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

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
Unit 3-4 Heol Aur, Dafen Ind Est, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784 040 Fax: 01554 784 040 info@gstl.co.uk https://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	71142	
Project Name	Heol Tabor, Cwmavon	
Date Tested	21/02/2024	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
TP02	4	B	1.80	-	2.00	Grey CLAY
TP05	4	B	1.80	-	2.00	Brown fine to medium gravelly sandy silty CLAY
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
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				-		
				-		

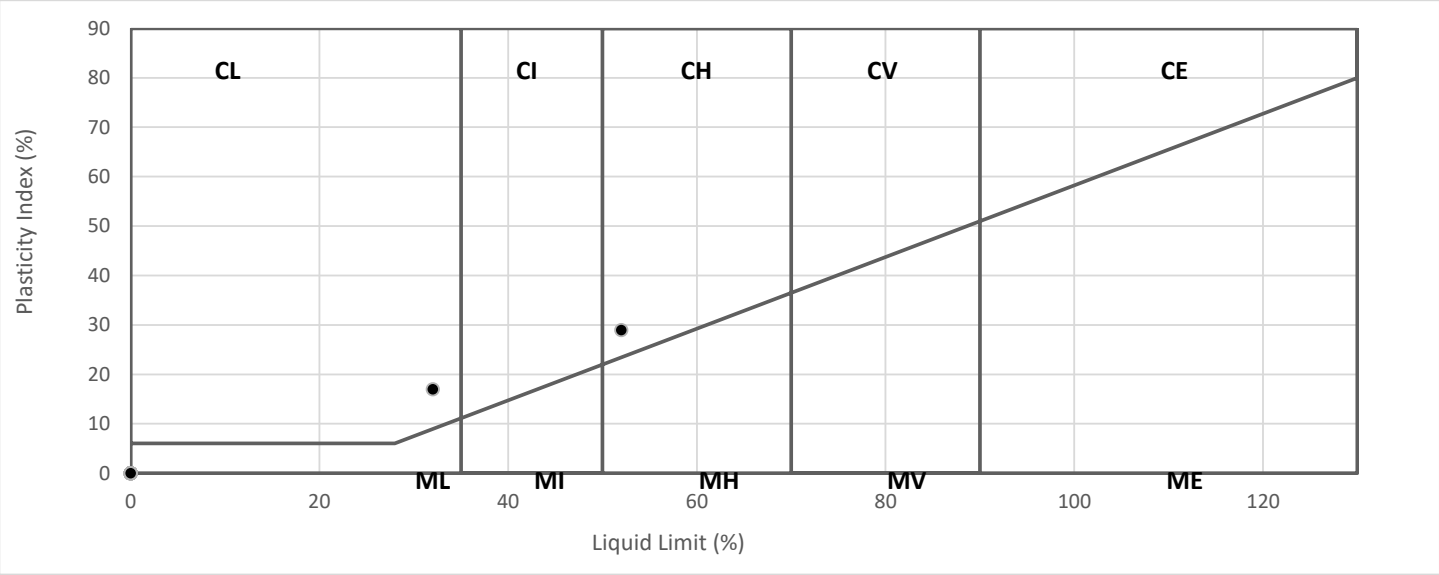
Operator
Aaron Hodge

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	71142	
Project Name	Heol Tabor, Cwmavon	
Date Tested	21/02/2024	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
TP02	4	B	1.80	-	2.00	27	52	23	29	100	CH High Plasticity
TP05	4	B	1.80	-	2.00	17	32	15	17	91	CL Low Plasticity

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

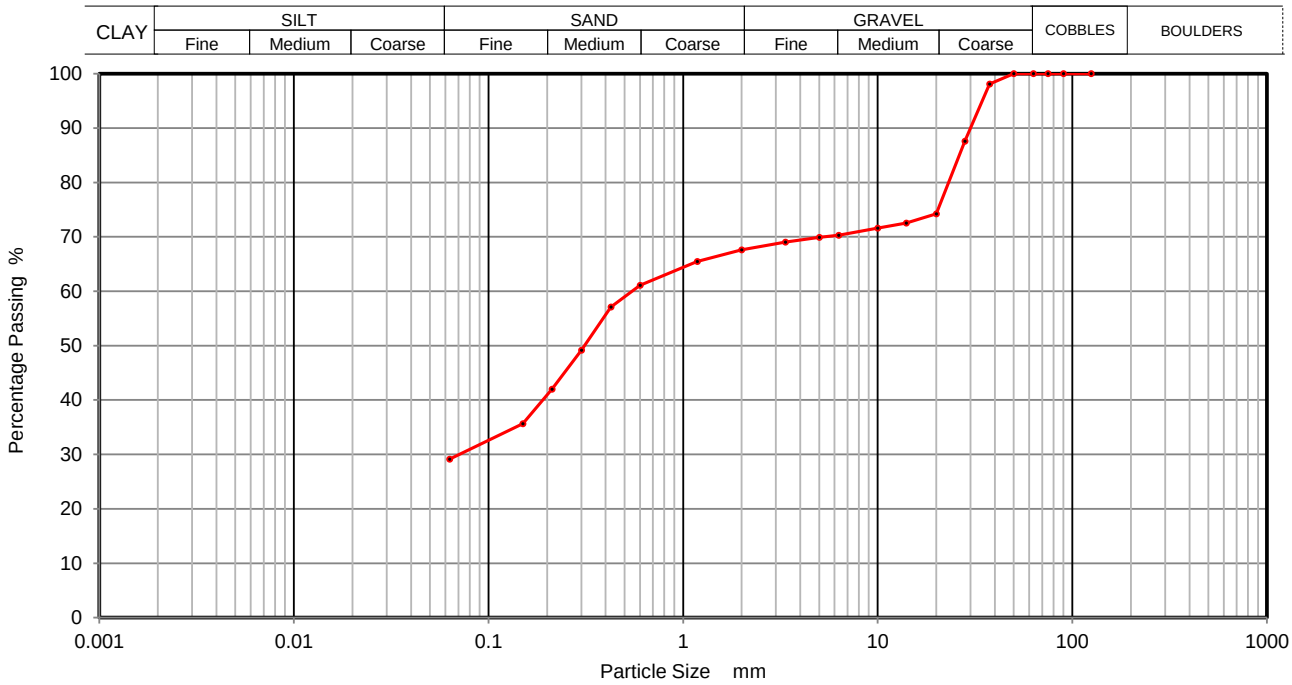
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:2015+A1:2020



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	71142
		Borehole/Pit No.	TP01
Project Name	Heol Tabor, Cwmavon	Sample No.	1
Soil Description	Brown/ grey silty/ clayey fine to coarse gravelly fine to coarse SAND	Depth Top	0.20
		Depth Base	0.80
Date Tested	20/02/2024	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	98		
28	88		
20	74		
14	73		
10	72		
6.3	70		
5	70		
3.35	69		
2	68		
1.18	65		
0.6	61		
0.425	57		
0.3	49		
0.212	42		
0.15	36		
0.063	29		

Sample Proportions	% dry mass
Cobbles	0
Gravel	32
Sand	39
Silt and Clay	29

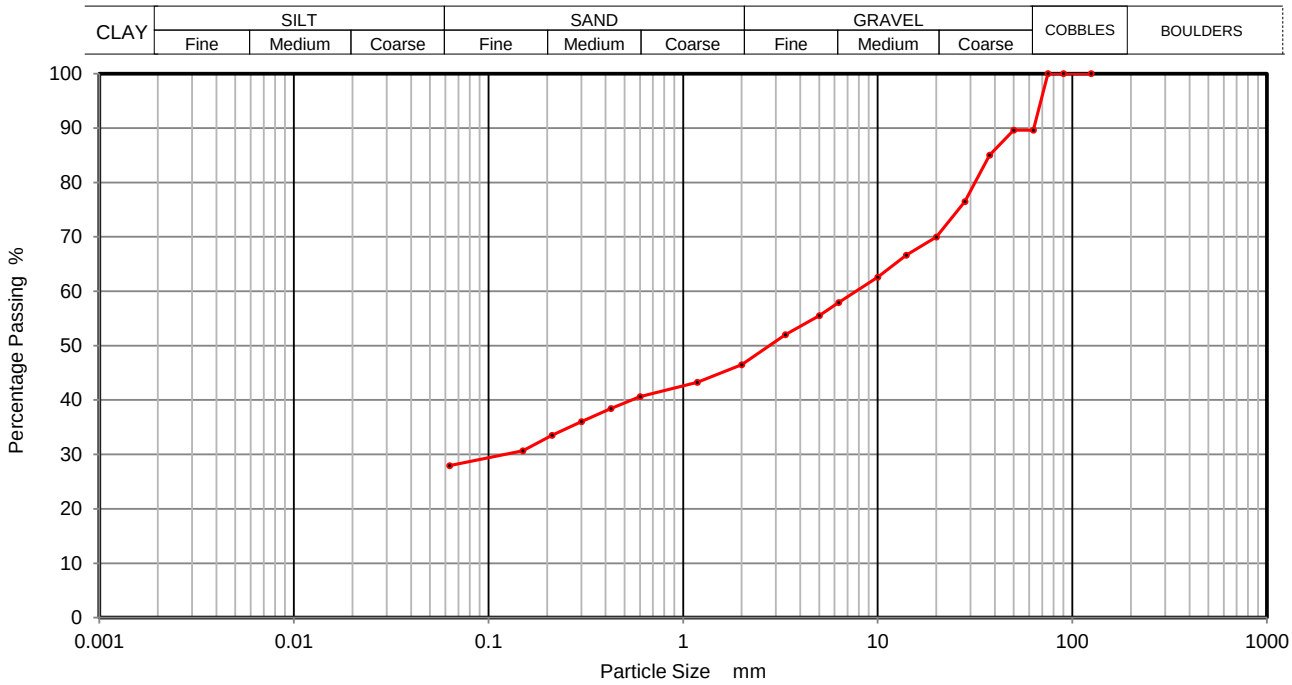
Remarks

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	71142
		Borehole/Pit No.	TP01
Project Name	Heol Tabor, Cwmavon	Sample No.	3
Soil Description	Grey/ brown fine to coarse sandy silty/ clayey fine to coarse GRAVEL with cobbles	Depth Top	1.40
		Depth Base	1.80
Date Tested	20/02/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	90		
50	90		
37.5	85		
28	76		
20	70		
14	67		
10	63		
6.3	58		
5	55		
3.35	52		
2	47		
1.18	43		
0.6	41		
0.425	38		
0.3	36		
0.212	34		
0.15	31		
0.063	28		

Sample Proportions	% dry mass
Cobbles	10
Gravel	43
Sand	19
Silt and Clay	28

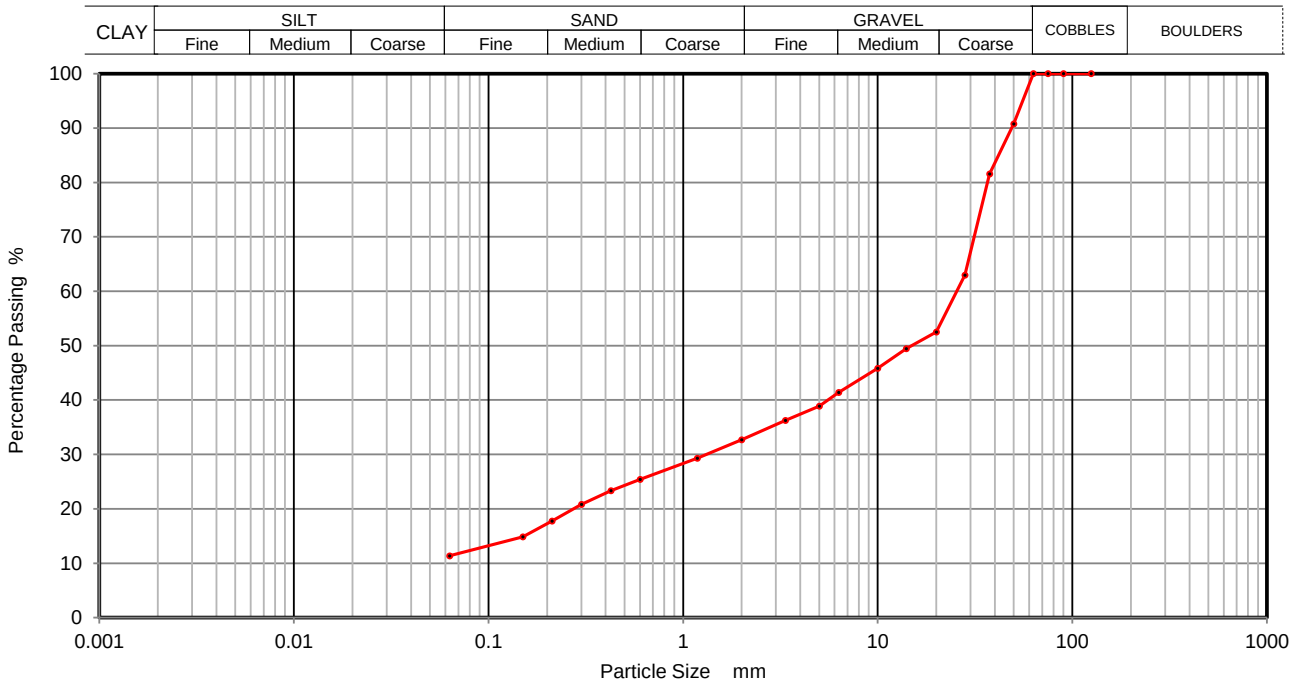
Remarks

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	71142
		Borehole/Pit No.	TP02
Project Name	Heol Tabor, Cwmavon	Sample No.	1
Soil Description	Grey/ brown silty/ clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	0.00
		Depth Base	0.40
Date Tested	20/02/2024	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	91		
37.5	82		
28	63		
20	52		
14	49		
10	46		
6.3	41		
5	39		
3.35	36		
2	33		
1.18	29		
0.6	25		
0.425	23		
0.3	21		
0.212	18		
0.15	15		
0.063	11		

Sample Proportions	% dry mass
Cobbles	0
Gravel	67
Sand	22
Silt and Clay	11

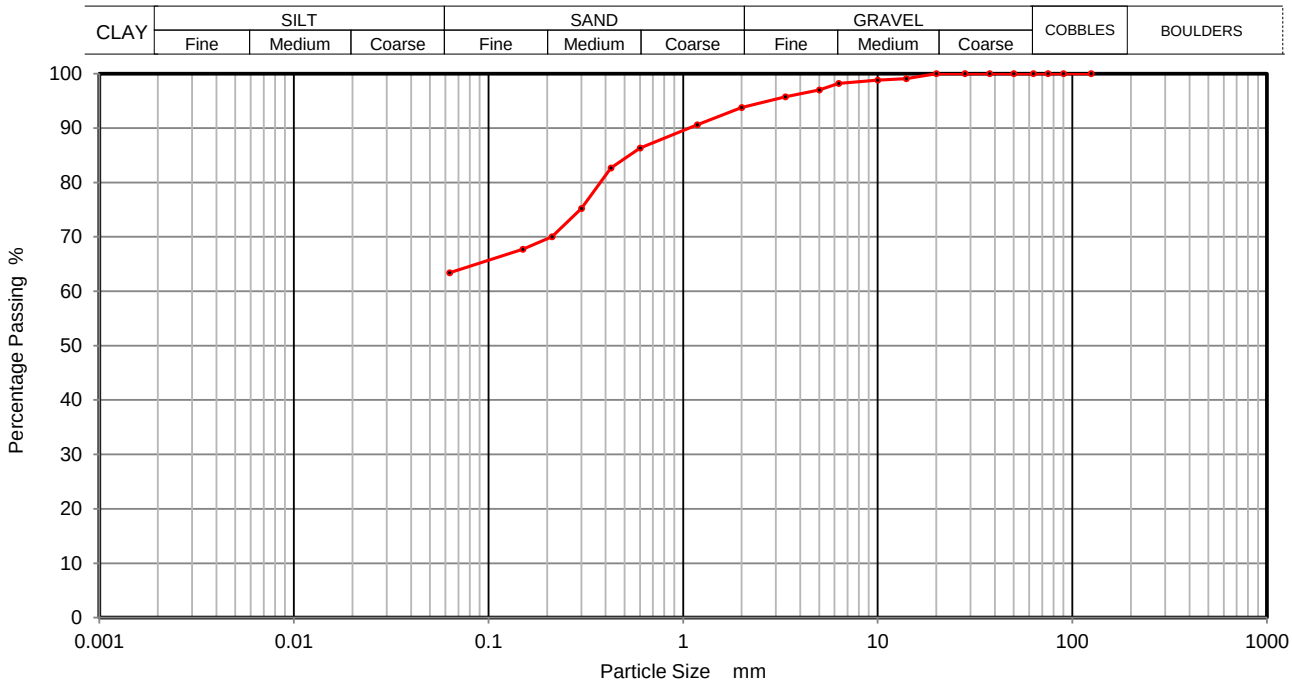
Remarks

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	71142
		Borehole/Pit No.	TP02
Project Name	Heol Tabor, Cwmavon	Sample No.	4
Soil Description	Grey/ brown slightly gravelly fine to coarse sandy SILT/ CLAY	Depth Top	0.80
		Depth Base	2.00
Date Tested	20/02/2024	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	99		
10	99		
6.3	98		
5	97		
3.35	96		
2	94		
1.18	91		
0.6	86		
0.425	83		
0.3	75		
0.212	70		
0.15	68		
0.063	63		

Sample Proportions	% dry mass
Cobbles	0
Gravel	6
Sand	31
Silt and Clay	63

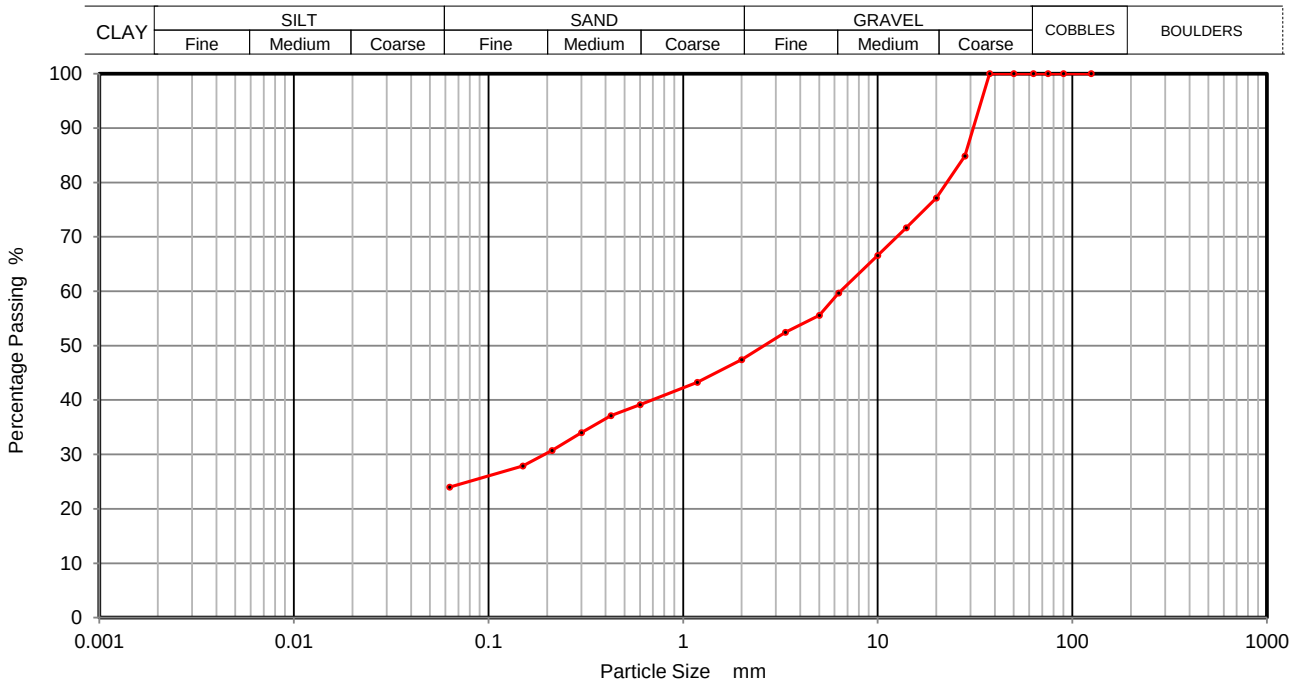
Remarks

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	71142
		Borehole/Pit No.	TP03
Project Name	Heol Tabor, Cwmavon	Sample No.	1
Soil Description	Brown fine to coarse sandy silty/ clayey fine to coarse GRAVEL	Depth Top	0.10
		Depth Base	0.50
Date Tested	20/02/2024	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	85		
20	77		
14	72		
10	67		
6.3	60		
5	56		
3.35	52		
2	47		
1.18	43		
0.6	39		
0.425	37		
0.3	34		
0.212	31		
0.15	28		
0.063	24		

Sample Proportions	% dry mass
Cobbles	0
Gravel	53
Sand	23
Silt and Clay	24

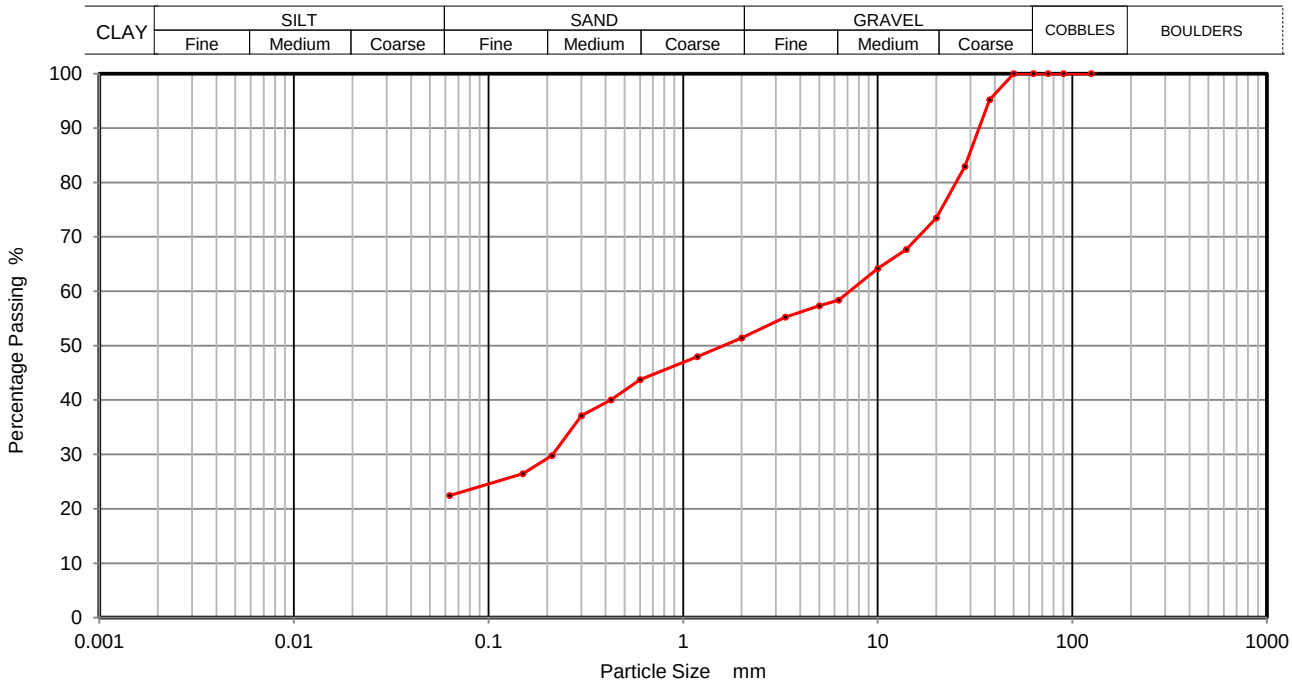
Remarks

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	71142
		Borehole/Pit No.	TP03
Project Name	Heol Tabor, Cwmavon	Sample No.	2
Soil Description	Brown/ grey silt/ clay fine to coarse sandy fine to coarse GRAVEL	Depth Top	0.60
		Depth Base	1.20
Date Tested	20/02/2024	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	83		
20	73		
14	68		
10	64		
6.3	58		
5	57		
3.35	55		
2	51		
1.18	48		
0.6	44		
0.425	40		
0.3	37		
0.212	30		
0.15	26		
0.063	22		

Sample Proportions	% dry mass
Cobbles	0
Gravel	49
Sand	29
Silt and Clay	22

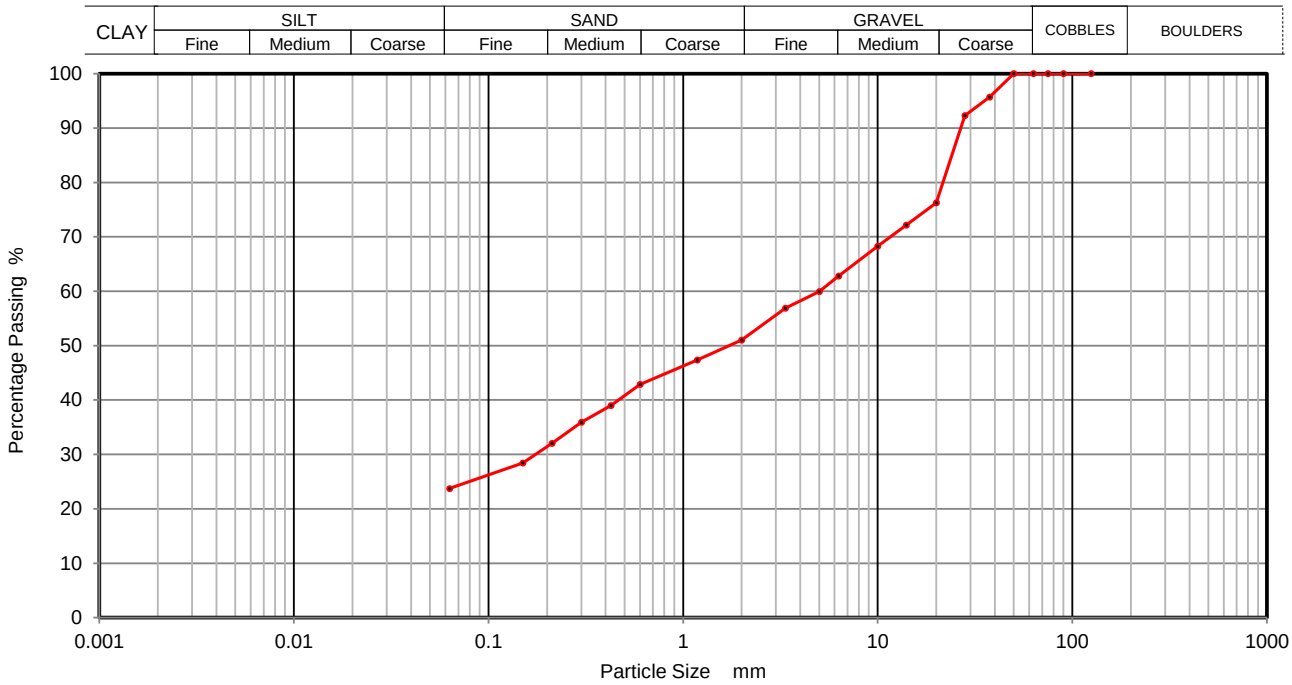
Remarks

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, Clause 9.2	Contract Number	71142
		Borehole/Pit No.	TP04
Project Name	Heol Tabor, Cwmavon	Sample No.	1
Soil Description	Brown silt/ clay fine to coarse sandy fine to coarse GRAVEL	Depth Top	0.00
		Depth Base	0.40
Date Tested	20/02/2024	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	92		
20	76		
14	72		
10	68		
6.3	63		
5	60		
3.35	57		
2	51		
1.18	47		
0.6	43		
0.425	39		
0.3	36		
0.212	32		
0.15	28		
0.063	24		

Sample Proportions	% dry mass
Cobbles	0
Gravel	49
Sand	27
Silt and Clay	24

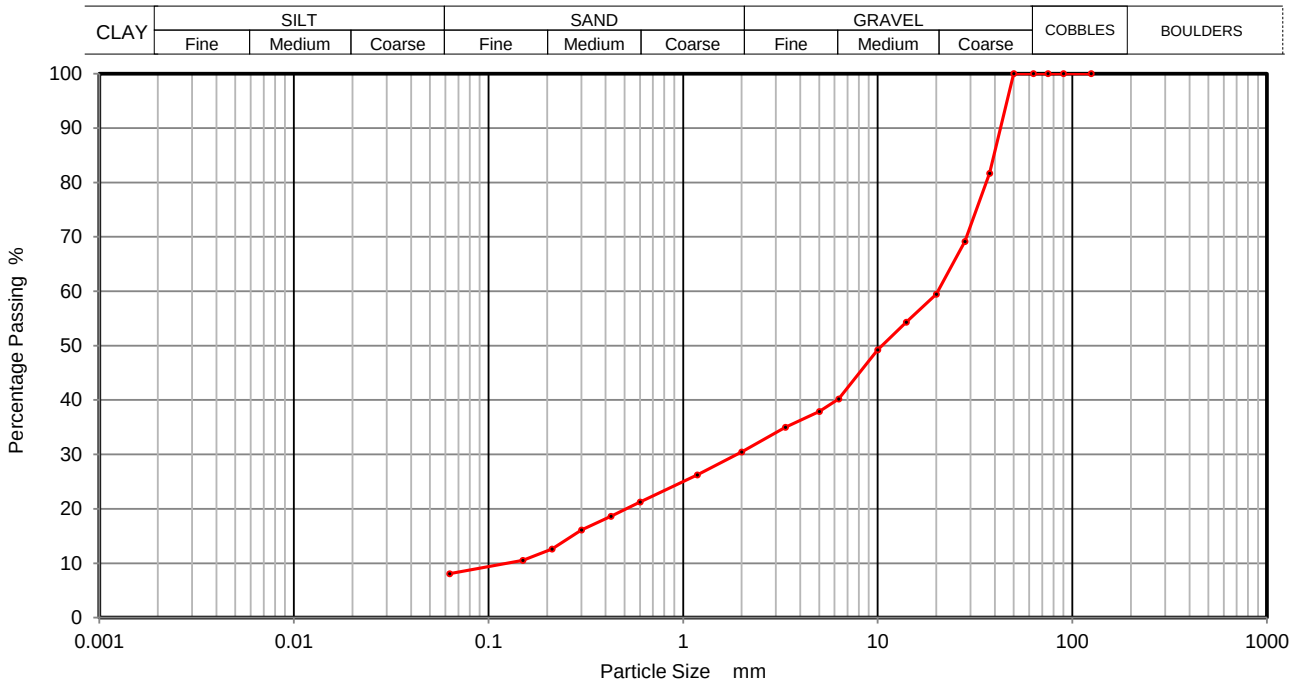
Remarks

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	71142
		Borehole/Pit No.	TP04
Project Name	Heol Tabor, Cwmavon	Sample No.	2
Soil Description	Grey/ brown silty/ clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	0.50
		Depth Base	1.50
Date Tested	20/02/2024	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	82		
28	69		
20	59		
14	54		
10	49		
6.3	40		
5	38		
3.35	35		
2	30		
1.18	26		
0.6	21		
0.425	19		
0.3	16		
0.212	13		
0.15	11		
0.063	8		

Sample Proportions	% dry mass
Cobbles	0
Gravel	70
Sand	22
Silt and Clay	8

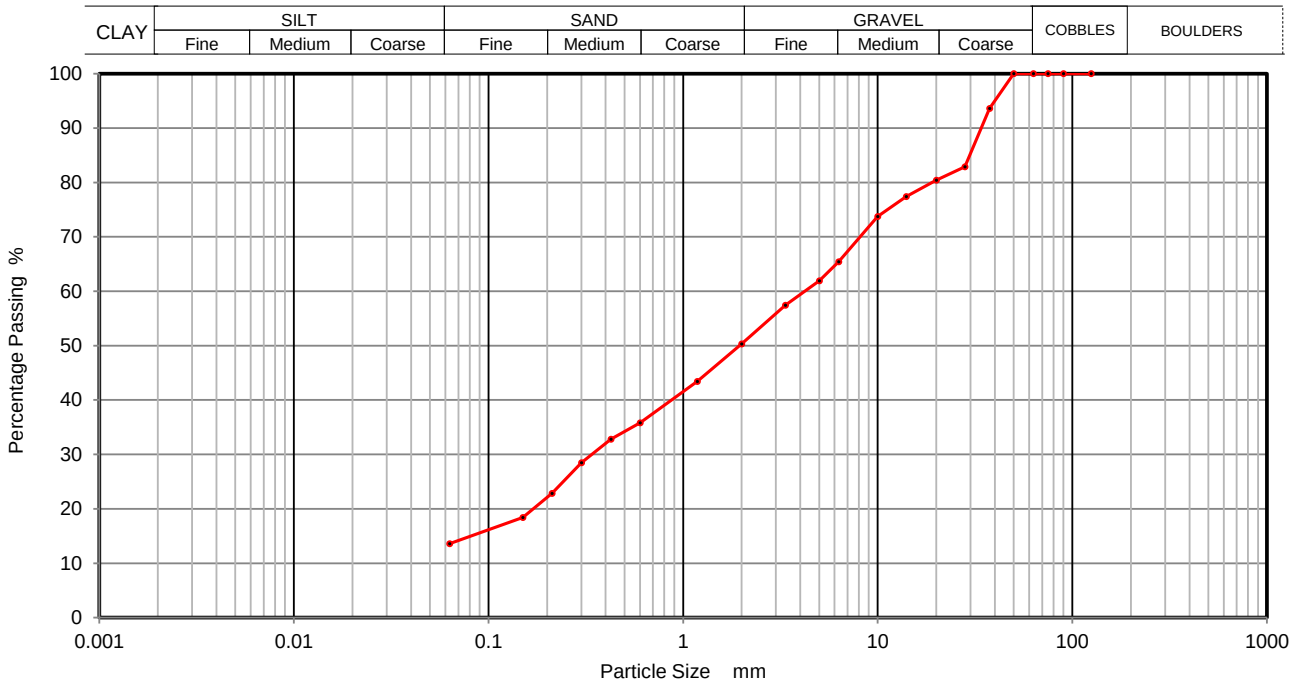
Remarks

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	71142
		Borehole/Pit No.	TP05
Project Name	Heol Tabor, Cwmavon	Sample No.	1
Soil Description	Grey/ brown/ black silty/ clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	0.00
		Depth Base	0.50
Date Tested	20/02/2024	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	94		
28	83		
20	80		
14	77		
10	74		
6.3	65		
5	62		
3.35	57		
2	50		
1.18	43		
0.6	36		
0.425	33		
0.3	28		
0.212	23		
0.15	18		
0.063	14		

Sample Proportions	% dry mass
Cobbles	0
Gravel	50
Sand	36
Silt and Clay	14

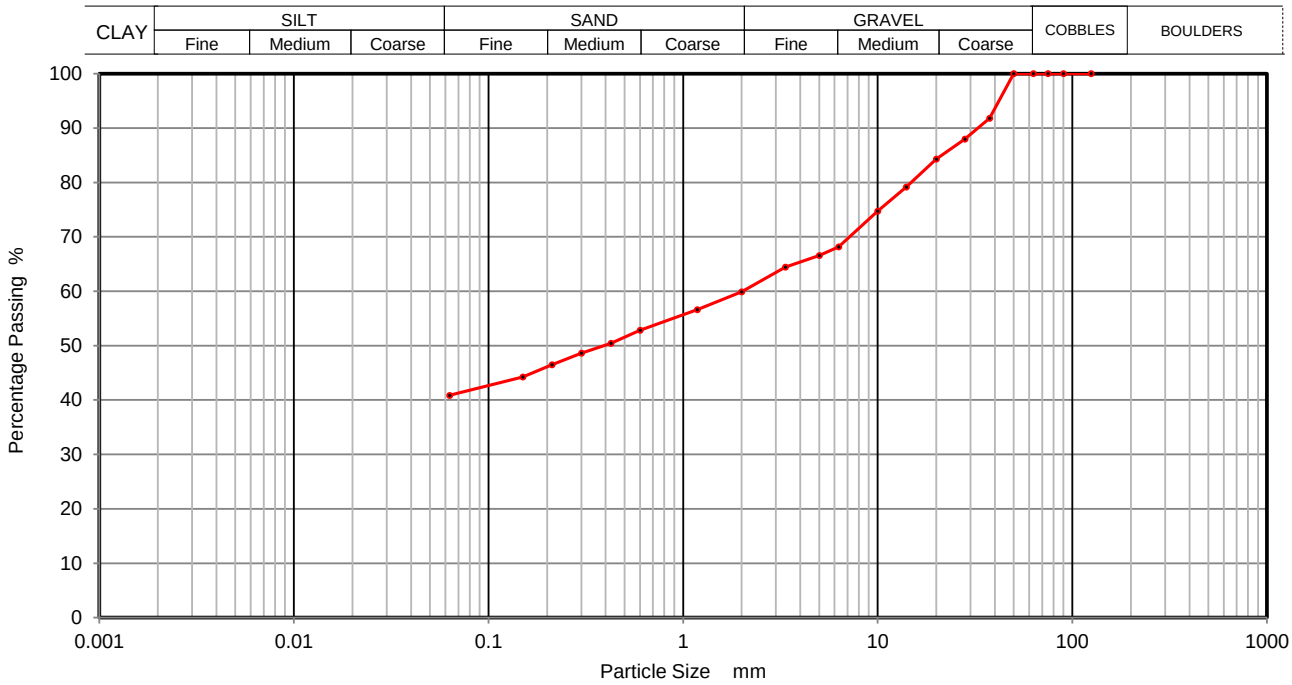
Remarks

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	71142
		Borehole/Pit No.	TP05
Project Name	Heol Tabor, Cwmavon	Sample No.	4
Soil Description	Grey/ brown fine to coarse sandy fine to coarse gravelly SILT/ CLAY	Depth Top	1.80
		Depth Base	2.00
Date Tested	20/02/2024	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	92		
28	88		
20	84		
14	79		
10	75		
6.3	68		
5	67		
3.35	64		
2	60		
1.18	57		
0.6	53		
0.425	50		
0.3	49		
0.212	47		
0.15	44		
0.063	41		

Sample Proportions	% dry mass
Cobbles	0
Gravel	40
Sand	19
Silt and Clay	41

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

7 - 11 Harding Street
Leicester
LE1 4DH

GSTL
Unit 3-4 Heol Aur
Dafen Ind Estate
Dafen
SA14 8QN

Analytical Test Report:	**L24/01203/GSL - 24-41711**		
Your Project Reference:	**Q1218 Heol Tabor**		
Your Order Number:	71142	Samples Received / Instructed:	15/02/2024 / 15/02/2024
Report Issue Number:	1	Sample Tested:	15/02 to 23/02/2024
Samples Analysed:	10 soil samples	Report issued:	23/02/2024

Signed

James Gane
Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 30.10.2023

Issued by: J. Gane

Issue No: 4

Rev No: 5

7 - 11 Harding Street
Leicester
LE1 4DH

L24/01203/GSL - 24-41711

Project Reference - Q1218 Heol Tabor

Analytical Test Results - Chemical Analysis

Lab Reference			341401	341402	341403	341404	341405	341406	341407
Client Sample ID			-	-	-	-	-	-	-
Client Sample Location			TP01	TP01	TP02	TP02	TP03	TP03	TP04
Client Sample Type			B	B	B	B	B	B	B
Client Sample Number			1	3	1	4	1	2	1
Depth - Top (m)			0.20	1.40	0.00	1.80	0.10	0.60	0.00
Depth - Bottom (m)			0.80	1.80	0.40	2.00	0.50	1.20	0.40
Date of Sampling			-	-	-	-	-	-	-
Time of Sampling			-	-	-	-	-	-	-
Sample Matrix			Clay	Clay	Clay	Clay	Clay	Clay	Sand
Determinant	**Units**	**Accreditation**							
Water soluble sulphate (as SO_4)	(mg/l)	u	220	20	42	< 10	25	< 10	51
Acid Soluble Sulphate	(%)	u	0.07	0.01	0.04	< 0.01	0.03	< 0.01	0.04
Total Sulphur	(%)	UKAS	0.07	0.02	0.09	0.02	0.07	0.01	0.31
pH Value	pH Units	MCERTS	7.3	8.0	8.0	7.8	7.6	7.4	7.1
Water Soluble Chloride	(mg/l)	u	4.3	5.6	4.4	3.5	3.2	3.5	5.1
Water Soluble Nitrate (As NO_3)	(mg/l)	u	13	< 1.0	26	7.0	1.2	< 1.0	9.2
Water Soluble Magnesium	(mg/l)	u	18	9.1	5.3	< 7.50	4.3	< 7.50	6.1

7 - 11 Harding Street
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L24/01203/GSL - 24-41711

Project Reference - Q1218 Heol Tabor

Analytical Test Results - Chemical Analysis

Lab Reference			341408	341409	341410
Client Sample ID			-	-	-
Client Sample Location			TP04	TP05	TP05
Client Sample Type			B	B	B
Client Sample Number			2	1	4
Depth - Top (m)			0.50	0.00	1.80
Depth - Bottom (m)			1.50	0.50	2.00
Date of Sampling			-	-	-
Time of Sampling			-	-	-
Sample Matrix			Clay	Sand	Clay
Determinant	**Units**	**Accreditation**			
Water soluble sulphate (as SO_4)	(mg/l)	u	< 10	33	19
Acid Soluble Sulphate	(%)	u	< 0.01	0.06	0.01
Total Sulphur	(%)	UKAS	0.01	0.27	0.02
pH Value	pH Units	MCERTS	7.2	7.8	7.4
Water Soluble Chloride	(mg/l)	u	1.9	3.1	3.1
Water Soluble Nitrate (As NO_3)	(mg/l)	u	< 1.0	4.3	< 1.0
Water Soluble Magnesium	(mg/l)	u	< 7.50	4.4	< 7.50

7 - 11 Harding Street
Leicester
LE1 4DH

L24/01203/GSL - 24-41711

Project Reference - Q1218 Heol Tabor

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
341401	-	TP01	B	1	Dark brown sandy slightly gravelly silty clay	-	-	63
341402	-	TP01	B	3	Brown silty slightly gravelly sandy clay	-	-	37
341403	-	TP02	B	1	Dark greyish brown sandy gravelly silty clay	-	-	44
341404	-	TP02	B	4	Brownish grey slightly sandy silty clay	-	-	67
341405	-	TP03	B	1	Made Ground- mottled red brown silty slightly gravelly sandy clay with frequent brick fragments	-	-	55
341406	-	TP03	B	2	Brown silty slightly gravelly sandy clay	-	-	50
341407	-	TP04	B	1	Made Ground- black very gravelly silty sand with frequent slag	-	-	47
341408	-	TP04	B	2	Brown silty slightly gravelly sandy clay	-	-	50
341409	-	TP05	B	1	Made Ground- black very gravelly silty sand with frequent slag	-	-	57
341410	-	TP05	B	4	Brown silty slightly gravelly sandy clay	-	-	49

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LE1 4DH

L24/01203/GSL - 24-41711

Project Reference - Q1218 Heol Tabor

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
341401	-	TP01	B	1	
341402	-	TP01	B	3	
341403	-	TP02	B	1	
341404	-	TP02	B	4	
341405	-	TP03	B	1	
341406	-	TP03	B	2	
341407	-	TP04	B	1	
341408	-	TP04	B	2	
341409	-	TP05	B	1	
341410	-	TP05	B	4	

7 - 11 Harding Street
Leicester
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L24/01203/GSL - 24-41711

Project Reference - Q1218 Heol Tabor

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preperation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
ASSO4S	MS - CL - Acid Soluble Sulphate	Oven Dried	Passing 2mm test sieve	Determination of total sulphate in soils by acid extraction followed by ICP analysis
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis
1377TS-ELT	BS1377 Total Sulphur Content by HTC	Oven dried	BS1377 : Part 1 : 2016	Total Sulphur Content testing of Soil in accordance with BS 1377 : Part 3 : 2018 + A1 : 2021 Clause 7.10 (using Eltra CS-800 Analyser)
1377MGICP	BS1377 WS Magnesium (ICP)	Oven dried	Passing 2mm test sieve	Water Soluble Magnesium testing of Soil in accordance with BS 1377 : Part 3 : 2018 + A1 : 2021 Clause 10.

7 - 11 Harding Street
Leicester
LE1 4DH

L24/01203/GSL - 24-41711

Project Reference - Q1218 Heol Tabor

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided
C - Received in inappropriate container
H - Contains headspace
T - Temperature on receipt exceeds storage temperature
R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
341401	-	TP01	B	1		A
341402	-	TP01	B	3		A
341403	-	TP02	B	1		A
341404	-	TP02	B	4		A
341405	-	TP03	B	1		A
341406	-	TP03	B	2		A
341407	-	TP04	B	1		A
341408	-	TP04	B	2		A
341409	-	TP05	B	1		A
341410	-	TP05	B	4		A

APPENDIX IX – GROUNDWATER AND GROUND GAS MONITORING RESULTS

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Cwmavon, Heol Tabor
Project No.:	Q1218
BH/TP No.:	BH01
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
74.93	A	50mm standpipe	30.00	10.00 - 30.00

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 mbgl	Water Level mAOD	HoleDepth mbgl	HoleDepth mAOD	Local Weather Recent	Local Weather Current	Remarks
A	19.12.23		1014	0.02	0.1	0.3	1.8	13.9	0	0	25.47	49.46	30.77	44.16	Overcast	Overcast	
A	11.01.24		1031	0.00	0.0	0.3	0.1	20.1	0	0	25.08	49.85	30.73	44.20	Overcast	Rain	
A	25.01.24		1014	-0.05	0.0	0.4	0.7	19.1	0	0	24.86	50.07	30.77	44.16	Rain	Rain	
A	7.02.24		997	0.02	0.0	0.4	2.5	16.4	0	0	24.53	50.40	30.75	44.18	Overcast	Overcast	
A	21.02.24		992	-0.02	0.1	0.4	4.9	9.6	0	0	24.20	50.73	30.79	44.14	Overcast	Overcast	
A	6.03.24		1011	0.04	0.0	0.0	0.1	20.6	0	0	26.54	48.39	30.80	44.13	Overcast	Overcast	
A	20.02.25		997	0.02	0.0	0.4	3.6	14.2	0	0	28.31	46.62	30.80	44.13	Overcast	Overcast / Showers	
A	25.03.25		1019	0.22	0.0	0.3	0.4	19.5	0	0	Dry		30.80	44.13	Dry/Sunny	Dry/Sunny	
A	23.04.25		1004	0.10	-0.2	0.1	0.3	19.6	0	0	29.20	45.73	30.80	44.13	Dry / Overcast	Rain / Overcast	
A	23.05.25		998	0.10	0.0	0.4	2.0	17.9	0	0	29.10	45.83	30.80	44.13	Rain	Rain	
A	26.06.25		1010	0.14	0.0	0.0	0.1	21.1	1	0	24.25	50.68	30.80	44.13	Dry/Sunny	Dry/Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Cwmavon, Heol Tabor
Project No.:	Q1218
BH/TP No.:	BH02
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
74.64	A	50mm standpipe	30.00	10.00 - 30.00

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 mbgl	Water Level mAOD	HoleDepth mbgl	HoleDepth mAOD	Local Weather Recent	Local Weather Current	Remarks
A	19.12.23		1014	0.02	0.0	0.3	0.1	21.2	0	0	Dry		11.95	62.69	Overcast	Overcast	
A	11.01.24		1031	0.00	0.2	0.3	0.1	20.7	0	0	Dry		11.95	62.69	Overcast	Rain	
A	25.01.24		1014	-0.05	0.0	0.3	2.7	14.1	0	0	Dry		11.96	62.68	Rain	Rain	
A	7.02.24		997	0.02	-0.1	0.4	6.3	5.7	0	0	Dry		11.95	62.69	Overcast	Overcast	
A	21.02.24		992	-0.02	0.1	0.4	3.4	12.9	0	0	Dry		11.96	62.68	Overcast	Overcast	
A	6.3.24		1011	0.04	0.1	0.0	1.1	18.5	0	0	Dry		11.95	62.69	Overcast	Overcast	
A	20.02.25		997	0.02	0.1	0.3	5.7	9.8	0	0	Dry		11.95	62.69	Overcast	ercast / Showers	
A	25.03.25		1019	0.22	0.0	0.3	0.0	20.0	0	0	Dry		11.95	62.69	Dry/Sunny	Dry/Sunny	
A	23/04/2025		1004	0.10	0.6	0.0	4.6	12.7	0	0	Dry		12.00	62.64	Dry / Overcast	Rain / Overcast	
A	23.05.25		998	0.10	0.0	0.4	5.1	10.2	0	0	Dry		12.00	62.64	Rain	Rain	
A	26.06.25		1010	0.14	0.0	0.0	6.9	8.5	3	1	Dry		12.00	62.64	Dry/Sunny	Dry/Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Cwmavon, Heol Tabor
Project No.:	Q1218
BH/TP No.:	BH06
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
72.46	A	50mm standpipe	30.00	10.00 - 30.00

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 mbgl	Water Level mAOD	HoleDepth mbgl	HoleDepth mAOD	Local Weather Recent	Local Weather Current	Remarks
A	19.12.23		1014	0.02	0.0	0.3	1.6	13.5	0	0	21.52	50.94	29.96	42.50	Overcast	Overcast	
A	11.01.24		1031	0.00	0.0	0.4	0.1	20.7	0	0	21.95	50.51	29.99	42.47	Overcast	Rain	
A	25.01.24		1014	-0.05	0.1	0.4	0.2	18.8	0	0	22.20	50.26	29.90	42.56	Rain	Rain	
A	7.02.24		997	0.02	0.0	0.4	1.5	16.8	0	0	22.35	50.11	29.95	42.51	Overcast	Overcast	
A	21.02.24		992	-0.02	0.0	0.4	2.9	10.5	0	0	22.52	49.94	29.88	42.58	Overcast	Overcast	
A	6.3.24		1011	0.04	0.0	0.0	0.4	19.6	0	0	22.53	49.93	29.92	42.54	Overcast	Overcast	
A	20.02.25		997	0.02	0.0	0.2	0.9	18.0	0	0	22.78	49.68	29.90	42.56	Overcast	vercast / Showers	
A	25.03.25		1019	0.22	0.2	0.2	0.3	20.0	0	0	22.93	49.53	29.90	42.56	Dry/Sunny	Dry/Sunny	
A	23.04.25		1004	0.10	-0.2	0.0	1.1	14.2	0	0	27.40	45.06	29.90	42.56	Dry / Overcast	Rain / Overcast	
A	23.05.25		998	0.10	0.0	0.4	2.5	14.8	0	0	25.60	46.86	29.90	42.56	Rain	Rain	
A	26.06.25		1010	0.14	0.0	0.0	3.3	8.9	3	1	23.04	49.42	29.94	42.52	Dry/Sunny	Dry/Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Cwmavon, Heol Tabor
Project No.:	Q1218
BH/TP No.:	WS01
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
74.91	A	50mm standpipe	5.60	1.60 - 5.60

Pipe	Date	Time (24hrs)	Atmos Pressure	Differential Well Pressure	Flow	CH_4	CO_2	O_2	CO	H_2S	Water Level		HoleDepth		Local Weather		Remarks
			mBar	mBar	L/hr	%	%	%	ppm	ppm	mbgl	mAOD	mbgl	mAOD	Recent	Current	
A	19.12.23		1014	0.02	0.0	0.3	6.7	8.6	0	0	Dry		5.66	69.25	Overcast	Overcast	
A	11.01.24		1031	0.00	0.0	0.3	2.1	17.0	0	0	Dry		5.66	69.25	Overcast	Rain	
A	25.01.24		1014	-0.05	0.0	0.3	2.2	16.7	0	0	Dry		5.66	69.25	Rain	Rain	
A	7.02.24		997	0.02	-0.1	0.4	1.3	18.7	0	0	Dry		5.67	69.24	Overcast	Overcast	
A	21.02.24		992	-0.02	0.0	0.4	4.5	12.0	0	0	Dry		5.66	69.25	Overcast	Overcast	
A	6.3.24		1011	0.04	0.0	0.0	0.2	20.3	0	0	Dry		5.66	69.25	Overcast	Overcast	
A	20.02.25		997	0.02	0.0	0.2	0.2	20.3	0	0	Dry		5.50	69.41	Overcast	vercast / Showers	
A	25/03/2025		1019	0.22	0.0	0.3	0.0	19.4	0	0	Dry		5.50	69.41	Dry/Sunny	Dry/Sunny	
A	23.04.25		1004	0.10	-0.1	0.0	0.0	20.1	0	0	Dry		5.70	69.21	Dry / Overcast	Rain / Overcast	
A	23.05.25		998	0.10	0.0	0.3	0.8	18.9	0	0	Dry		5.70	69.21	Rain	Rain	
A	26.06.25		1010	0.14	0.0	0.0	0.1	20.7	2	0	Dry		5.70	69.21	Dry/Sunny	Dry/Sunny	

LANDGAS & GROUNDWATER MONITORING RECORD SHEET

Project Name:	Cwmavon, Heol Tabor
Project No.:	Q1218
BH/TP No.:	WS02
Instruments Used:	Water Dip Meter Probe, GA2000 Gas Anaylser

Installation Date:				
GL (mAOD)	Pipe	Type	Installation Depth (mbgl)	Response Zone (mbgl)
74	A	50mm standpipe	5.00	1.00 - 5.00

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 mbgl	Water Level mAOD	HoleDepth mbgl	HoleDepth mAOD	Local Weather Recent	Local Weather Current	Remarks
A	19.12.23		1014	0.02	0.1	0.3	0.5	19.2	0	0	2.00	72.00	4.66	69.34	Overcast	Overcast	
A	11.01.24		1031	0.00	0.0	0.3	0.1	20.8	0	0	2.41	71.59	4.70	69.30	Overcast	Rain	
A	25.01.24		1014	-0.05	0.0	0.3	0.5	14.6	0	0	2.04	71.96	4.71	69.29	Rain	Rain	
A	7.02.24		997	0.02	0.0	0.4	0.7	18.8	0	0	2.00	72.00	4.70	69.30	Overcast	Overcast	
A	21.02.24		992	-0.02	0.0	0.4	3.3	13.4	0	0	2.02	71.98	4.72	69.28	Overcast	Overcast	
A	6.3.24		1011	0.04	0.0	0.0	0.1	20.0	0	0	2.33	71.67	4.71	69.29	Overcast	Overcast	
A	20.02.25		997	0.02	0.0	0.3	1.8	19.6	0	0	2.82	71.18	4.70	69.30	Overcast	vercast / Showers	
A	25.03.2025		1019	0.22	0.0	0.3	0.0	20.0	0	0	Dry		4.70	69.30	Dry/Sunny	Dry/Sunny	
A	23.04.25		1004	0.10	-0.1	0.0	0.8	20.3	0	0	Dry		4.70	69.30	Dry / Overcast	Rain / Overcast	
A	23.05.25		998	0.10	0.0	0.1	0.8	19.0	0	0	4.20	69.80	4.78	69.22	Rain	Rain	
A	26.06.25		1010	0.14	0.0	0.0	0.1	20.0	1	0	2.02	71.98	4.78	69.22	Dry/Sunny	Dry/Sunny	