



# **Former Cwmcarn High School**

## **Ground Investigation Report (Phase 1 and 2)**

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Caerphilly County Borough Council

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Prepared by WYG Environment Planning Transport Limited.

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## CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>1. INTRODUCTION .....</b>	<b>3</b>
1.1 Instruction .....	3
1.2 Brief .....	3
1.3 Report Scope .....	4
1.4 Limitations .....	5
<b>2. SITE INFORMATION .....</b>	<b>6</b>
2.1 Location .....	6
2.2 Site Description .....	6
<b>3. SITE SETTING .....</b>	<b>7</b>
3.1 Site Walkover .....	7
3.2 Geology, hydrogeology and hydrology .....	7
3.2.1 Geology .....	7
3.2.2 Hydrogeology .....	8
3.2.3 Hydrology .....	8
3.3 Historical Mining .....	8
3.3.1 Summary .....	9
3.4 Radon .....	9
3.5 Unexploded Ordnance .....	10
3.6 Site History .....	10
3.7 Preliminary Ground Contamination Risk Assessment .....	10
3.8 Recommendations .....	11
<b>4. SITE INVESTIGATION .....</b>	<b>12</b>
4.1 Phase 1 .....	12
4.1.1 Scope .....	12

4.2	Phase 2 .....	13
4.2.1	Scope.....	13
<b>5.</b>	<b>GROUND CONDITIONS ENCOUNTERED .....</b>	<b>15</b>
5.1	Strata encountered.....	15
5.1.1	Topsoil .....	17
5.1.2	Made Ground.....	17
5.1.3	Alluvium .....	18
5.2	Groundwater .....	19
5.3	In Situ Testing .....	19
5.3.1	Standard Penetration Testing.....	19
5.3.2	Soil Infiltration Testing .....	19
5.4	Visual or Olfactory Evidence of Contamination.....	20
5.5	Foundations .....	20
<b>6.</b>	<b>LABORATORY TESTING .....</b>	<b>21</b>
6.1	Geotechnical Testing .....	21
6.2	Environmental Testing .....	22
<b>7.</b>	<b>GROUNDWATER AND GAS MONITORING.....</b>	<b>24</b>
7.1	Groundwater Monitoring .....	24
7.2	Ground Gas Monitoring .....	25
<b>8.</b>	<b>GEOTECHNICAL ASSESSMENT.....</b>	<b>27</b>
8.1	Ground Conditions.....	27
8.2	Soil Properties .....	27
8.2.1	Made Ground.....	28
8.2.2	Shallow fine-grained alluvium .....	28
8.2.3	Coarse-grained alluvium .....	29
8.2.4	Fine-grained (Deeper) Alluvium .....	29



<b>9. GEOTECHNICAL DESIGN CONSIDERATIONS.....</b>	<b>31</b>
9.1 Proposed Development .....	31
9.2 Earthworks.....	31
9.3 Foundations .....	31
9.4 Floor Slabs .....	32
9.5 Chemical Attack on Buried Concrete .....	32
9.6 Temporary Works .....	32
9.7 Pavements .....	33
9.8 Drainage.....	33
<b>10. GROUND CONTAMINATION ASSESSMENT – HUMAN HEALTH.....</b>	<b>34</b>
10.1 Introduction .....	34
10.2 Assessment Criteria .....	34
10.2.1 Generic Assessment Criteria.....	34
10.2.2 Proposed End Use .....	35
10.2.3 Soil Organic Matter .....	36
10.2.4 Sampling Rationale .....	36
10.3 Tier 1 – Soil Screening – General Ground Conditions.....	36
10.4 Asbestos – General Ground Conditions.....	37
10.5 Asbestos – Post Demolition Survey .....	37
<b>11. GROUND CONTAMINATION ASSESSMENT – WIDER ENVIRONMENT.....</b>	<b>39</b>
11.1 Introduction .....	39
11.2 Assessment Criteria .....	39
11.3 Tier 1 Screening Assessment – Soil Derived Leachate .....	39
11.4 Tier 1 Screening Assessment – Groundwater .....	41
<b>12. PRELIMINARY GROUND GAS ASSESSMENT .....</b>	<b>43</b>
12.1 Introduction .....	43
12.2 Land Gas Risk Assessment Methodology .....	43

12.3 Preliminary Ground Gas Risk Assessment .....	43
12.3.1 Source potential .....	43
12.3.2 Risk Assessment .....	43
12.4 Summary and Discussion .....	44
<b>13. SITE CONCEPTUAL MODEL AND GROUND CONTAMINATION RISK ASSESSMENT .....</b>	<b>45</b>
13.1 Introduction .....	45
13.2 Site Conceptual Model .....	45
13.2.1 Sources .....	45
13.2.2 Pathways .....	46
13.2.3 Receptors .....	46
13.3 Ground Contamination Risk Assessment Table .....	47
<b>14. CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>53</b>
14.1 Ground Contamination .....	53
14.1.1 Summary .....	53
14.1.2 Asbestos .....	53
14.1.3 Ground Gas .....	54
14.2 Geotechnical .....	54
14.3 Recommendations .....	54
<b>15. NOTES .....</b>	<b>56</b>
<b>16. GLOSSARY .....</b>	<b>57</b>
<b>17. REFERENCES .....</b>	<b>58</b>

## FIGURES

Figure 1 – Site Location Plan

Figure 2 – Site Investigation Layout Plan

Figure 3 – SPT v Depth Plot

Figure 4 – Geological Sections

## TABLES

Table 1 – Summary of Coal Authority Report.....	8
Table 2 - Summary of strata depths (m bgl) for exploratory hole (Phase 1) .....	15
Table 3 - Summary of strata depths (m bgl) for exploratory hole (Phase 2) .....	16
Table 4 – Soil Infiltration Testing Results Summary .....	19
Table 5 - Summary of Geotechnical Testing .....	21
Table 6 - Summary of environmental testing .....	22
Table 7- Summary of Phase 1 groundwater levels monitoring .....	24
Table 8- Summary of Phase 2 groundwater levels monitoring .....	24
Table 9 – Summary of phase 1 Ground Gas monitoring .....	25
Table 10 – Summary of phase 2 Ground Gas monitoring.....	25
Table 11 - Summary of test results within the fine-grained alluvial deposits .....	28
Table 12 - Summary of in-situ test results within the coarse-grained alluvial deposits .....	29
Table 13 - Summary of in-situ SPT N test results within the deeper fine-grained Alluvium.....	30
Table 14 – Summary of pH exceedances.....	36
Table 15 – Summary of Asbestos Quantification .....	37
Table 16 – Summary of Exceedances within Soil Derived Leachate Samples.....	40
Table 17 – M-BAT adjusted Screening Values for Heavy Metals – Soil Derived Leachate.....	41
Table 18 – Summary of Exceedances within groundwater samples .....	42
Table 19 – M-BAT adjusted Screening Values for Heavy Metals – Groundwater .....	42
Table 20 – Initial GSV Calculations .....	44
Table 21 - Ground Contamination Assessment Risk Table .....	48

## APPENDICES

Appendix A – Report Conditions
Appendix B - Exploratory Hole Logs and photographic plates
Appendix C – Soil Infiltration Testing Results
Appendix D –TRL DCP results
Appendix E – Geotechnical laboratory test results
Appendix F – Environmental laboratory test results
Appendix G – Groundwater and Groundgas monitoring results
Appendix H – CIRIA C552 Risk Methodology

## EXECUTIVE SUMMARY

<b>The Site</b>	The site is a the former Cwmcarn High School consisting of a single remaining building surrounded by sports fields and hardstanding areas occupying an area of approximately 5.87 hectares. It is located off Chapel Farm Terrace near the A467 in the village of Cwmcarn. The proposed development comprises the construction of a new primary school with associated parking.
<b>Summary of DTS</b>	<p>The site is underlain by River Terrace Deposits in the east and Alluvium in the west. The bedrock is recorded to be the Rhonda Member composed of sandstone. The superficial deposits and bedrock are both classified as Secondary A Aquifers. The nearest watercourse is the Ebbw River located adjacent to the western boundary of the site. There are no surface water or groundwater abstractions near to the site and the site is not located within a groundwater source protection zone. A site-specific radon report for the site indicates no radon protection measures will be required for the future development.</p> <p>A review of historical mapping indicates the site was previously occupied by the remains of a chapel and agricultural buildings. A school was established on the site by 1962.</p>
<b>Site Investigation</b>	<p>Two site investigations (phases 1 &amp; 2) have been undertaken on the site with the following scope of works:</p> <p><u>Phase 1:</u> Three cable percussive boreholes to a maximum depth of 10.00mbgl. Six window sample boreholes, four machine excavated trial pits and two soakaway tests, two hand dug pits. Geotechnical and contamination laboratory testing.</p> <p><u>Phase 2:</u> Eight cable percussive boreholes to a maximum depth of 16.45m bgl. Ten windowless sampled boreholes, 26 machine excavated trial pits, five soakaway tests, and 17 TRL DCP tests. Geotechnical and contamination laboratory testing.</p>
<b>Ground Conditions</b>	The ground conditions across the site generally comprise topsoil or Made Ground over coarse grained and fine-grained alluvium. Within all but three of the deeper boreholes, and within two shallow locations, between 5.7m and 7.2m of variable strength clay and silt was encountered, from depths ranging from 2.3m to 11.2m bgl. In all locations identified, this strata was noted underlying dense sands and gravels, and the base was marked by more dense sands and gravels.
<b>Geotechnical Assessment</b>	<p>Shallow foundations, strip or pad, formed on the shallow fine-grained and coarse-grained alluvial deposits, at a minimum depth of 1m bgl, may be designed to an allowable net bearing pressure of 175kPa for strip foundations no wider than 0.7m or pads of no greater than 1m<sup>2</sup>.</p> <p>If greater loads are required a higher bearing capacity may be achieved with foundations placed solely within coarse grained material, however this would be subject to a more detailed assessment of settlement, primarily within the underlying clay and silt.</p> <p>Given the instability of the alluvial soils, high groundwater, and the compressibility of the clay and silt, piled foundations may be considered a more favourable option. Floor slabs may be ground bearing.</p>
<b>Ground Contamination Assessment</b>	Within the context of a human health risk assessment, no exceedances have been identified in the near surface soils within the context of the proposed development. Asbestos fibres were noted outside the proposed development. Based on the

	current development plan this is not considered a risk to end users. Made Ground is considered to pose a Low Risk to the wider environment (surface waters and groundwater).
<b>Ground Gas Assessment</b>	The site is classified as Characteristic Situation 1 whereby gas protection measures are not considered necessary in new developments.
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• Testing and classification of any excess soils to inform reuse or disposal;</li> <li>• Groundworkers should be informed of the nature of the historical developments on the site including the asbestos removal process and identification of a limited extent of asbestos fibres within two samples on the site. Works should be undertaken following a watching brief to identify any asbestos containing materials and outline the procedures to assess and manage any impacted soils.</li> <li>• Preparation of a geotechnical design report to fully assess the potential for settlement once required loads and foundation type has been confirmed.</li> </ul>

## 1. INTRODUCTION

### 1.1 Instruction

WYG Environment Planning Transport Ltd (WYG) was commissioned by Caerphilly County Borough Council to undertake a Ground Investigation and Interpretive Report on the site of the former Cwmcarn High School (known hereafter as “the site”), with the aim of gathering an overview of the geotechnical and geo-environmental conditions at the site.

The initial phase of works was undertaken whilst the former school buildings were still present on site, and as such, investigation locations were limited to open areas around the existing structures. Following the initial works, the school buildings were demolished following extensive asbestos removal by licenced contractors. All demolition rubble was removed from the site.

Subsequently, the proposed layout of the Cwm Gyddon Primary School was confirmed by the client, and WYG was commissioned to undertake a ground investigation specifically targeting the footprint of the proposed buildings, to gather more in depth information in areas possibly earmarked for development in the future, and to verify the ground conditions following the demolition of the former structures. The original report has been updated and re-issued as a Version 2 (V2). Data from both phases of ground investigation are included within this report.

This report should be read in conjunction with the following Desk Top Study (DTS) completed by WYG in March 2019 for the same site.

- WYG, March 2019 Cwmcarn High School. Phase 1 Geo-environmental Assessment. Desk Top Study. A110489-4. Caerphilly County Borough Council.

Key findings from the DTS have been summarised in this report for reference.

The location of the site is shown on Figure 1.

### 1.2 Brief

The brief was to undertake two phases of intrusive ground investigation to provide information on the ground conditions and to provide a geotechnical assessment and contaminated land risk assessment to support proposals for redevelopment.

The investigation was designed to comprise the following elements:

## Phase 1 (March 2019)

- 6 No. windowless sample boreholes to a maximum depth of 5.0m bgl with SPTs at 1m intervals to full depth;
- 3 No. cable percussive boreholes to a maximum depth of 10.0m bgl;
- 2 No. hand excavated inspection pits to expose foundations;
- 2 No. soil infiltration tests within mechanically excavated trial pits;
- Installation of 6 No. standpipes;
- On-site inspection and logging of samples;
- In-situ testing in exploratory holes;
- Chemical and geotechnical sampling in exploratory holes; and
- Laboratory geotechnical and chemical testing of soils.

## Phase 2 (November 2019)

- 8 No. windowless sample boreholes to a maximum depth of 5.0m bgl with SPTs at 1m intervals to full depth;
- 6 No. cable percussive boreholes to between 10.0m and 15.0m bgl, or competent strata;
- 12 No. machine excavated pits to a maximum depth of 5.0m bgl;
- 4 No. soil infiltration tests within mechanically excavated trial pits;
- Installation of 8 No. standpipes;
- On-site inspection and logging of samples;
- In-situ testing in exploratory holes;
- Chemical and geotechnical sampling in exploratory holes; and
- Laboratory geotechnical and chemical testing of soils.

## **1.3 Report Scope**

This report summarises the work undertaken during both phases of investigation and includes the following elements:

- Summary of the previous Desk Top Study undertaken by WYG in March 2019;
- Full factual records of the site works carried out (Phase 1 & 2);
- Summary of the ground conditions encountered;
- In-Situ testing results;

- Environmental laboratory testing results;
- Geotechnical laboratory testing results;
- Interpretation of Geotechnical and Environmental laboratory data, including a ground contamination risk assessment; and
- An executive summary of the report to allow a rapid, layman's overview.

### **1.4 Limitations**

This report has been prepared in accordance with the requirements of Caerphilly County Borough Council. It is subject to the report conditions presented in Appendix A.

The information contained in this report is intended for the use of Caerphilly County Borough Council and WYG can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.



## 2. SITE INFORMATION

### 2.1 Location

The site is located in Cwmcarn and is accessed via an access road (Chapel Farm Terrace) off the A467. The site is approximately 5.87ha in area and is centred on National Grid Reference (NGR) 321600, 193960.

A site location plan is presented in Figure 1.

### 2.2 Site Description

At the time of the Phase 1 site investigation, the site was occupied by the buildings of the former Cwmcarn High School. The former school consisted of school buildings across much of the south of the site, hard standing car parking in the south west of the site and playing fields across the majority of the northern part of the site. An all-weather sports pitch was situated in the north east of the site. The school was permanently closed in October 2018 with pupils being transferred to other schools.

Following the completion of the Phase 1 Ground Investigation, the majority of the school buildings were demolished with only the two storey performance building remaining. The all-weather pitch remained in the north east with grass sports pitches to the north and east. The footprint of the school buildings was characterised by gravel at the surface. All demolition waste had been removed from the site.

The site is generally level with a secure fence defining the site boundaries.

## 3. SITE SETTING

A Phase 1 Geo-environmental Desk Top Study (DTS) report has previously been prepared by WYG in March 2019. A summary of the key site information gathered as part of the DTS is presented in the following sections, however, the reader should refer to the report for full details including supporting/ referenced information.

### 3.1 Site Walkover

The site boundary is formed by a secure fence encompassing the entire site with pedestrian access points secured by padlocks and vehicle access secured by an electronic gate. Access to the site is via an unnamed road off Chapel Farm Terrace. At the time of the site walkover, the site was generally level with numerous school buildings and areas of hardstanding formerly used as a car parks and playing pitches. A courtyard was located adjacent to the school building which comprises a variety of low-lying shrubs and immature trees.

No visual or olfactory evidence of contamination was noted during the site walkover.

### 3.2 Geology, hydrogeology and hydrology

#### 3.2.1 Geology

The DTS reviewed the anticipated geology underlying the site, based on information collated from the British Geological Survey (BGS) sheet No.249 Solid and Drift (1:50,000) and the BGS website. The geological maps show no evidence that Made Ground is present at the site. However, as the site has previously been developed, it is anticipated that deposits of Made Ground will be present below the existing school buildings and external hard standing.

Geological maps show superficial deposits on site to comprise River Terrace Deposits (sand and gravel) in the east and south and Alluvium (clay, silt, sand and gravel) in the north and west. The bedrock underlying the site is recorded as sandstone of Rhondda Member Formation which is part of the South Wales Upper Coal Measures Formation.

A review of the Coal Authority Interactive Mapper indicates that a coal outcrop encircles the site to the east west and north.

### 3.2.2 Hydrogeology

The Rhondda Member Sandstone is designated as a Secondary A Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The River Terrace Deposits are also designated as a Secondary A Aquifer.

### 3.2.3 Hydrology

The nearest watercourse is the Ebbw River which lies adjacent to the western boundary of the site flowing south.

## 3.3 Historical Mining

According to the Coal Authority Interactive Viewer (The Coal Authority, 2019) the site is located within a Coal Mining Reporting Area and a Development High Risk Area. As such, a site-specific Coal Authority Report has been obtained for the site and is presented in the DTS report and summarised in the table below.

**Table 1 – Summary of Coal Authority Report**

Feature	Details
Past Underground Coal Mining	The property is in a surface area that could be affected by underground mining in 4 seams of coal at 70m to 90m depth, last worked in 1931. Any movement in the ground due to coal mining activity associated with these workings should have stopped by now.
Present Underground Coal Mining	The property is not within a surface area that could be affected by present underground mining.
Future Underground Coal Mining	The property is not in an area where the Coal Authority has received an application for and is currently considering whether to grant a licence to remove or work coal by underground methods. The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods. The property is not in an area likely to be affected from any planned future underground coal mining. However, reserves of coal exist in the local area which could be worked at some time in the future. No notices have been given, under Section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.
Mine Entries	There are no known coal mine entries within, or within 20m of the boundary of the property. There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

Feature	Details
Coal Mining Geology	The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.
Past Opencast Coal Mining	The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.
Present Opencast Coal Mining	The property does not lie within 200m of the boundary of an opencast site from which coal is being removed by opencast methods.
Future Opencast Coal Mining	There are no licence requests outstanding to remove coal by opencast methods within 800m of the boundary. The property is not within 800m of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.
Coal Mining Subsidence	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50m of the enquiry boundary, since 31 <sup>st</sup> October 1994. There is no current Stop Notice delaying the start of remedial works or repairs to the property. The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under Section 33 of the Coal Mining Subsidence Act 1991.
Mine Gas	The Coal Authority has no record of a mine gas emission requiring action.
Hazards related to coal mining	The property has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.
Withdrawal of Support	The property is in an area where a notice to withdraw support was given in 1945. The property is not in an area where a notice has been given under Section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

### 3.3.1 Summary

Based on the information presented above, the depth to recorded coal mine workings indicate that there is sufficient overlying bedrock, whereby in the event of the collapse of mine workings, the instability should not propagate to the surface.

## 3.4 Radon

The Envirocheck Report presented in the DTS report states that the site is in a low probability radon area as less than 1% of homes are estimated to be at or above the action level. However, consultation with the Public Health England online Radon UK Map showed around two-thirds of the site to fall within a grid square where there is a maximum Radon potential of 5 – 10% (requiring 'Basic' protection measures) and one-third of the site to fall within a grid square with a maximum Radon potential of 1% (not requiring protection measures). The BRE document 211 (Scivyer, 2015) mapping coverage for the site area was consulted and similarly indicated that the site is located

near the border of two areas where radon protection measures are, and are not, required for new developments. As such, a site-specific radon report was obtained from the BGS to clarify the site's Radon classification. The report ref. no. GR\_220243/1 is presented in the DTS report and confirms that no radon protection measures will be required for new developments on the site.

### **3.5 Unexploded Ordnance**

Based on freely available mapping data from Zetica UXO (Zetica UXO, 2008), the site is located within a Low Risk Area with regards to Unexploded Ordnance (UXO).

### **3.6 Site History**

The earliest available mapping (1880s) records the site as being occupied by the remnants of a former chapel, Chapel Farm buildings and agricultural land. The surrounding land consisted of mainly forest with industrial usage to the north comprising a quarry (possibly associated with the Prince of Wales Colliery) and a tin plate factory accessed by the Western Valleys railway line. Through the early 1900s, residential development took place to the south in Cwmcarn. Chapel Farm was demolished, and a school was established on the site by 1962. Potentially contaminative refuse tips were located both on-site and nearby in the 1960s, although these are limited in size. Commercial development continued to the north with the building of an office and several factories by 1973. An electricity substation associated with the TA barracks was built adjacent to the southern boundary at this time. The school complex was expanded with additional sports / leisure facilities in the 1980's. By the early 2000s the site was in its current configuration with the area to the north established as an industrial estate.

### **3.7 Preliminary Ground Contamination Risk Assessment**

The information in the DTS report was collated and evaluated to establish an initial qualitative risk assessment for the site. A conceptual model of the site was generated based on information derived from the Phase 1 Geo-environmental Assessment, supplemented by information attained during the WYG site walkover. The following potential pollutant linkages were identified:

- General contamination associated with Made Ground and re-worked materials on site with the potential to impact human health and environmental receptors;
- Potential for ACM in surface soils due to asbestos containing materials having been identified

within the school buildings; and

- Contamination associated with historical tip on site with the potential to impact human health and environmental receptors;
- Ground gas generation from on-site Made Ground, historical refuse tip and infilled ground and adjacent former refuse tip and quarry.

### 3.8 Recommendations

Based on the information within the DTS, ground investigation was recommended to facilitate the following:

- Investigation, logging and sampling of general ground conditions (superficial deposits and Made Ground soils) to assess the variability of soils and assess the depth to competent strata and/ or bedrock;
- Installation of land gas and groundwater monitoring wells;
- Geotechnical testing of soils (in situ and laboratory);
- Chemical laboratory testing of soils, soil derived leachate and groundwater chemistry for a range of contaminants including heavy metals, polycyclic aromatic hydrocarbons (PAHs), speciated hydrocarbons and PCBs;
- Return visits to monitor land gas (in line with CIRIA 665 guidance) and groundwater;
- An interpretive land quality assessment including development of a refined conceptual site model (based on site specific data) and a qualitative risk assessment (compliant with UK CLR guidance and CIRIA 552 methodology) within the context of a residential land use scenario;
- An interpretive geotechnical assessment of ground properties with respect to the proposed development of the site, including assessment of likely solutions for foundations, floor slabs and hard surface areas, feasibility of soakaway drainage, sulphate chemical attack and other salient matters such as potential requirements for ground stabilisation.

## **4. SITE INVESTIGATION**

### **4.1 Phase 1**

The Phase 1 site investigation was undertaken on the 25<sup>th</sup> March and the 28<sup>th</sup> of March to the 4<sup>th</sup> of April 2019. Three groundwater and ground gas monitoring visits were undertaken between 2<sup>nd</sup> and 16<sup>th</sup> of April 2019.

Details of the fieldwork methods are given in the notes section at the end of this report.

#### **4.1.1 Scope**

The scope of the site investigation included the following:

- Seven windowless sample boreholes (designated WS01, WS02, WS03, WS04, WS05, WS05A and WS06) to depths ranging from 1.7m to 3.0m bgl, with SPTs conducted at 1m intervals throughout;
- Four cable percussive boreholes (BH01-BH03 and BH03A) to depths ranging from 1.6m to 10.0m bgl;
- Six machine excavated trial pits designated TP01-TP04, SA01 and SA02 to a maximum depth of 2.2m bgl;
- Two soil infiltration tests undertaken within SA01 and SA02;
- Two hand excavated trial pits dug to a depth of 1.2m bgl designated HP01 and HP02;
- Installation of seven ground gas and groundwater monitoring wells;
- On-site inspection and logging of recovered samples;
- Representative soil samples taken and submitted for geotechnical classification testing;
- Representative soil samples submitted and tested for a suite of potential contaminants.
- Three return ground water and ground gas monitoring visits, including the collection of groundwater samples from five boreholes.

## 4.2 Phase 2

Following the completion of the initial ground investigation and demolition of the buildings, the proposed layout of the Cwm Gyddon Primary School was confirmed. WYG was commissioned to undertake a ground investigation specifically targeting the footprint of the proposed buildings, to gather more in-depth information in areas possibly earmarked for development in the future, and to verify the ground conditions following the demolition of the former structures.

The Phase 2 ground investigation was undertaken from 26<sup>th</sup> November to 20<sup>th</sup> December 2019 and three groundwater and ground gas monitoring visits between 13<sup>th</sup> December 2019 and 14<sup>th</sup> January 2020.

### 4.2.1 Scope

The scope of the site investigation included the following:

- Ten windowless sample boreholes (designated WS101, WS102, WS103, WS104, WS104A, WS105, WS106, WS107, WS107A, and WS108) to depths ranging from 1.36m to 4.61m bgl, with SPTs conducted at 1m intervals throughout;
- Eight cable percussive boreholes (BH101, BH101A, BH102, BH103, BH104, BH104A, BH105, and BH106) to depths ranging from 2.0m to 16.45m bgl;
- Fourteen machine excavated trial pits designated TP101 to TP108 (including TP105A & TP107A) and SA101 to SA104 to a maximum depth of 3.1m bgl;
- Twelve shallow machine excavated trial pits designated S1 to S12;
- Five soil infiltration tests undertaken within SA101, SA102, SA103, SA104 and TP103;
- Seventeen transport research lab dynamic cone penetrometer (TRL DCP) tests;
- Installation of eight ground gas and groundwater monitoring wells;
- On-site inspection and logging of recovered samples;
- Representative soil samples taken and submitted for geotechnical classification testing;
- Representative soil samples submitted and tested for a suite of potential contaminants;
- Three return ground water and ground gas monitoring visits, including the collection of





groundwater samples from two boreholes.

Figure 2 shows the layout of the exploratory holes advanced during the site investigation. Exploratory hole logs including photographic plates are presented in Appendix B.

## 5. GROUND CONDITIONS ENCOUNTERED

### 5.1 Strata encountered

The sequence of strata encountered beneath the site was;

- Topsoil;
- Made Ground;
- Fine grained and coarse-grained alluvial deposits.

It is noted that due to the complex sequence of the superficial deposits, they have been described by the generalised term of alluvium (encompassing clay, silt, sand, and gravel) and split into fine and coarse grained for the purposes of this report.

A summary of each stratum depth is provided in Table 2 (Phase 1) and Table 3 (Phase 2) below, with descriptions of each stratum detailed in the subsequent sections. Exploratory hole logs including photographic plates can also be seen in Appendix B.

**Table 2 - Summary of strata depths (m bgl) for exploratory hole (Phase 1)**

Location	Depth to base of strata (m bgl)			
	Topsoil	Made Ground	Alluvium	
			Fine grained	Coarse grained
BH01	0.0-0.3	ne	ne	0.3-10.0*
BH02	0.0-0.3	ne	ne	0.3-4.8*
BH03	0.0-0.3	ne	ne	0.0-1.6*
BH03A	0.0-0.3	ne	2.7-10.0*	0.3-2.7
HP01	0.0-0.2	0.2-0.4	ne	0.4-0.8
HP02	ne	0.0-0.1	0.1-0.45*	ne
SA01	0.0-0.3	ne	ne	0.3-1.2*
SA02	0.0-0.3	ne	ne	0.3-1.1*
TP01A	0.0-0.2	ne	ne	0.2-2.0*
TP02	0.0-0.3	ne	ne	0.3-2.2*
TP03	0.0-0.4	ne	0.9-1.7*	0.4-0.9
TP04	ne	0.0-0.4	0.4-1.2	1.2-1.9*
WS01	0.0-0.3	ne	0.3-1.0	1.0-1.3*
WS02	0.0-0.45	ne	0.45-1.0	1.0-1.7*
WS03	0.0-0.45	ne	0.45-1.0	1.0-1.7*
WS04	ne	ne	0.3-0.6	0.6-2.1*
WS05	ne	ne	ne	1.2-2.5*
WS05A	0.0-0.6	ne	0.6-1.1	1.1-2.9*
WS06	ne	0.0-1.4	1.4-2.15*	ne

\*Base of stratum not proven 'ne' denotes not encountered

**Table 3 - Summary of strata depths (m bgl) for exploratory hole (Phase 2)**

Location	Depth to base of strata (m bgl)			
	Topsoil	Made Ground	Alluvium	
			Fine grained	Coarse grained
BH101	0.0-0.3	ne	ne	0.3-2.0*
BH101A	0.0-0.3	ne	0.3-0.8 3.2-11.2	0.8-3.2 11.2-16.45*
BH102	0.0-0.3	ne	2.9-9.5	0.3-2.9 9.5-15.45*
BH103	0.0-0.3	ne	3.0-4.5	0.3-3.0 4.5-10.45*
BH104	0.0-0.3	ne	ne	0.2-2.0*
BH104A	0.0-0.3	ne	3.8-9.5	0.3-3.8 9.5-10.45*
BH105	ne	0.0-0.9	ne	0.9-6.95*
BH106	ne	0.0-0.4	2.9-9.1	0.4-2.4 9.1-10.15*
S1	ne	0.0-0.5*	ne	ne
S2	ne	0.0-0.2	ne	0.2-0.6*
S3	ne	0.0-0.5	0.5-0.7*	ne
S4	ne	0.0-0.2	0.2-0.6*	ne
S5	0.0-0.5	ne	0.4-0.8*	ne
S6	ne	0.0-0.2	0.2-0.6*	ne
S7	ne	0.0-0.3	0.3-0.6*	ne
S8	ne	0.0-0.8*	ne	ne
S9	ne	ne	ne	0.0-0.5*
S10	ne	0.0-0.3	0.3-0.6*	ne
S11	ne	0.0-0.05	0.05-0.5*	ne
S12	ne	0.0-0.5*	ne	ne
SA101	ne	0.0-0.1	0.1-1.1*	ne
SA102	0.0-0.5	ne	0.5-1.2*	ne
SA103	ne	0.0-0.9	0.9-1.9	1.9-2.6*
SA104	ne	0.0-0.4	0.3-1.2	1.2-2.6*
TP101	0.0-0.2	ne	2.3-2.9*	0.2-2.3
TP102	0.0-0.3	ne	0.3-1.1	1.1-2.2*
TP103	0.0-0.2	ne	0.2-0.7	0.7-1.9*
TP104	ne	0.0-0.9	0.9-1.3	1.3-2.9*
TP105	ne	0.0-0.4*	ne	ne
TP105A	ne	0.0-0.5	ne	0.5-1.6*
TP106	ne	0.0-0.2	ne	0.2-1.8*
TP107	ne	0.0-0.5*	ne	ne
TP107A	ne	0.0-3.1*	ne	ne
TP108	ne	0.0-0.4	0.4-0.9	0.9-2.6*
WS101	0.0-0.3	ne	0.3-0.7	0.7-2.45*
WS102	0.0-0.3	ne	0.3-1.0 2.9-4.61*	1.0-2.9
WS103	0.0-0.1	ne	ne	0.3-2.0*

Location	Depth to base of strata (m bgl)			
	Topsoil	Made Ground	Alluvium	
			Fine grained	Coarse grained
WS104	0.0-0.3	ne	ne	0.3-2.0*
WS104A	0.0-0.3	ne	ne	0.3-1.61*
WS105	ne	ne	ne	0.0-2.31*
WS106	ne	0.0-0.7	ne	0.7-1.36*
WS107	0.0-0.3	ne	0.3-1.86*	ne
WS107A	0.0-0.3	ne	0.3-2.14	ne
WS108	0.0-0.3	ne	0.3-1.2 1.45-1.7	1.2-2.06*

\*Base of stratum not proven  
ne denotes not encountered

### 5.1.1 Topsoil

Topsoil was encountered within 32 of the 63 exploratory holes (see above tables) to depths ranging from 0.1m bgl to 0.6m bgl. It was generally described as dark brown to brown gravelly to very gravelly sandy to very sandy organic clay/silt with frequent rootlets.

### 5.1.2 Made Ground

Made Ground was encountered within 30 locations, generally from ground level to between 0.1m and 3.1m bgl. Made Ground was found underlying topsoil within HP01. Spatially, Made Ground was only encountered within the area of the former school and parking in the south, and in the area of the former all-weather pitch. None was recorded within the grass pitch areas in the north.

The Made Ground generally consisted of a subbase type limestone gravel, or natural sands, gravels and clays mixed with anthropogenic materials such as limestone and brick with occasional/rare plastic, asphalt, glass, slag and metal. Boulders and cobbles of sandstone and limestone were sporadically noted.

Some exceptions include:

- Pink sand encountered within SA101, used as the surfacing of the all-weather pitch;
- Black ashy gravel/sand encountered in SA101, S7, TP105, and TP105A; and
- A reworked topsoil type material with gravel and cobbles of brick, limestone, sandstone and rare metal within TP108.

Aside from the aforementioned ashy material no visual or olfactory evidence of contamination was noted.

Please see exploratory hole logs in Appendix B for full descriptions of each position.

### 5.1.3 Alluvium

As previously noted, due to the complex stratigraphy of the superficial deposits underlying the site, the soils have been classified under the general term of alluvium and divided by the grain size and depth encountered.

The general organisation of the alluvial deposits is outlined below and clearly displayed in figures 4a and 4b.

- Shallow clays overlying;
- Sands and gravels overlying;
- Silts and clays overlying;
- Sands and gravels.

The silts and clays were not always encountered; sand and gravel being noted throughout the boreholes within BH01, BH02, and BH105.

#### **Shallow fine-grained alluvium**

Clays and silts were variable in depth and thicknesses. Shallow, soft to firm, sandy, gravelly clay was noted within 30 exploratory location from a top depth ranging from 0.05m to 1.45m bgl, to a base depth ranging from 0.45m to 2.15m bgl. This stratum ranged in thickness from 0.2m to 1.0m; averagely 0.6m. In terms of spatial distribution, the clay is present across the site.

#### **Coarse-grained alluvium**

Underlying the topsoil, Made Ground, and shallow clays, medium dense to dense sands and gravels were encountered. These materials included sub-rounded mixed gravels, cobbles and boulders. In the majority of locations, the base of this strata was not proven and was encountered to a maximum depth of 16.45mbgl within BH101A.

#### **Fine-grained alluvium (silts and clays)**

Within the majority of deeper boreholes, and two shallower locations (TP101 and WS102), low to high strength grey sandy silt/ silty clay was encountered from a minimum depth ranging from 2.3m to 3.8m bgl to a maximum depth ranging from 2.9m to 11.2m bgl. The full depth was not proven within BH03A, TP101 and WS102.

The depth of coarse-grained materials was not proven within the majority of trial pits and windowless sampled boreholes, and as such the silts and clays may extend further south and east than the logs indicate.

## 5.2 Groundwater

A continuous groundwater body was not identified across the site during the site investigation. Localised groundwater strikes were encountered in the superficial deposits in 30 locations at depths ranging from 0.40m (seepage) to 6.0m bgl (averagely 1.8m bgl).

## 5.3 In Situ Testing

### 5.3.1 Standard Penetration Testing

Standard Penetration Tests (SPTs) were undertaken throughout all window sample positions at approximately 1.0m intervals. SPTs were undertaken within all the cable percussive boreholes at 1.0m intervals within the top 5.00m and at every 1.5m below 5.00mbgl. The results are presented in the exploratory hole logs included in Appendix B.

### 5.3.2 Soil Infiltration Testing

A total of seven soil infiltration tests were carried out, designated as SA01, SA02, and SA101-105. The tests were undertaken within the shallow fine-grained alluvial deposits and the coarse-grained alluvial deposits. The results of these tests can be found in Appendix C and are summarised in Table 4 below.

It should be noted that the tests presented as part of the Phase 1 ground investigation were undertaken prior to the adoption of procedures in line with the new SAB regulations. As such these tests were terminated prior to a 24-hour test being completed. Tests undertaken during Phase 2 were continued for a minimum of 24 hours.

**Table 4 – Soil Infiltration Testing Results Summary**

Location	Depth	Strata	Hydraulic Conductivity (m/sec)		
			Test 1	Test 2	Test 3
SA01	1.2	Coarse grained alluvium	$5.09 \times 10^{-5}$	$4.75 \times 10^{-5}$	Fail – did not reach 25% effective depth
SA02	1.1	Coarse grained alluvium	Fail – did not reach 75% effective depth	-	-

Location	Depth	Strata	Hydraulic Conductivity (m/sec)		
			Test 1	Test 2	Test 3
SA101	0.6	Fine grained alluvium	$3.36 \times 10^{-6}$	$4.99 \times 10^{-6}$	$5.03 \times 10^{-6}$
SA102	0.6	Fine grained alluvium	$3.61 \times 10^{-6}$	$1.48 \times 10^{-6}$	$1.36 \times 10^{-6}$
SA103	1.6	Fine grained alluvium	Fail – did not reach 25% effective depth	-	-
	1.35	Fine grained alluvium	$3.71 \times 10^{-5}$	$6.06 \times 10^{-6}$	$2.01 \times 10^{-5}$
SA104	1.1	Fine grained alluvium	$8.95 \times 10^{-5}$	$8.39 \times 10^{-5}$	$6.42 \times 10^{-5}$
SA105	0.9	Coarse grained alluvium	$1.27 \times 10^{-3}$	$6.58 \times 10^{-4}$	$4.07 \times 10^{-4}$

## 5.4 Visual or Olfactory Evidence of Contamination

During the site investigation no significant visual or olfactory signs of contamination were identified. However, components of Made Ground, outlined above included the presence of coal, clinker, slag, metal, fabric membrane and compacted gravel hardstanding. Extensive areas of asphalt hardstanding are present on site, the front carpark in the south of the site and an access road running through the site.

## 5.5 Foundations

Foundations to an existing performing arts building were exposed during Phase 1 by the excavation of two hand pits (HP01 and HP02). It is proposed that the existing two storey performing arts block is retained and utilisation within the proposed development.

No other in ground obstructions were noted during the ground investigation.

## 6. LABORATORY TESTING

### 6.1 Geotechnical Testing

A programme of laboratory testing was carried out on samples taken from the various strata encountered during the site investigation. Geotechnical testing was scheduled by WYG and carried out by GSTL Ltd, an approved supplier in accordance with the requirements of WYG quality system and UKAS accredited for a range of geotechnical tests. The test procedures used were generally in accordance with the methods described in BS1377:1990. Details of the specific tests used in each case are given in Table 5. Laboratory geotechnical test results are given in Appendix E.

**Table 5 - Summary of Geotechnical Testing**

Test	No.	Test Method
<b>Phase 1</b>		
Moisture Content	9	BS1377:1990 Part 2:3.2
4 Point Liquid & Plastic Limit	9	BS1377:1990 Part 2:4.3&5.3
PSD: Wet Sieve method	19	BS1377:1990 Part 2:9.2
PSD: Sedimentation by Pipette	7	BS1377:1990 Part 2:9.4
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould)	12	BS1377:1990 Part 4 3.3
BRE Reduced Suite: pH, Acid Soluble Sulphate, Water Soluble Sulphate and Total Sulphur	19	BS1377:1990 Part 3 & BRE CP2/79 (non-accredited test)
<b>Phase 2</b>		
Moisture Content	8	BS1377:1990 Part 2:3.2
4 Point Liquid & Plastic Limit	8	BS1377:1990 Part 2:4.3&5.3
PSD: Wet Sieve method	13	BS1377:1990 Part 2:9.2
PSD: Sedimentation by Pipette	8	BS1377:1990 Part 2:9.4
One-dimensional Consolidation	6	BS1377:1990 5/3
Quick Undrained Triaxial Compression Test - Multi-stage	2	BS1377:1990 7/9
BRE Reduced Suite: pH, Acid Soluble Sulphate, Water Soluble Sulphate and Total Sulphur	5	BS1377:1990 Part 3 & BRE CP2/79 (non-accredited test)



## 6.2 Environmental Testing

Environmental chemistry was investigated by specialist chemical analysis of selected soil samples carried out by ALS Environmental Laboratories, an approved supplier in accordance with the requirements of WYG quality system and UKAS and MCERTS accredited for a range of chemical analyses. The testing was scheduled by WYG and is summarised in Table 6 for soil samples. The test results are included in Appendix F.

**Table 6 - Summary of environmental testing**

Test suite	No.	
	Phase 1	Phase 2
<b><u>Soil Samples:</u></b>  <b>WYG Suite C</b> <ul style="list-style-type: none"> <li>Heavy metals including Chromium (Hexavalent), Boron (water soluble), Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium and Zinc;</li> <li>Inorganics – including pH, Water soluble Sulphate as SO<sub>4</sub> (2:1 Extract), Cyanide (Easily liberatable- low level);</li> <li>Speciated Petroleum Hydrocarbons (TPH CWG);</li> <li>Speciated Polyaromatic Hydrocarbons (USEPA 16);</li> <li>BTEX and MTBE;</li> <li>Asbestos Screen; and,</li> <li>Phenol.</li> </ul>	<b>10</b>	<b>18</b>
<b>Asbestos Screening</b>	-	<b>11</b>
<b><u>Soil Derived Leachate Samples and Groundwater Suites</u></b>  <b>WYG Leachate Suite C</b> <ul style="list-style-type: none"> <li>Heavy metals including Antimony, Boron, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc;</li> <li>Inorganics – including pH, Sulphate, Chloride, Nitrite, Nitrate, Total Cyanide, Ammoniacal Nitrogen and NH<sub>3</sub> and NH<sub>4</sub> and Total Alkalinity</li> <li>Speciated Petroleum Hydrocarbons (TPH CWG);</li> <li>Speciated Polyaromatic Hydrocarbons (USEPA 16);</li> </ul>	<b>4</b> (soil derived leachates) <b>5</b> (groundwater samples)	<b>7</b> (soil derived leachates) <b>2</b> (groundwater samples)



Test suite	No.	
	Phase 1	Phase 2
<ul style="list-style-type: none"> <li>• BTEX and MTBE;</li> <li>• Phenol.</li> </ul>		

## 7. GROUNDWATER AND GAS MONITORING

### 7.1 Groundwater Monitoring

Groundwater levels were monitored on three occasions following the Phase 1 investigation, between 2<sup>nd</sup> and 16<sup>th</sup> April 2019. Groundwater levels were also recorded three times following the Phase 2 works between 13<sup>th</sup> December 2019 and 14<sup>th</sup> January 2020. The monitoring data is presented in Appendix G and summarised in Table 7 below.

It should be noted that groundwater level information was not obtained from the Phase 1 boreholes within the Phase 2 works due to the loss of installations during the demolition works on the site.

**Table 7- Summary of Phase 1 groundwater levels monitoring**

Location	Base of borehole (m bgl)	Depth to water (m bgl)		
		2 <sup>nd</sup> April	8 <sup>th</sup> April	16 <sup>th</sup> April
BH01	6.70	nr	1.10	1.33
BH02	4.85	0.95	0.65	0.87
BH03A	6.54	nr	1.22	1.38
WS01	1.60	DRY	1.45	1.53
WS02	1.27	DRY	0.94	1.18
WS03	1.55	1.50	1.17	1.45
WS05	2.30	Dry	Dry	Dry

**Table 8- Summary of Phase 2 groundwater levels monitoring**

Location	Base of borehole (m bgl)	Depth to water (m bgl)		
		13/12/2019	16/12/2019	16 <sup>th</sup> April
WS101	2.0	1.78	1.84	1.8
WS102	2.0	1.59	1.85	1.8
WS105	2.0	1.67	1.70	1.7
WS107	1.6	1.59	1.61	1.6
WS108	1.8	Dry	Dry	Dry
BH101A	7.0	1.97	4.06	nr
BH104	4.0	nr	nr	1.9
BH105	4.5	nr	nr	0.5

\*nr denotes not recorded.

## 7.2 Ground Gas Monitoring

Ground gas levels were monitored on three occasions following Phase 1 between 2<sup>nd</sup> and 16<sup>th</sup> April.

The monitoring data is presented in Appendix G.

**Table 9 – Summary of phase 1 Ground Gas monitoring**

Location	Max. Methane (peak) (% vol)	Max. Carbon Dioxide (peak) (% vol)	Min. Oxygen (steady) (% vol)	Max. Carbon Monoxide (steady) (ppm)	Max. Hydrogen Sulphide (steady) (ppm)	Max. Borehole flow (peak) (l/h)
BH01	<0.1	1.00	15.10	2	<1	-1.50
BH02	<0.1	0.90	20.50	2	<1	-1.20
BH03A	<0.1	2.10	16.40	<1	<1	0.30
WS01	<0.1	2.00	18.20	1	<1	0.40
WS02	<0.1	1.20	20.20	<1	<1	0.20
WS03	<0.1	4.00	17.40	<1	<1	0.30
WS05	<0.1	0.70	21.90	<1	<1	0.50

Ground gas levels were also monitored on three occasions following Phase 2 between 13<sup>th</sup> November 2019 and 14<sup>th</sup> January 2020. This is summarised in the below table. It is noted the Phase 1 wells were not located and therefore not monitored during this round.

**Table 10 – Summary of phase 2 Ground Gas monitoring**

Location	Max. Methane (peak) (% vol)	Max. Carbon Dioxide (peak) (% vol)	Min. Oxygen (steady) (% vol)	Max. Carbon Monoxide (steady) (ppm)	Max. Hydrogen Sulphide (steady) (ppm)	Max. Borehole flow (peak) (l/h)
WS101	0.2	1.8	19.5	<1	<1	0.1
WS102	0.2	2.0	1.5	<1	<1	0.2
WS105	0.2	1.3	18.8	<1	<1	0.2
WS107	0.2	3.0	18.2	<1	<1	0.1
WS108	0.2	1.8	19.2	<1	<1	0.1
BH101A	0.1	0.2	20.7	<1	<1	0.1
BH104	0.2	1.7	20.2	<1	<1	0.1
BH105	0.2	1.6	20.0	<1	<1	0.1

The results indicate measurable concentrations of carbon dioxide (maximum of 4.0%/vol) and methane (maximum 0.2%/vol).

The maximum gas flow recorded across the monitoring round was a flow of -1.50 l/hr, recorded at BH01. The highest positive gas flow was 0.5l/hr recorded in WS05.



The monitoring rounds were undertaken during atmospheric pressure conditions ranging from 975mb to 1007mb. A review of atmospheric pressure graphs on [weatheronline.co.uk](http://weatheronline.co.uk) indicates that monitoring was undertaken during periods of raising, falling and steady pressure.

In addition, the ground gas monitoring results indicate hydrogen sulphide concentrations of <1ppm across all monitoring rounds. Maximum concentrations of carbon monoxide of 2ppm were recorded.

## **8. GEOTECHNICAL ASSESSMENT**

### **8.1 Ground Conditions**

The ground conditions across the site generally comprise topsoil or Made Ground over coarse grained and fine-grained alluvium.

Made Ground was identified in the centre and east of the site in the footprint of the recently demolished school. The thickness and composition of the Made Ground in part reflects the use of the site and includes predominantly compacted gravel hardstanding and areas of asphalt hardstanding. Within TP107A, 3.1m of sub-base type gravel was noted, the base was not proven.

A thin layer of firm sandy gravelly clay was generally encountered at shallow depths underlying the topsoil/Made Ground.

The coarse-grained alluvial deposits generally recorded medium dense to dense sands and gravels with cobbles and boulders and was encountered across the site to a maximum depth of 16.45m bgl.

Within all but three of the deeper boreholes, and within two shallow locations, and from depths ranging from 2.3m to 11.2m bgl, variable strength clay and silt was encountered, this stratum was noted underlying dense sands and gravels, and the base was marked by more dense sands and gravels.

The depth of the coarse-grained alluvial deposits was often not proven. Based on the locations where silts and clay were encountered it is considered likely to underlie the majority of the site.

### **8.2 Soil Properties**

The ranges of the various soil properties measured are discussed below, to aid in the selection of design values. However, the appropriate choice of characteristic and design values will depend on the particular analysis and design philosophy used and should be selected by the designer.

Where characteristic values are given, these are reasonably conservative estimates of a measured or assessed property that may be used to represent the overall behaviour of the material. Design values are similar but also take into account the ground-structure interaction for a given structure so need to be selected by the designer. It is recommended, however, that design values used do

not exceed the characteristic values given in this report.

### 8.2.1 Made Ground

The Made Ground comprises both fine and coarse-grained soils, although the fine-grained soils typically have a high coarse-grained content. The deepest area of Made Ground encountered is in TP107a to 3.1m bgl. Given its shallow depth and variability it is not considered appropriate to give geotechnical parameters for this stratum.

### 8.2.2 Shallow fine-grained alluvium

Shallow fine-grained deposits were identified within 30 positions immediately below the Made Ground/topsoil and varied in thickness between 0.2m and 1.0m. A summary is presented in the table below.

**Table 11 - Summary of test results within the fine-grained alluvial deposits**

	No. of results	Range (min-max)	Average	Lower quartile	Upper quartile	Characteristic value <sup>+</sup>
Natural moisture content (m - %)	1	40	-	-	-	40
Liquid limit (LL)	1	40	-	-	-	40
Plastic limit (PL)	1	32	-	-	-	32
Plasticity index (PI)	1	8	-	-	-	8
Modified Plasticity Index <sup>1</sup>	1	7	-	-	-	7
SPT N Values	6	16-50	36	-	-	16
Undrained shear strength (kPa):						
- from SPT N values <sup>2</sup>	6	110-225	162	-	-	110
- from hand vanes	1	112	112	-	-	112

Notes:

+ suggested characteristic values are appropriate for most normal applications but designers should satisfy themselves that they are suitable for the specific application and design method they are using;

\* Estimated from a correlation from Peck, Hansen and Thornburn, Foundation Engineering, Wiley, 2nd ed., (1974)<sup>(6)</sup>

1 Modified Plasticity Index (I<sub>P</sub>) is defined as:  $I_P = (PI \times \% \text{passing } 425\mu\text{m}) / 100\%$ ;

2 Estimated from a correlation by Stroud and Butler (1975)<sup>(4)</sup>

Based on the above, it is recommended that the following values are taken as design/characteristic values for this material:

- Undrained shear strength 110kPa
- SPT N Value 16
- Angle of shearing resistance,  $\phi$  32°

### 8.2.3 Coarse-grained alluvium

Coarse grained alluvial deposits have been encountered across the site, and descriptions confirmed by PSD testing. A summary of the in-situ SPT N values can be seen in Table 12 below. A plot of SPN values with depth is also presented as figure 3.

**Table 12 - Summary of in-situ test results within the coarse-grained alluvial deposits**

	No of Results	Range (min-max)	Average	Lower quartile	Upper quartile	Characteristic value <sup>+</sup>
SPT N Values	83	0 - 57	37	28	50	28
$\phi$ (°)*		27-43	38	35	41	36

Notes:

+ suggested characteristic values are appropriate for most normal applications but designers should satisfy themselves that they are suitable for the specific application and design method they are using;

\* Estimated from a correlation from Peck, Hansen and Thornburn, Foundation Engineering, Wiley, 2nd ed., (1974)(6)

Based on the above, it is recommended that the following values are taken as design/characteristic values for this material:

- SPT N Value 28
- Angle of shearing resistance,  $\phi$  36°

Twelve representative samples of the coarse-grained alluvial deposits were selected for compaction tests. These indicated an optimum moisture content of 6-15% (average of 12%) with corresponding maximum dry densities ranging between 1.67 and 2.03 Mg/m<sup>3</sup> (average 1.83 Mg/m<sup>3</sup>). Initial moisture contents ranged between 3.7% and 14% above optimum (average 9.6%) and reflects the high groundwater table encountered beneath the site.

### 8.2.4 Fine-grained (Deeper) Alluvium

Deeper fine-grained alluvial deposits were encountered in all but three of the exploratory locations. The alluvium was encountered between 2.3m and 11.2m bgl and generally comprised grey silt and clay. A summary of the in-situ SPT N values and other relevant parameters from the Alluvium are presented in Table 13 below and in figure 3.



**Table 13 - Summary of in-situ SPT N test results within the deeper fine-grained Alluvium**

	No. of results	Range (min-max)	Average	Lower quartile	Upper quartile	Characteristic value <sup>+</sup>	
Natural moisture content (m - %)	7	21-27	24	22	27	24	
Liquid limit (LL)	7	26-72	61	51	76	61	
Plastic limit(PL)	7	21-31	27	24	31	27	
Plasticity index (PI)	7	5-49	34	26	49	49	
Modified Plasticity Index <sup>1</sup>	7	5-48	32	21	48	48	
SPT N Values	24	4-50	14	10	15	10	
Angle of shearing resistance, $\phi^{*}$	24	28-41	31	20	32	31	
Undrained shear strength (kPa):							
- from SPT N values <sup>2</sup>	24	17-210	59	41	64	59	
- from lab multistage triaxial tests	6	27-126	65	34	84	64	
- from Liquidity Index <sup>3</sup>	7	40-299	145	73	196	73	
Consolidation properties <sup>^</sup> :							
- from oedometer test	mv (m <sup>2</sup> /MN)	8	0.10-0.91	0.32	0.185	0.365	0.32
	cy (m <sup>2</sup> /yr)	8	6.3-15	11.3	8.8	14.3	11.3

Notes:

+ suggested characteristic values are appropriate for most normal applications but designers should satisfy themselves that they are suitable for the specific application and design method they are using;

\* Estimated from a correlation from Peck, Hansen and Thornburn, Foundation Engineering, Wiley, 2nd ed., (1974)(6)

^ values of mv and cv are quoted for pressure ranges appropriate to the depth of material and probable additional pressures following development, and designers should check the detailed test results to satisfy themselves that these values are relevant to their specific design requirements;

1 Modified Plasticity Index (I<sub>P</sub>) is defined as:  $I_P = (PI \times \% \text{passing } 425\mu\text{m}) / 100\%$ ;

2 Estimated from a correlation by Stroud and Butler (1975)(4)

3 estimated assuming  $c = 102(1-LI)$ , based on a correlation by Skempton and Northey (1952)(5);

Based on the above, it is recommended that the following values are taken as design/characteristic values for this material:

- SPT N Value 14
- Angle of shearing resistance,  $\phi'$  31°
- Undrained shear strength,  $c_u$  59kPa
- coefficient of volume compressibility, mv 0.20m<sup>2</sup>/MN

## **9. GEOTECHNICAL DESIGN CONSIDERATIONS**

### **9.1 Proposed Development**

The proposed development plan is presented on Figure 2 and comprises a single-story primary school located in the centre-north of the site with surrounding hardstanding and car parking. A hardstanding car park proposed in the centre south.

It is understood the two-storey performing arts block is to be retained.

### **9.2 Earthworks**

Given the current levels of the site, significant earthworks (cut and fill) is not anticipated at this stage. Site won coarse grained alluvial deposits are likely to be considerably wet of optimum moisture content due in part to the high groundwater table and require drying out before re-use.

### **9.3 Foundations**

Within the area of the proposed building topsoil was encountered overlying shallow fine-grained and coarse-grained alluvium. Underlying the coarse-grained material, variable strength silt/clay was encountered ranging from 2.3m to 11.3m overlying medium dense to dense gravels.

Based on the above ground conditions and given the relatively high groundwater table it is considered that shallow spread foundations, strip or pads, placed within the shallow fine grained and/or coarse grained alluvium, at a minimum depth of 1m bgl, would be a suitable foundation option for the proposed primary school. Shallow footings may be design to an allowable net bearing pressure of 175kPa, giving a factor of safety greater than 3 against ultimate bearing capacity failure, and should result in settlement less that 25mm for a strip footing of no greater than 0.7m wide or a pad of no more than 1m<sup>2</sup>.

If a greater bearing capacity is required then founding only within the coarse-grained alluvium may yield higher values however, a more detailed assessment of settlement (specifically of the underlying fine-grained alluvium) would be need to be undertaken in this instance.

If foundations cross from a fine to a coarse-grained soil, reinforcement of the foundation may be required to prevent differential settlement. Foundation excavations should be extended where deeper Made Ground is encountered.

Alternatively, given the unstable nature of the soils, or if increased loadings push settlement over an allowable limit, the use of piled foundations may offer an alternative. This should be confirmed with a specialist contractor.

Foundation excavations should be inspected by a suitably experienced engineer or inspector to ensure the founding material is suitable natural deposits. Any soft, loose or otherwise unsuitable material should be excavated and replaced by compacted granular backfill or lean concrete.

Construction elsewhere on the site would require further ground investigation.

### **9.4 Floor Slabs**

Floor slabs may be ground bearing to combined dead and live loads of  $20\text{kNm}^2$ . Any topsoil should be stripped and localised made ground excavated and replaced with compacted granular fill. The formation should be proof rolled and inspected by a suitably qualified engineer.

### **9.5 Chemical Attack on Buried Concrete**

Chemical tests undertaken on representative samples from the Made Ground and natural deposits show low levels of water-soluble sulphates and generally slightly alkaline conditions (in places up to pH10). Based on these conditions, it is recommended that for foundations the Design Sulphate Class for the site, as defined in BRE Special Digest 1, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1.

### **9.6 Temporary Works**

Trials pits were frequently terminated before target depth was achieved due to pit wall instability and groundwater ingress. It is considered that shoring or battering of even shallow excavations in the short term will be required. Groundwater is likely to be encountered at shallow depth (0.4m bgl downwards) and dewatering of excavations is likely to be required.

Within the eastern area (where the school was previously situated) two trial pits were terminated upon concrete obstructions. Further grubbing up may be required to facilitate any future development in this area.

## 9.7 Pavements

Hardstanding parking areas are currently proposed to the far south and north of the new primary school. Across the whole site 17 transport research lab dynamic cone penetrometer (TRL DCP) tests were undertaken and subsequently CBR values calculated based on the results.

Based on the 23 results gathered within the Made Ground, CBR values were in the range of 1% to 82% (average 30%). Given the very variable nature of the results obtained it is recommended a conservative value of 5% is adopted for pavement design within this stratum.

The results within the shallow fine grained and coarse-grained alluvium ranged from 3% to 249%. A CBR value of 5% is recommended for pavement design.

Proof rolling of the formation level will be required and any loose or soft spots should be removed and replaced with an engineer fill, in accordance with a suitable specification. The formation level will also need to be protected during inclement weather from deterioration.

Prior to placement of the founding material and the construction of the road pavement, the sub-formation and formation will need to be inspected and checked in accordance with a suitable specification to ensure the ground conditions are as expected. All testing should be carried out in accordance with DMRB IAN 73/06 to confirm that the ground conditions at the time of construction are consistent with the previous design parameters.

## 9.8 Drainage

Soakaway testing within the shallow fine grained and coarse-grained alluvial deposits at SA101 to SA105 has yielded soil infiltration values of the magnitude  $10^{-3}$  to  $10^{-6}$  with three tests undertaken at each location.

Based on the results it is considered soakaways may be feasible at the tested locations and depths, providing at least a 1m separation from the base of soakaway to the maximum anticipated water table (as per CIRIA's 2015 SuDS Manual) can be achieved. This should be further assessed when finalised soakaway positions and invert levels are known.

## 10. GROUND CONTAMINATION ASSESSMENT – HUMAN HEALTH

### 10.1 Introduction

The UK Contaminated Land Regime (CLR) allows for a tiered approach to the assessment of ground contamination which is designed to allow increasingly site-specific assessment. In order to assess the potential risk posed by contaminants contained within the soils at the study area a generic quantitative risk assessment (gQRA) has been undertaken by comparing recorded concentrations of chemical constituents in soil with Generic Assessment Criteria (GAC) to identify whether, at the concentrations recorded, the presence of the constituent has the potential to adversely affect the health of site users (a Tier 1 assessment). GAC are set at levels where potential exposure is deemed to be within acceptable limits.

If the recorded concentrations of a particular constituent are below the GAC then the risk is generally considered to be acceptable and further assessment / or mitigation measures are not required. Where a substance is recorded at concentrations higher than GAC this does not necessarily indicate that a particular risk is present, however, it does typically signify the requirement to undertake further assessment in line with the UK tiered risk assessment framework.

### 10.2 Assessment Criteria

#### 10.2.1 Generic Assessment Criteria

The following GAC for soils have been utilised for the screening process, in order of preference:

- CL:AIRE published C4SL (DEFRA, 2014);
- CIEH/LQM published S4UL (LQM/CIEH, 2015);
- WYG internal Tier 1 Screening Criteria (issue 15) derived using the derivation tool CLEA version 1.06, in line with the current UK Contaminated Land Regime.

C4SL are currently available for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead<sup>1</sup>. The C4SL were originally developed to support the categorisation of sites in accordance with Part 2A are also, based on DEFRA guidance, considered suitable for use during the assessment of sites as part of the planning process.

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<sup>1</sup> Arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI, lead assuming 6% SOM (1% SOM C4SL also published for benzene).

Where C4SLs are not available, 'Suitable for Use Levels' (S4UL) developed by CIEH/LQM have been used. The S4UL provide GAC based on minimal or tolerable risk intended to be protective of human health for individual or mixtures of substances. It is considered conservative and appropriate to use these values for contaminants for which C4SL are unavailable. GAC for volatile and semi-volatile organic compounds (VOC and SVOC) not presented in the S4UL document are sourced from CL:AIRE (CL:AIRE, January 2010).

Where no published screening values are available WYG have derived their own values (easily liberatable cyanide).

The CLEA model states that "For most exposure pathways, the contamination is assumed to be at or within one metre of the surface" (Environment Agency, 2009). It is considered that at depths greater than 1.0m, the probability of human exposure via the direct contact pathways are significantly reduced, leaving inhalation of volatile compounds as the dominant pathway with regard to human health risks. Typically, volatile compounds only significantly affect the indoor inhalation pathway. The same screening concentrations have been used for all depths at this stage, though it is noted that these are highly conservative for depths below 1.00m bgl.

### 10.2.2 Proposed End Use

Screening criteria have been developed for the following land use scenarios:

- Residential with plant uptake;
- Residential without plant uptake;
- Allotments;
- Public open space (park and residential);
- Commercial / Industrial.

The proposed development on site will consist of the construction of a single storey primary school positioned on the former sports pitches in the north of the site, it is assumed that any future construction on the site will be associated with education facilities. In the event that alternative development plans are proposed, further risk assessment may be required.

As the proposed land use does not fall into one of the categories listed above, the screening assessment has been undertaken against the residential without plant uptake scenario to provide a conservative assessment.

### 10.2.3 Soil Organic Matter

For organic contaminants, the generic soil screening values have been derived for a range of concentrations of soil organic matter (1%, 2.5%, 6%). In order to provide a conservative assessment the GAC derived for a 1% SOM have been adopted.

### 10.2.4 Sampling Rationale

Samples were obtained from the near surface soils across the site during both phases of ground investigation. During the fieldwork no olfactory or visual evidence of contamination was noted, and as such the testing regime was scheduled to represent a spread of material representative of the near surface soils. The results from both phases of work have been combined as part of this assessment.

In addition to this, twelve samples were obtained from the surface material across the footprint of the former school buildings during the second phase of works. These samples were scheduled for asbestos screening only and were intended to identify asbestos fibres or asbestos containing materials which may have become entrained within the surface materials during the demolition process.

## 10.3 Tier 1 – Soil Screening – General Ground Conditions

A total of 28 soil samples collected from across the site during both phases of investigation. These were submitted for chemical laboratory analysis in line with the testing outlined in Table 6. Full copies of laboratory certificates for all soil analysis are included in Appendix F, along with a summary table of the results.

Comparison of the chemical analysis results with the generic assessment criteria for a residential with plant uptake end use has identified three samples to have a pH in exceedance of the screening value (pH5 - pH9). These are detailed below:

**Table 14 – Summary of pH exceedances**

Location	Depth	Strata	Concentration
BH106	0.3	Made Ground	9.15
	0.6	Coarse grained alluvium	10.3
TP106	0.1	Made Ground	9.22

No other exceedances were recorded with respect to the relevant screening criteria.

Marginally elevated pH is not generally considered to pose a risk to site users and is potentially linked to concrete within the Made Ground or entrained within the near surface materials. Further consideration is however given to the recorded values in the following sections.

## 10.4 Asbestos – General Ground Conditions

Since 2009 there have been laboratory improvements in the detection of asbestos and as such all samples of made ground and natural were subject to an asbestos screen. There is no published screening value for asbestos.

A total of 28 samples were collected and analysed for the presence of asbestos containing materials as part of the assessment of the general soils on site. The laboratory results indicated that asbestos was positively identified in one sample (WS105 at 0.5m). This sample was subsequently scheduled for quantification testing and the results are summarised below, as well as within Appendix F.

**Table 15 – Summary of Asbestos Quantification**

Exploratory Hole	Depth (m bgl)	Asbestos Identified (Laboratory Description)	Asbestos Containing Material (Laboratory Description)	Gravimetric Quantification (ACM) (mass %)	PCOM Quantification (fibres) (mass %)	Gravimetric and PCOM Total* (mass %)
WS105	0.5	Amosite	Loose fibres in soil	<0.001	<0.001	<0.001

**Table Notes:** ACM = asbestos containing material. PCOM = phase contrast optical microscopy. \*total of mass % from gravimetric quantification and phase contrast optical microscopy quantification.

Quantification testing has indicated the presence of amosite fibers at concentration below the laboratory limit of detection.

Asbestos was not identified within any other samples and asbestos containing materials were not noted during the ground investigation.

The risks posed by the presence of asbestos are considered in more detail in the risk assessment presented in Section 13.

## 10.5 Asbestos – Post Demolition Survey

Following the demolition of the former school buildings samples of the shallow soils were obtained and screened for the presence of asbestos containing materials. Twelve samples were obtained from across the footprint of the buildings and asbestos containing materials were only identified



within one sample, as summarised below.

Exploratory Hole	Depth (m bgl)	Asbestos Identified (Laboratory Description)	Asbestos Containing Material (Laboratory Description)	Gravimetric Quantification (ACM) (mass %)	PCOM Quantification (fibres) (mass %)	Gravimetric and PCOM Total* (mass %)
S12	0.3	Amosite	Loose fibres in soil	0.003	<0.001	0.0034

The presence of amosite within soil samples associated with the former footprint of the building is discussed further in Section 13.

## **11. GROUND CONTAMINATION ASSESSMENT – WIDER ENVIRONMENT**

### **11.1 Introduction**

The potential for contaminated groundwater on site to adversely affect controlled water receptors (groundwater and surface water bodies) has been assessed at this stage by direct comparison of analytical data from the WYG ground investigation with relevant Water Quality Standards (WQS).

Similarly, the potential for soil contamination to impact controlled waters has been assessed by comparing analytical data from soil derived leachate tests directly against WQS.

### **11.2 Assessment Criteria**

In light of the environmental setting of the site under consideration. The following water quality standards have been adopted, in order of preference.

- Water Framework Directive (WFD),
- Environmental Quality Standards (EQS);<sup>2</sup>
- WHO 2008 - Petroleum Products in Drinking Water (WHO 2008)
- UK Drinking Water Standards<sup>3</sup>.

### **11.3 Tier 1 Screening Assessment – Soil Derived Leachate**

Soil derived leachate samples can be used to identify potentially mobile contamination within soil samples collected from the site. It should be noted that the laboratory preparation of leachate samples is likely to produce higher concentrations of leachable components than conditions encountered on site, as such the following assessment is considered to be inherently conservative in nature.

Four soil derived leachate samples were screened against a suite of determinants outlined in

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<sup>2</sup> Where WFD 2015 are not presented revoked WFD 2010 standards are used

<sup>3</sup> WHO 2005; WHO 2008; UK Water Supply Regulations 2010 and 1989 Regulations. Priority given to UK drinking water standards

Section 11.2 as part of the Phase 1 Investigation, with a further seven samples analysed in Phase 2.

The following table summarises the determinants which have been identified at concentrations in excess of the relevant WQS screening criteria.

**Table 16 – Summary of Exceedances within Soil Derived Leachate Samples**

Determinant	Units	Maximum	Minimum	Screening Value	Exceedances	
					No.	Location/depth (m bgl)
Cadmium	mg/l	0.0000817	<0.00008	0.00008	1	WS108 0.2
Copper	mg/l	0.00416	<0.0003	0.0001	7	BH106 0.3 SA101 0.6-0.7 SA102 0.1-0.2 TP104 0.5 TP106 0.1 WS102 0.2 WS108 0.2
Lead	mg/l	0.00132	<0.0002	0.0012	1	WS108 0.2
Zinc	mg/l	0.053	<0.001	0.0109	2	WS102 0.2 WS108 0.2
Aromatics EC7-EC8	mg/l	0.021	<0.01	0.01	1	SA01 0.2
Fluoranthene	mg/l	0.000235	0.000059	0.0000063	11	SA01 0.2 TP04 0.3 WS03 1.0 WS06 0.9 BH106 0.3 SA101 0.6-0.7 SA102 0.1-0.2 TP104 0.5 TP106 0.1 WS102 0.2 WS108 0.2
Benzo(b)fluoranthene	mg/l	0.000040	0.000005	0.000017	1	SA101 0.6-0.7

\* Inland waters EQS

A number of determinants (heavy metals, aromatic hydrocarbons, and PAH compounds) were identified within the soil derived leachate samples at concentrations in excess of the relevant screening value.

The screening criteria for lead, copper, and zinc should be considered in the context of the bioavailability of the contaminant, which can be calculated using the Water Framework Metal

Bioavailability Assessment Tool (M-BAT)<sup>4</sup>. The results of this assessment are presented in the table below.

**Table 17 – M-BAT adjusted Screening Values for Heavy Metals – Soil Derived Leachate**

Determinant	Sample	Concentration (µg/l)	Screening Value (µg/l)	M-BAT Screening Value (µg/l)	Exceedances
Copper	BH106 0.3	1.94	1	16.59	No
	SA101 0.6-0.7	1.18		14.25	No
	SA102 0.1-0.2	3.05		15.99	No
	TP104 0.5	2.41		9.52	No
	TP106 0.1	3.00		11.65	No
	WS102 0.2	2.48		22.23	No
	WS108 0.2	4.16		15.70	No
Lead	WS108 0.2	1.32	1.2	4.85	No
Zinc	WS102 0.2	31.1	10.9	25.42	Yes
	WS108 0.2	53		18.07	Yes

When these values are taken into account only the zinc exceedances remain.

The remaining exceedances pertain to elevated concentrations of cadmium, aromatic hydrocarbons and PAH compounds. These exceedances in soil derived leachate samples have been carried forward to the risk assessment presented in Section 13.

A summary of the recorded concentrations is presented in Appendix F along with the full laboratory test results.

## 11.4 Tier 1 Screening Assessment – Groundwater

Groundwater samples were analysed from seven locations across the site; BH01, BH02, BH03A, WS02, WS03, BH104, and BH105, from both phases of the investigation.

The samples were tested against the suite of determinants and the exceedances are summarized in the following table. A summary of the recorded concentrations is presented in Appendix F along with the full laboratory test results.

<sup>4</sup> [www.wfduk.org](http://www.wfduk.org)

**Table 18 – Summary of Exceedances within groundwater samples**

Determinant	Units	Maximum	Minimum	Screening Value	Exceedances	
					No.	Location
Copper	ug/l	1.38	<0.3	1.0	1	BH105
Fluoranthene	ug/l	0.0198	<0.005	0.0063	1	BH104
Benzo(a)pyrene	ug/l	0.0114	<0.002	0.00017	1	BH104
Benzo(g,h,i)perylene	ug/l	0.0145	<0.005	0.0082	1	BH104

\* Freshwater waters EQS 2015

# DWS 1989

\$ Inland Surface Waters EQS 2015

Similar to the process undertaken within the leachate assessment, copper has been considered within the context of bioavailability. The calculated site specific values indicate no further copper exceedance as summarised in the following table.

**Table 19 – M-BAT adjusted Screening Values for Heavy Metals – Groundwater**

Determinant	Sample	Concentration (µg/l)	Screening Value (µg/l)	M-BAT Screening Value (µg/l)	Exceedances
Copper	BH105	1.38	1	13.96	No

The elevated concentrations of the PAHs are considered in more detail in Section 13.

## 12. PRELIMINARY GROUND GAS ASSESSMENT

### 12.1 Introduction

Six return ground gas monitoring visits were undertaken between the 2<sup>nd</sup> and 16<sup>th</sup> April 2019.

Three return ground gas monitoring visits were undertaken following phase 1 between the 2<sup>nd</sup> and 16<sup>th</sup> April 2019 and a further three visits following phase 2 between 13<sup>th</sup> December 2019 and 14<sup>th</sup> January 2020. Full factual site records of the gas monitoring results are presented in Appendix G.

### 12.2 Land Gas Risk Assessment Methodology

The key reference document which has been used to undertake the semi-quantitative land gas assessment presented in this report is CIRIA C665<sup>5</sup>. This provides a framework for assessment of land gas risk to buildings/structures with foundations (i.e. houses and/or commercial properties).

The collected data has been used for the purposes of undertaking a semi-quantitative assessment in accordance with the CIRIA 665 methodology. The calculation used to calculate the gas screening value (GSV) for the site, together with the relevant definition of units, is as follows:

$$\text{GSV (litres of gas/hr)} = \text{borehole flow rate (l/hr)} \times \text{gas concentration (volume/100)}$$

### 12.3 Preliminary Ground Gas Risk Assessment

#### 12.3.1 Source potential

The site is underlain by mostly natural alluvial deposits with a limited thickness of Made Ground close to the school building, both of which are considered to represent a potential (but limited) source of ground gas generation.

#### 12.3.2 Risk Assessment

In order to assess the significance of ground gases at the site, measured concentrations and flow rates have been used to derive Gas Screening Values (GSVs). GSVs are the product of gas concentration and gas flow measured in a borehole and provide an indication of the flow of the

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<sup>5</sup> CIRIA C665, Assessing Risks Posed by Hazardous Ground Gases to Buildings. 2007

particular gas in question out of the ground.

Based on a maximum flow recorded of 1.5l/hr and the maximum recorded concentration of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) during the two monitoring visits, the GSVs have been calculated as presented in Table 20.

**Table 20 – Initial GSV Calculations**

Gas	Maximum Concentration (%)	Maximum Flow Rate (l/hr)	GSV (l/hr)	Characteristic Situation (Wilson and Card)
Carbon Dioxide	4.0	1.50	0.06	1 (Very Low Risk)
Methane	0.2	1.50	0.003	1 (Very Low Risk)

These values have been compared with the Revised Wilson and Card Classification presented within the CIRIA C665 (2007) report, specifically Table 8.5. The Characteristic values presented above reflect a risk assessment designed for the majority of building types with the exception of low-rise residential buildings which are covered by the NHBC Traffic light system which is specifically designed for residential properties.

## 12.4 Summary and Discussion

The site has been classified as Character Situation 1 (Very Low Risk) based on consistently low concentrations of carbon dioxide and methane, coupled with low borehole flow rates. Site classification of a Characteristic Situation 1 indicates no requirement for special protection measures for new developments.

The site is also located within a low risk area with respect to radon.

## **13. SITE CONCEPTUAL MODEL AND GROUND CONTAMINATION RISK ASSESSMENT**

### **13.1 Introduction**

In general, ground contamination can occur through several causes, particularly from historical operations and activities. Contamination can result from either on-site sources or from on-site migration from off-site sources, leading to long term liabilities under recent legislation for any site owner.

The Environmental Protection Act 1990 (Part IIA) makes provisions for a risk-based framework for the identification, assessment, management and redevelopment of contaminated land within the UK. The provisions of the Act came into effect in England and Wales in July 2001 and are aimed at ensuring that actions taken with respect to contaminated land are directed by a technically well-founded assessment of risk.

The process of risk assessment is an evaluation of the probability of harm, and comprises the identification of sources of contamination, receptors that may be affected by the contamination and pathways by which the receptors may be harmed forming a pollution linkage. The site conceptual model (presented below) forms the basis for the qualitative assessment of ground contamination risks associated with the site.

### **13.2 Site Conceptual Model**

The conceptual model for the site reflects the findings and observations during the site investigation. The key source, pathway, receptor model is outlined below within the context of the anticipated future residential development on the site.

#### **13.2.1 Sources**

The following sources of contamination have been identified from the site investigation and subsequent monitoring rounds:

- General contamination associated with Made Ground on site;
- Potentially Mobile Contamination within Made Ground (PAH from soil derived leachate samples);



- Asbestos containing materials associated with general shallow soils;
- Asbestos containing materials associated with footprint of former school buildings;
- Contaminants associated with historical refuse heaps, both on site and off site;
- Ground Gas.

### 13.2.2 Pathways

The primary pathways by which sensitive receptors may come into contact with ground contamination are considered to be the following:

- Direct dermal contact or ingestion of soils, or inhalation of dust (i.e. human interaction with surface and sub-surface materials);
- Disturbance of potential asbestos impacted soils and subsequent inhalation of asbestos fibres;
- Leaching and horizontal or vertical migration through the unsaturated ground, whether through permeable sub-surface materials and/or preferential pathways;
- Lateral and vertical migration of groundwater through permeable sub-surface materials and/or preferential pathways;
- The migration and accumulation of ground gases or vapours through permeable sub-surface materials and/or preferential pathways.

### 13.2.3 Receptors

The following are considered to be sensitive receptors:

- Site construction workers;
- Future Site users (within the context of the proposed use following future development);
- Groundwater within underlying Secondary A Aquifer;
- Surface waters of the Ebbw River;
- Future Building Infrastructure.

### **13.3 Ground Contamination Risk Assessment Table**

The pollution linkages and a qualitative risk assessment are presented in the table below. The risk assessment considers the site within an area context and assesses potential risks to identified receptors in relation to the existing site setting and the proposed development. CIRIA C552 has been used to define the risk rating presented in the Qualitative Risk Assessment matrix, methodology for which is presented in Appendix H.

## Former Cwmcarn High School

**Table 21 - Ground Contamination Assessment Risk Table**

Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
General contamination associated with Made Ground on site	Direct dermal contact or ingestion	Current site users	Medium	Unlikely	<b>Low Risk</b>	The only contaminants exceeding the GAC are high pH values within three samples. This is not considered a risk to human health and is likely to reflect the inclusion of concrete containing materials with near surface soils. As such no risk management procedures are considered necessary.
		Future site users		Unlikely	<b>Low Risk</b>	
		Construction workers		Unlikely	<b>Low Risk</b>	
	Leaching and horizontal or vertical migration	Groundwater (Secondary A Aquifer)	Medium	Unlikely	<b>Low Risk</b>	The laboratory test results of the soil derived leachate testing from the general Made Ground, and groundwater testing indicated a limited number of elevated concentrations of metal, aromatic hydrocarbons and PAH compounds above the EQS screening criteria. Given the conservative nature of the leachate and groundwater testing methodology and the relatively minor exceedances identified, the recorded concentrations are not considered to pose a significant risk to controlled waters.
		Surface waters (Ebbw River)		Unlikely	<b>Low Risk</b>	

## Former Cwmcarn High School

Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Potential contamination associated with historical refuse heaps (on- and off-site)	Direct dermal contact or ingestion	Future site users	Medium	Unlikely	Low Risk	Samples obtained from the general area did not identify any elevated contaminants however, in the event that this area is redeveloped a watching brief should be in place, and if any contamination is identified works should cease and WYG contacted.
		Construction workers	Medium	Low likelihood	Moderate to Low Risk	
	Leaching and horizontal or vertical migration	Groundwater (Secondary A Aquifer)	Medium	Unlikely	Low Risk	
		Surface waters (Ebbw River)	Medium	Unlikely	Low Risk	

## Former Cwmcarn High School

Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Asbestos within Made Ground (general site)	Inhalation	Current and future site users	Medium	Unlikely	<b>Low Risk</b>	Only one sample from the general made ground has identified the presence of asbestos fibres at low concentrations (<0.001%). risk management procedures are not considered necessary in the context of the proposed development. However, site construction workers should be cognisant of the potential presence of asbestos containing materials and works should be undertaken following a watching brief to identify any asbestos containing materials and outline the procedures to assess and manage any impacted soils.
		Construction Workers	Medium	Low likelihood	<b>Moderate to Low Risk</b>	

## Former Cwmcarn High School

Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Asbestos within Made Ground (former building footprint)	Inhalation	Current and future site users	Medium	Unlikely	<b>Low Risk</b>	<p>One sample from the shallow soils within the footprint of the former school buildings identified the presence of asbestos fibres above the laboratory limit of detection.</p> <p>Prior to the demolition of the school asbestos was removed from the buildings by a licenced asbestos removal contractor and materials disposed of off-site. Whilst procedures to minimise asbestos mobilisation would have been implemented some asbestos containing materials may have remained within the demolition rubble. The likely extent of any asbestos containing materials in this area of the site is considered to be limited, however it is recommended that any future development within this area of the site is undertaken under an Asbestos Management Plan to identify, assess and manage any asbestos containing materials encountered during the development phase. It should be noted that the current development proposals do not extend into this area of the site.</p>
		Construction Workers	Medium	Low likelihood	<b>Moderate to Low Risk</b>	

## Former Cwmcarn High School

Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Ground gas generation associated with Made Ground	Inhalation of gases	Current and future site users	Medium	Unlikely	<b>Low Risk</b>	The results of the ground gas monitoring undertaken across the site indicates that the site is categorised as Characteristic Situation 1 under the Wilson and Card classification presented in CIRIA 665. This does not require the installation of gas protection measures for new developments.
		Site construction workers	Medium	Unlikely	<b>Low Risk</b>	

## 14. CONCLUSIONS AND RECOMMENDATIONS

### 14.1 Ground Contamination

#### 14.1.1 Summary

Only minimal extents of Made Ground were recorded across the site, with no contamination exceedances considered to pose a risk to the primary school development.

Historical mapping indicates the potential presence of a refuse heaps located on southern extent of the site. Investigation locations within this area did not indicate the presence of potential contamination and the current development proposals do not extend onto this part of the site. In the event that future development is proposed in this area a watching brief should be in place when excavating soils in this area.

Similarly, the general Made Ground is considered to pose a Low Risk to the wider environment (surface waters and groundwater), with a higher level of risk (Moderate to low) assigned to the possible former refuse heaps. A new hardstanding carpark is proposed within this area and it is recommended a watching brief be in place during excavations.

#### 14.1.2 Asbestos

Asbestos samples have been obtained from the general made ground on site and in the footprint of the former school buildings.

Only one sample from the general Made Ground identified the presence of asbestos containing materials and quantification testing recorded concentrations below the laboratory limit of detection. It is also noted that this sample was obtained from outside the current proposed development area and as such, additional risk management plans are not considered necessary.

Additional asbestos screening was undertaken within the near surface soils from the footprint of the former school. Prior to their demolition, the buildings underwent asbestos removal by a licenced asbestos removal contractor, and all demolition materials were removed from site. Of the twelve samples obtained from this area, one identified asbestos fibres at concentrations above the laboratory limit of detection. Whilst the mobilisation of asbestos fibres would have been managed during the demolition process the removal of all asbestos containing materials would not have been practicable and as such some ACM may have become entrained within shallow soils in the footprint of the former buildings. testing has indicted the presence of ACM in this material; however concentrations are considered to be low and limited to one sample



location.

As a precautionary measure, it is recommended that any future development within this area of the site is undertaken under an Asbestos Management Plan to identify, assess and manage any asbestos containing materials encountered during the development phase. It should be noted that the current development proposals do not extend into this area of the site and an Asbestos Management Plan is not considered necessary to support the current proposed development.

### **14.1.3 Ground Gas**

Ground gas monitoring from six visits has shown low concentrations of carbon dioxide and methane coupled with low flow rates. Monitoring was undertaken during periods of low, falling, and steady atmospheric pressures and monitoring data is therefore considered to have been undertaken during worst case conditions.

The site is therefore classified as Characteristic Situation 1 whereby gas protection measures are not considered necessary in new developments.

Radon protection measures are not considered necessary.

## **14.2 Geotechnical**

Shallow foundations formed on the shallow fine grained and coarse grained alluvial deposits may be designed to an allowable net bearing pressure of 150kPa for foundations no wider than 0.7m.

If greater loads are required a higher bearing capacity may be achieved with foundations placed solely within coarse grained material, however this would be subject to a more detailed assessment of settlement, primarily within the underlying clay and silt.

Given the instability of the alluvial soils, high groundwater, and the compressibility of the clay and silt, piled foundations may be considered a more favourable option.

Floor slabs may be ground bearing.

## **14.3 Recommendations**

Based on the findings of the site investigation, the following recommendations are presented outlining the requirements for further ground investigation and general recommendations to support the current proposed development:



- Testing and classification of any excess soils to inform reuse or disposal;
- Groundworkers should be informed of the nature of the historical developments on the site including the asbestos removal process and identification of a limited extent of asbestos fibres within two samples on the site. Works should be undertaken following a watching brief to identify any asbestos containing materials and outline the procedures to assess and manage any impacted soils.
- Preparation of a geotechnical design report to fully assess the potential for settlement once required loads and foundation type has been confirmed.

## 15. NOTES

### 1. Standards

All boring operations, sampling of soils, *in situ* testing and geotechnical laboratory testing have been carried out in accordance with the recommendations of the British Standards BS 5930(2015)<sup>(1)</sup>, BS 1377 (1990)<sup>(2)</sup> and BS10175 (2001)<sup>(3)</sup>.

Soil and rock descriptions follow the recommendations of BS 593. Where descriptions or classifications are based on other documents (e.g. BS 8004 (1986) or CIRIA Project Report 11 (1993)), this is stated in the report text.

### 2. Site methods

Unless specifically stated otherwise, the following methods are used for exploratory holes.

- Holes described as cable percussive are bored using a light cable percussive rig. Standard penetration tests are carried out where appropriate, as shown in the logs. Disturbed and undisturbed samples are taken from the exploratory holes at the depths on the records.
- Window sampling generally uses the windowless sampling method, using a tracked Geotool.
- Dynamic probes are usually heavy dynamic probes, using the same tracked Geotool used for window sampling.

### 3. Definitions and abbreviations

The following terms are used in the exploratory hole logs

#### Samples

U	Undisturbed 102mm dia. sample
TW	Thin Walled undisturbed 102mm dia. sample
B	Bulk sample
D	Small disturbed sample
W	Water sample
CBR	California Bearing Ratio test or CBR value obtained from Mexiprobe test

#### In situ tests

S	Standard penetration test (SPT)
N	SPT N value (blows/300mm)
HP	Hand penetrometer – shear strength
SV	Hand shear vane – shear strength
VOC	Volatile organic compounds (ppm)
PID	Photo-ionisation detector – used to detect the presence of VOCs.

#### Core recovery and rock quality

TCR	Total core recovery (%)
SCR	Solid core recovery (%)
RQD	Rock quality designation (%)
FI	Fracture index
NR	No recovery
NI	Not intact

#### Rotary drilling sizes

Index letter	Nominal diameter (mm)	
	Borehole	Core
N	75	54
H	99	76
P	120	92
S	146	113

#### Water strikes

▽	Level of water strike
▼	Water level rose to this level (see Remarks at foot of log for details)

Depth means depth below existing ground level unless otherwise specified. Values specified in soil descriptions given in the exploratory hole logs are depths unless otherwise specified.

## 16. GLOSSARY

AOD	above Ordnance Datum
bgl	below ground level
BGS	British Geological Survey
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C4SL	Category 4 Screening Levels
CIEH	Chartered Institute of Environmental Health
CLEA	Contaminated Land Exposure Assessment
CoC	Constituent of Concern
CSM	Conceptual Site Model
DEFRA	Department of Environment, food and Rural Affairs
DQRA	Detailed Quantitative Risk Assessment
DTS	Desktop Study
DRO	Diesel Range Organics
DWS	Drinking Water Standard
EA	Environment Agency (England)
EPH	Extractable Petroleum Hydrocarbons
EQS	Environmental Quality Standards
FOC	Fraction Organic Carbon
GPR	Ground Penetrating Radar
LOD	Limit of detection
LQM	Land Quality Management
NRW	Natural Resources Wales
OS	Ordnance Survey
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PHC	Petroleum Hydrocarbon
PPE	Personal Protection Equipment
ppm	parts per million
PRO	Petroleum Range Organics
SGV	Soil Guideline Values
SOM	Soil Organic Matter
SVOC	Semi-volatile organic compounds
TPH	Total Petroleum Hydrocarbon
TSV	Tier 1 Screening Values
VOC	Volatile Organic Carbon
VPH	Volatile Petroleum Hydrocarbons

## 17. REFERENCES

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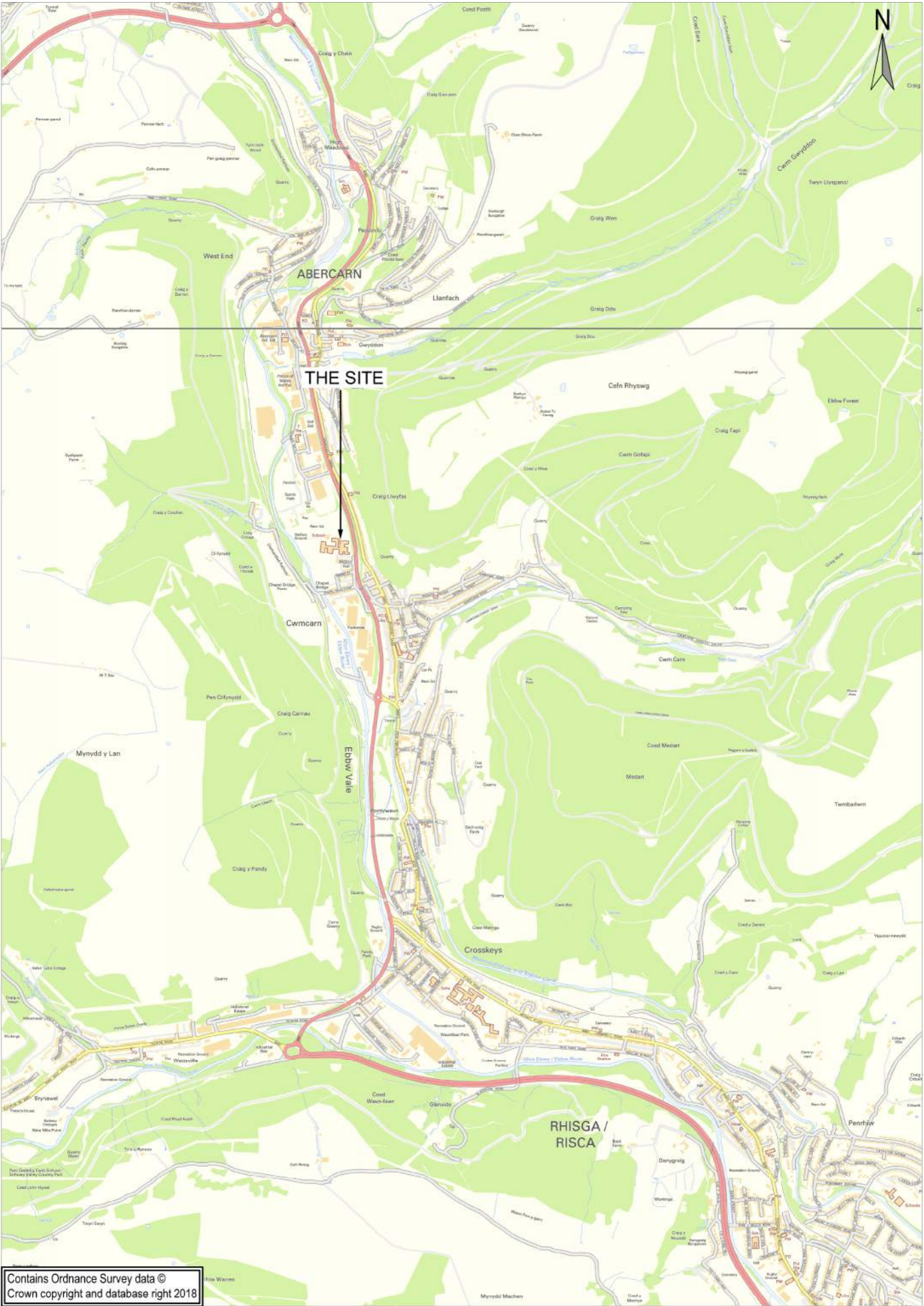
## FIGURES

# Former Cwmcarn High School



**Figure 1 – Site Location Plan**





REV DESCRIPTION BY CHK APP DATE

5th FLOOR  
LONGCROSS COURT  
47 NEWPORT ROAD  
CARDIFF  
CF24 0AD  
TEL: +44 (0)29 2082 9200  
FAX: +44 (0)29 2085 5321  
e-mail: cardiff@wyg.com



Client:  
**CAERPHILLY COUNTY BOROUGH  
COUNCIL**

Project:  
**CWMCARAN HIGH SCHOOL**

Drawing Title:  
**SITE LOCATION PLAN**

Scale @	A4	Drawn	Date	Checked	Date	Approved	Date
PP	18.04.19	KW	18.04.19	SR	18.04.19		
Project No.	A110489-4	Office	CDF	Type	N	Drawing No.	1
Revision							00



## Former Cwmcarn High School





**Figure 2 – Site Investigation Layout Plan**








DO NOT SCALE. CONTRACTOR TO CHECK ALL DIMENSIONS AND  
REPORT ANY OMISSIONS OR ERRORS







Legend:

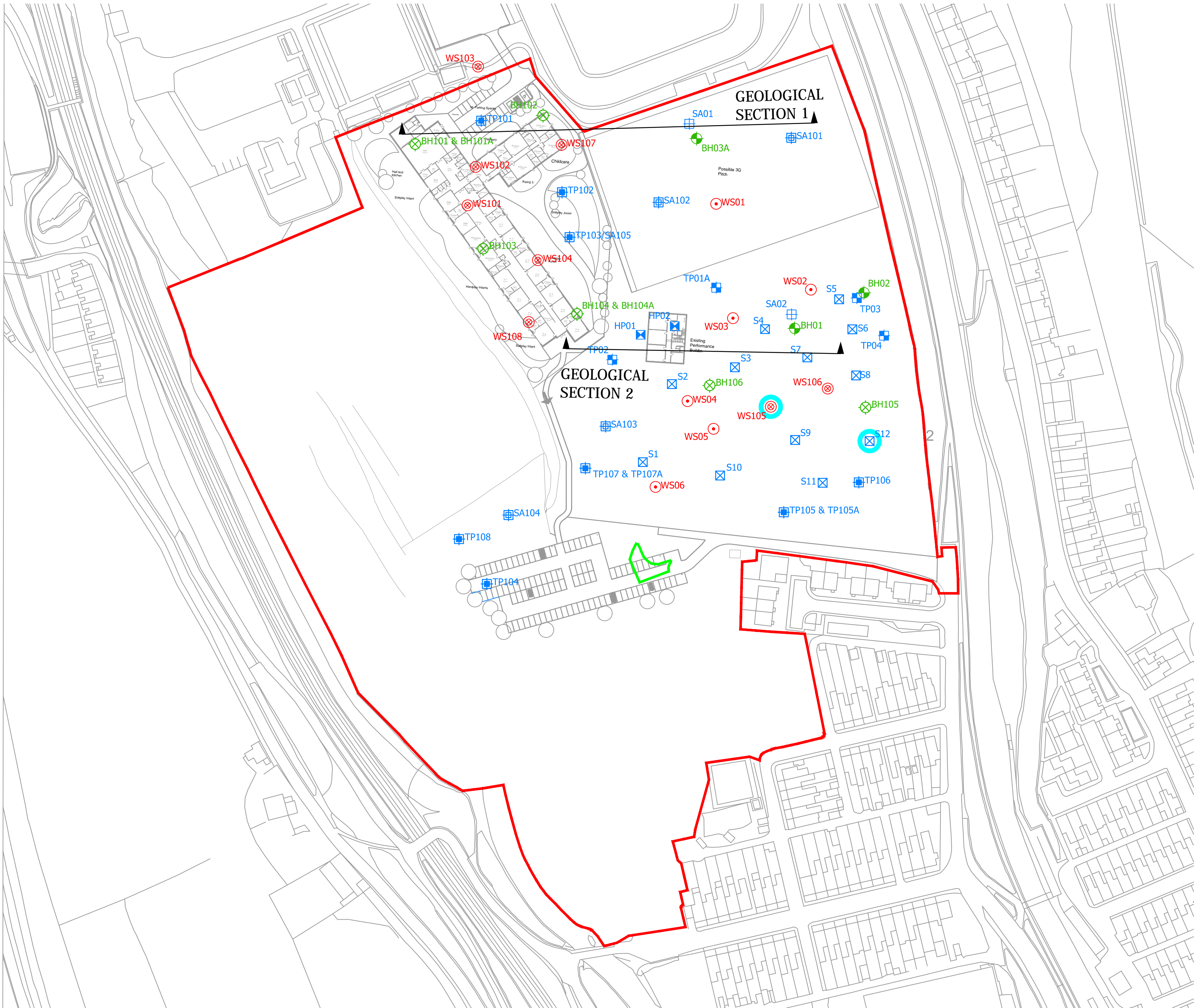
-  Site Boundary
-  Historical Refuse Tip

Phase 1 Site Investigation

-  Window Samples
-  Cable Percussive Boreholes
-  Trial Pits
-  Hand Dug Pits
-  Soakaway Tests

Phase 2 Site Investigation

-  Window Samples
-  Cable Percussive Boreholes
-  Trial Pits
-  Shallow Pits for Asbestos Screening
-  Soakaway Tests
-  Asbestos Fibres Recorded



0 12.5 25 37.5 50 62.5 m  
SCALE 1:1250

REV	DESCRIPTION	BY	CHK	APP	DATE
-----	-------------	----	-----	-----	------

Client:

CAERPHILLY COUNTY BOROUGH COUNCIL

5th FLOOR  
LONGCROSS COURT  
47 NEWPORT ROAD  
CARDIFF  
CF24 0AD  
TEL: +44 (0)29 2082 9200  
FAX: +44 (0)29 2045 5321  
e-mail: cardiff@wyg.com



Project:

FORMER CWMCARN HIGH SCHOOL

Drawing Title:

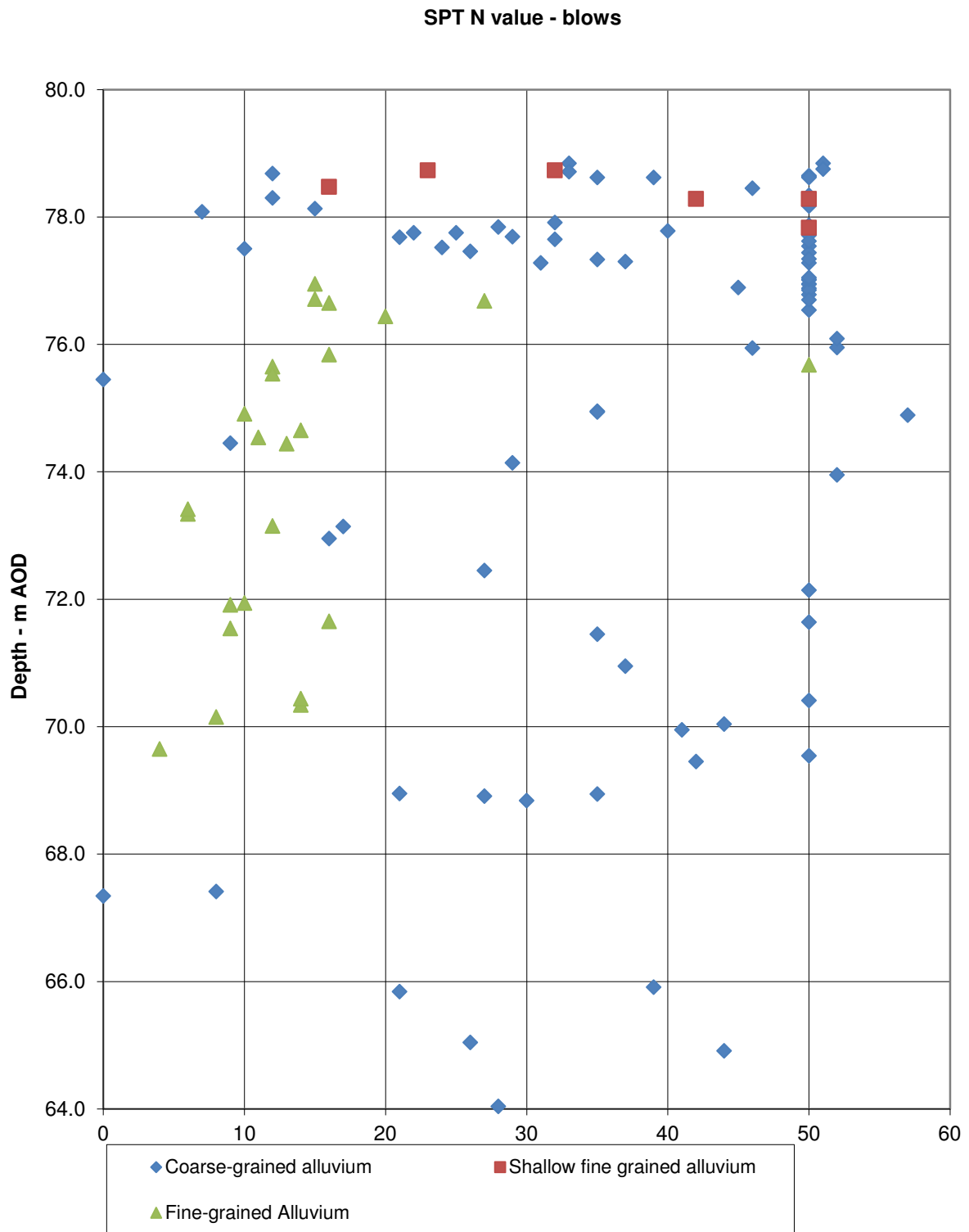
SITE INVESTIGATION PLAN & PROPOSED LAYOUT

Scale @ A2	Drawn	Date	Checked	Date	Approved	Date
1:1,250	CM	04.12.19				
Project No.	Office	Type	Drawing No.	Revision		
A110489-4	CDF	N	02	00		

## Former Cwmcarn High School



**Figure 3 – SPT v Depth Plot**



WYG Environment Ltd

Longcross Court, Newport Rd, Cardiff, CF24 0AD

Tel: 02920 892200

Fax: 02920 455321



Environmental Consultancy

Project

**Former Cwmcarn  
High School**

Client

**Caerphilly CBC**

Drawing Title

**Plot of SPT N values  
vs Depth (m bgl)**

Drawing No.

**3**

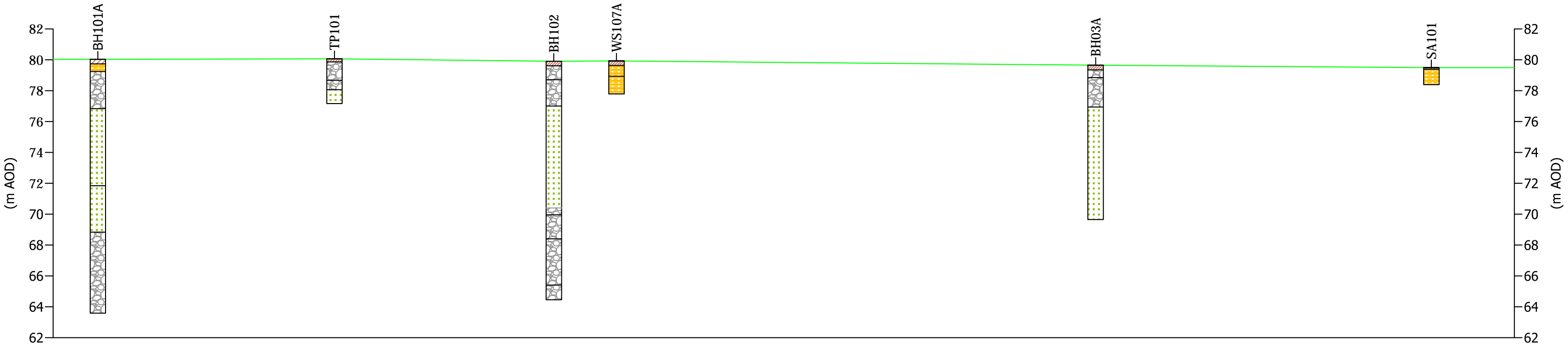


**Figure 4 – Geological Sections**

KEY

- MADE GROUND / TOPSOIL
- SHALLOW FINE GRAINED ALLUVIUM
- COARSE GRAINED ALLUVIUM
- FINE GRAINED ALLUVIUM

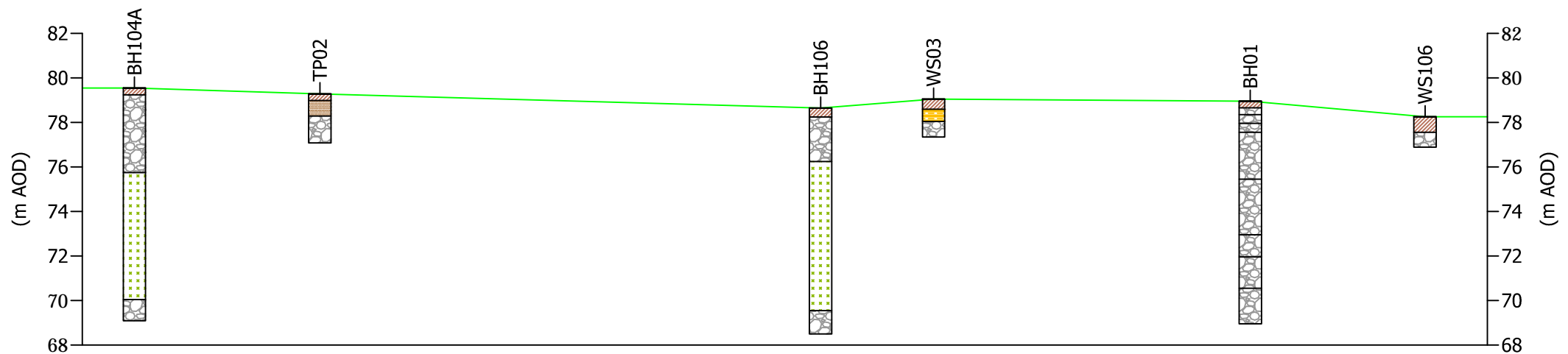
SECTION 1  
Scale - 1:500H, 1:250V



KEY

- MADE GROUND / TOPSOIL
- SHALLOW FINE GRAINED ALLUVIUM
- COARSE GRAINED ALLUVIUM
- FINE GRAINED ALLUVIUM

SECTION 2  
Scale - 1:500H, 1:250V



REV	DESCRIPTION	BY	CHK	APP	DATE
	Scale @ A4 AS SHOWN	Drawn CM	Date 23.01.20	Checked Date	Approved Date
	Project No. A110489-4	Office CDF	Type N	Drawing No. 4b	Revision 00



## **APPENDICES**





## **APPENDIX A – REPORT CONDITIONS**

## **APPENDIX A - REPORT CONDITIONS GROUND INVESTIGATION**

This report is produced solely for the benefit of Caerphilly County Borough Council and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

























Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYGE. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.





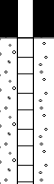
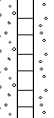


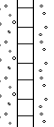

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.




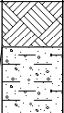
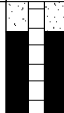
## **APPENDIX B - EXPLORATORY HOLE LOGS AND PHOTOGRAPHIC PLATES**

	Project: <b>Former Cwmcarn High School</b>				Location Details				Status		Borehole Number					
	Location: <b>Cwmcarn</b>				Easting: 321678.87    Northing: 193968.19 Level: 78.95mAOD    Depth: 10.00m Logger: ST    Type: CP Inclination: °				FINAL		<b>BH01</b>					
	Client: <b>Caerphilly County Borough Council</b>										Sheet 1 of 2					
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV	
0.00	10.00	Cable Percussion	Dando Duke	GW & MW			10.00	200						Approved By:	CBP	
														Start Date:	02/04/2019	
														Finish Date:	03/04/2019	
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
												Depth (m)	Ref	Tests / Results		
Dark brown gravelly sandy CLAY. Gravel is fine to medium subrounded to subangular of sandstone. Sand is fine to coarse. (TOPSOIL)								0.30	78.65			0.00	EW4			
Brown clayey fine to coarse sub angular to subrounded sandstone GRAVEL.								0.60	78.35			0.70 0.70 - 1.00	ES B			
Brown silty clayey sandy GRAVEL. Gravels are fine to coarse rounded to subangular of sandstone.								1.00	77.95			1.00 - 1.45 1.00 - 1.50	D B	SPT(C) 1.20m, N=22 (3,5/6,6,5,5)		
Brown silty clayey gravelly fine to coarse SAND. Gravels are fine to coarse rounded to subangular sandstone.								1.40	77.55			1.40	ES			
Very dense brown very sandy slightly clayey GRAVEL. Gravel is fine to medium subrounded to subangular of sandstone. Sand is fine to medium.												2.00 - 2.20	B	SPT(C) 2.00m, 50 (9,10/50 for 225mm)		
												3.00 - 3.20	B	SPT(C) 3.00m, N=52 (4,12/11,13,13,15)		
												4.00 - 4.50	B	SPT(C) 4.00m, N=35 (7,11/10,10,8,7)		
Dense brown slightly clayey sandy GRAVEL. Gravels are fine to coarse Sand is fine to coarse.								3.50	75.45			5.00 - 5.40	B	SPT(C) 5.00m, N=52 (5,8/13,9,9,21)		
From 5.00 to 6.00mbgl gravel becomes very dense.												6.00	B			
												6.50 - 7.00	B	SPT(C) 6.50m, N=27 (2,3/4,7,7,9)		
Medium dense brown very sandy very cobbly fine to medium sandstone GRAVEL. Sand is fine to coarse.								6.00	72.95			7.50	B			
Dense brown very sandy very gravelly COBBLES. Cobbles are subrounded of sandstone. Sand is fine to coarse. Gravel is fine to coarse subrounded of sandstone.								7.00	71.95			8.00 - 8.40	B	SPT(C) 8.00m, N=37 (1,3/5,6,8,18)		
Dense brown with grey sandy cobbly GRAVEL. Gravel is fine to medium subrounded to angular of sandstone. Sand is fine to coarse. Cobbles are subrounded to subangular.								8.40	70.55			9.00	B			
												9.50 - 10.00	B	SPT(C) 9.50m, N=42 (4,7/6,8,14,14)		
								10.00	68.95					SPT(C) 10.00m, N=21 (2,3/4,4,5,8)		
Observations / Remarks										Chiselling			Water Added		Hammer Information	
1) Hand excavated inspection pit to 1.20mbgl. 2) Groundwater encountered at 1.40mbgl rising to 1.30mbgl after 20 minutes. Additional water added during drilling.										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
										2.20	3.00	120				
										3.00	3.60	60				
										Groundwater				Project Number		
										Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	<b>A110489-4</b>
										1.40	-	-	20	1.30		

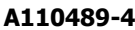
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale:		1:50					
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV						
0.00	10.00	Cable Percussion	Dando Duke	GW & MW			10.00	200						Approved By:	CBP						
														Start Date:	02/04/2019						
														Finish Date:	03/04/2019						
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing									
												Depth (m)	Ref	Tests / Results							
EOH at 10.00m - Reached required depth.																					
							Observations / Remarks										Chiselling			Water Added	
1) Hand excavated inspection pit to 1.20mbgl. 2) Groundwater encountered at 1.40mbgl rising to 1.30mbgl after 20 minutes. Additional water added during drilling.										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %					
										5.40	5.70	60									
										8.40	8.60	30									
										Groundwater						Project Number					
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	A110489-4															





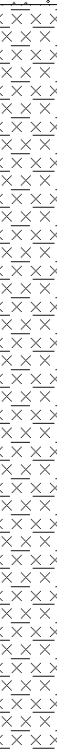
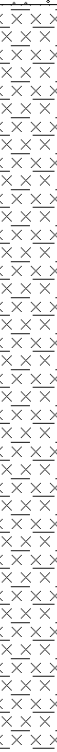
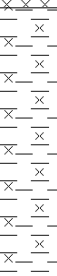
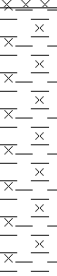
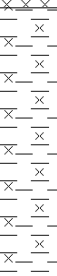
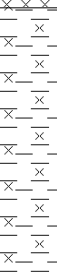
	Project: <b>Former Cwmcarn High School</b>				Location Details				Status		Borehole Number					
	Location: <b>Cwmcarn</b>				Easting: 321710.74    Northing: 193984.59 Level: 78.89mAOD    Depth: 4.80m Logger: ST    Type: CP Inclination: °				FINAL		<b>BH02</b>					
	Client: <b>Caerphilly County Borough Council</b>										Sheet 1 of 1					
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time				Scale: 1:50			
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By: PV		
0.00	4.80	Cable Percussion	Dando Duke	GW & MW			4.80	200						Approved By: CBP		
														Start Date: 28/03/2019		
														Finish Date: 28/03/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
												Depth (m)	Ref	Tests / Results		
Brown sandy gravelly CLAY. Sand is fine to medium subrounded to subangular of sandstone. (TOPSOIL)								0.30	78.59			0.00 0.20 0.40 - 0.80	EW3 ES10 B			
Brown very clayey silty slightly gravelly SAND. Sand is fine to coarse. Gravels are fine to medium subrounded to subangular of sandstone.								0.80	78.09			0.80 - 1.00 0.90 1.00 - 1.50	B ES B	SPT(C) 1.20m, N=29 (2,3/5,7,8,9)	1	
Medium dense brown very cobbly sandy slightly clayey GRAVEL. Gravel is fine to coarse subrounded to subangular of sandstone. Cobbles are subrounded of sandstone. Sand is fine to coarse.								2.00	76.89			2.00 - 2.50	B	SPT(C) 2.00m, N=45 (3,5/9,13,10,13)	2	
Dense brown very sandy GRAVEL. Gravel is fine to coarse subrounded to subangular of mixed lithologies. Sand is fine to coarse.								2.80	76.09			2.80 - 3.10	B	SPT(C) 2.80m, 52 (25 for 65mm/52 for 40mm)	3	
Very dense grey fine to coarse angular GRAVEL. (possible boulder) recovered as gravel.								3.10	75.79			3.10 - 3.50	B			
Brown sandy slightly e cobbly GRAVEL. Gravel is medium to coarse subrounded of sandstone. Sand is fine to coarse. Cobbles are subrounded.								4.00	74.89			4.00 - 4.40	B	SPT(C) 4.00m, N=57 (1,16/10,13,18,16)	4	
Very dense brown gravelly COBBLES. Cobbles are subrounded to rounded of sandstone. Gravels are coarse subrounded of sandstone.								4.80	74.09						5	
EOH at 4.80m - High cobble and boulder content encountered resulting in difficult drilling conditions. Casing buckled in at the base.															6	
															7	
															8	
															9	
															10	
Observations / Remarks										Chiselling		Water Added		Hammer Information		
1) Hand excavated inspection pit to 1.20mbgl. 2)Groundwater encountered at 1.00mbgl.										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
										2.80 4.40	3.10 4.80	30 30				
										Groundwater						
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks		A110489-4									
1.00	-	-	20	0.00												


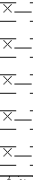















	Project: <b>Former Cwmcarn High School</b>				Location Details				Status		Borehole Number								
	Location: <b>Cwmcarn</b>				Easting: 321633.78    Northing: 194055.50 Level: 79.65mAOD    Depth: 10.00m Logger: ST    Type: CP Inclination: °				FINAL		<b>BH03A</b>								
	Client: <b>Caerphilly County Borough Council</b>										Sheet 1 of 1								
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50					
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:					
0.00	10.00	Cable Percussion	Dando Duke	GW & MW			10.00	200						PV					
														Approved By:	CBP				
														Start Date:	01/04/2019				
														Finish Date:	01/04/2019				
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing							
<p>Grass over TOPSOIL: Dark brown very gravelly sandy CLAY. Gravel is fine to coarse subrounded to rounded of sandstone.</p> <p>(TOPSOIL)</p> <p>Brown clayey silty sandy GRAVEL. Gravel is fine to coarse subrounded to subangular of sandstone. Sand is fine to coarse.</p> <p>Dense brown sandy slightly silty GRAVEL. Gravels are fine to coarse subrounded of sandstone. Sand is fine to coarse.</p>								0.30	79.35			0.00	EW1	<p>SPT(C) 1.20m, 46 (9,17/46 for 100mm)</p>		1			
								0.80	78.85				0.30 - 0.80				B		
													0.50				ES		
													1.00 - 1.20				B	SPT(C) 2.00m, N=32 (5,7/10,8,7,7)	2
													2.00 - 2.50				B		
													3.00 - 3.45				D	SPT(S) 3.00m, N=16 (2,3/4,4,4,4)	3
													3.00 - 3.50				B		
													4.00 - 4.45				D	SPT(S) 4.00m, N=12 (1,2/2,3,3,4)	4
													4.00 - 4.50				B		
													5.00 - 5.45				D	SPT(S) 5.00m, N=14 (1,2/3,3,4,4)	5
5.00 - 5.50	B																		
				6.00	B	SPT(S) 6.50m, N=12 (2,2/3,3,2,4)	6												
				6.50 - 6.95	D														
				6.50 - 7.00	B	SPT(S) 8.00m, N=16 (2,2/3,4,4,5)	8												
				8.00 - 8.45	D														
				8.00 - 8.50	B	SPT(S) 9.50m, N=8 (1,1/1,2,2,3)	9												
				9.00	B														
				9.50 - 10.00	B	SPT(S) 10.00m, N=4 (1,0/1,1,1,1)	10												
EOH at 10.00m - Reached required depth.							10.00	69.65											
Observations / Remarks										Chiselling			Water Added		Hammer Information				
1) Hand excavated inspection pit to 1.20mbgl. 2) Groundwater encountered at 1.50mbgl.										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %			
										1.20	1.60	30							
										1.70	1.90	30							
										Groundwater					Project Number				
										Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	<b>A110489-4</b>			
										1.50	-	-	20	0.00					

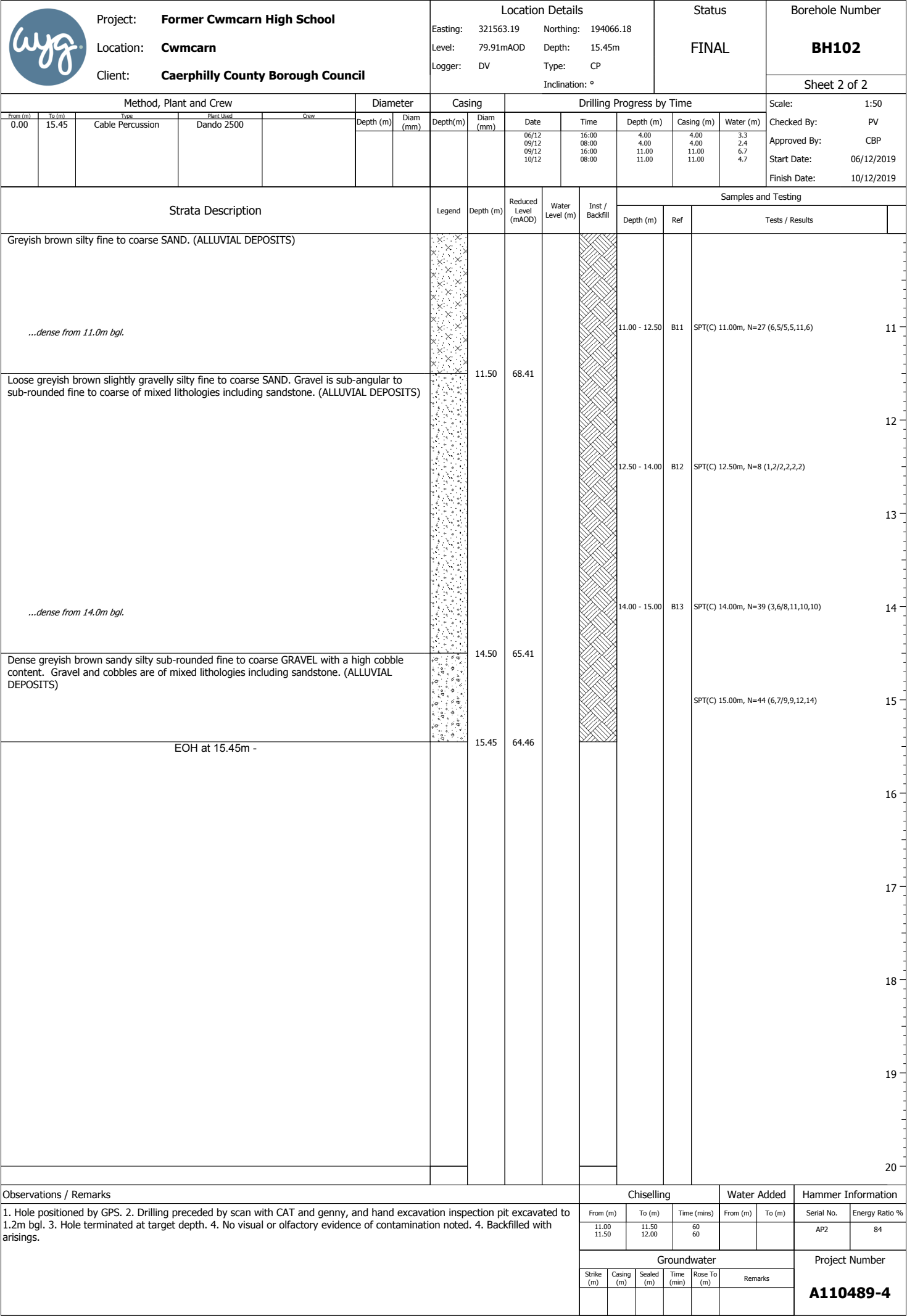
















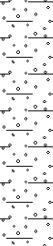


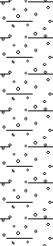


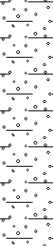







<div></div> <div>Project: <b>Former Cwmcarn High School</b></div> <div>Location: <b>Cwmcarn</b></div> <div>Client: <b>Caerphilly County Borough Council</b></div>					Location Details					Status  <b>FINAL</b>		Borehole Number  <b>BH101A</b>																					
					Easting: 321504.39    Northing: 194052.95 Level: 80.04mAOD    Depth: 16.45m Logger: DV    Type: CP Inclination: °																												
					Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50														
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV																		
0.00	16.45	Cable Percussion	Dando 2500						27/11 16:00 28/11 08:00 28/11 16:00 29/11 08:30 29/11 12:00 02/12 08:30 02/12 16:00	16:00 08:00 16:00 08:30 12:00 08:30 16:00	1.40 1.30 6.70 5.80 9.00 8.10 16.45	1.40 1.40 6.70 6.70 9.00 9.00 16.00	6.2 4.1 5.2	Approved By: CBP	26/11/2019																		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing			Finish Date: 26/11/2019																		
												Depth (m)	Ref	Tests / Results																			
Dark brown slightly gravelly clayey fine to coarse organic SAND. (TOPSOIL)								0.30	79.74																								
Firm brown gravelly very sandy CLAY. Gravel is sub-rounded fine to coarse of mixed lithologies including sandstone, limestone and mudstone. (ALLUVIAL DEPOSITS)								0.80	79.24																								
Dense greyish brown very sandy sub-rounded fine to coarse GRAVEL with a medium cobble content and low boulder content. Gravel, cobbles and boulders are of mixed lithologies including sandstone, limestone and mudstone. (ALLUVIAL DEPOSITS)												1.20 - 2.20	B1	SPT(C) 1.20m, N=33 (12,9/6,5,10,12)																			
High strength grey sandy clayey SILT with frequent bands of clay. (ALLUVIAL DEPOSITS)								3.20	76.84																								
																	2.20 - 3.30	B9	SPT(C) 2.20m, 50 (25 for 117mm/50 for 110mm)														
																	3.20 - 3.60	UT10	Ublows=9 Recovery=100%														
																	3.20 - 4.20	B12															
...gravelly from 6.7m bgl.								3.20	76.84																								
																	3.60 - 3.80	D11															
																	4.20 - 4.45	D13	SPT(S) 4.20m, N=16 (2,3/3,4,4,5)														
																	4.20 - 5.20	B14															
Firm grey slightly sandy silty CLAY. (ALLUVIAL DEPOSITS)								8.20	71.84																								
																	5.20 - 5.60	UT15	Ublows=13 Recovery=100%														
																	5.20 - 6.70	B17															
																	5.60 - 5.80	D16															
Firm grey slightly sandy silty CLAY. (ALLUVIAL DEPOSITS)								8.20	71.84																								
																	6.70 - 7.15	D18	SPT(S) 6.70m, N=6 (1,0/1,2,1,2)														
																	6.70 - 8.20	B19															
																	8.20 - 8.60	UT20	Ublows=12 Recovery=100%														
Firm grey slightly sandy silty CLAY. (ALLUVIAL DEPOSITS)								8.20	71.84																								
																	8.20 - 9.70	D21															
																	8.60 - 8.80	D21															
																	9.70 - 10.15	D23	SPT(S) 9.70m, N=14 (2,2/3,3,4,4)														
Firm grey slightly sandy silty CLAY. (ALLUVIAL DEPOSITS)								8.20	71.84																								
																	9.70 - 11.20	D24															
																	9.70 - 11.20	D24															
																	9.70 - 11.20	D24															
Observations / Remarks										Chiselling			Water Added		Hammer Information																		
1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated at target depth. 4. No visual or olfactory evidence of contamination noted. 4. Installation to 7.0m bgl: 1.0m plain, 6.0m slotted.										From (m)			To (m)			Time (mins)			From (m)			To (m)			Serial No.			Energy Ratio %					
										0.80			1.20			60									AP2			84					
										1.30			1.70			60																	
										1.60			2.00			60																	
										Groundwater									Project Number														
										Strike (m)			Casing (m)			Sealed (m)			Time (min)			Rose To (m)			Remarks			A110489-4					
										6.20			-			-			0			0.00											




		Project: <b>Former Cwmcarn High School</b>				Location Details				Status		Borehole Number				
		Location: <b>Cwmcarn</b>				Easting: 321504.39    Northing: 194052.95				FINAL		<b>BH101A</b>				
		Client: <b>Caerphilly County Borough Council</b>				Level: 80.04mAOD    Depth: 16.45m Logger: DV    Type: CP Inclination: °										
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV	
0.00	16.45	Cable Percussion	Dando 2500						27/11 16:00 28/11 08:00 28/11 16:00 29/11 08:30 29/11 12:00 02/12 08:30 02/12 16:00	16:00 08:00 16:00 08:30 12:00 08:30 16:00	1.40 1.30 6.70 5.80 9.00 8.10 16.45	1.40 1.40 6.70 6.70 9.00 9.00 16.00	6.2 4.1 5.2	Approved By: CBP	Start Date: 26/11/2019	
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
												Depth (m)	Ref	Tests / Results		
Firm grey slightly sandy silty CLAY. (ALLUVIAL DEPOSITS)								11.20	68.84			11.20 - 11.65	D25	SPT(S) 11.20m, N=30 (4,4/6,5,9,10)		11
Dense dark grey sandy silty sub-angular to sub-rounded fine to coarse GRAVEL with a low cobble content. Cobbles and gravel are of sandstone. (ALLUVIAL DEPOSITS)														SPT(S) 12.70m, N=0 (1,0/0,0,0,0)		
...very loose from 12.7m bgl.														SPT(S) 14.20m, N=21 (4,5/5,5,4,7)		13
...medium dense from 14.2m bgl.														SPT(S) 15.00m, N=26 (3,3/4,3,4,15)		
...high cobble content from 15.5m bgl.														SPT(S) 16.00m, N=28 (8,9/6,7,6,9)		15
EOH at 16.45m -								16.45	63.59							
																17
																19
Observations / Remarks										Chiselling			Water Added		Hammer Information	
1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated at target depth. 4. No visual or olfactory evidence of contamination noted. 4. Installation to 7.0m bgl: 1.0m plain, 6.0m slotted.										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
															AP2	84
										Groundwater						Project Number
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	A110489-4										

<div></div> <div>Project: <b>Former Cwmcarn High School</b> Location: <b>Cwmcarn</b> Client: <b>Caerphilly County Borough Council</b></div>		Location Details				Status  <b>FINAL</b>		Borehole Number  <b>BH102</b>									
		Easting: 321563.19    Northing: 194066.18 Level: 79.91mAOD    Depth: 15.45m Logger: DV    Type: CP Inclination: °						Sheet 1 of 2									
		Method, Plant and Crew				Diameter		Casing		Drilling Progress by Time				Scale: 1:50			
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By: PV			
0.00	15.45	Cable Percussion	Dando 2500						06/12 09/12 09/12 10/12	16:00 08:00 16:00 08:00	4.00 4.00 11.00 11.00	4.00 4.00 11.00 11.00	3.3 2.4 6.7 4.7	Approved By: CBP			
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing			Tests / Results		
												Depth (m)	Ref				
Dark brown slightly gravelly clayey fine to coarse organic SAND. (TOPSOIL)								0.30	79.61			0.00 - 1.20	B2	SPT(C) 1.20m, N=33 (5,8/8,8,9,8)			
Orangish brown mottled grey slightly gravelly very silty very clayey fine to coarse SAND. Gravel is sub-rounded fine to coarse of mixed lithologies including sandstone and mudstone. (ALLUVIAL DEPOSITS)												0.20	ES1				
												0.30 - 1.20	B1				
Dense greyish brown very sandy silty sub-rounded fine to coarse GRAVEL with a medium cobble content. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS) ...greyish brown from 1.2m bgl.								1.20	78.71			1.20 - 2.20	B3	SPT(C) 2.20m, 50 (5,15/50 for 165mm)			
...very dense from 2.20m bgl.												2.20 - 3.20	B4				
Firm grey slightly sandy slightly gravelly silty CLAY. Gravel is sub-rounded fine to coarse of sandstone. (ALLUVIAL DEPOSITS)								2.90	77.01			3.20 - 3.65	D1	SPT(S) 3.20m, N=15 (2,2/3,4,5)			
												3.20 - 4.20	B5				
												4.00 - 4.40	UT1				
												4.00 - 5.00	B6				
												4.40 - 4.60	D2				
												5.00 - 5.45	D3				
												6.00 - 6.50	B7				
												6.50 - 6.95	D4				
												6.50 - 8.00	B8				
												8.00 - 8.45	D5				
												8.00 - 9.50	B9				
Very dense greyish brown slightly gravelly silty fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to coarse of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)								9.50	70.41			9.50 - 11.00	B10	SPT(S) 9.50m, 50 (3,2/50 for 181mm)			
												9.50 - 9.95	D6				
								9.95	69.96								
Observations / Remarks											Chiselling		Water Added		Hammer Information		
1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated at target depth. 4. No visual or olfactory evidence of contamination noted. 4. Backfilled with arisings.											From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
											2.30	2.60	60			AP2	84
											Groundwater						
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	A110489-4											
2.00	-	-	20	1.50													








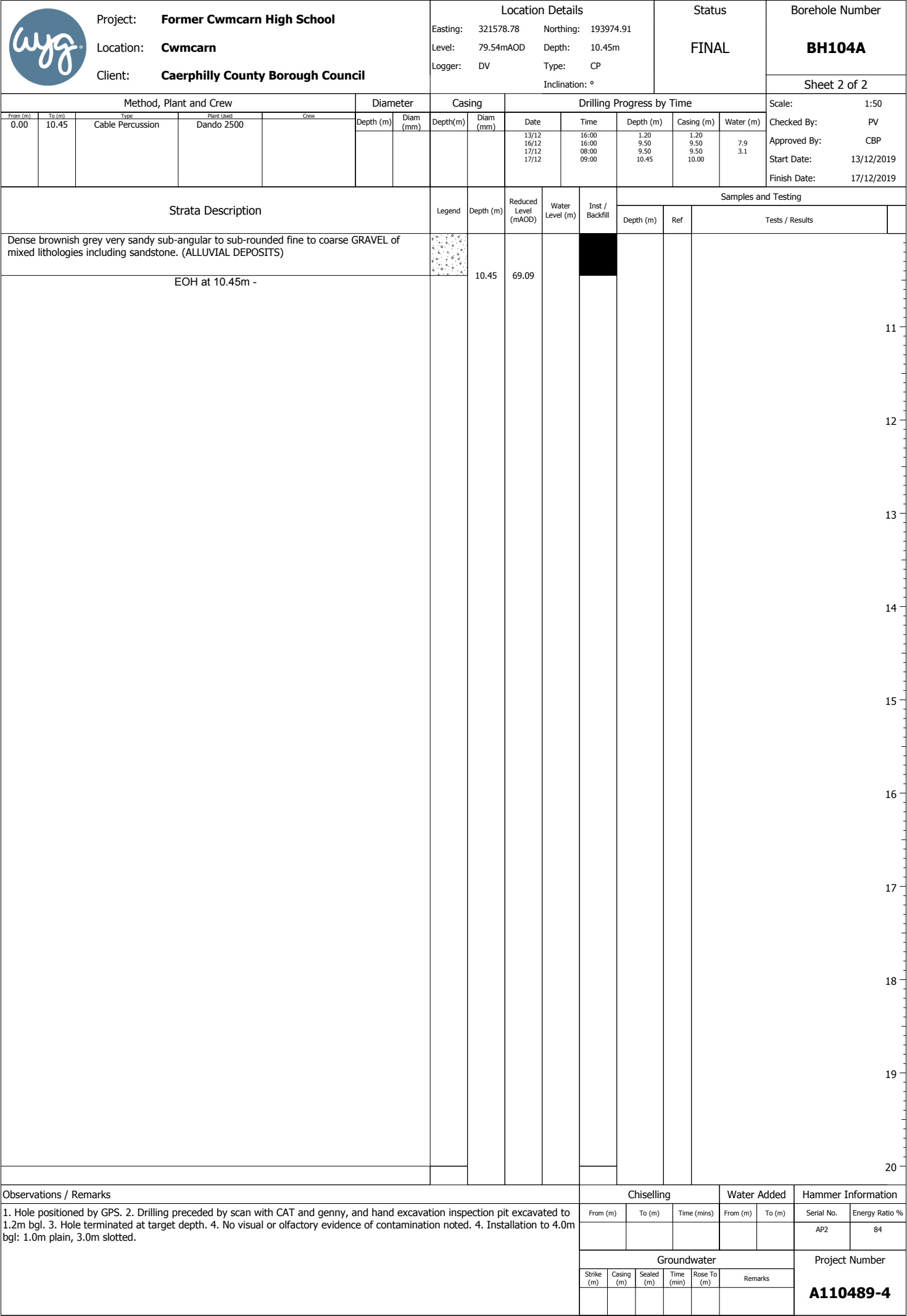
		Project: <b>Former Cwmcarn High School</b>		Location Details				Status		Borehole Number						
		Location: <b>Cwmcarn</b>		Easting: 321535.63    Northing: 194004.82 Level: 79.95mAOD    Depth: 10.45m Logger: DV    Type: CP Inclination: °				FINAL		<b>BH103</b>						
		Client: <b>Caerphilly County Borough Council</b>		Sheet 1 of 2												
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV	
0.00	10.45	Cable Percussion	Dando 2500						11/12 12/12	16:00 14:30	4.50 10.00	4.50 10.00	3.2 7.6	Approved By:	CBP	
														Start Date:	11/12/2019	
														Finish Date:	12/12/2019	
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
												Depth (m)	Ref	Tests / Results		
Dark brown slightly gravelly clayey fine to coarse organic SAND. (TOPSOIL)								0.30	79.65				0.00 - 1.20	B1	SPT(C) 1.20m, N=51 (25 for 75mm/21,7,15,8)	
Very dense greyish brown slightly sandy sub-rounded fine to coarse GRAVEL with a medium cobble content. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)													0.30 - 1.20	B2		
													0.50	ES2		
...medium dense from 2.2m bgl.																
								2.00	ES1							
Grey sandy SILT with occasional bands of clay. (ALLUVIAL DEPOSITS)								3.00	76.95				2.20 - 3.00	B4		
													3.00 - 4.00	B5		
Very loose brownish grey silty fine to medium SAND. (ALLUVIAL DEPOSITS)								4.50	75.45				4.00 - 4.45	UT1		
													4.00 - 4.50	B6		
Loose greyish brown sandy silty sub-rounded fine to coarse GRAVEL with a low cobble content. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)								5.50	74.45				4.50 - 5.50	B7		
													5.50 - 7.00	B8		
...medium dense from 7.0m bgl.													7.00 - 8.50	B9		
													8.50 - 10.00	B10		
...dense from 8.5m bgl.													SPT(C) 10.00m, N=41 (7,9/11,10,10,10)	10		
Observations / Remarks										Chiselling		Water Added		Hammer Information		
1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated at target depth. 4. No visual or olfactory evidence of contamination noted. 4. Backfilled with arisings.										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
										1.30	1.60	60			AP2	84
										1.60	2.00	60				
										Groundwater					Project Number	
										Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	<b>A110489-4</b>
										2.10	-	-	20	1.40		
										6.00	-	-	20	4.70		








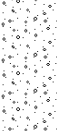
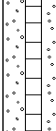

	Project: <b>Former Cwmcarn High School</b>				Location Details				Status		Borehole Number					
	Location: <b>Cwmcarn</b>				Easting: 321535.63    Northing: 194004.82 Level: 79.95mAOD    Depth: 10.45m Logger: DV    Type: CP Inclination: °				FINAL		<b>BH103</b>					
	Client: <b>Caerphilly County Borough Council</b>										Sheet 2 of 2					
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV	
0.00	10.45	Cable Percussion	Dando 2500						11/12 12/12	16:00 14:30	4.50 10.00	4.50 10.00	3.2 7.6	Approved By:	CBP	
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
												Depth (m)	Ref	Tests / Results		
Loose greyish brown sandy silty sub-rounded fine to coarse GRAVEL with a low cobble content. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)								10.45	69.50							
EOH at 10.45m -																
																11
																12
																13
																14
																15
																16
																17
																18
																19
																20
Observations / Remarks										Chiselling			Water Added		Hammer Information	
1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated at target depth. 4. No visual or olfactory evidence of contamination noted. 4. Backfilled with arisings.										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
															AP2	84
										Groundwater						Project Number
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	<b>A110489-4</b>										

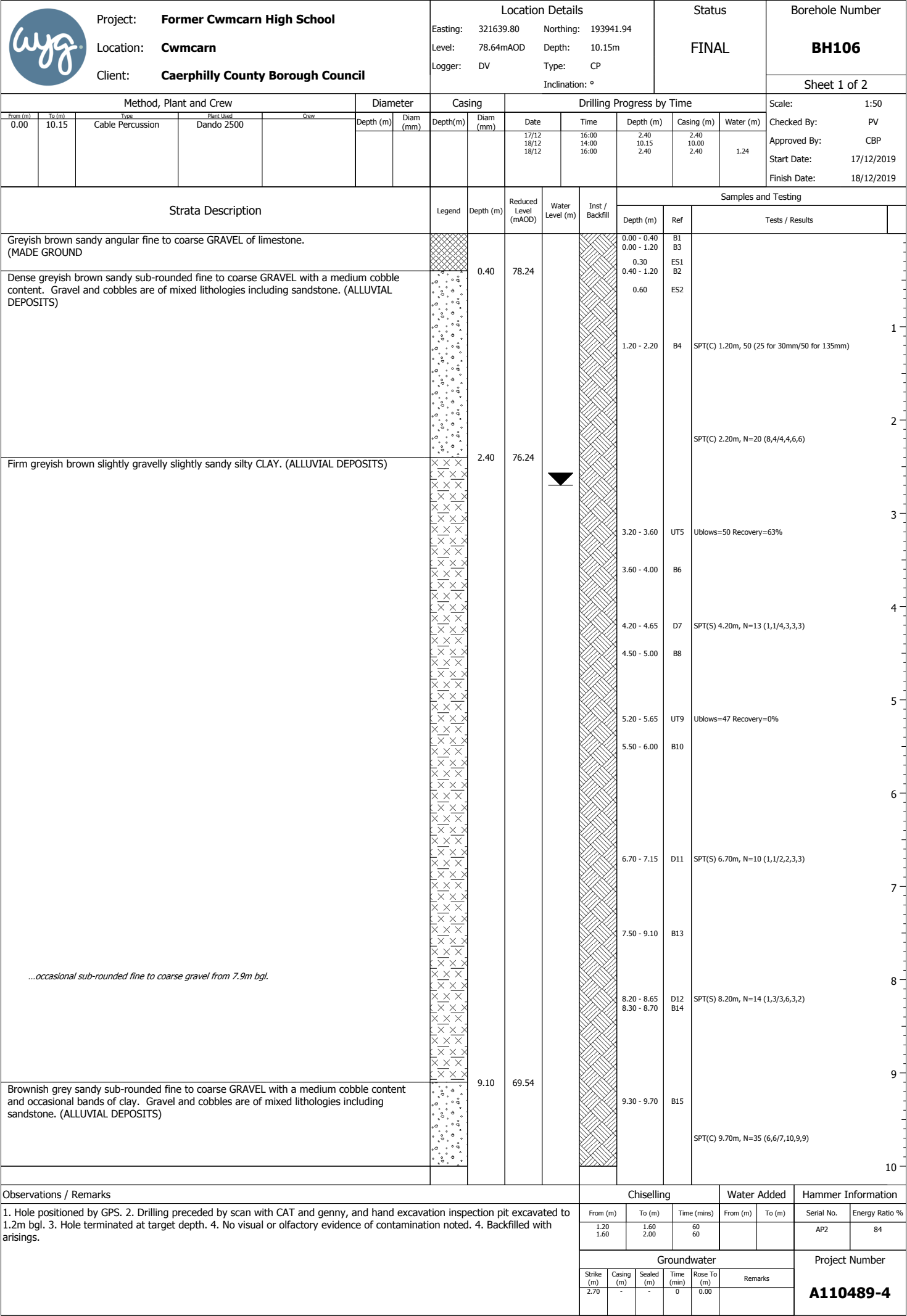
	Project: <b>Former Cwmcarn High School</b>				Location Details				Status		Borehole Number						
	Location: <b>Cwmcarn</b>				Easting: 321578.78    Northing: 193974.91 Level: 79.54mAOD    Depth: 2.00m Logger: DV    Type: CP Inclination: °				FINAL		<b>BH104</b>						
	Client: <b>Caerphilly County Borough Council</b>										Sheet 1 of 1						
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50			
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV		
0.00	2.00	Cable Percussion	Dando 2500						13/12	13:00	2.00	2.00		Approved By:	CBP		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
Dark brown slightly gravelly clayey fine to coarse organic SAND. (TOPSOIL)  Dense greyish brown slightly sandy slightly silty sub-rounded fine to coarse GRAVEL with a medium cobble content. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)								0.30	79.24			Depth (m)	Ref	Tests / Results		1	
												0.00 - 1.20	B2				
												0.20	ES1				
												0.30 - 1.20	B1				
												0.50	ES2				
EOH at 2.00m -								2.00	77.54			1.85	EW2	SPT(C) 2.00m, 50 (25 for 29mm/50 for 85mm)		2	
																	3
																	4
																	5
																	6
																	7
																	8
																	9
																	10
Observations / Remarks									Chiselling			Water Added		Hammer Information			
1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated due to obstruction. 4. No visual or olfactory evidence of contamination noted. 5. Backfilled with arisings. 6. No Groundwater encountered.									From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %		
									1.30	1.60	90			AP2	84		
									1.60	2.00	120						
									2.00	2.00	90						
									Groundwater						Project Number		
									Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	<b>A110489-4</b>		




	Project: <b>Former Cwmcarn High School</b>				Location Details				Status		Borehole Number											
	Location: <b>Cwmcarn</b>				Easting: 321578.78    Northing: 193974.91 Level: 79.54mAOD    Depth: 10.45m Logger: DV    Type: CP Inclination: °				FINAL		<b>BH104A</b>											
	Client: <b>Caerphilly County Borough Council</b>										Sheet 1 of 2											
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50								
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV							
0.00	10.45	Cable Percussion	Dando 2500						13/12 16/12 17/12	16:00 16:00 08:00 09:00	1.20 9.50 9.50 10.45	1.20 9.50 9.50 10.00	7.9 3.1	Approved By:	CBP							
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing										
												Depth (m)	Ref	Tests / Results								
Dark brown slightly gravelly clayey fine to coarse organic SAND. (TOPSOIL)								0.30	79.24													
Dense greyish brown sandy sub-rounded fine to coarse GRAVEL with a medium cobble content. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)																						
Low strength firm grey to dark grey sandy slightly gravelly silty CLAY with occasionally bands of sandy silt and silty sandy. Gravel is sub-rounded fine to coarse of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)  ...sandy silt recorded in SPT sample at 5.0m bgl.								3.80	75.74													
Dense brownish grey very sandy sub-angular to sub-rounded fine to coarse GRAVEL of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)								9.50	70.04													
Observations / Remarks							Chiselling			Water Added		Hammer Information										
1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated at target depth. 4. No visual or olfactory evidence of contamination noted. 4. Installation to 4.0m bgl: 1.0m plain, 3.0m slotted.							From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %									
							2.70	3.00	60			AP2	84									
							Groundwater				Project Number											
							Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	<b>A110489-4</b>									
							2.00	-	-	20	1.10											



		Project: <b>Former Cwmcarn High School</b>		Location Details				Status		Borehole Number						
		Location: <b>Cwmcarn</b>		Easting: 321711.44 Northing: 193931.83 Level: 78.14mAOD Depth: 6.95m Logger: DV Type: CP Inclination: °				FINAL		<b>BH105</b>						
		Client: <b>Caerphilly County Borough Council</b>								Sheet 1 of 1						
Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time					Scale: 1:50		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By:	PV	
0.00	6.95	Cable Percussion	Dando 2500						19/12	16:00	6.95	6.00		Approved By:	CBP	
														Start Date:	19/12/2019	
														Finish Date:	19/12/2019	
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
												Depth (m)	Ref	Tests / Results		
Greyish brown very gravelly slightly clayey fine to coarse SAND. Gravel is angular fine to coarse of limestone, sandstone and rare brick. (MADE GROUND)								0.90	77.24			0.00 - 0.90	B1 ES1	SPT(C) 1.20m, N=50 (7,9/12,13,14,11)		
											0.45 - 4.50	EW1				
Dense greyish brown very sandy silty sub-rounded fine to coarse GRAVEL with a medium cobble content. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)											0.90 - 1.20 B2 ES2 0.90 - 1.20 B3 1.00 - 1.20 B4					
											2.20 - 3.20	B5	SPT(C) 2.20m, N=46 (2,5/14,9,11,12)			
											3.20 - 4.00	B6	SPT(C) 3.20m, N=35 (6,9/8,8,9,10)			
Medium dense greyish brown very gravelly fine to coarse SAND with a low cobble content. Gravel and cobbles are sub-rounded fine to coarse of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)								4.20	73.94			4.00 - 4.45 D1 B7 4.00 - 5.00		SPT(S) 4.00m, N=29 (2,3/6,7,8,8)	4	
												5.00 - 5.45 D2 B8 5.00 - 6.00		SPT(S) 5.00m, N=17 (1,2/3,4,6,4)	5	
Dense greyish brown very sandy sub-rounded fine to coarse GRAVEL with a medium cobble content. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)								6.00	72.14					SPT(C) 6.00m, 50 (25 for 28mm/50 for 135mm)	6	
														SPT(C) 6.50m, 50 (25 for 75mm/50 for 225mm)		
EOH at 6.95m -								6.95	71.19							7
																8
																9
																10
Observations / Remarks										Chiselling			Water Added		Hammer Information	
1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated due to obstruction. 4. No visual or olfactory evidence of contamination noted. 4. Installation to 4.5m bgl: 1.5 plain, 3.0 slotted.										From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %
										6.00	6.50	60			AP2	84
										Groundwater						
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks		A110489-4									
2.00	-	-	20	1.10												





Project: **Former Cwmcarn High School**

Location: **Cwmcarn**

Client: **Caerphilly County Borough Council**

Location Details

Easting: 321639.80

Northing: 193941.94

Level: 78.64mAOD

Depth: 10.15m

Logger: DV

Type: CP

Inclination: °

Status

FINAL

Borehole Number

BH106

Sheet 2 of 2

Method, Plant and Crew

From (m)

To (m)

Type

Plant Used

Crew

0.00

10.15

Cable Percussion

Dando 2500

Diameter

Depth (m)

Diam (mm)

Casing

Depth(m)

Diam (mm)

Drilling Progress by Time

Date

Time

Depth (m)

Casing (m)

Water (m)

17/12

16:00

2.40

2.40

18/12

14:00

10.15

10.00

18/12

16:00

2.40

2.40

1.24

Scale: 1:50

Checked By: PV

Approved By: CBP

Start Date: 17/12/2019

Finish Date: 18/12/2019

Strata Description

Brownish grey sandy sub-rounded fine to coarse GRAVEL with a medium cobble content and occasional bands of clay. Gravel and cobbles are of mixed lithologies including sandstone. (ALLUVIAL DEPOSITS)

EOH at 10.15m -

Legend

Depth (m)

Reduced Level (mAOD)

Water Level (m)

Inst / Backfill

10.15

68.49

Samples and Testing

Depth (m)

Ref

Tests / Results

11

12

13

14

15

16

17

18

19

20

Observations / Remarks

1. Hole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand excavation inspection pit excavated to 1.2m bgl. 3. Hole terminated at target depth. 4. No visual or olfactory evidence of contamination noted. 4. Backfilled with arisings.

Chiselling

From (m)

To (m)

Time (mins)

Water Added

From (m)

To (m)

Hammer Information

Serial No.

Energy Ratio %

AP2

84

Groundwater

Strike (m)

Casing (m)

Sealed (m)

Time (min)

Rose To (m)

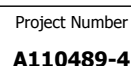
Remarks

Project Number

A110489-4

























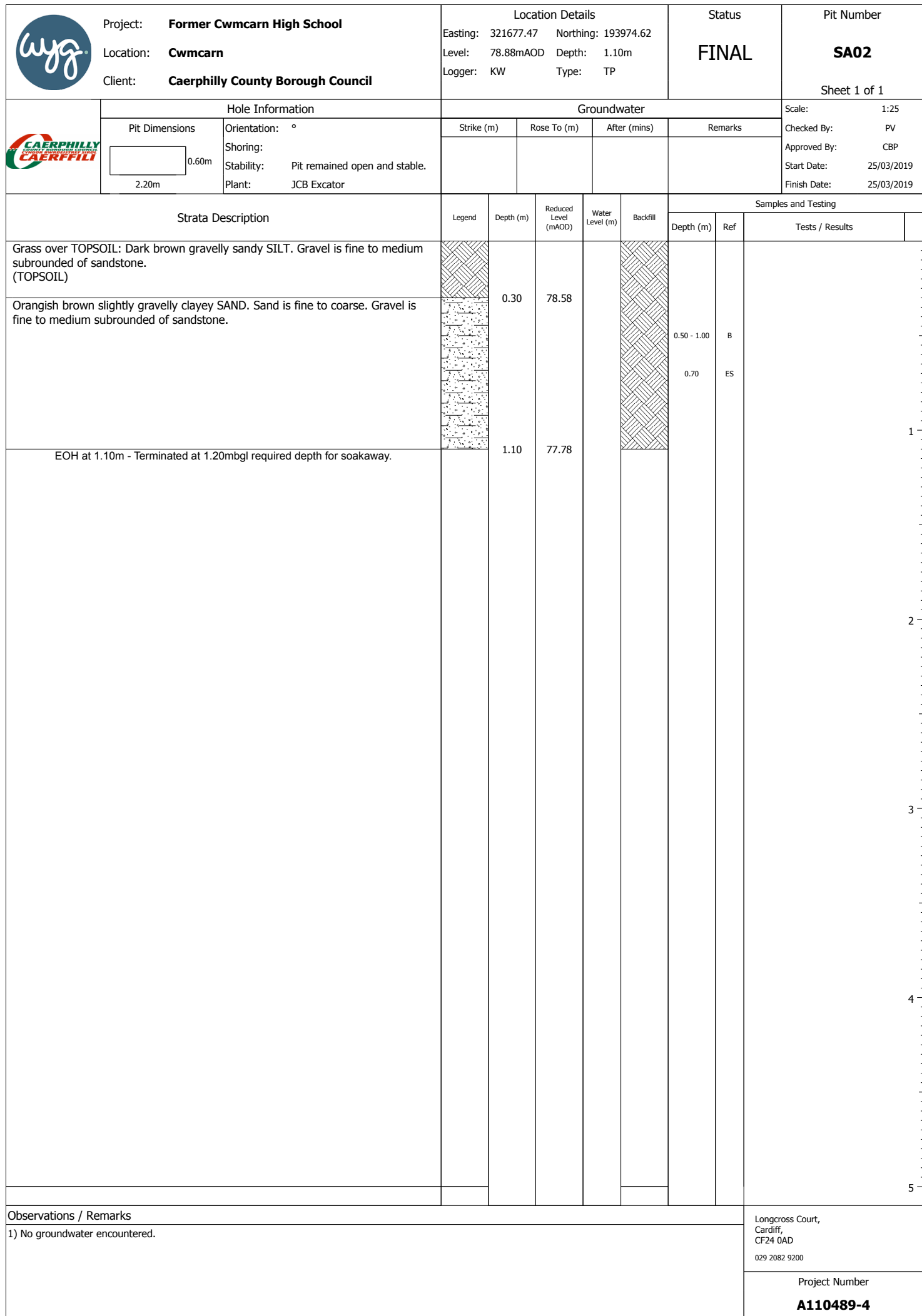








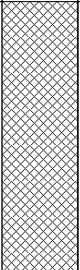
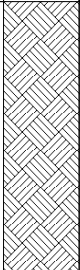
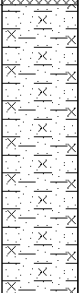
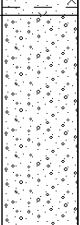





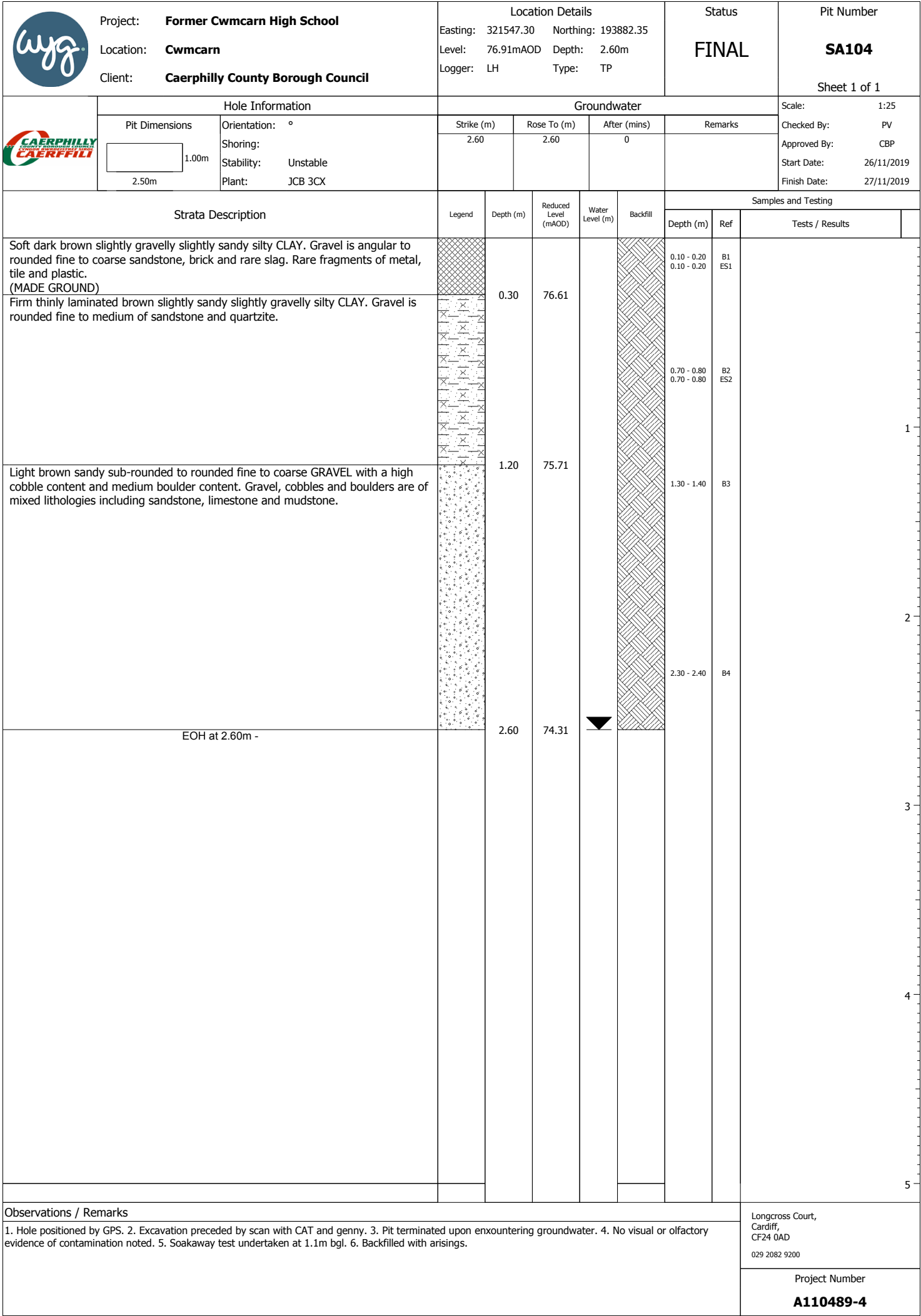


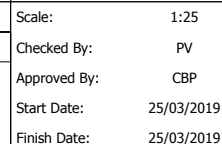
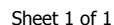




	Project: <b>Former Cwmcarn High School</b>		Location Details				Status		Pit Number		
	Location: <b>Cwmcarn</b>		Easting: 321591.96    Northing: 193923.13 Level: 78.69mAOD    Depth: 2.60m Logger: LH    Type: TP				<b>FINAL</b>		<b>SA103</b>		
Client: <b>Caerphilly County Borough Council</b>										Sheet 1 of 1	
	Hole Information		Groundwater				Scale: 1:25				
	Pit Dimensions <div><div></div><div>1.40m</div><div>3.00m</div></div>	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: PV				
		Shoring:	2.60	2.60	0		Approved By: CBP				
		Stability: Unstable					Start Date: 26/11/2019				
		Plant: JCB 3CX					Finish Date: 29/11/2019				
Strata Description			Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing			
								Depth (m)	Ref	Tests / Results	
Light pinkish brown slightly sandy angular fine to coarse GRAVEL of limestone and rare brick. (MADE GROUND)				0.90	77.79			0.10 - 0.20	B1		
								0.10 - 0.20	ES1		
Firm light brown mottled light yellowish brown slightly sandy slightly gravelly silty CLAY with frequent lenses of dark brown silt. Gravel is rounded fine to medium of sandstone.								1.20 - 1.30	B2		
							1.20 - 1.30	ES2			
Light brown sandy sub-rounded to rounded fine to coarse GRAVEL with a high cobble and boulder content. Gravel, cobbles and boulders are sub-rounded to rounded of mixed lithologies including sandstone and quartzite.				1.90	76.79			2.00 - 2.10	B3	2	
EOH at 2.60m -				2.60	76.09					3	
										4	
										5	
Observations / Remarks								Longcross Court, Cardiff, CF24 0AD 029 2082 9200			
1. Hole positioned by GPS. 2. Excavation preceded by scan with CAT and genny. 3. Pit terminated upon encountering groundwater. 4. No visual or olfactory evidence of contamination noted. 5. Soakaway test undertaken at 1.35m bgl. 6. Backfilled with arisings.								Project Number <b>A110489-4</b>			









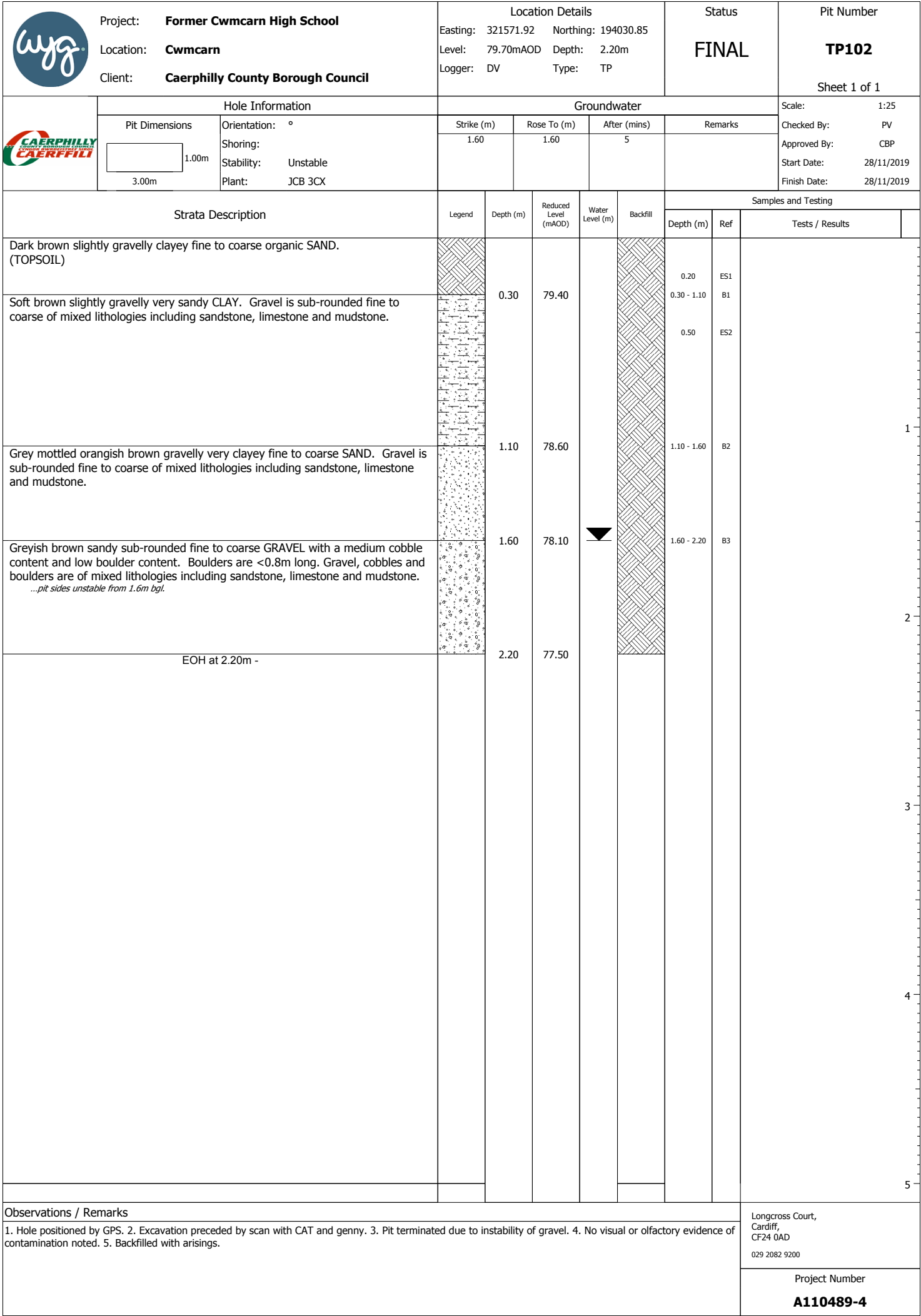
<div>Observations / Remarks</div> <div>1) Groundwater encountered at 1.60mbgl as a major seepage.</div>	<div>Longcross Court, Cardiff, CF24 0AD</div> <div>029 2082 9200</div> <div>Project Number</div> <div><b>A110489-4</b></div>
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**A110489-4**

	Project: <b>Former Cwmcarn High School</b>	Location Details				Status		Pit Number	
	Location: <b>Cwmcarn</b>	Easting: 321707.47    Northing: 193982.17 Level: 78.87mAOD    Depth: 1.70m Logger: ST    Type: TP				<b>FINAL</b>		<b>TP03</b>	
Client: <b>Caerphilly County Borough Council</b>								Sheet 1 of 1	
	Hole Information		Groundwater				Scale: 1:25		
	Pit Dimensions <div><div></div><div>m</div></div>	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks		Checked By: PV	
		Shoring:	1.10	1.10	20	Seepage		Approved By: CBP	
Stability: Pit became unstable below 1.70mbgl.							Start Date: 25/03/2019		
Plant: JCB Excavator							Finish Date: 25/03/2019		
Strata Description		Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing		
							Depth (m)	Ref	Tests / Results
Grass over TOPSOIL: Dark brown very gravelly very sandy CLAY. Gravel is fine to coarse subrounded of sandstone. Sand is fine to coarse.							0.00 - 0.40	B	
Brown sandy clayey silty GRAVEL. Gravel is fine to coarse subrounded of sandstone. Sand is fine to coarse.			0.40	78.47			0.40 - 0.90	B	
Soft brown very sandy silty CLAY.			0.90	77.97			0.90 - 1.70	B	
							1.00	ES	
EOH at 1.70m - Terminated at 1.70mbgl due to water ingress and pit instability.			1.70	77.17					1
									2
									3
									4
									5
Observations / Remarks							Longcross Court, Cardiff, CF24 0AD 029 2082 9200		
1) Groundwater encountered at 1.10mbgl as a medium seepage.							Project Number <b>A110489-4</b>		







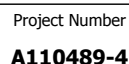

























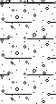

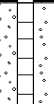







Project Number  
**A110489-4**








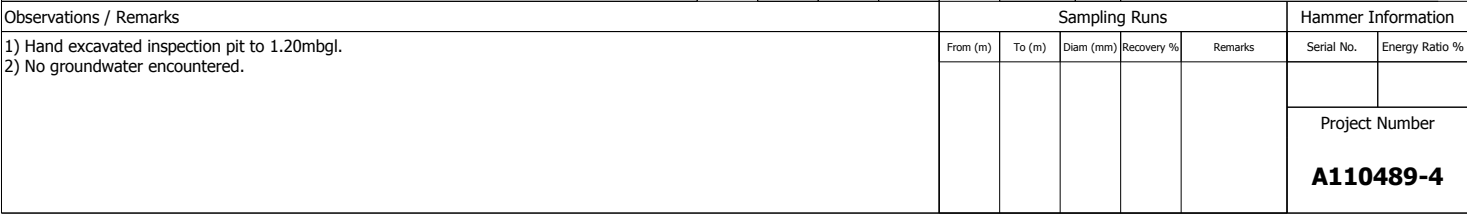
		Project: <b>Former Cwmcarn High School</b>		Location Details								Status		Borehole Number			
		Location: <b>Cwmcarn</b>		Easting: 321642.78    Northing: 194025.46 Level: 79.33mAOD    Depth: 3.00m Logger: ST    Type: WS Inclination: °								FINAL		<b>WS01</b>			
		Client: <b>Caerphilly County Borough Council</b>												Sheet 1 of 1			
Method, Plant and Crew						Diameter		Casing		Groundwater						Scale: 1:50	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By:	PV	
0.00	3.00	Dynamic Windowless Sampling	Window Sampler	SGT					1.10	-	-	0.00	20		Approved By:	CBP	
															Start Date:	28/03/2019	
															Finish Date:	28/04/2019	
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
Grass over TOPSOIL: Dark brown gravelly sandy CLAY. Gravel is fine to medium subrounded to subangular of sandstone. Sand is fine to coarse. (TOPSOIL) Soft brown very sandy very gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular of sandstone.								0.30	79.03			Depth (m)	Ref	Tests / Results			
												0.00 - 0.30	B				
Medium dense brown very sandy GRAVEL. Gravel is fine to coarse subrounded to subangular. Sand is fine to coarse.  From 2.00 to 3.00mbgl gravel becomes very dense.								1.00	78.33			0.30 - 1.00	B	SPT(C) 1.20m, N=15 (1,2/4,4,4,3)		1	
												0.40	ES				
EOH at 3.00m - WS refusal on suspected cobble.								3.00	76.33			1.00 - 3.00	B	SPT(C) 2.00m, N=35 (3,5/6,10,8,11)		2	
															SPT(C) 2.45m, 50 (12,14/50 for 245mm)		3
																	4
																	5
																	6
																	7
																	8
																	9
																	10
Observations / Remarks											Sampling Runs				Hammer Information		
1) Hand excavated inspection pit to 1.20mbgl. 2) Groundwater encountered at 1.10mbgl. Hole collapsed during removal of sampler.											From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
															Project Number		
															<b>A110489-4</b>		





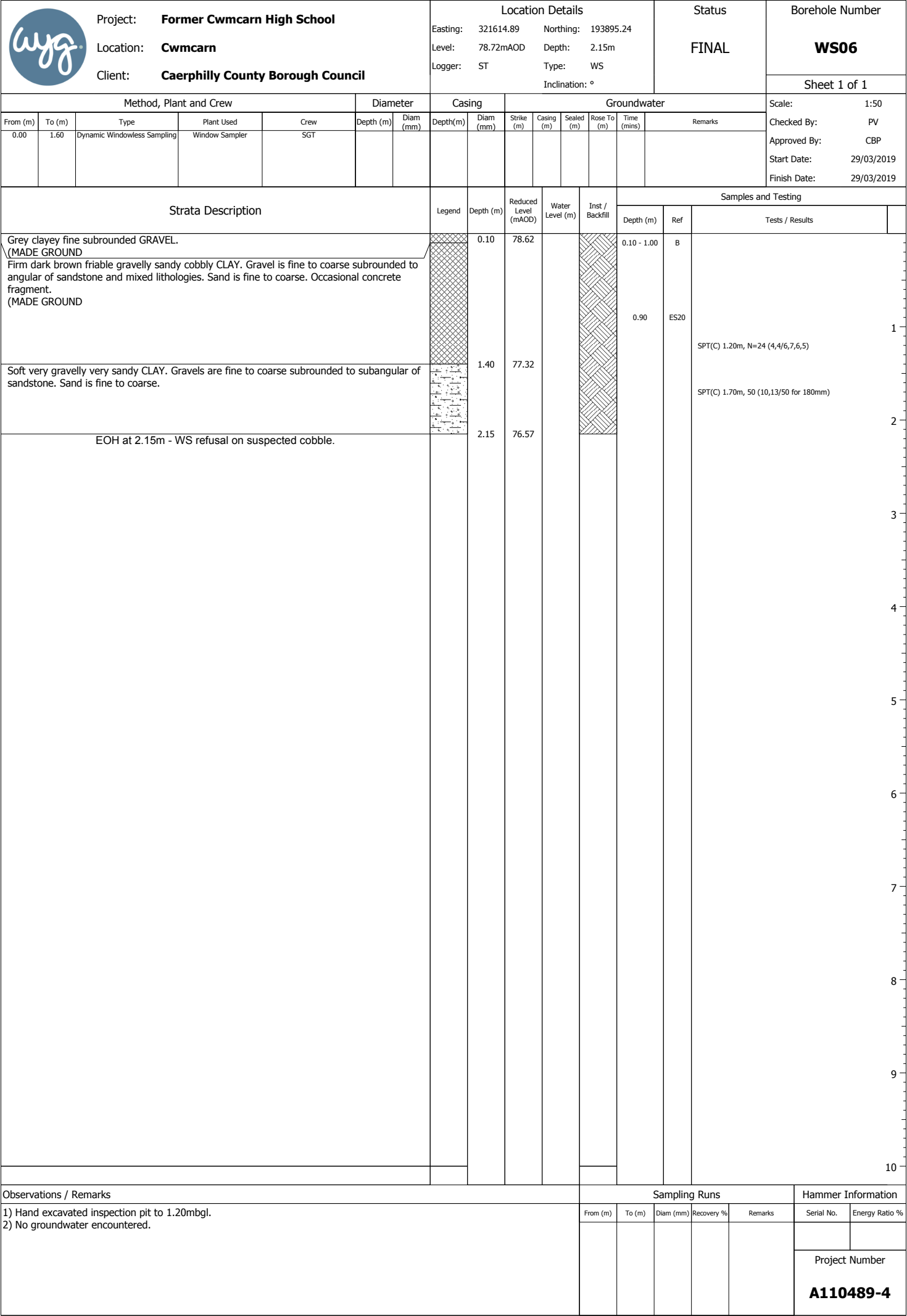
		Project: <b>Former Cwmcarn High School</b>		Location Details		Status		Borehole Number								
		Location: <b>Cwmcarn</b>		Easting: 321686.32    Northing: 193986.02		<b>FINAL</b>		<b>WS02</b>								
		Client: <b>Caerphilly County Borough Council</b>		Level: 78.98mAOD    Depth: 1.70m												
				Logger: ST    Type: WS		Inclination: °		Sheet 1 of 1								
Method, Plant and Crew					Diameter		Casing		Groundwater			Scale: 1:50				
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: PV	
0.00	1.70	Dynamic Windowless Sampling	Window Sampler	SGT					1.50	-	-	0.00	20		Approved By: CBP	
														Start Date: 28/03/2019		
														Finish Date: 28/03/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing				
													Depth (m)	Ref	Tests / Results	
Dark brown gravelly sandy CLAY. Gravel is fine to medium subrounded to subangular of sandstone. Sand is fine to coarse. (TOPSOIL)								0.45	78.53				0.00 0.00 - 0.45 0.20	EW B ES		
Firm orangish brown very sandy very gravelly cobbly CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular of sandstone.								1.00	77.98				0.45 - 1.00  0.80	B  ES		
Medium dense brown very sandy clayey GRAVEL. Gravel is fine to coarse subrounded to angular of sandstone. Sand is fine to coarse.								1.70	77.28				1.00 - 1.70	B	SPT(C) 1.20m, N=40 (11,11/12,9,10,9)	1
EOH at 1.70m - WS refusal on suspected cobble.															SPT(C) 1.70m, 50 (11,13/50 for 255mm)	2
																3
																4
																5
																6
																7
																8
																9
																10
Observations / Remarks										Sampling Runs				Hammer Information		
1) Hand excavated inspection pit to 1.20mblg 2) Groundwater encountered at 1.30mblg.										From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
										Project Number						
A110489-4																

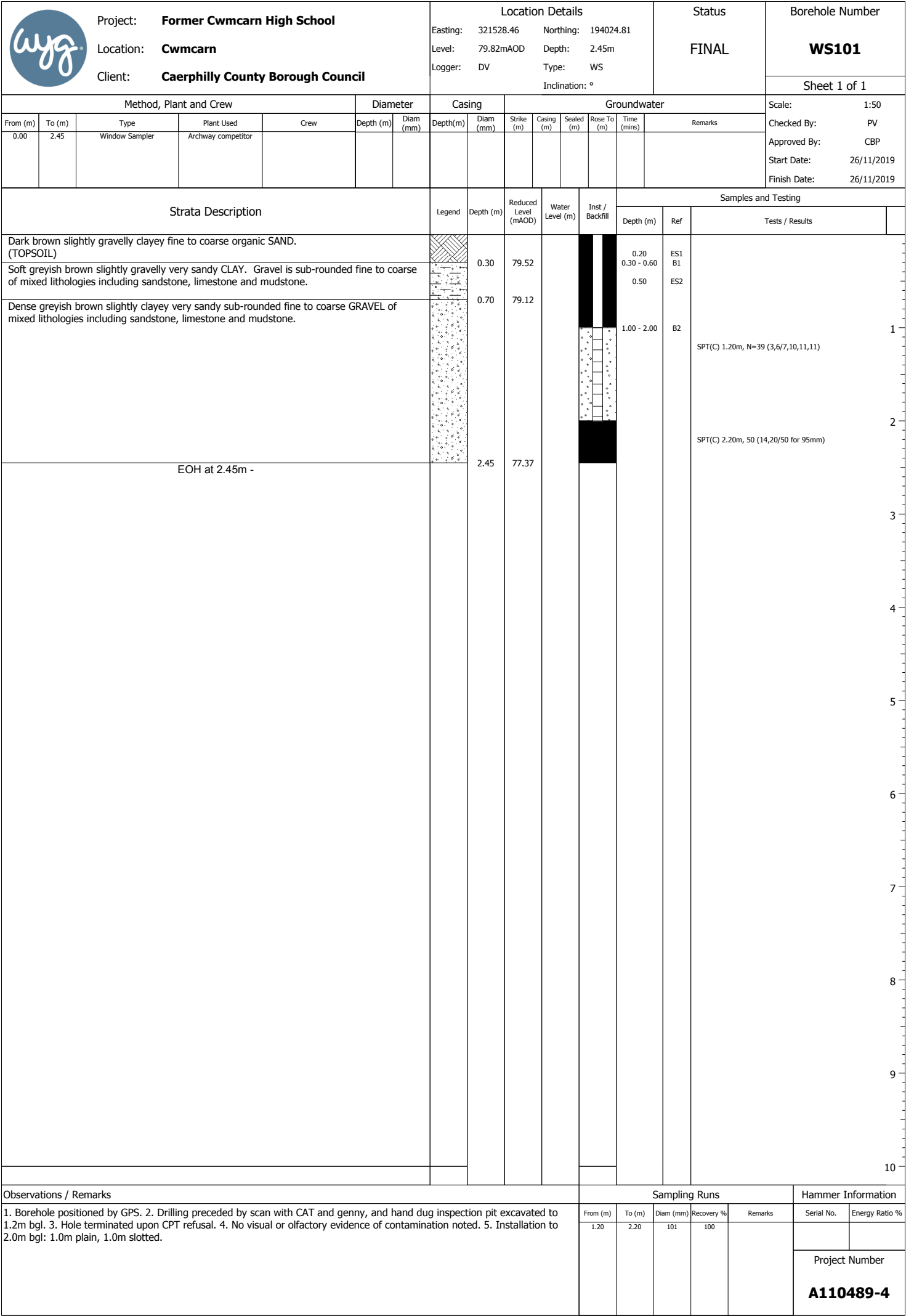
		Project: <b>Former Cwmcarn High School</b>		Location Details						Status		Borehole Number					
		Location: <b>Cwmcarn</b>		Easting: 321650.51    Northing: 193972.88 Level: 79.04mAOD    Depth: 1.70m Logger: ST    Type: WS Inclination: °						FINAL		<b>WS03</b>					
		Client: <b>Caerphilly County Borough Council</b>										Sheet 1 of 1					
Method, Plant and Crew					Diameter		Casing		Groundwater						Scale: 1:50		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: PV		
0.00	1.70	Window Sampler	Window Sampler	SGT					1.50	-	-	0.00	20		Approved By: CBP		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
Dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium subrounded to subangular of sandstone. (TOPSOIL)								0.45	78.59				0.00 0.00 - 0.45 0.30 0.45 - 1.00	EW5 B ES B	SPT(C) 1.20m, N=28 (3,4/6,6,7,9)		
Firm brown very sandy very gravelly slightly cobbly CLAY. Sand is fine to coarse. Gravel is fine to coarse subrounded to subangular of sandstone. Cobbles are subrounded of sandstone.								1.00	78.04				1.00 1.00 - 1.70	ES16 B			
Medium dense brown very sandy clayey GRAVEL. Gravel is fine to coarse subrounded to angular of sandstone. Sand is fine to coarse.								1.70	77.34								SPT(C) 1.70m, 50 (8,11/50 for 180mm)
EOH at 1.70m - WS refusal on suspected cobble.																	
Observations / Remarks							Sampling Runs						Hammer Information				
							From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %				
													Project Number				
						A110489-4											

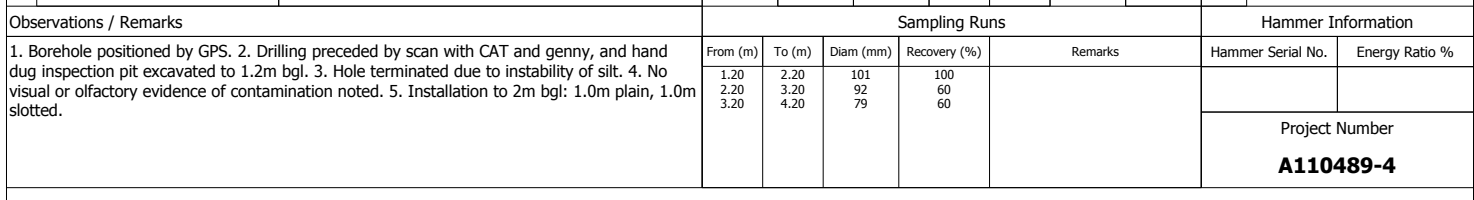
		Project: <b>Former Cwmcarn High School</b>		Location Details							Status		Borehole Number				
		Location: <b>Cwmcarn</b>		Easting: 321629.61    Northing: 193934.74 Level: 79.11mAOD    Depth: 2.10m Logger: ST    Type: WS Inclination: °							FINAL		<b>WS04</b>				
		Client: <b>Caerphilly County Borough Council</b>											Sheet 1 of 1				
Method, Plant and Crew					Diameter		Casing		Groundwater							Scale: 1:50	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: PV		
0.00	2.10	Dynamic Windowless Sampling	Window Sampler	SGT											Approved By: CBP		
															Start Date: 29/03/2019		
															Finish Date: 29/03/2019		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
<p>Brown gravelly slightly sandy CLAY. Gravel is rounded to subrounded of sandstone. Sand is fine to coarse. Small diamter metal bar identified.</p> <p>(MADE GROUND</p> <p>Firm brown very gravelly slightly cobbly CLAY. Gravels are fine to coarse subrounded to rounded of sandstone. Cobbles of subrounded sandstone.</p> <p>TILL</p> <p>Dense brown sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse angular of subrounded sandstone.</p>								0.30	78.81		0.00 - 0.30	B	SPT(C) 1.20m, N=32 (4,5/7,8,7,10)				
											0.20	ES17					
											0.30 - 0.60	B					
											0.50	ES					
								0.60	78.51				SPT(C) 1.65m, N=26 (7,8/7,6,6,7)				
EOH at 2.10m - WS refusal on suspected cobble.								2.10	77.01				SPT(C) 2.10m, 50 (9,12/50 for 170mm)				
																1	
																	2
																	3
																	4
																	5
																	6
																	7
																	8
																	9
																	10
Observations / Remarks										Sampling Runs				Hammer Information			
1) Hand excavated inspection pit to 1.20mbgl. 2) No groundwater encountered.										From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %	
										Project Number							
A110489-4																	




		Project: <b>Former Cwmcarn High School</b>		Location: <b>Cwmcarn</b>		Client: <b>Caerphilly County Borough Council</b>		Location Details						Status		Borehole Number	
								Easting: 321644.00    Northing: 193923.00 Level: 79.30mAOD    Depth: 2.90m Logger: ST    Type: WS Inclination: °						FINAL		<b>WS05A</b>	
																Sheet 1 of 1	
Method, Plant and Crew						Diameter		Casing		Groundwater						Scale: 1:50	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: PV		
0.00	2.10	Dynamic Windowless Sampling		SGT											Approved By: CBP		
																Start Date: 29/03/2019	
																Finish Date: 29/03/2019	
Strata Description						Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing						
											Depth (m)	Ref	Tests / Results				
Brown gravelly slightly silty CLAY. Gravel is fine to coarse subrounded of sandstone.							0.60	78.70			0.80	ES	SPT(C) 1.00m, N=12 (3,3/2,3,3,4) 1				
(TOPSOIL)																	
Firm brown very gravelly sandy CLAY. Gravel is medium to coarse of sandstone. Sand is fine to coarse.																	
Dense very sandy clayey GRAVEL. Gravel is fine to coarse subrounded to subangular of yellow and grey sandstone.							1.10	78.20			1.10 - 2.10	B	SPT(C) 2.00m, N=37 (5,4/6,7,10,14) 2				
EOH at 2.90m - WS refusal on suspected cobble.							2.90	76.40					SPT(C) 2.45m, 50 (10,14/50 for 190mm) 3				
																4	
																5	
																6	
																7	
																8	
																9	
																10	
Observations / Remarks										Sampling Runs				Hammer Information			
1) Hand excavated inspection pit to 1.20mbgl. 2) No groundwater encountered										From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %	
										Project Number							
												<b>A110489-4</b>					











Project:**Former Cwmcarn High School**

Location:**Cwmcarn**

Client:**Caerphilly County Borough Council**

Location Details

Easting: 321533.29

Northing: 194088.60

Level: 79.83mAOD

Depth: 1.51m

Logger: DV

Type: WS+DP

Inclination: °

Status

FINAL

Hole Number

WS103

Sheet 1 of 1



Hole Information

From (m)

To (m)

Type

Termination

0.00

1.51

Window Sampler

Groundwater

Strike (m)

Rises to (m)

Time (min)

Remarks

Scale: 1:50

Checked By: PV

Approved By: CBP

Start Date: 27/11/2019

Finish Date: 27/11/2019

Blows / 100mm

5

10

15

20

25

30

35

40

45

1

2

3

4

5

6

7

8

9

10

Strata Description

Dark brown slightly gravelly clayey fine to coarse organic SAND. (TOPSOIL)

Dark brown very gravelly fine to coarse SAND with a medium cobble content. Gravel and cobbles are sub-rounded fine to coarse of mixed lithologies including sandstone, limestone and mudstone. ...greyish brown from 0.7m bgl.

EOH at 1.51m -

Legend





Depth (m)

Reduced Level (mAOD)

Casing Ø (mm)

Water Level (m)

Installation / Backfill

0.10

79.73



1.51

78.32

Samples & Testing

Depth (m)

Ref

Test Results

0.20 - 0.70

1 B

0.50

1 ES

1.20

SPT(C)

50 (6,14/50 for 160mm)

Observations / Remarks

1. Borehole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand dug inspection pit excavated to 1.2m bgl. 3. Hole terminated upon CPT refusal. 4. No visual or olfactory evidence of contamination noted. 5. Backfilled with arisings.

Sampling Runs

From (m)

To (m)

Diam (mm)

Recovery (%)

Remarks

1.20

1.40

47

50

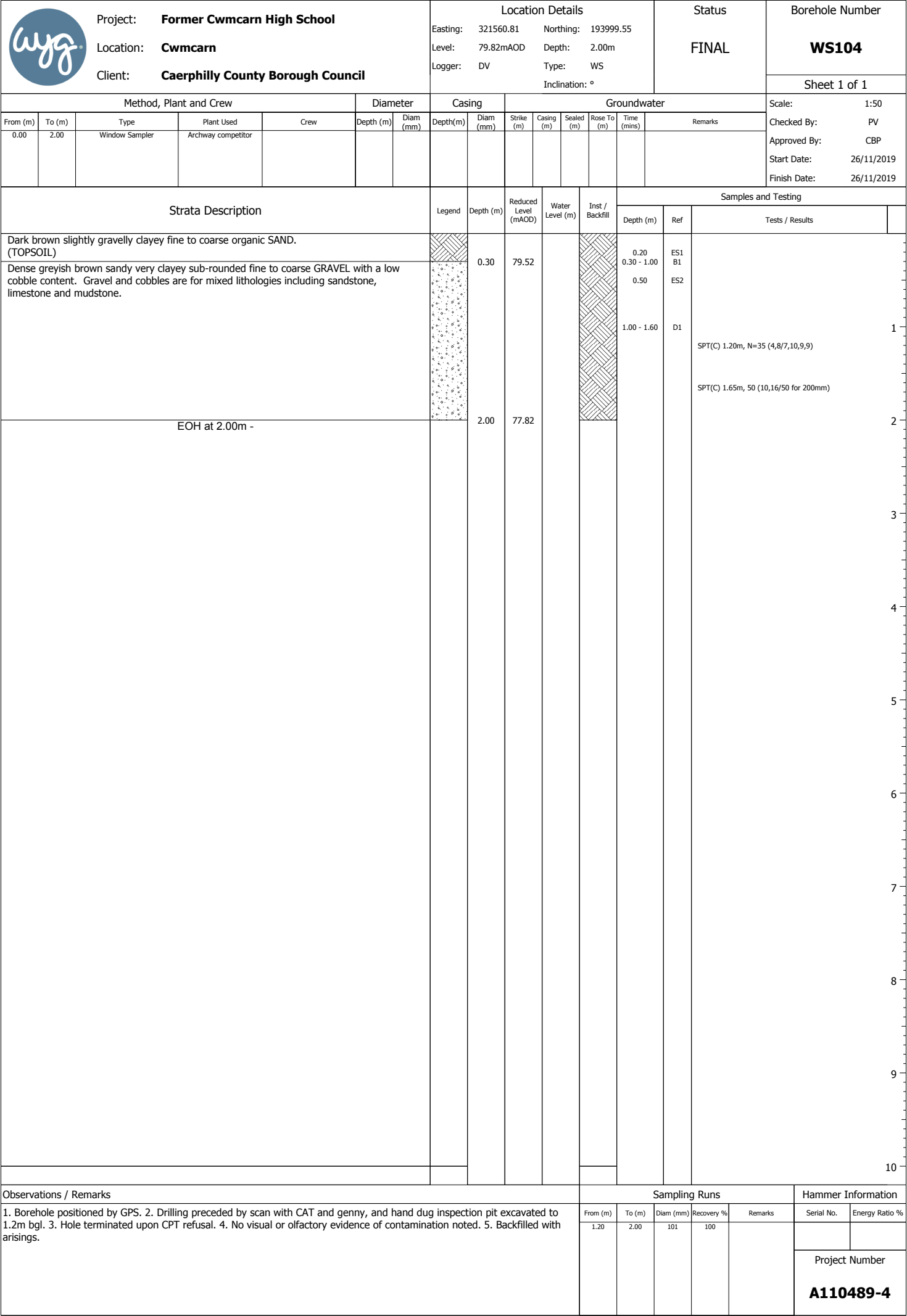
Hammer Information

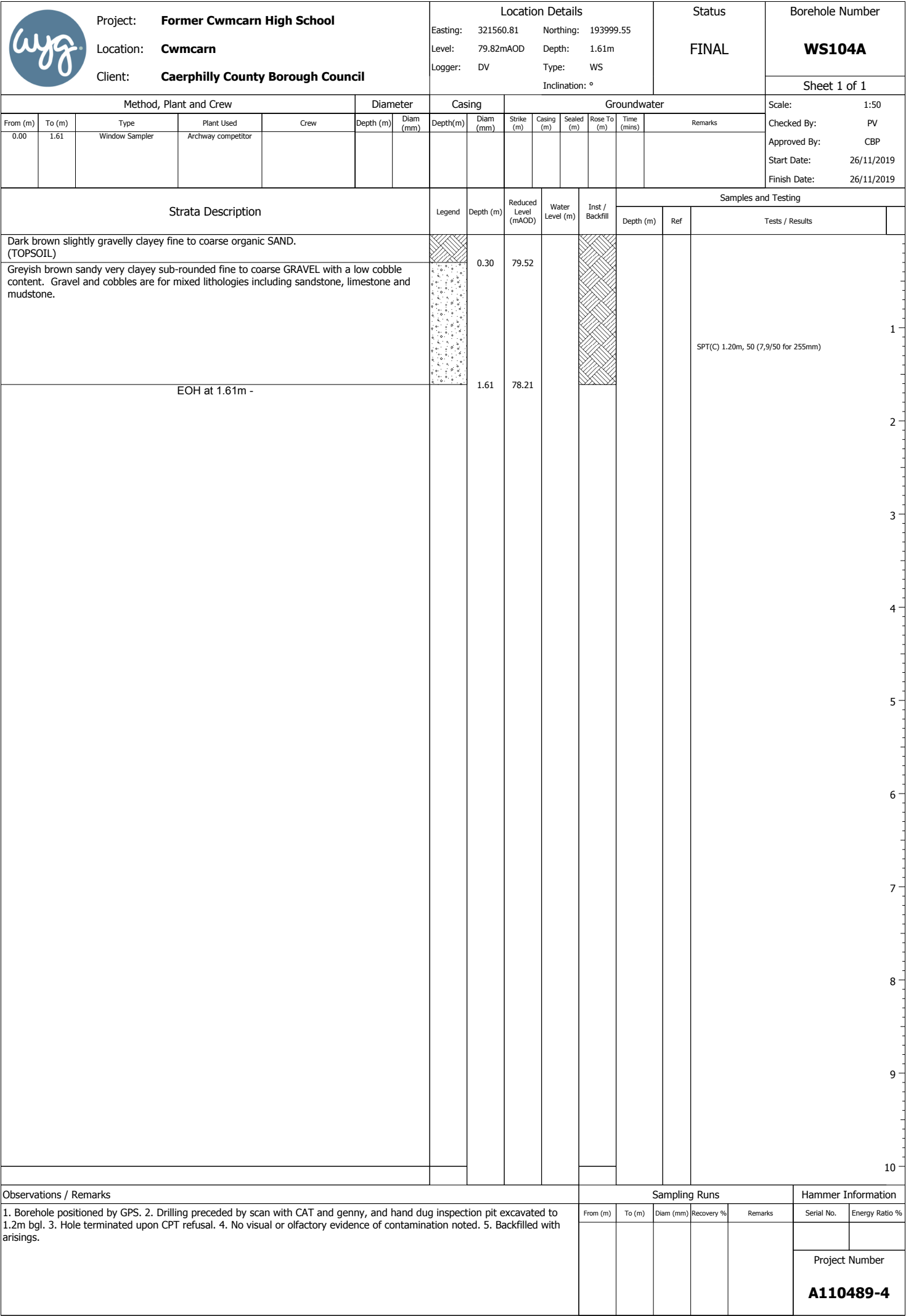
Hammer Serial No.

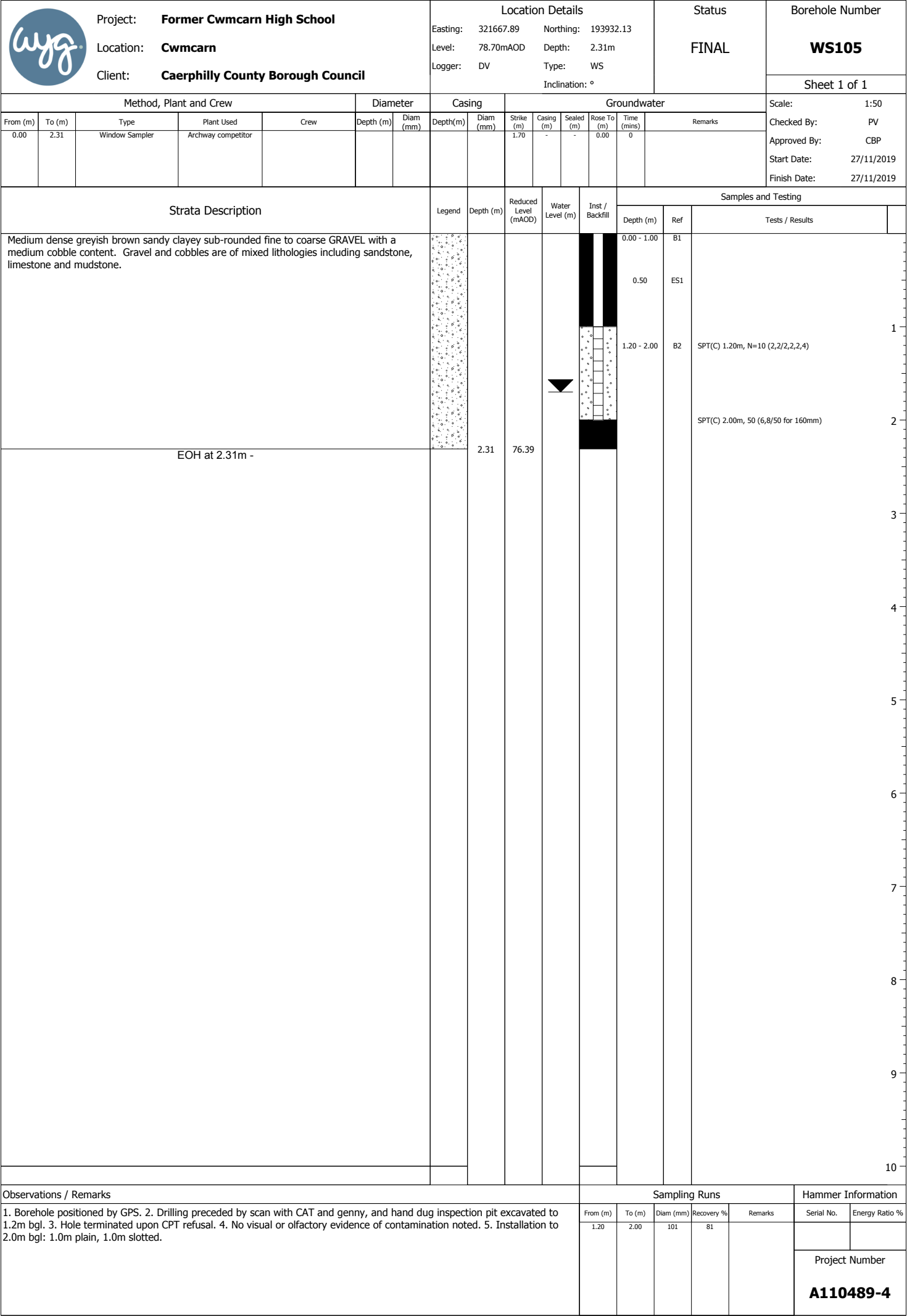
Energy Ratio %


Project Number

A110489-4









Project:**Former Cwmcarn High School**

Location:**Cwmcarn**

Client:**Caerphilly County Borough Council**

Location Details

Easting: 321694.06

Northing: 193940.52

Level: 78.25mAOD

Depth: 1.36m

Logger: DV

Type: WS+DP

Inclination: °

Status

FINAL

Hole Number

WS106

Sheet 1 of 1



Hole Information

From (m)

To (m)

Type

Termination

0.00

1.36

Window Sampler

Groundwater

Strike (m)

Rises to (m)

Time (min)

Remarks

Scale: 1:50

Checked By: PV

Approved By: CBP

Start Date: 27/11/2019

Finish Date: 27/11/2019

Blows / 100mm

5

10

15

20

25

30

35

40

45

4

7

5

4

3

3

2

3

6

7

9

11

9

13

14

25

1

2

3

4

5

6

7

8

9

10

Strata Description

Reddish grey sandy angular fine to coarse GRAVEL with a low cobble content. Gravel and cobbles are of limestone. (MADE GROUND)

Greyish brown very sandy sub-rounded fine to coarse GRAVEL with a low cobble content. Gravel and cobbles are of mixed lithologies including sandstone, limestone and mudstone.

EOH at 1.36m -

Legend





Depth (m)

Reduced Level (mAOD)

Casing Ø (mm)

Water Level (m)

Installation / Backfill

0.00 - 0.70

0.50

1.20

1 B

1 ES

SPT(C)

50 (10,14/50 for 10mm)

1

2

3

4

5

6

7

8

9

10

Observations / Remarks

1. Borehole positioned by GPS. 2. Drilling preceded by scan with CAT and genny, and hand dug inspection pit excavated to 1.2m bgl. 3. Hole terminated upon CPT refusal. 4. No visual or olfactory evidence of contamination noted. 5. Backfilled with arisings.

Sampling Runs

From (m)

To (m)

Diam (mm)

Recovery (%)

Remarks

Hammer Information

Hammer Serial No.

Energy Ratio %

Project Number

A110489-4



3 U R W H F Former Cwmcarn High School  
/ R B W R Q Cwmcarn  
& O M H Q Caerphilly County Borough Council

/ R B W R Q W H O V  
( D W L Q J , ~ ~ 1 R U W K E Q J , ~  
/ H Y H O , ~ ~ P \$ 2 ' ' H S W K , ~ ~ P  
/ R J J H U 9 7 \ S H , : 6 ' 3  
, Q F O L Q D W L R Q , ~ ~

6 W X V  
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+ R O H 1 X P E H U  
WS107  
6 K W H R I



+ R O H , O M R U Q P

\* U R X O M Z

6 F D O H , ~ ~  
& K H F N H G % \ , 3 9  
\$ S S U R Y H G % \ , & % 3  
6 W D U W ' D W H , ~ ~  
) L Q L V K ' D W H , ~ ~

J U R P P

7 R P

7 \ S H

7 H U P L Q D W

6 R V O L N

5 L V H V

W R L P H

P L Q

5 H U N V

: L Q G R P S O H U

% O R Z V P P

6 W U D W D ' H V F U L S W L R Q

/ H J H Q 6 ' H S K P

5 H G X F

6 D V L Q J

~ P P

~ D W H

U Q V W D O

P % D F N I

6 D P S O H V

7 H V W L Q J

' D U N E U R Z Q V O L J K W O \ J U D Y H O O \  
R U D L F 6 \$ 1 '  
7 2 3 6 2 , /

6 R I W J U H \ L V K E U R Z Q V D Q G \ Y H U \  
O R Z F R E E O H F R O M H O G H 6 I V D X E G V V \  
L V V X E X Q G H G I L Q H W R G F R O D U W K R Q \  
L Q F O X O L Q W W R Q H O O E H W G R O W R Q H

) L U P R U D Q J L V K E U R Z Q J U D Y H O O \  
L V V X E X Q G H G I L Q H W R G F R O D U W K R Q \  
L Q F O X O L Q W W R Q H O O E H W G R O W R Q H

EOH at 1.86m -

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H O O \ & / \$ < Z L W K D  
\* U D Y H O

V D Q G \ & / \$ < \* U D Y H O

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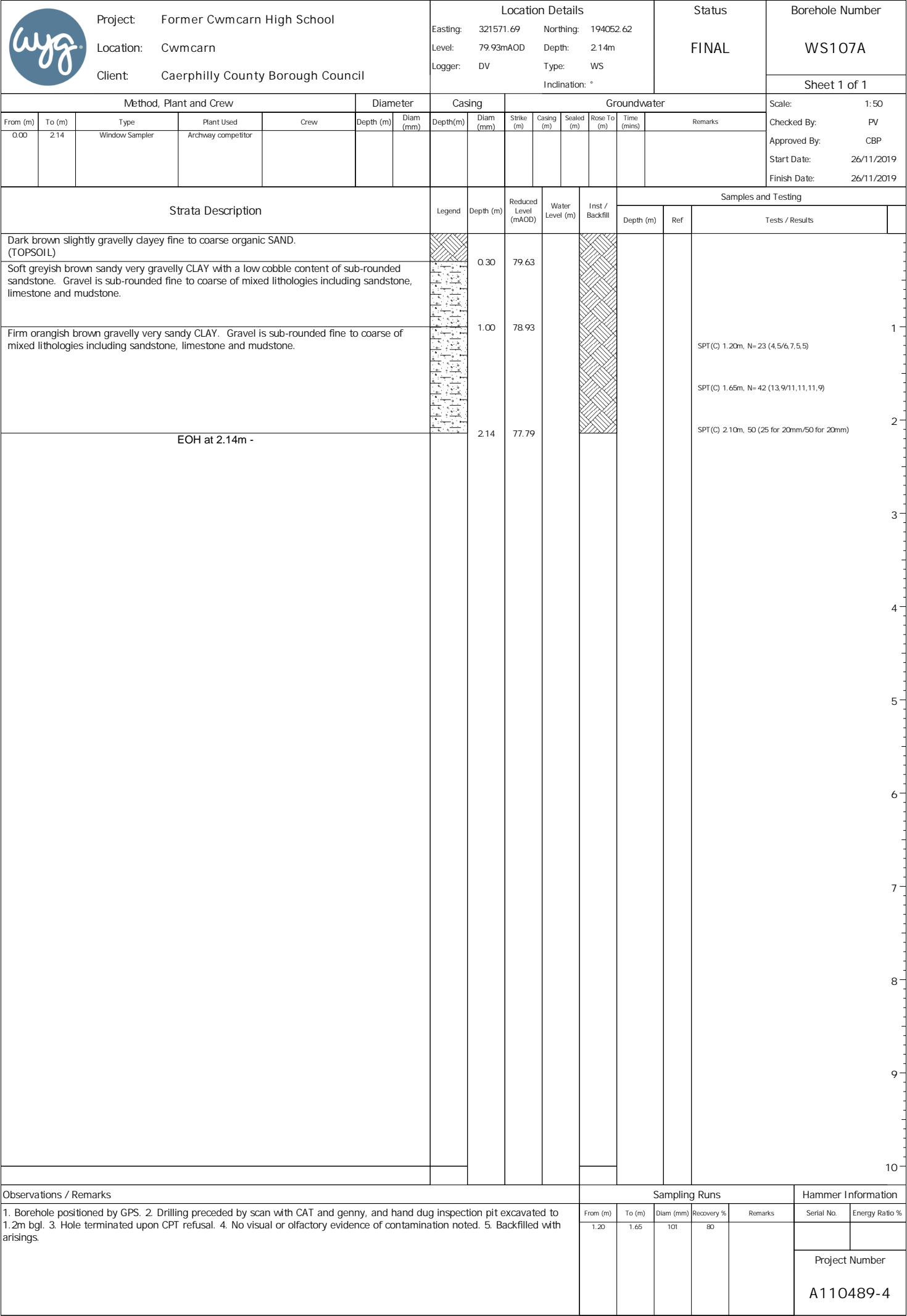
2 E V H W Y R Q V D J S M P

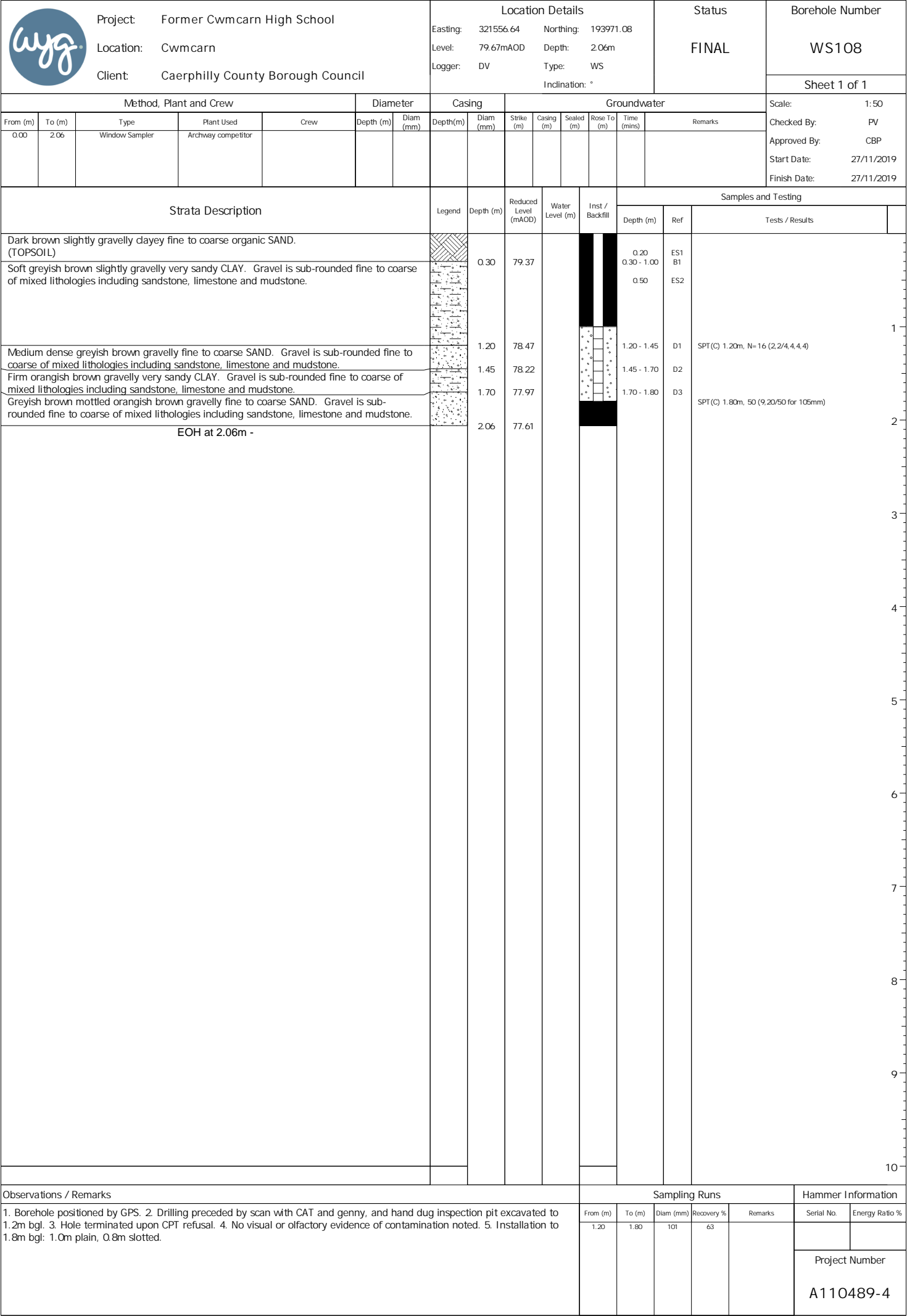
% R U H K R O H S R V L W L R Q H G E \ \* 3 6 ' U L O O L Q J S U H F H G H X O R E \ P F D O L L W K 5 8 \$ F Y I D G J H Q Q A B U D Q G K O Q P P H U 6 H U L Q H U J \ 5 D W L R  
G X J L Q V S H F W D R Q W S L Q W R P E J O + R O H W H U P L Q D W H G X S R Q - 8 7 U H T X V D O T R Y L V X D O R U  
R O I D F W R U \ H Y L G H Q F H R I F R Q W D P L Q D W L R Q Q R W H G ~ , Q V W D O O D W L R Q W R ~ P E J O , P S O D L Q  
V O R W W H G

6 D P S O L Q J 5 X Q V

+ D P P H U , Q D R U R Q

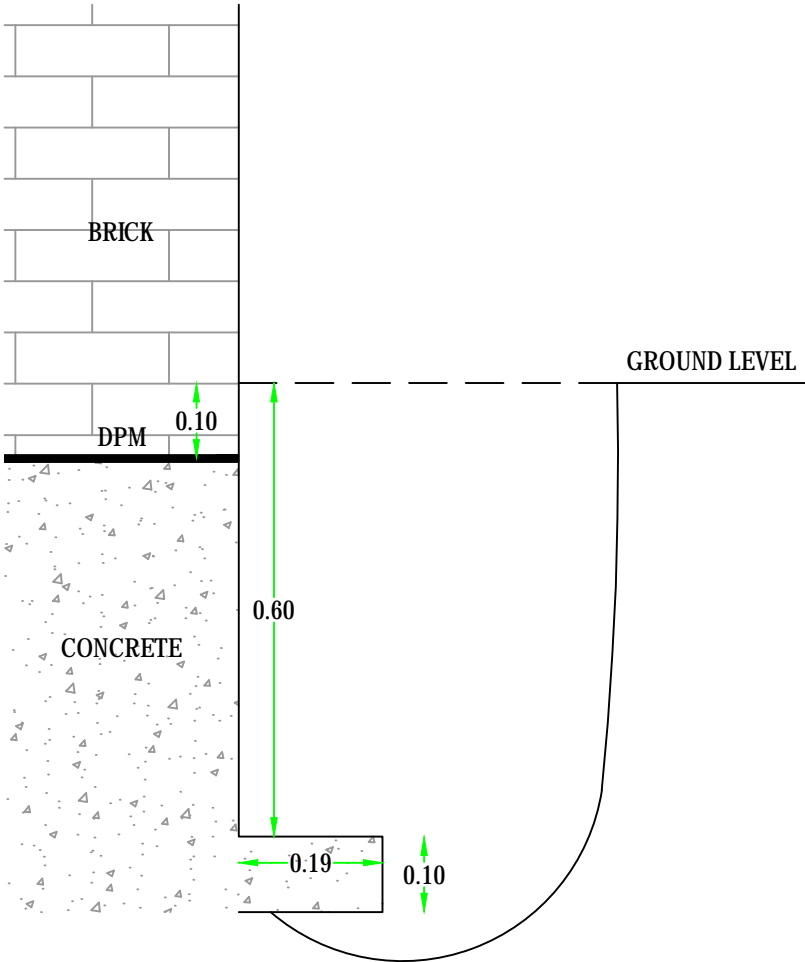
3 U R M H F W 1 X P E H U  
A110489-4



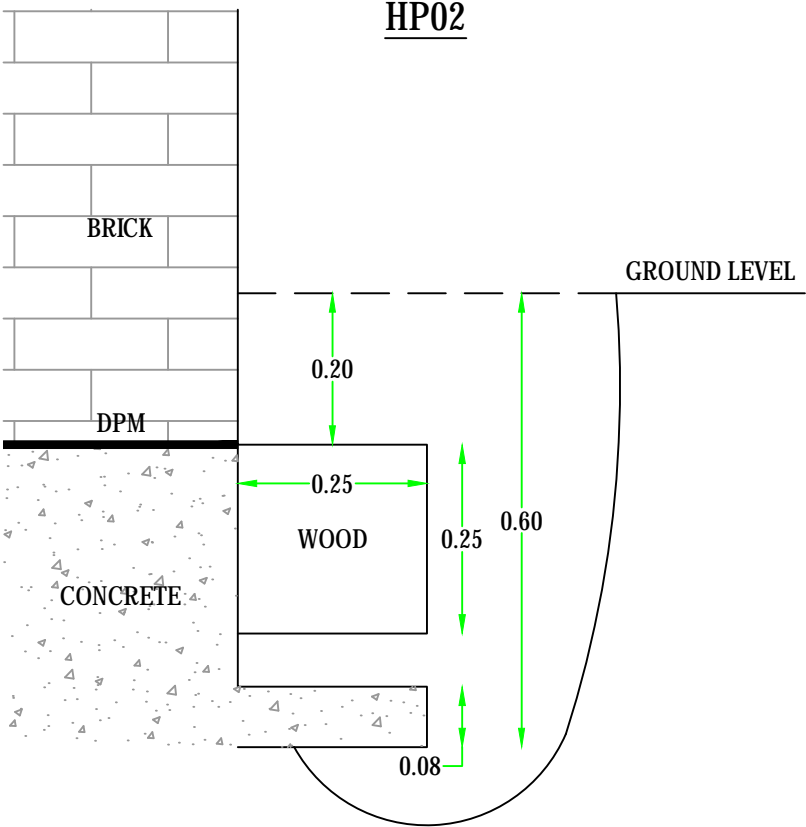




HP01



REV	DESCRIPTION	BY	CHK	APP	DATE
1	Scale @ A4 1:10	Drawn CM	Date 11.06.19	Checked Date	Approved Date
2	Project No. A110489-4	Office CDF	Type N	Drawing No. HPSK/01	Revision



REV	DESCRIPTION	BY	CHK	APP	DATE
	Scale @ A4 1:10	Drawn CM	Date 11.06.19	Checked Date	Approved Date
	Project No. A110489-4	Office CDF	Type N	Drawing No. HPSK/02	Revision





**Plate 1** SA103 Side 1



**Plate 2** SA103 Side 2

**WYG Environment**  
5th Floor, Longcross Court  
47 Newport Road  
Cardiff  
CF24 0AD

**Tel: 029 20 829200**  
**Fax: 029 20 455321**  
**E-mail [enviro.cardiff@wyg.com](mailto:enviro.cardiff@wyg.com)**  
Environmental Consultancy  
Ground Technologies & Investigation



**Project :-**  
**Cwmcarn High School**

**Project No.: A110489-4-1**

**26/11/2019**



**Plate 3** SA103 Side 3



**Plate 4** SA103 Side 4

**WYG Environment**  
**5th Floor, Longcross Court**  
**47 Newport Road**  
**Cardiff**  
**CF24 0AD**

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**Fax: 029 20 455321**  
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**26/11/2019**





**Plate 5** SA103 Spoil

**Plate 6** BLANK

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**Plate 7** SA104 Side 1



**Plate 8** SA104 Side 2

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**Project No.: A110489-4-1**

**26/11/2019**





Plate 9 SA104 Side 3



Plate 10 SA104 Side 4

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Project No.: A110489-4-1

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**Plate 11** SA104 Spoil

**Plate 12** BLANK

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**Project No.: A110489-4-1**

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**Plate 13** SA105/TP103 Side 1



**Plate 14** SA105/TP103 Side 2

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**26/11/2019**



**Plate 15**

SA105/TP103 Side 3



**Plate 16**

SA105/TP103 Side 4

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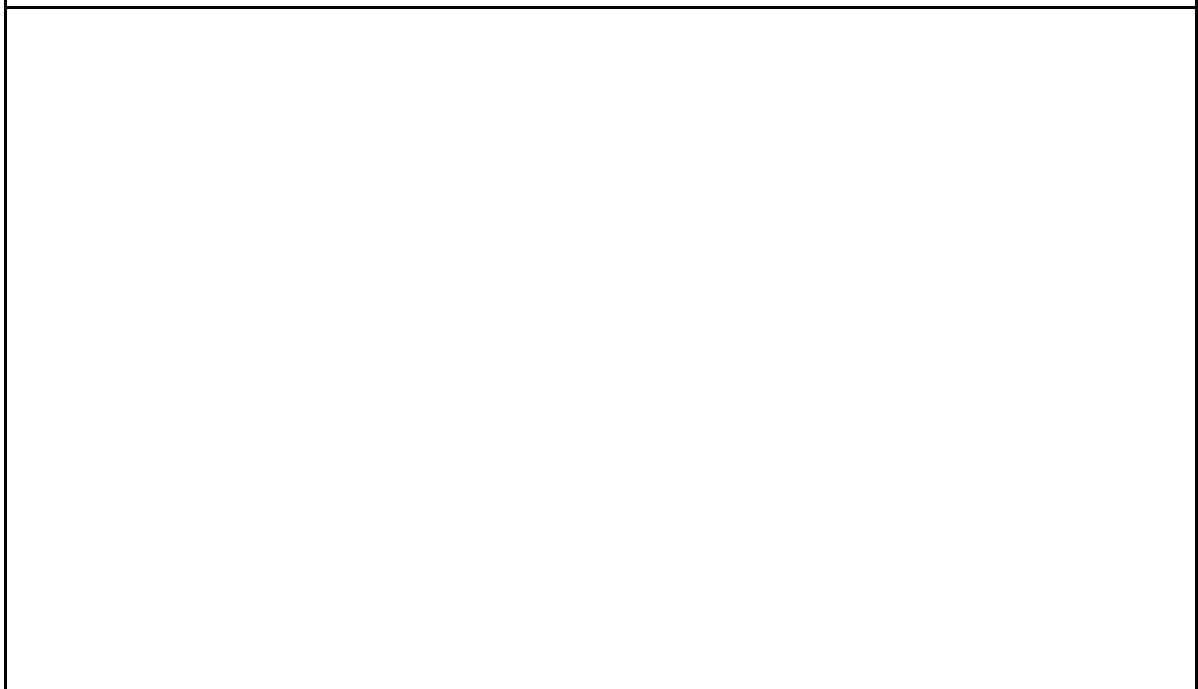
Project No.: A110489-4-1

26/11/2019





**Plate 17** SA105/TP103 Spoil



**Plate 18** BLANK

**WYG Environment**  
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**Plate 19** TP101 Side 1



**Plate 20** TP101 Side 2

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**Plate 21** TP101 Side 3



**Plate 22** TP101 Side 4

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**Plate 23** TP101 Spoil



**Plate 24** TP102 spoil

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Plate 25

TP104



Plate 26

TP105

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Plate 27

TP105A



Plate 28

TP106

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Plate 29

TP107A



Plate 30

TP108

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Plate 31 WS101 - 0.0m - 1.0m bgl



Plate 32 WS101 - 1.0m - 2.0m bgl.

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Plate 33 WS102 - 0.0m - 1.0m bgl.



Plate 34 WS102 - 1.0m - 3.0m bgl.

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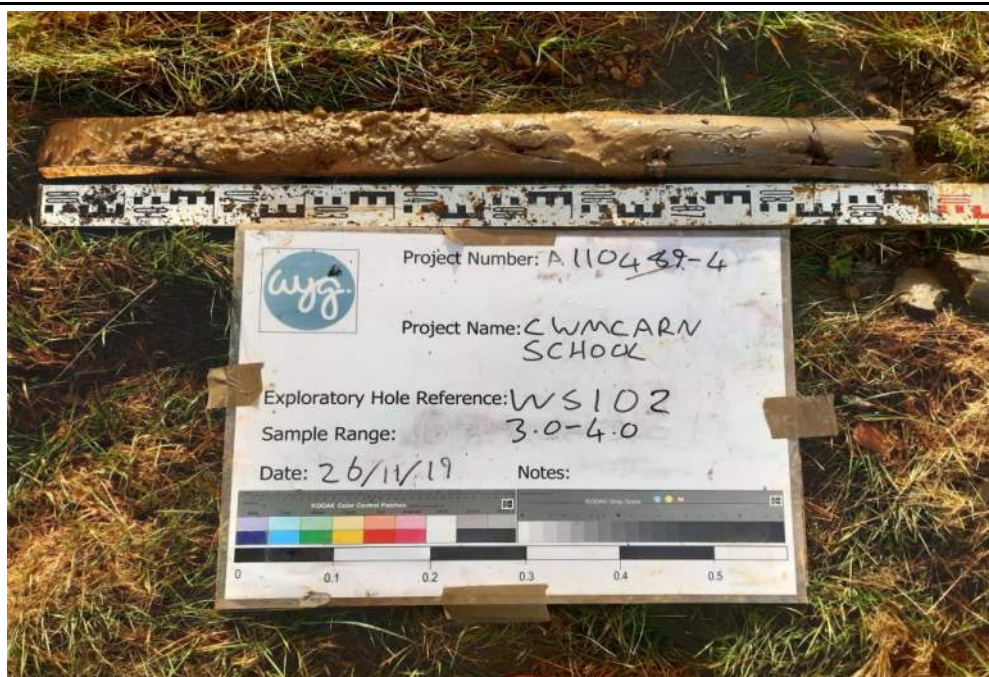


Plate 35 WS102 - 3.0m - 4.0m bgl.



Plate 36 WS103 - 0.0m - 1.2m bgl.

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Plate 37 WS103 - 1.2m - 1.4m bgl.



Plate 38 WS104 - 0.0m - 1.2m bgl.

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Plate 39 WS104 - 1.2m - 1.6m bgl.



Plate 40 WS105 - 0.0 - 1.2m bgl.

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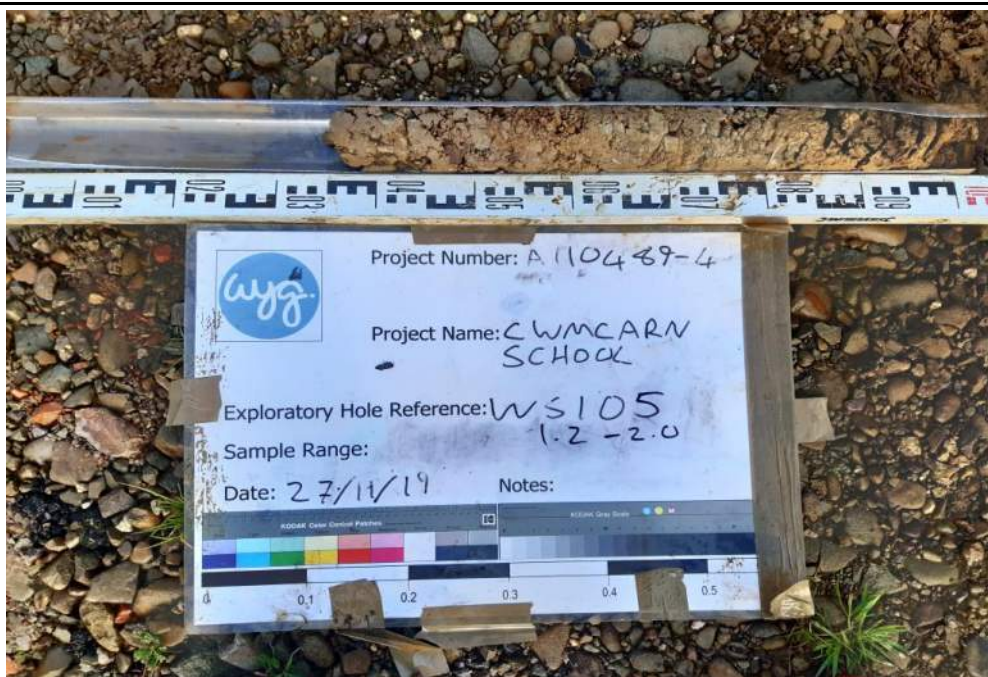


Plate 41 WS105 - 1.2m - 2.0m bgl.

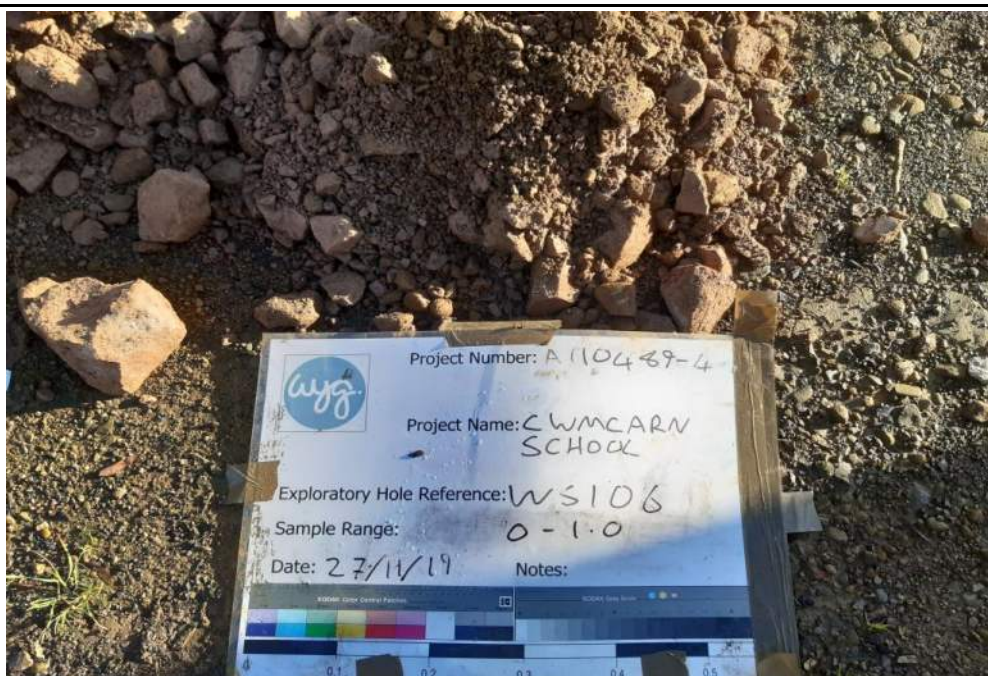


Plate 42 WS105 - 0.0m - 1.0m bgl.

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Plate 43 S1



Plate 44 S2

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Plate 45 S3



Plate 46 S4

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Plate 47 S5



Plate 48 S6

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Plate 49 S7



Plate 50 S8

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Plate 51 S9



Plate 52 S10

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Plate 53

S11



Plate 54

S12

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Project No.: A110489-4-1

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Plate Title

SA01

Plate No

1



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Ground Engineering Services



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Client

CCBC

Plate Title

SA01

Checked by  
SR

Plate No.

2





Plate Title

TP01

Plate No

3



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Plate Title

TP01

Checked by

SR

Plate No.

4





Plate Title

TP02

Plate No

5



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Client

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Plate Title

TP02

Checked by

SR

Plate No.

6





Plate Title

TP03

Plate No

7



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Plate Title

TP03

Checked by

SR


Plate No.

8



Plate Title	TP04	Plate No	9
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	<b>Client</b> <b>CCBC</b>	<b>Checked by</b> <b>SR</b>	<b>Plate No.</b> <b>10</b>

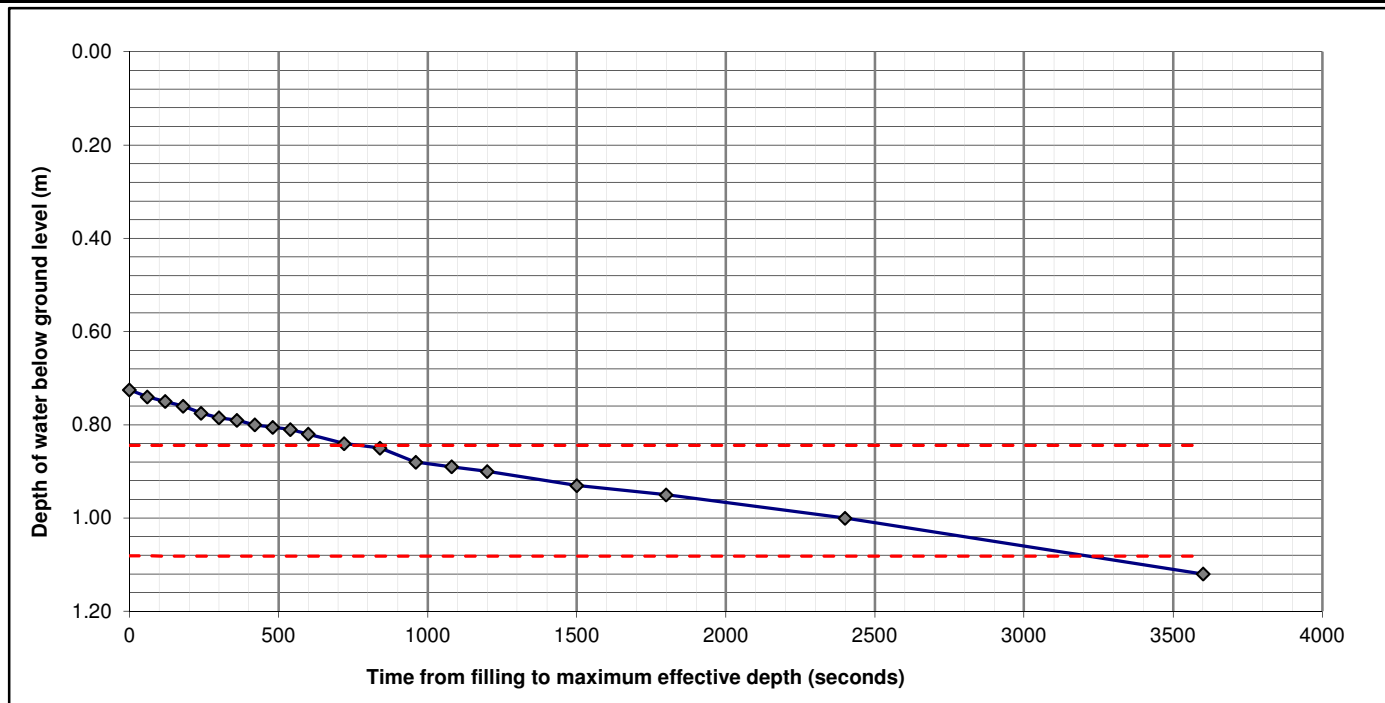


## **APPENDIX C – SOIL INFILTRATION TESTING RESULTS**



DATE:	25/03/2019
PROJECT No:	A110489-4
PROJECT NAME:	Cwmcarn
CLIENT:	CCBC
TRIAL PIT ID:	SA01
TEST NUMBER:	1

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

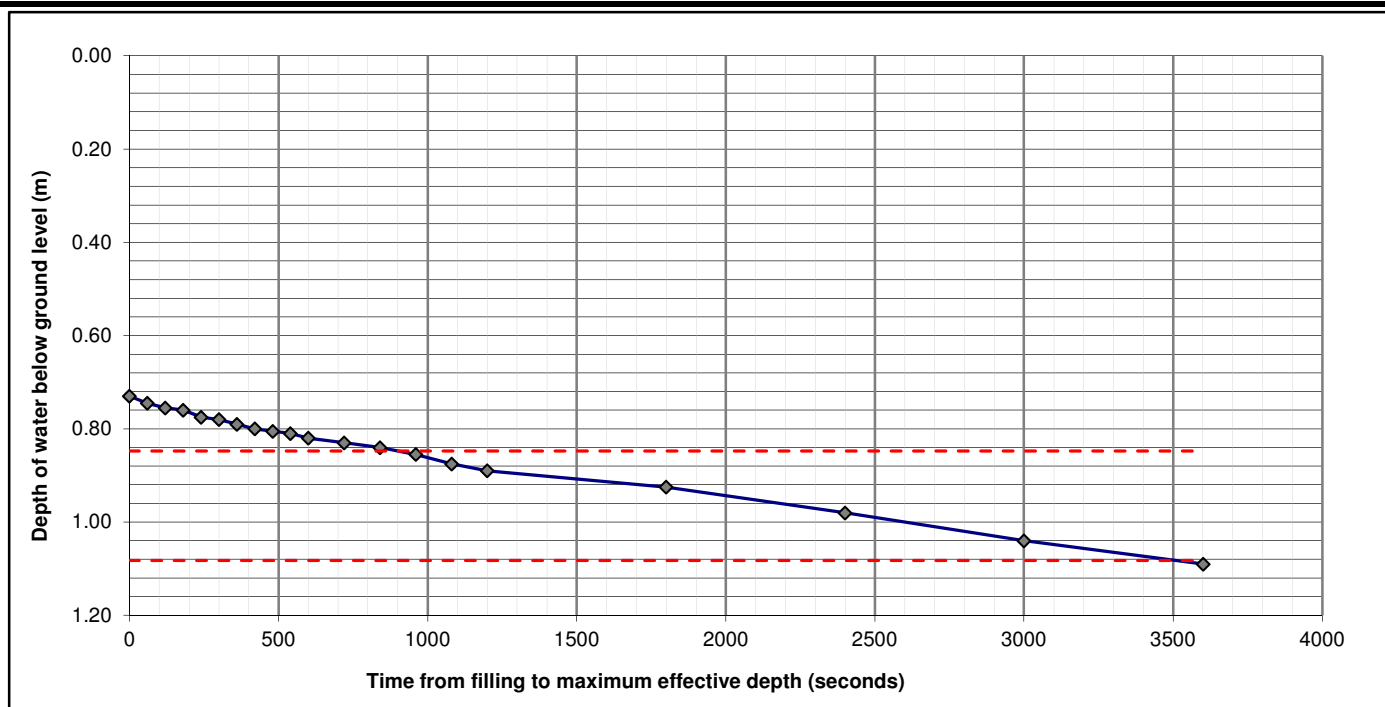


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)				
0	0.00	0.725				
60	1.00	0.740				
120	2.00	0.750				
180	3.00	0.760				
240	4.00	0.775				
300	5.00	0.785				
360	6.00	0.790				
420	7.00	0.800				
480	8.00	0.805				
540	9.00	0.810				
600	10.00	0.820				
720	12.00	0.840				
840	14.00	0.850				
960	16.00	0.880				
1080	18.00	0.890				
1200	20.00	0.900				
1500	25.00	0.930				
1800	30.00	0.950				
2400	40.00	1.000				
3600	60.00	1.120				



DATE:	25/03/2019
PROJECT No:	A110489-4
PROJECT NAME:	Cwmcarn
CLIENT:	CCBC
TRIAL PIT ID:	SA01
TEST NUMBER:	2

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



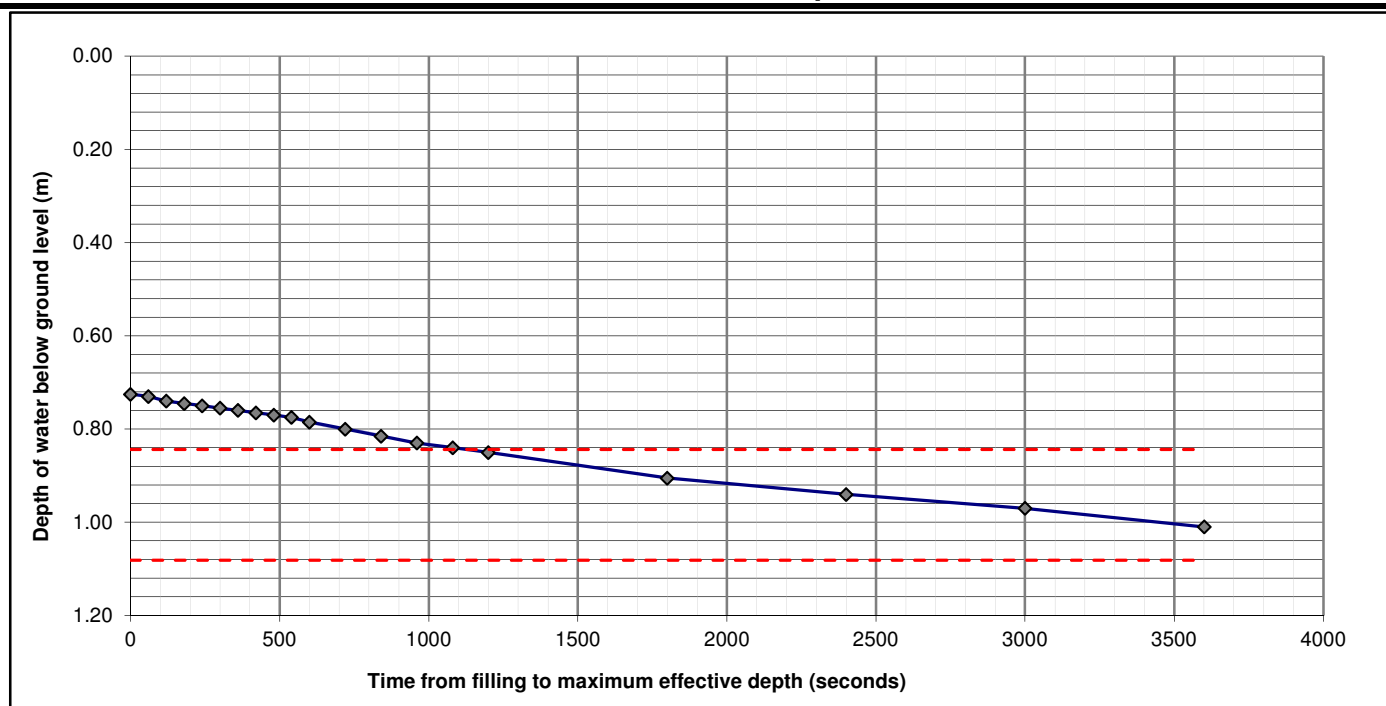
Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)				
0	0.00	0.730				
60	1.00	0.745				
120	2.00	0.755				
180	3.00	0.760				
240	4.00	0.775				
300	5.00	0.780				
360	6.00	0.790				
420	7.00	0.800				
480	8.00	0.805				
540	9.00	0.810				
600	10.00	0.820				
720	12.00	0.830				
840	14.00	0.840				
960	16.00	0.855				
1080	18.00	0.875				
1200	20.00	0.890				
1800	30.00	0.925				
2400	40.00	0.980				
3000	50.00	1.040				
3600	60.00	1.090				





<b>DATE:</b>	25/03/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA01
<b>TEST NUMBER:</b>	3

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



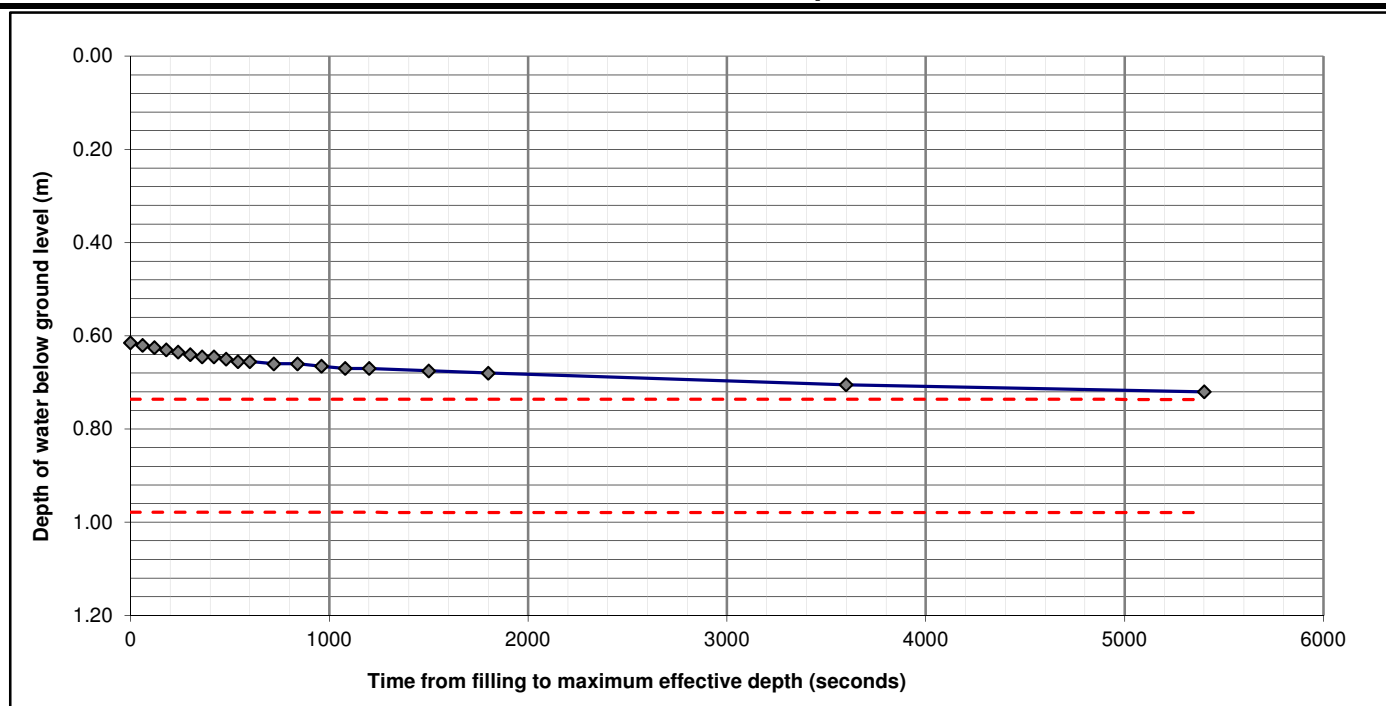
Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)				
0	0.00	0.725				
60	1.00	0.730				
120	2.00	0.740				
180	3.00	0.745				
240	4.00	0.750				
300	5.00	0.755				
360	6.00	0.760				
420	7.00	0.765				
480	8.00	0.770				
540	9.00	0.775				
600	10.00	0.785				
720	12.00	0.800				
840	14.00	0.815				
960	16.00	0.830				
1080	18.00	0.840				
1200	20.00	0.850				
1800	30.00	0.905				
2400	40.00	0.940				
3000	50.00	0.970				
3600	60.00	1.010				
	</					





DATE:	25/03/2019
PROJECT No:	A110489-4
PROJECT NAME:	Cwmcarn
CLIENT:	CCBC
TRIAL PIT ID:	SA02
TEST NUMBER:	1

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

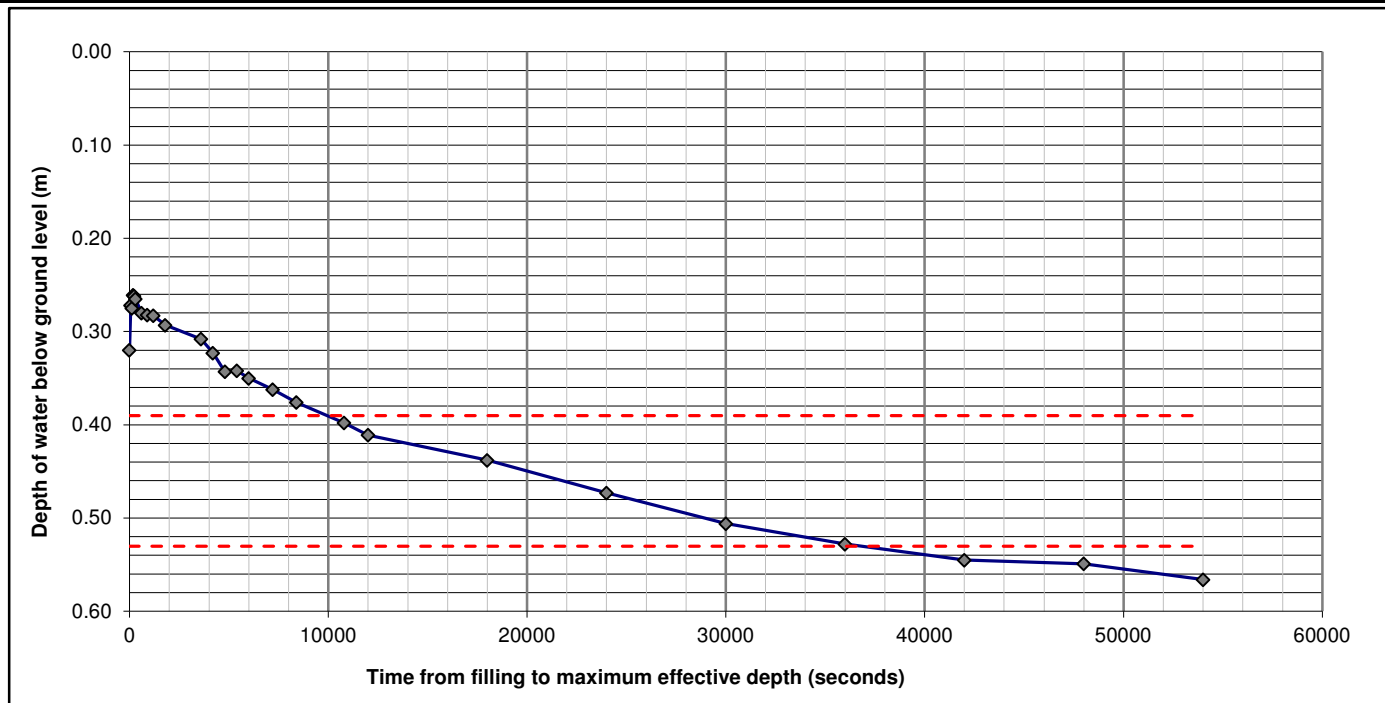


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	PIT LENGTH (m):		2.20	Pit construction	
			PIT WIDTH (m):		0.60		
			PIT DEPTH (m):		1.10		
0	0.00	0.615	INPUT PARAMETERS:				
60	1.00	0.620	Total volume of pit		(m <sup>3</sup> )	0.64	
120	2.00	0.625	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.32	
180	3.00	0.630	Effective depth of Pit		(m)	0.49	
240	4.00	0.635	Proportion of pit volume occupied by gravel solids		(0-1)	0.00	
300	5.00	0.640	Maximum potential volume of Water		(m <sup>3</sup> )	0.64	
360	6.00	0.645	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.12	
420	7.00	0.645	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.36	
480	8.00	0.650					
540	9.00	0.655	Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.32	
600	10.00	0.655	Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	2.68	
720	12.00	0.660					
840	14.00	0.660	Time at 75% effective depth (p <sub>75</sub> )		(s)	8849	
960	16.00	0.665	Time at 25% effective depth (p <sub>25</sub> )		(s)	183300848	
1080	18.00	0.670	Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	183291999	
1200	20.00	0.670	OUTPUT:				
1500	25.00	0.675	SOIL INFILTRATION RATE (f)		V <sub>p75 - 25</sub>	(m/s)	6.52E-10
1800	30.00	0.680			A <sub>p50</sub> × T <sub>p75 - 25</sub>		
3600	60.00	0.705					
5400	90.00	0.720	WATER INPUT: 450 in 2 mins				
			GEOLOGY OF TEST SECTION:				
			Orangish brown slightly gravelly clayey SAND.				



<b>DATE:</b>	26/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA101
<b>TEST NUMBER:</b>	1

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



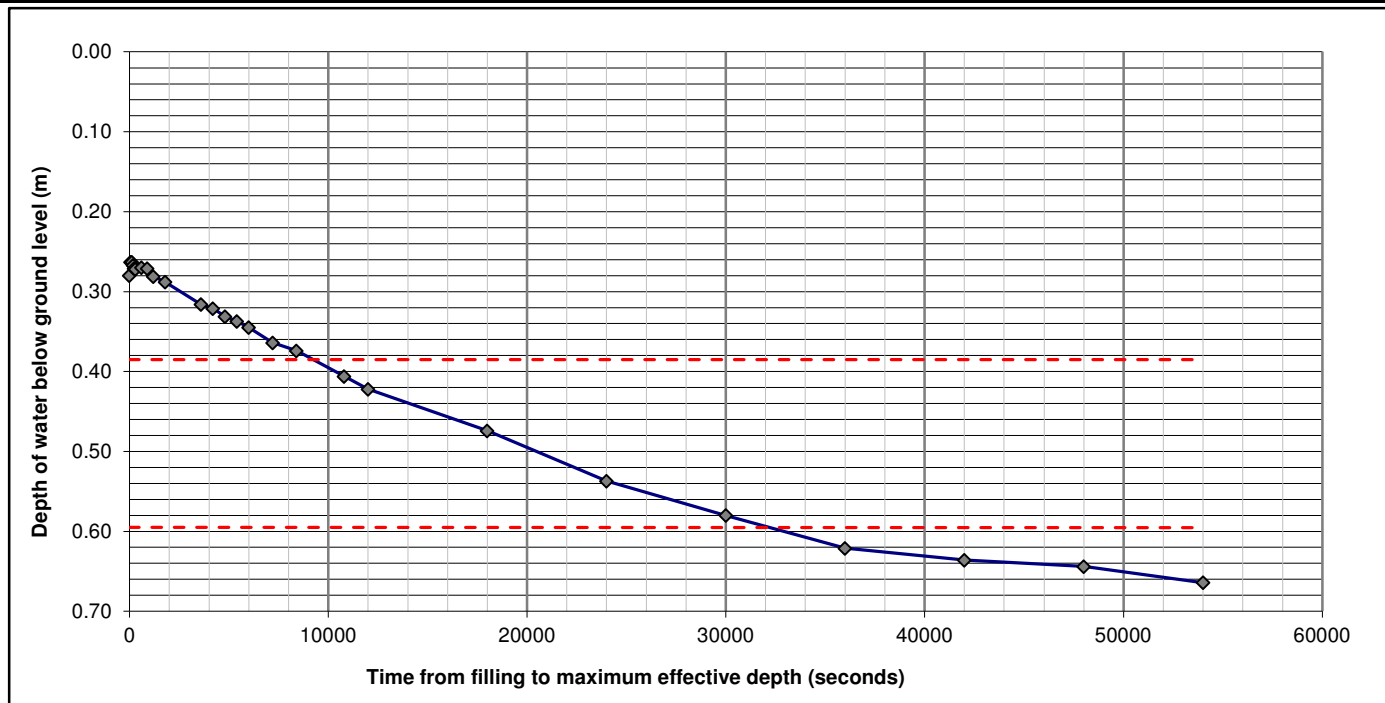
Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)				
0	0.00	0.320				
60	1.00	0.272				
120	2.00	0.275				
180	3.00	0.261				
240	4.00	0.262				
300	5.00	0.265				
600	10.00	0.280				
900	15.00	0.282				
1200	20.00	0.283				
1800	30.00	0.293				
3600	60.00	0.308				
4200	70.00	0.323				
4800	80.00	0.343				
5400	90.00	0.342				
6000	100.00	0.350				
7200	120.00	0.362				
8400	140.00	0.376				
10800	180.00	0.398				
12000	200.00	0.411				
18000	300.00	0.438				
24000	400.00	0.473				
30000	500.00	0.506				
36000	600.00	0.528				
42000	700.00	0.545				
48000	800.00	0.549				
54000	900.00	0.566				

PIT LENGTH (m):		1.80	Pit construction	
PIT WIDTH (m):		0.70	Open - no gravel.	
PIT DEPTH (m):		0.60		
INPUT PARAMETERS:				
Total volume of pit		(m <sup>3</sup> )	0.35	
Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.18	
Effective depth of Pit		(m)	0.28	
Proportion of pit volume occupied by gravel solids		(0-1)	0.00	
Maximum potential volume of Water		(m <sup>3</sup> )	0.35	
Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.07	
Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.21	
Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.18	
Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	1.96	
Time at 75% effective depth (p <sub>75</sub> )		(s)	9934	
Time at 25% effective depth (p <sub>25</sub> )		(s)	36710	
Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	26776	
OUTPUT:				
SOIL INFILTRATION RATE (f)		V <sub>p75 - 25</sub>	(m/s)	3.36E-06
		A <sub>p50</sub> x T <sub>p75 - 25</sub>		
WATER INPUT:		in		
GEOLOGY OF TEST SECTION:				
Sandy gravelly sitly CLAY.				
		Compiled by:		LH
		Checked by:		DV



<b>DATE:</b>	27/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcaru High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA101
<b>TEST NUMBER:</b>	2

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

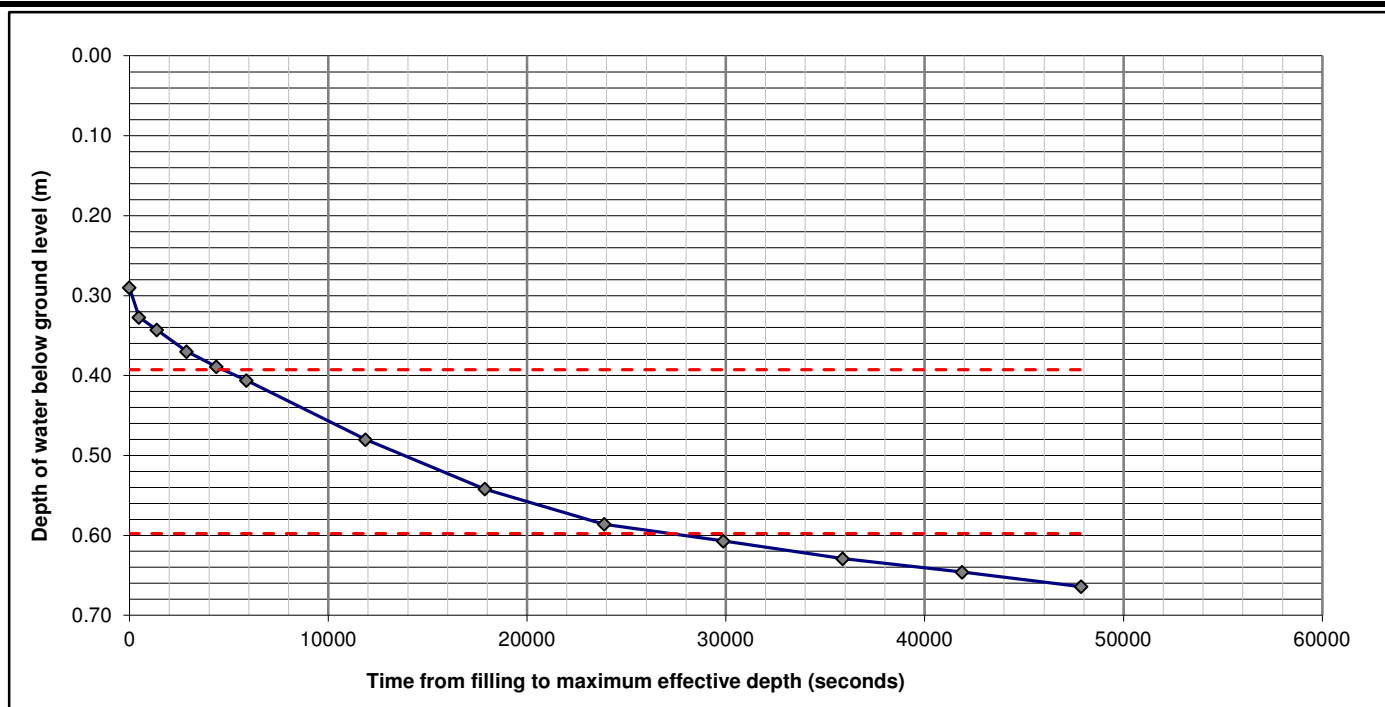


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	PIT LENGTH (m):		Pit construction		
			PIT WIDTH (m):	0.70	Open - no gravel.		
			PIT DEPTH (m):	0.70			
0	0.00	0.280	INPUT PARAMETERS:				
60	1.00	0.263	Total volume of pit		(m <sup>3</sup> )	0.53	
120	2.00	0.263	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.26	
180	3.00	0.267	Effective depth of Pit		(m)	0.42	
240	4.00	0.271	Proportion of pit volume occupied by gravel solids		(0-1)	0.00	
300	5.00	0.272	Maximum potential volume of Water		(m <sup>3</sup> )	0.53	
600	10.00	0.270	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.11	
900	15.00	0.271	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.32	
1200	20.00	0.281					
1800	30.00	0.288	Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.26	
3600	60.00	0.316	Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	2.31	
4200	70.00	0.321					
4800	80.00	0.331	Time at 75% effective depth (p <sub>75</sub> )		(s)	9228	
5400	90.00	0.337	Time at 25% effective depth (p <sub>25</sub> )		(s)	32200	
6000	100.00	0.345	Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	22973	
7200	120.00	0.364	OUTPUT:				
8400	140.00	0.374	SOIL INFILTRATION RATE (f)		V <sub>p75 - 25</sub>	(m/s)	4.99E-06
10800	180.00	0.406			A <sub>p50</sub> × T <sub>p75 - 25</sub>		
12000	200.00	0.422					
18000	300.00	0.474	WATER INPUT:		in		
24000	400.00	0.537	GEOLOGY OF TEST SECTION:				
30000	500.00	0.580	Sandy gravelly sitly CLAY.				
36000	600.00	0.621					
42000	700.00	0.636					
48000	800.00	0.644					
54000	900.00	0.664	Compiled by: DV				
			Checked by:				



<b>DATE:</b>	28/11/2019
<b>PROJECT No:</b>	A110489-4-1
<b>PROJECT NAME:</b>	Cwmcaru School
<b>CLIENT:</b>	Caerphilly Council
<b>TRIAL PIT ID:</b>	SA101
<b>TEST NUMBER:</b>	3

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

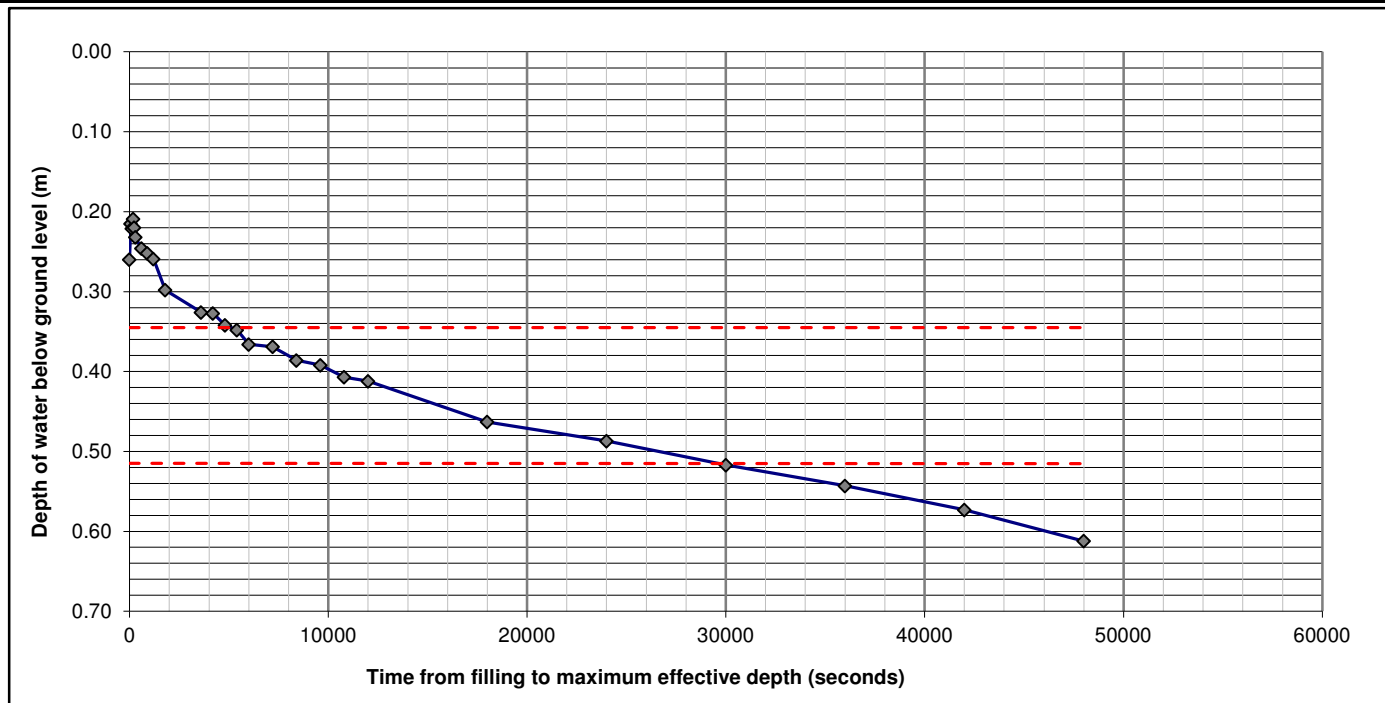


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	<b>PIT LENGTH (m):</b>		<b>Pit construction</b>	
			<b>PIT WIDTH (m):</b>	1.80	Open - no gravel.	
			<b>PIT DEPTH (m):</b>	0.70		
0	0.00	0.290	<b>INPUT PARAMETERS:</b>			
480	8.00	0.327	Total volume of pit		(m <sup>3</sup> )	0.52
1380	23.00	0.343	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.26
2880	48.00	0.370	Effective depth of Pit		(m)	0.41
4380	73.00	0.389	Proportion of pit volume occupied by gravel solids		(0-1)	0.00
5880	98.00	0.406	Maximum potential volume of Water		(m <sup>3</sup> )	0.52
11880	198.00	0.480	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.10
17880	298.00	0.542	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.31
23880	398.00	0.586				
29880	498.00	0.607	Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.26
35880	598.00	0.629	Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	2.29
41880	698.00	0.646				
47880	798.00	0.664	Time at 75% effective depth (p <sub>75</sub> )		(s)	4691
			Time at 25% effective depth (p <sub>25</sub> )		(s)	27181
			Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	22491
			<b>OUTPUT:</b>			
			<b>SOIL INFILTRATION RATE (f)</b>	V <sub>p75 - 25</sub>	(m/s)	<b>5.03E-06</b>
				A <sub>p50</sub> × T <sub>p75 - 25</sub>		
			WATER INPUT:		in	
			<b>GEOLOGY OF TEST SECTION:</b>			
			Sandy gravelly sitly CLAY.			



<b>DATE:</b>	26/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA102
<b>TEST NUMBER:</b>	1

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



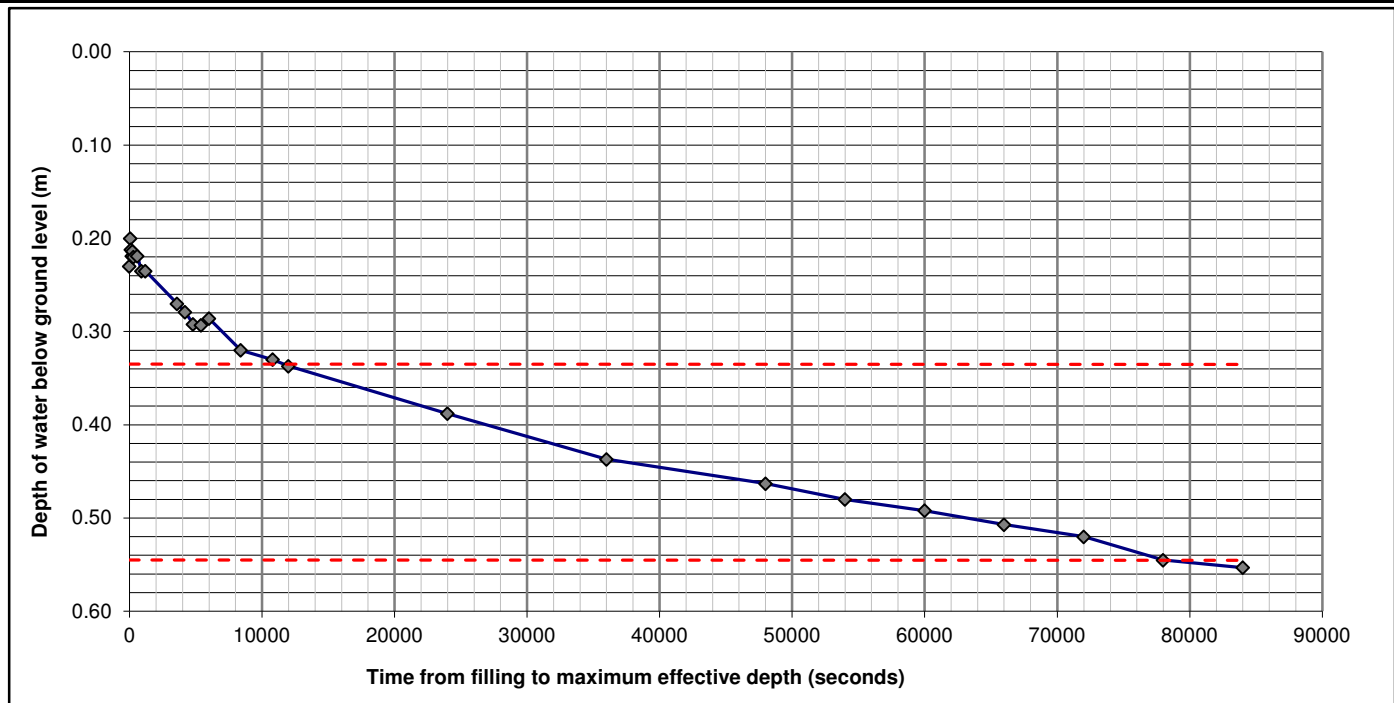
Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	0.260
60	1.00	0.215
120	2.00	0.221
180	3.00	0.209
240	4.00	0.220
300	5.00	0.232
600	10.00	0.246
900	15.00	0.252
1200	20.00	0.259
1800	30.00	0.298
3600	60.00	0.326
4200	70.00	0.327
4800	80.00	0.342
5400	90.00	0.348
6000	100.00	0.366
7200	120.00	0.369
8400	140.00	0.386
9600	160.00	0.392
10800	180.00	0.407
12000	200.00	0.412
18000	300.00	0.463
24000	400.00	0.487
30000	500.00	0.517
36000	600.00	0.543
42000	700.00	0.573
48000	800.00	0.612

<b>PIT LENGTH (m):</b>	1.40	<b>Pit construction</b>	
<b>PIT WIDTH (m):</b>	0.50	Open - no gravel.	
<b>PIT DEPTH (m):</b>	0.60		
<b>INPUT PARAMETERS:</b>			
Total volume of pit	(m <sup>3</sup> )	0.24	
Pit volume between 75% and 25% depths = L x W x ½D	(m <sup>3</sup> )	0.12	
Effective depth of Pit	(m)	0.34	
Proportion of pit volume occupied by gravel solids	(0-1)	0.00	
Maximum potential volume of Water	(m <sup>3</sup> )	0.24	
Level of water in pit at 75% effective depth (p <sub>75</sub> )	(m)	0.09	
Level of water in pit at 25% effective depth (p <sub>25</sub> )	(m)	0.26	
Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>	(m <sup>3</sup> )	0.12	
Surface area of pit up to 50% effective depth (A <sub>p50</sub> )	(m <sup>2</sup> )	1.35	
Time at 75% effective depth (p <sub>75</sub> )	(s)	5105	
Time at 25% effective depth (p <sub>25</sub> )	(s)	29619	
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	24514	
<b>OUTPUT:</b>			
<b>SOIL INFILTRATION RATE (f)</b>	V <sub>p75 - 25</sub>	(m/s)	<b>3.61E-06</b>
	A <sub>p50</sub> x T <sub>p75 - 25</sub>		
<b>WATER INPUT:</b>	in		
<b>GEOLOGY OF TEST SECTION:</b>			
Slightly sandy, slightly gravelly sitly CLAY.			
Compiled by:		LH	
Checked by:		DV	



<b>DATE:</b>	27/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcaru High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA102
<b>TEST NUMBER:</b>	2

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	0.230
60	1.00	0.200
120	2.00	0.212
180	3.00	0.219
240	4.00	0.214
300	5.00	0.220
600	10.00	0.219
900	15.00	0.235
1200	20.00	0.235
3600	60.00	0.270
4200	70.00	0.279
4800	80.00	0.292
5400	90.00	0.293
6000	100.00	0.286
8400	140.00	0.320
10800	180.00	0.330
12000	200.00	0.337
24000	400.00	0.388
36000	600.00	0.437
48000	800.00	0.463
54000	900.00	0.480
60000	1000.00	0.492
66000	1100.00	0.507
72000	1200.00	0.520
78000	1300.00	0.545
84000	1400.00	0.553

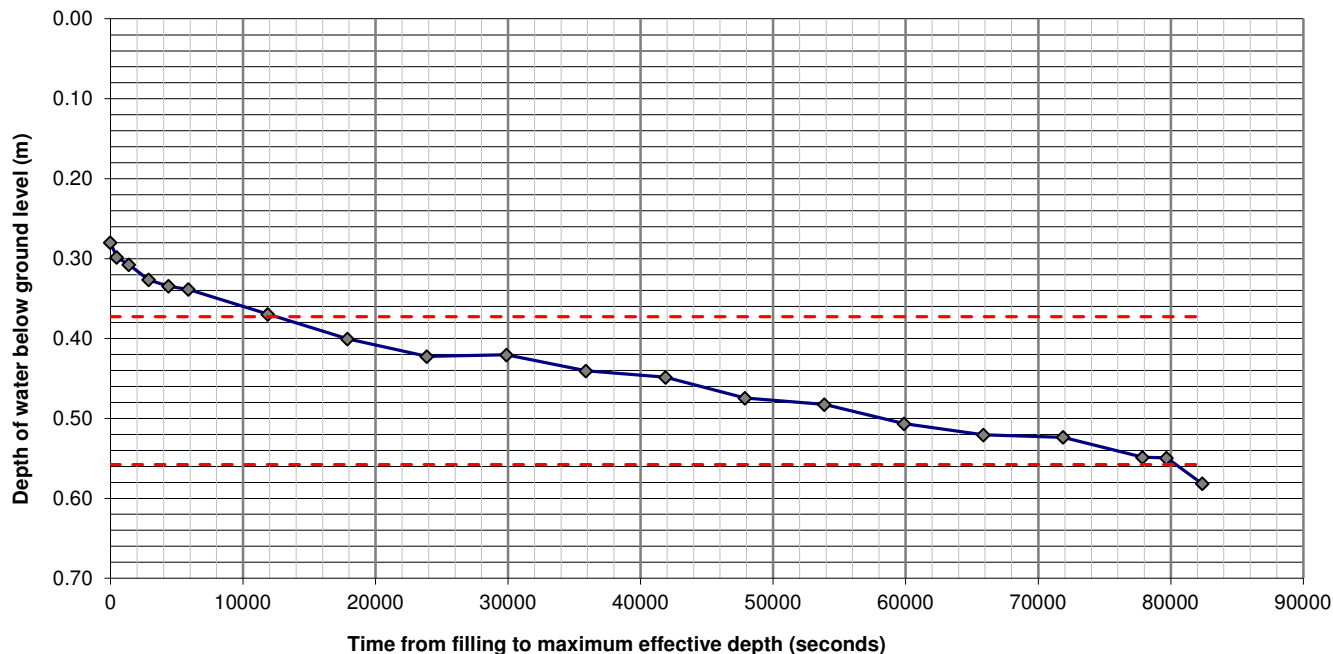
<b>PIT LENGTH (m):</b>	1.40	<b>Pit construction</b>	
<b>PIT WIDTH (m):</b>	0.50	Open - no gravel.	
<b>PIT DEPTH (m):</b>	0.65		
<b>INPUT PARAMETERS:</b>			
Total volume of pit	(m <sup>3</sup> )	0.29	
Pit volume between 75% and 25% depths = L x W x ½D	(m <sup>3</sup> )	0.15	
Effective depth of Pit	(m)	0.42	
Proportion of pit volume occupied by gravel solids	(0-1)	0.00	
Maximum potential volume of Water	(m <sup>3</sup> )	0.29	
Level of water in pit at 75% effective depth (p <sub>75</sub> )	(m)	0.11	
Level of water in pit at 25% effective depth (p <sub>25</sub> )	(m)	0.32	
Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>	(m <sup>3</sup> )	0.15	
Surface area of pit up to 50% effective depth (A <sub>p50</sub> )	(m <sup>2</sup> )	1.50	
Time at 75% effective depth (p <sub>75</sub> )	(s)	11670	
Time at 25% effective depth (p <sub>25</sub> )	(s)	78000	
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	66330	
<b>OUTPUT:</b>			
<b>SOIL INFILTRATION RATE (f)</b>	V <sub>p75 - 25</sub>	(m/s)	<b>1.48E-06</b>
	A <sub>p50</sub> x T <sub>p75 - 25</sub>		
<b>WATER INPUT:</b>	in		
<b>GEOLOGY OF TEST SECTION:</b>			
Slightly sandy, slightly gravelly silty CLAY.			
Compiled by:		LH	
Checked by:		DV	





<b>DATE:</b>	28/11/2019
<b>PROJECT No:</b>	A110489-4-1
<b>PROJECT NAME:</b>	Cwmcarn School
<b>CLIENT:</b>	Caerphilly Council
<b>TRIAL PIT ID:</b>	SA102
<b>TEST NUMBER:</b>	3

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



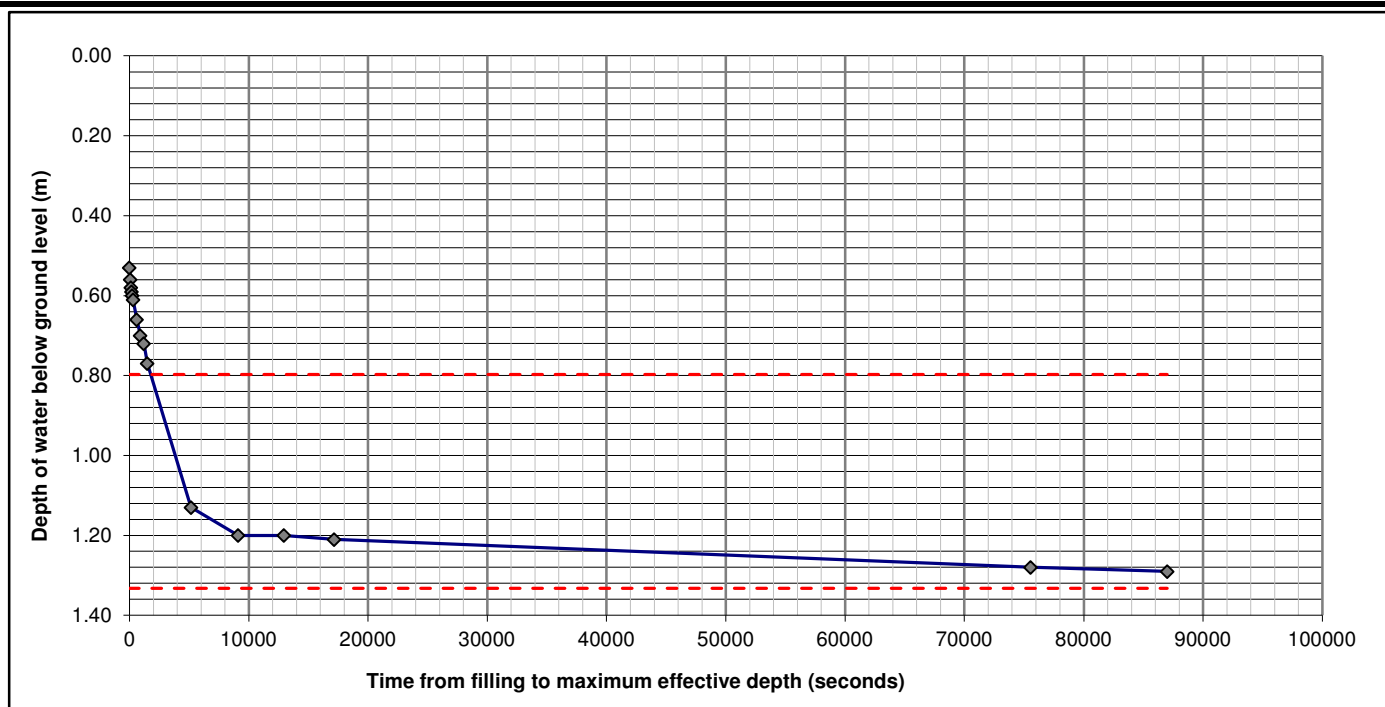
Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	0.280
480	8.00	0.299
1380	23.00	0.308
2880	48.00	0.327
4380	73.00	0.335
5880	98.00	0.339
11880	198.00	0.370
17880	298.00	0.401
23880	398.00	0.423
29880	498.00	0.421
35880	598.00	0.441
41880	698.00	0.449
47880	798.00	0.475
53880	898.00	0.483
59880	998.00	0.507
65880	1098.00	0.521
71880	1198.00	0.524
77880	1298.00	0.549
79680	1328.00	0.550
82380	1373.00	0.582

<b>PIT LENGTH (m):</b>	1.40	<b>Pit construction</b>	
<b>PIT WIDTH (m):</b>	0.50	Open - no gavel.	
<b>PIT DEPTH (m):</b>	0.65		
<b>INPUT PARAMETERS:</b>			
Total volume of pit	(m <sup>3</sup> )	0.26	
Pit volume between 75% and 25% depths = L x W x ½D	(m <sup>3</sup> )	0.13	
Effective depth of Pit	(m)	0.37	
Proportion of pit volume occupied by gravel solids	(0-1)	0.00	
Maximum potential volume of Water	(m <sup>3</sup> )	0.26	
Level of water in pit at 75% effective depth (p <sub>75</sub> )	(m)	0.09	
Level of water in pit at 25% effective depth (p <sub>25</sub> )	(m)	0.28	
Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>	(m <sup>3</sup> )	0.13	
Surface area of pit up to 50% effective depth (A <sub>p50</sub> )	(m <sup>2</sup> )	1.40	
Time at 75% effective depth (p <sub>75</sub> )	(s)	12463	
Time at 25% effective depth (p <sub>25</sub> )	(s)	80357	
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	67895	
<b>OUTPUT:</b>			
<b>SOIL INFILTRATION RATE (f)</b>	V <sub>p75 - 25</sub>	(m/s)	<b>1.36E-06</b>
	A <sub>p50</sub> x T <sub>p75 - 25</sub>		
<b>WATER INPUT:</b>	in		
<b>GEOLOGY OF TEST SECTION:</b>			
Slightly sandy, slightly gravelly sitly CLAY.			
Compiled by:		DV	
Checked by:			



<b>DATE:</b>	26/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA103
<b>TEST NUMBER:</b>	1

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

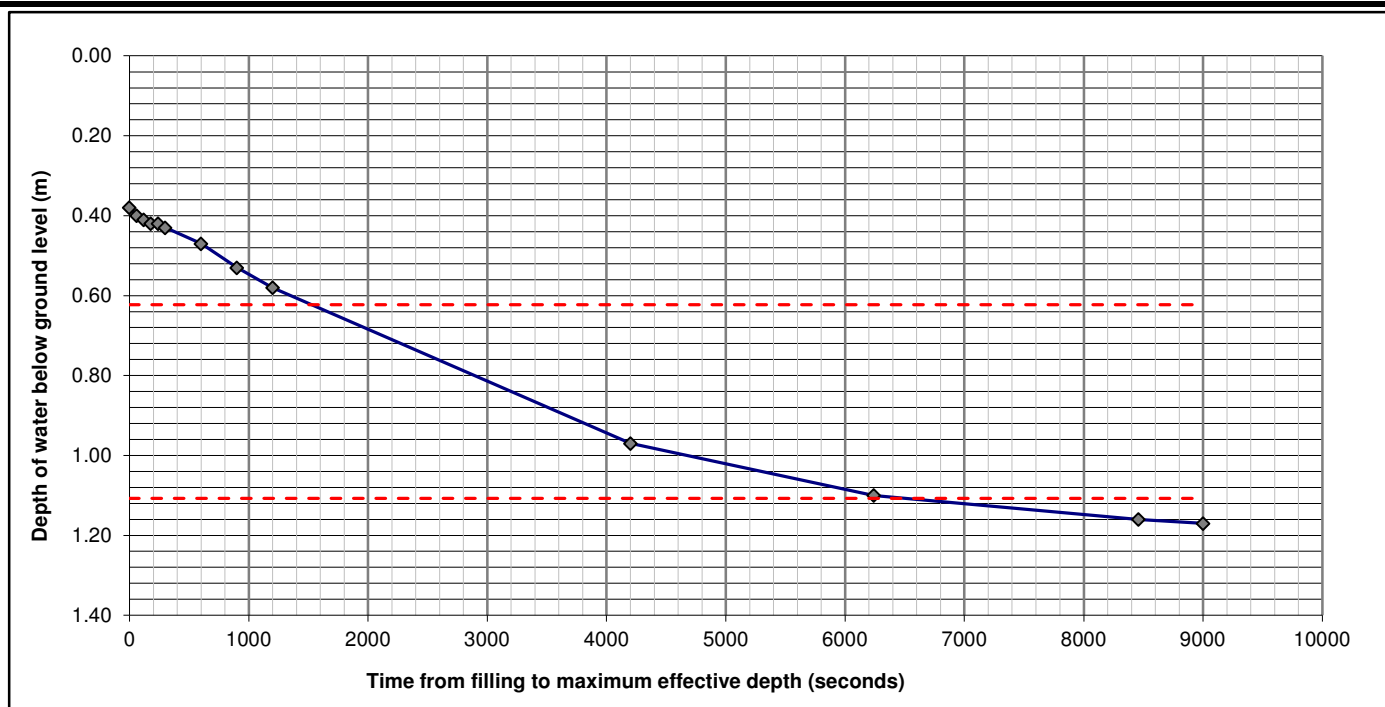


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	PIT LENGTH (m):	1.80	Pit construction	
			PIT WIDTH (m):	0.90	Open - no gravel.	
			PIT DEPTH (m):	1.60		
0	0.00	0.530	INPUT PARAMETERS:			
60	1.00	0.560	Total volume of pit	(m <sup>3</sup> )	1.73	
120	2.00	0.580	Pit volume between 75% and 25% depths = L x W x ½D	(m <sup>3</sup> )	0.87	
180	3.00	0.590	Effective depth of Pit	(m)	1.07	
240	4.00	0.600	Proportion of pit volume occupied by gravel solids	(0-1)	0.00	
300	5.00	0.610	Maximum potential volume of Water	(m <sup>3</sup> )	1.73	
600	10.00	0.660	Level of water in pit at 75% effective depth (p <sub>75</sub> )	(m)	0.27	
900	15.00	0.700	Level of water in pit at 25% effective depth (p <sub>25</sub> )	(m)	0.80	
1200	20.00	0.720				
1500	25.00	0.770	Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>	(m <sup>3</sup> )	0.87	
5160	86.00	1.130	Surface area of pit up to 50% effective depth (A <sub>p50</sub> )	(m <sup>2</sup> )	4.51	
9120	152.00	1.200				
12960	216.00	1.200	Time at 75% effective depth (p <sub>75</sub> )	(s)	1780	
17160	286.00	1.210	Time at 25% effective depth (p <sub>25</sub> )	(s)	#N/A	
75540	1259.00	1.280	Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	#N/A	
87000	1450.00	1.290	OUTPUT:			
			SOIL INFILTRATION RATE (f)	V <sub>p75 - 25</sub>	(m/s)	#N/A
				A <sub>p50</sub> x T <sub>p75 - 25</sub>		
			WATER INPUT: in			
			GEOLOGY OF TEST SECTION:			
			Slightly sandy, slightly gravelly silty CLAY.			



<b>DATE:</b>	27/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA103
<b>TEST NUMBER:</b>	2

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

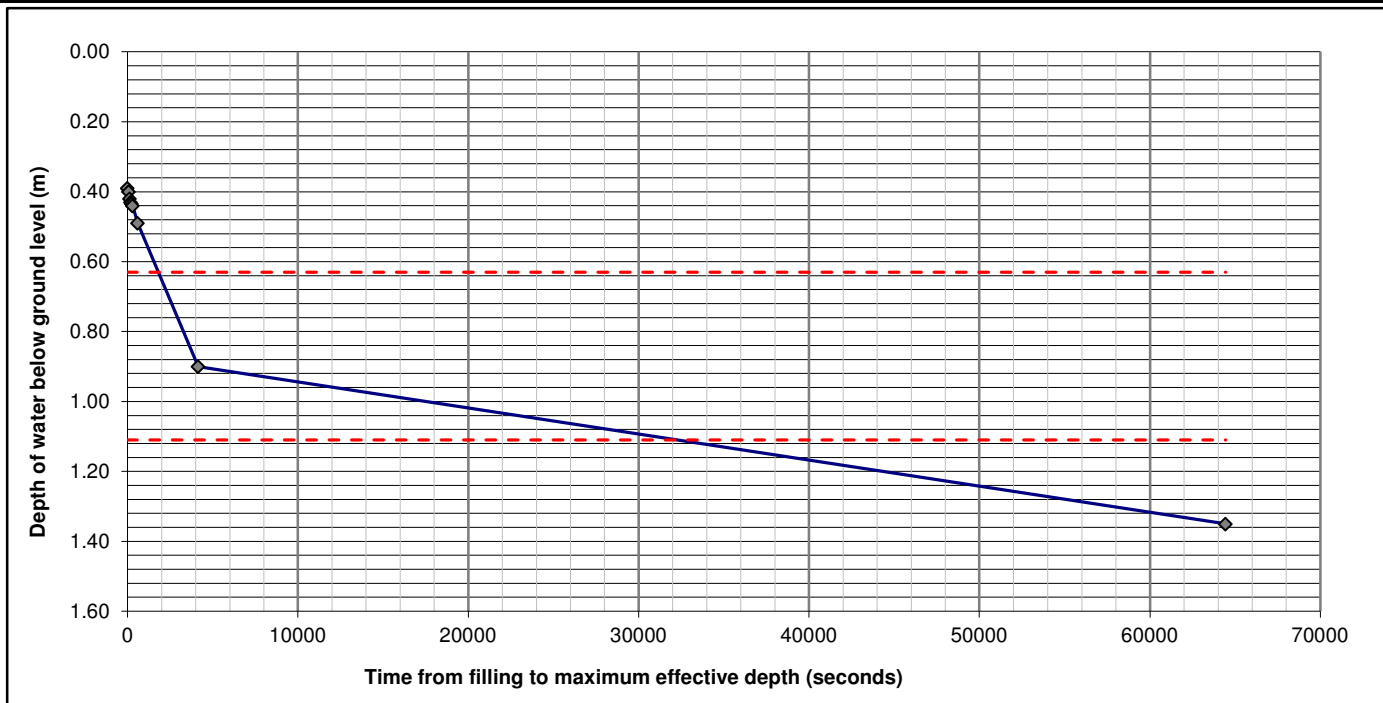


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	<b>PIT LENGTH (m):</b>	1.80	<b>Pit construction</b>	
			<b>PIT WIDTH (m):</b>	0.90	Open - no gravel.	
			<b>PIT DEPTH (m):</b>	1.35		
0	0.00	0.380	<b>INPUT PARAMETERS:</b>			
60	1.00	0.400	Total volume of pit		(m <sup>3</sup> )	1.57
120	2.00	0.410	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.79
180	3.00	0.420	Effective depth of Pit		(m)	0.97
240	4.00	0.420	Proportion of pit volume occupied by gravel solids		(0-1)	0.00
300	5.00	0.430	Maximum potential volume of Water		(m <sup>3</sup> )	1.57
600	10.00	0.470	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.24
900	15.00	0.530	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.73
1200	20.00	0.580				
4200	70.00	0.970	Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.79
6240	104.00	1.100	Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	4.24
8460	141.00	1.160				
9000	150.00	1.170	Time at 75% effective depth (p <sub>75</sub> )		(s)	1527
			Time at 25% effective depth (p <sub>25</sub> )		(s)	6518
			Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	4991
			<b>OUTPUT:</b>			
			<b>SOIL INFILTRATION RATE (f)</b>	V <sub>p75 - 25</sub>	(m/s)	<b>3.71E-05</b>
				A <sub>p50</sub> × T <sub>p75 - 25</sub>		
			WATER INPUT:		in	
			<b>GEOLOGY OF TEST SECTION:</b>			
			Slightly sandy, slightly gravelly silty CLAY.			



<b>DATE:</b>	27/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA103
<b>TEST NUMBER:</b>	3

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

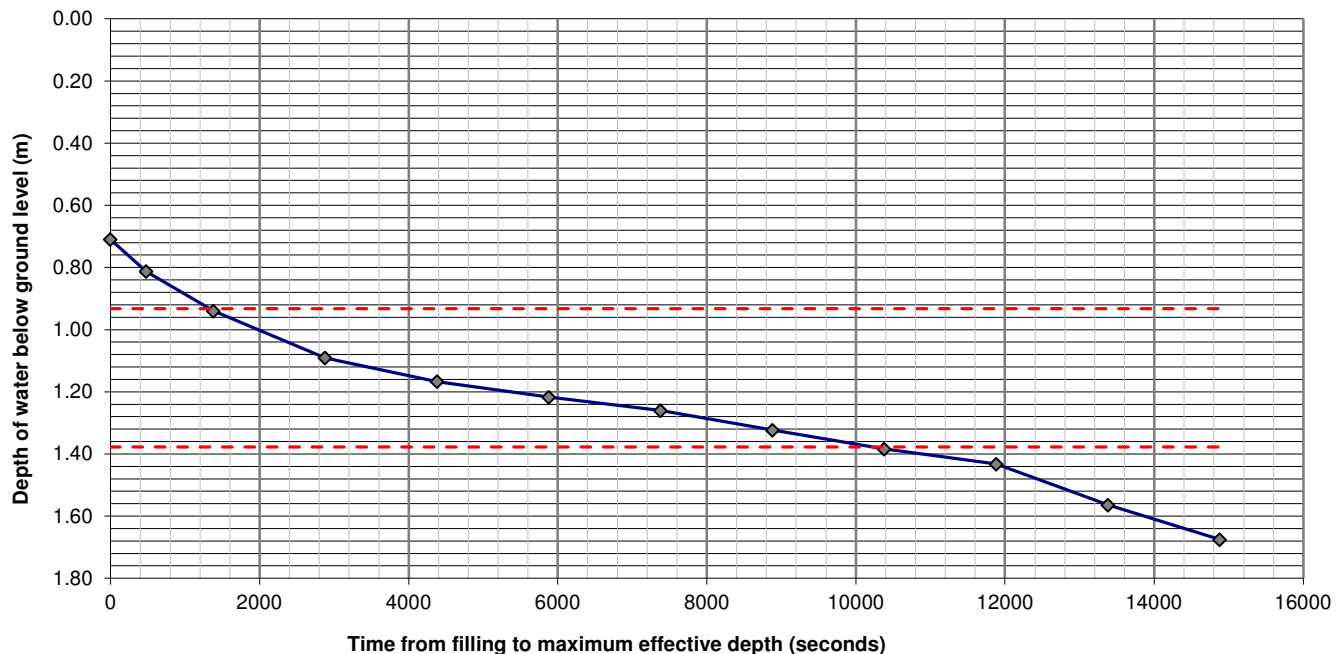


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	<b>PIT LENGTH (m):</b>	1.80	<b>Pit construction</b>	
			<b>PIT WIDTH (m):</b>	0.90	Open - no gravel.	
			<b>PIT DEPTH (m):</b>	1.35		
0	0.00	0.390	<b>INPUT PARAMETERS:</b>			
60	1.00	0.400	Total volume of pit		(m <sup>3</sup> )	1.56
120	2.00	0.420	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.78
180	3.00	0.430	Effective depth of Pit		(m)	0.96
240	4.00	0.435	Proportion of pit volume occupied by gravel solids		(0-1)	0.00
300	5.00	0.440	Maximum potential volume of Water		(m <sup>3</sup> )	1.56
600	10.00	0.490	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.24
4140	69.00	0.900	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.72
64440	1074.00	1.350				
			Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.78
			Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	4.21
			Time at 75% effective depth (p <sub>75</sub> )		(s)	1809
			Time at 25% effective depth (p <sub>25</sub> )		(s)	32286
			Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	30477
			<b>OUTPUT:</b>			
			<b>SOIL INFILTRATION RATE (f)</b>	V <sub>p75 - 25</sub>	(m/s)	<b>6.06E-06</b>
				A <sub>p50</sub> X T <sub>p75 - 25</sub>		
			WATER INPUT:		in	
			<b>GEOLOGY OF TEST SECTION:</b>			
			Slightly sandy, slightly gravelly silty CLAY.			
</						



<b>DATE:</b>	28/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA103
<b>TEST NUMBER:</b>	4

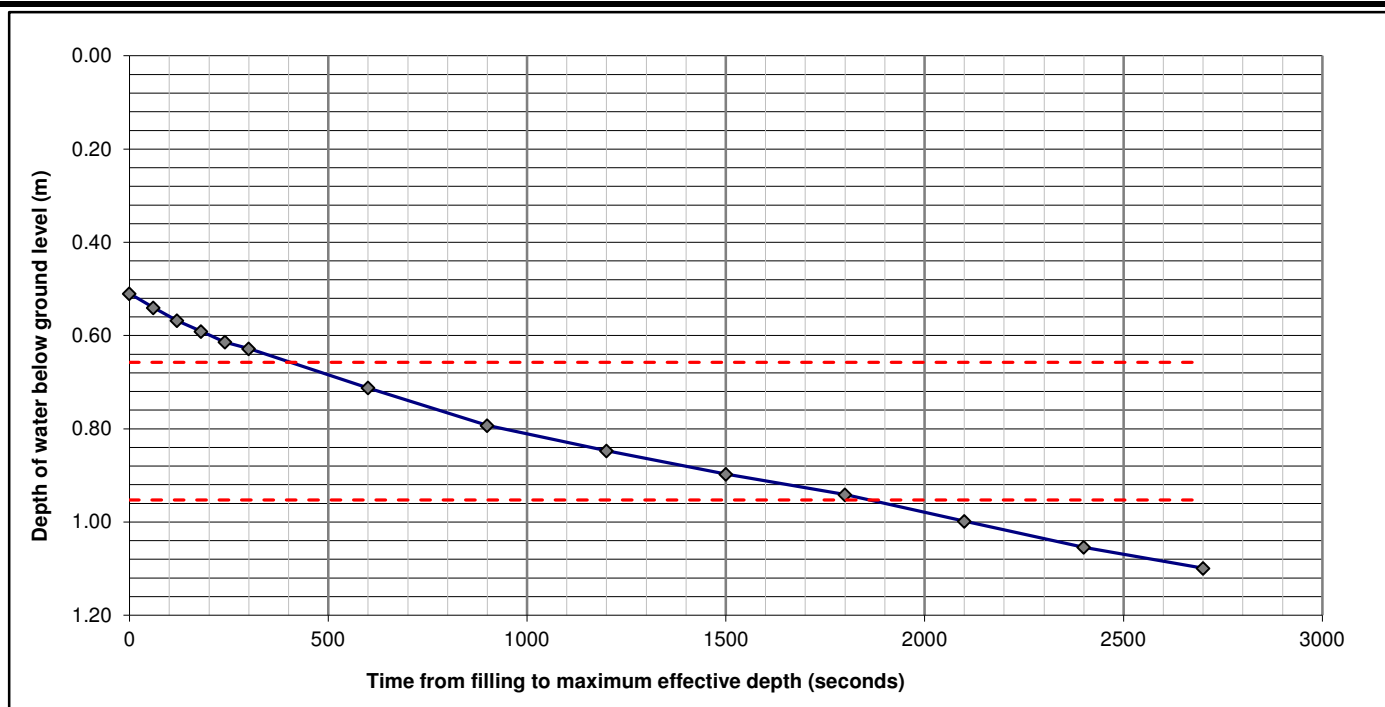
## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

[illegible]



<b>DATE:</b>	26/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcaru High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA104
<b>TEST NUMBER:</b>	1

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



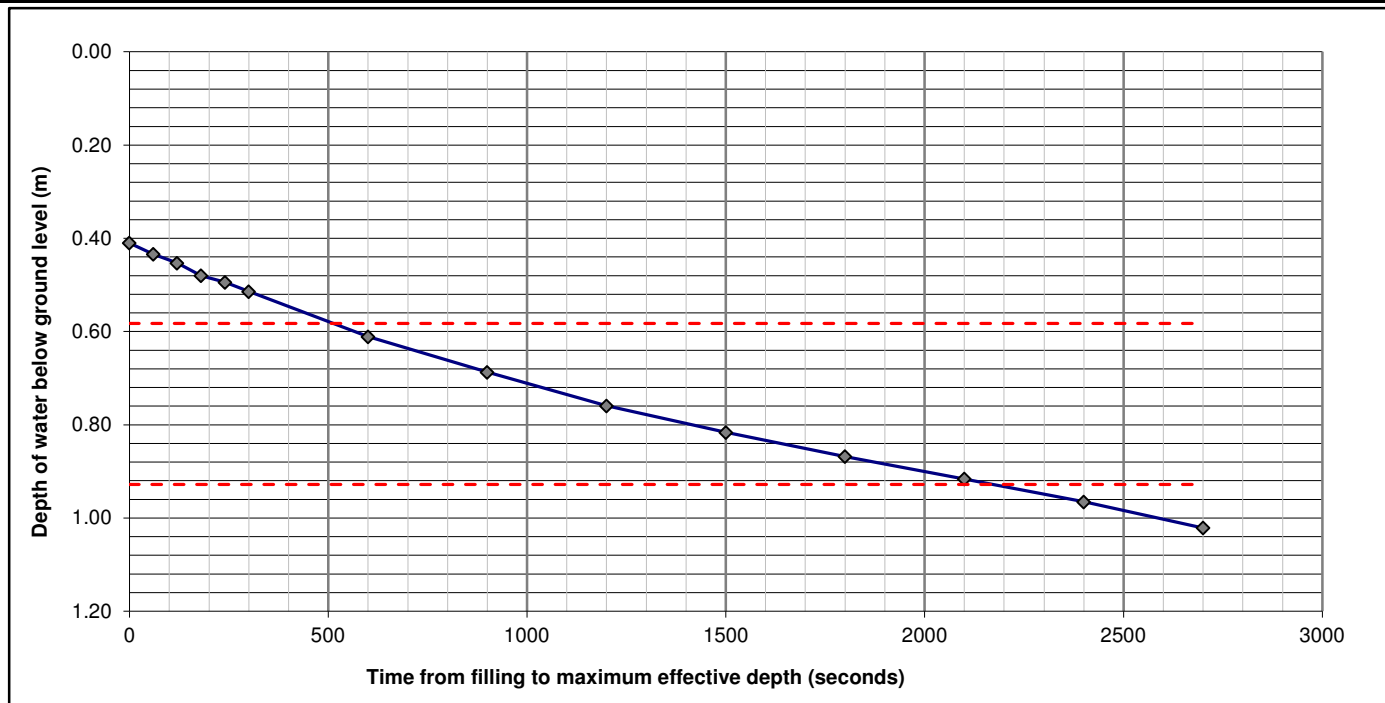
Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	<b>PIT LENGTH (m):</b>		<b>Pit construction</b>	
			<b>PIT WIDTH (m):</b>	1.40	Open - no gravel.	
			<b>PIT DEPTH (m):</b>	0.70		
				1.10		
0	0.00	0.510	<b>INPUT PARAMETERS:</b>			
60	1.00	0.540	Total volume of pit		(m <sup>3</sup> )	0.58
120	2.00	0.568	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.29
180	3.00	0.591	Effective depth of Pit		(m)	0.59
240	4.00	0.614	Proportion of pit volume occupied by gravel solids		(0-1)	0.00
300	5.00	0.628	Maximum potential volume of Water		(m <sup>3</sup> )	0.58
600	10.00	0.712	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.15
900	15.00	0.793	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.44
1200	20.00	0.847				
1500	25.00	0.897	Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.29
1800	30.00	0.941	Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	2.22
2100	35.00	0.998				
2400	40.00	1.054	Time at 75% effective depth (p <sub>75</sub> )		(s)	405
2700	45.00	1.099	Time at 25% effective depth (p <sub>25</sub> )		(s)	1861
			Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	1455
			<b>OUTPUT:</b>			
			<b>SOIL INFILTRATION RATE (f)</b>	V <sub>p75 - 25</sub>	(m/s)	<b>8.95E-05</b>
				A <sub>p50</sub> × T <sub>p75 - 25</sub>		
			WATER INPUT:		in	
			<b>GEOLOGY OF TEST SECTION:</b>			
			Slightly sandy, slightly gravelly silty CLAY.			





<b>DATE:</b>	27/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcaru High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA104
<b>TEST NUMBER:</b>	2

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

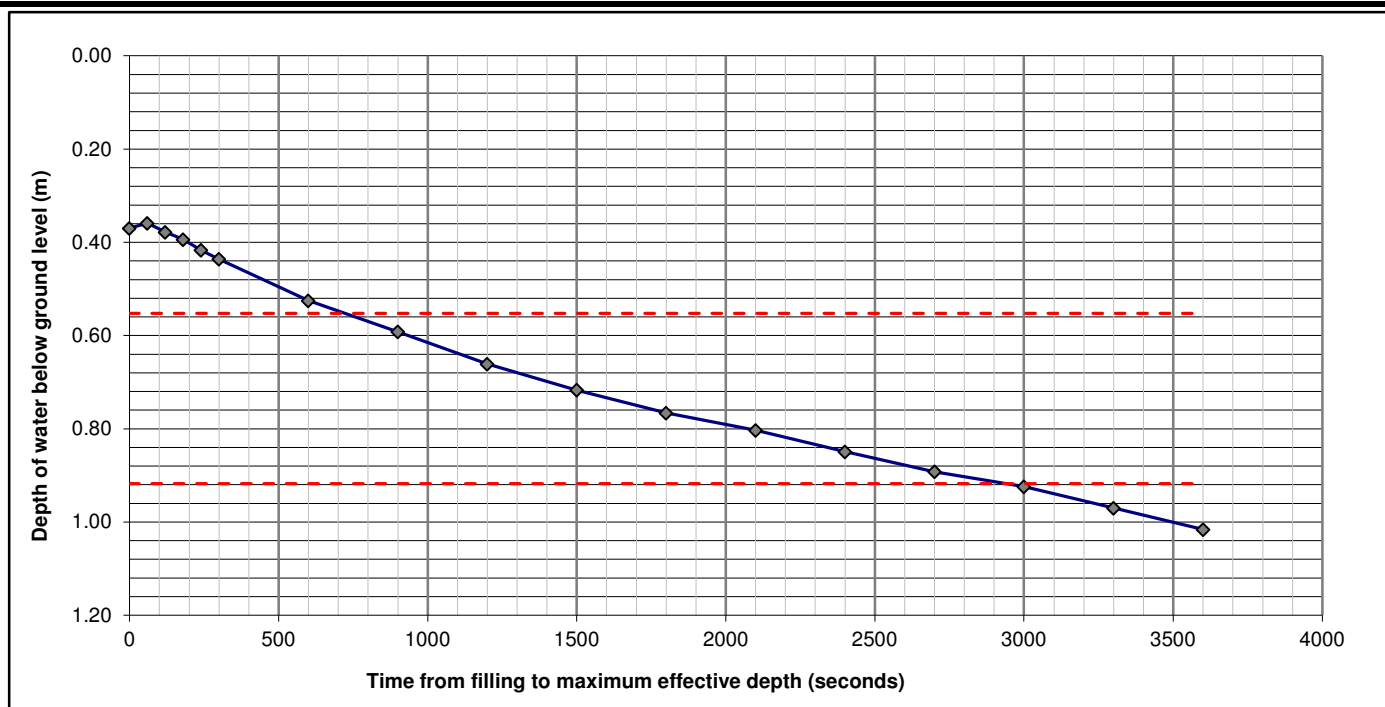


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	PIT LENGTH (m):	1.40	Pit construction	
			PIT WIDTH (m):	0.70	Open - no gravel.	
			PIT DEPTH (m):	1.10		
0	0.00	0.410	INPUT PARAMETERS:			
60	1.00	0.434	Total volume of pit		(m <sup>3</sup> )	0.68
120	2.00	0.453	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.34
180	3.00	0.480	Effective depth of Pit		(m)	0.69
240	4.00	0.494	Proportion of pit volume occupied by gravel solids		(0-1)	0.00
300	5.00	0.514	Maximum potential volume of Water		(m <sup>3</sup> )	0.68
600	10.00	0.611	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.17
900	15.00	0.687	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.52
1200	20.00	0.759				
1500	25.00	0.816	Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.34
1800	30.00	0.868	Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	2.43
2100	35.00	0.916				
2400	40.00	0.965	Time at 75% effective depth (p <sub>75</sub> )		(s)	512
2700	45.00	1.021	Time at 25% effective depth (p <sub>25</sub> )		(s)	2171
			Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	1658
			OUTPUT:			
			SOIL INFILTRATION RATE (f)	V <sub>p75 - 25</sub>	(m/s)	8.39E-05
				A <sub>p50</sub> × T <sub>p75 - 25</sub>		
			WATER INPUT:		in	
			GEOLOGY OF TEST SECTION:			
			Slightly sandy, slightly gravelly silty CLAY.			
	</					



<b>DATE:</b>	27/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcaru High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA104
<b>TEST NUMBER:</b>	3

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

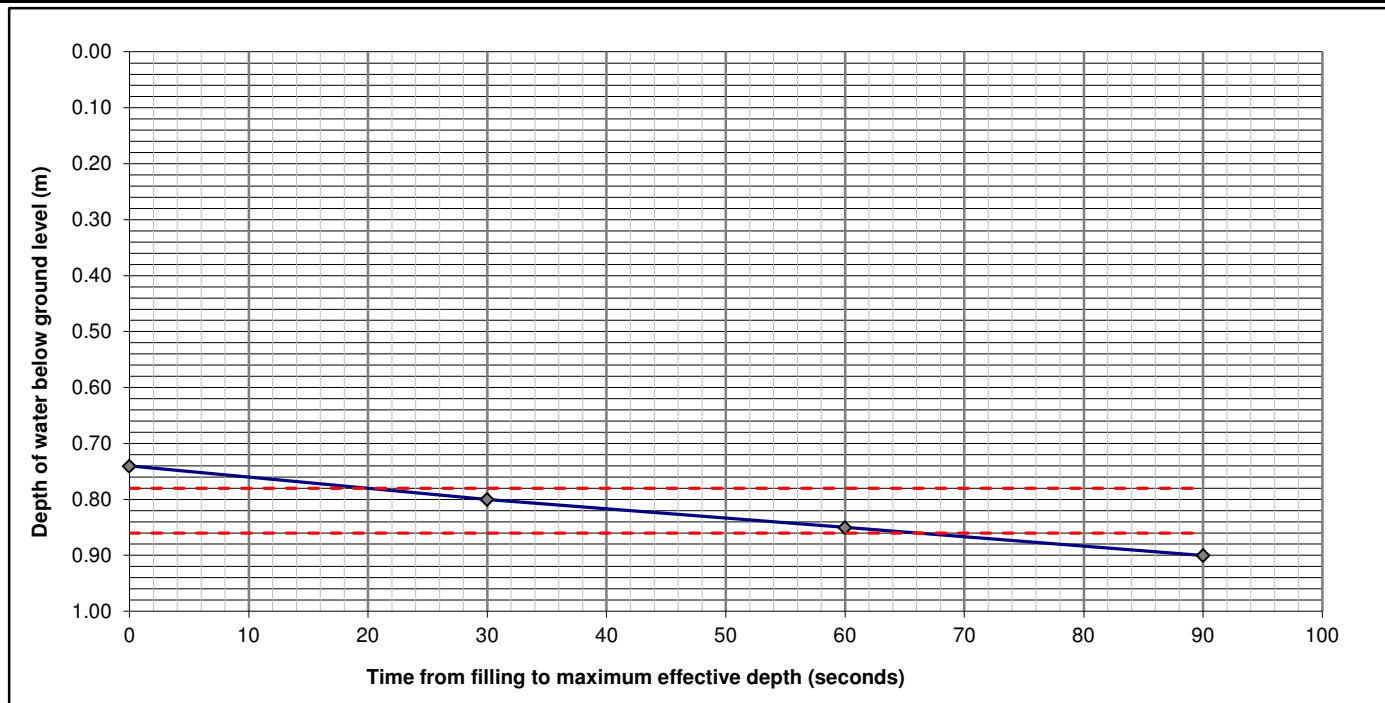


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)				
0	0.00	0.370				
60	1.00	0.359				
120	2.00	0.378				
180	3.00	0.394				
240	4.00	0.417				
300	5.00	0.436				
600	10.00	0.525				
900	15.00	0.592				
1200	20.00	0.661				
1500	25.00	0.717				
1800	30.00	0.766				
2100	35.00	0.803				
2400	40.00	0.849				
2700	45.00	0.892				
3000	50.00	0.924				
3300	55.00	0.970				
3600	60.00	1.016				



<b>DATE:</b>	26/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA105
<b>TEST NUMBER:</b>	1

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION

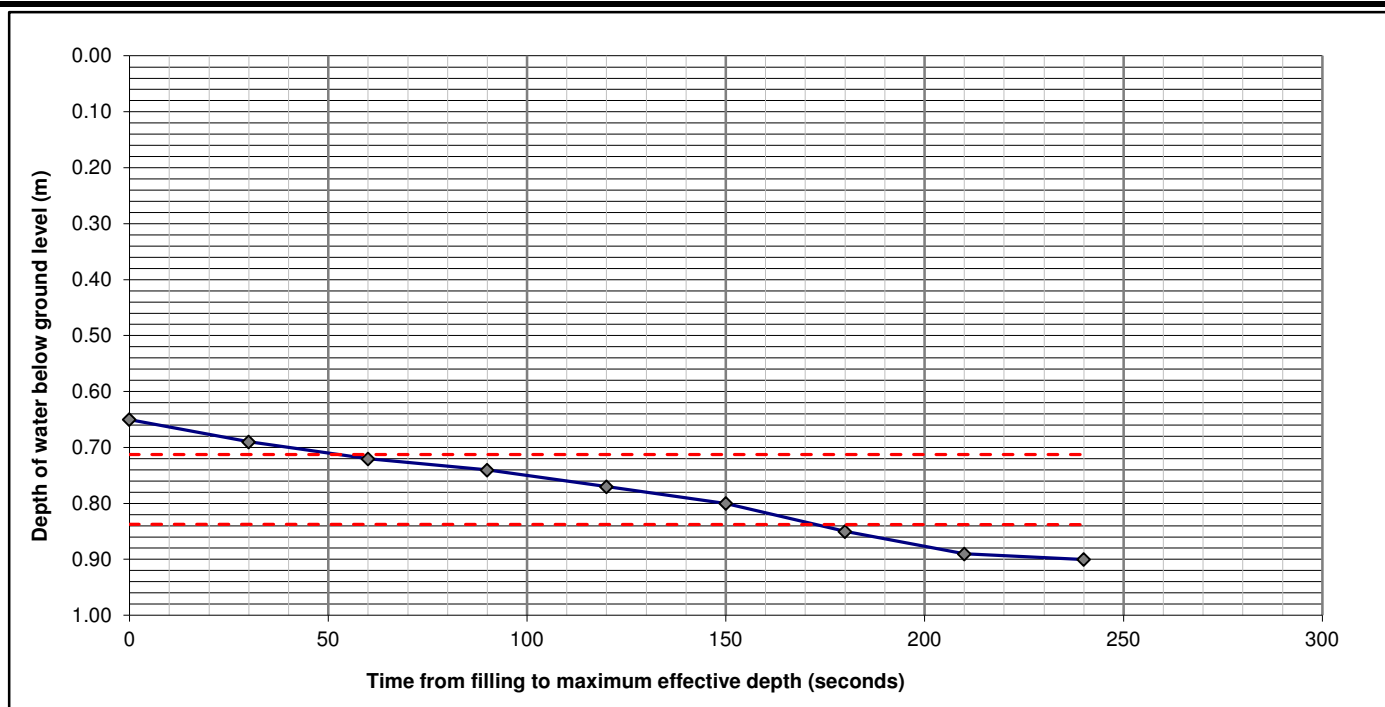


Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	<b>PIT LENGTH (m):</b>	1.50	<b>Pit construction</b>	
			<b>PIT WIDTH (m):</b>	0.60	Open - no gravel.	
			<b>PIT DEPTH (m):</b>	0.90		
0	0.00	0.740	<b>INPUT PARAMETERS:</b>			
30	0.50	0.800	Total volume of pit		(m <sup>3</sup> )	0.14
60	1.00	0.850	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.07
90	1.50	0.900	Effective depth of Pit		(m)	0.16
			Proportion of pit volume occupied by gravel solids		(0-1)	0.00
			Maximum potential volume of Water		(m <sup>3</sup> )	0.14
			Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.04
			Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.12
			Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.07
			Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	1.24
			Time at 75% effective depth (p <sub>75</sub> )		(s)	20
			Time at 25% effective depth (p <sub>25</sub> )		(s)	66
			Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	46
			<b>OUTPUT:</b>			
			<b>SOIL INFILTRATION RATE (f)</b>	V <sub>p75 - 25</sub>	(m/s)	<b>1.27E-03</b>
				A <sub>p50</sub> X T <sub>p75 - 25</sub>		
			WATER INPUT:		in	
			<b>GEOLOGY OF TEST SECTION:</b>			
			Slightly sandy, slightly clayey GRAVEL.			



<b>DATE:</b>	27/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmearn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA105
<b>TEST NUMBER:</b>	2

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	PIT LENGTH (m):	1.50	Pit construction	
			PIT WIDTH (m):	0.60	Open - no gravel.	
			PIT DEPTH (m):	0.90		
0	0.00	0.650	INPUT PARAMETERS:			
30	0.50	0.690	Total volume of pit		(m <sup>3</sup> )	0.23
60	1.00	0.720	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.11
90	1.50	0.740	Effective depth of Pit		(m)	0.25
120	2.00	0.770	Proportion of pit volume occupied by gravel solids		(0-1)	0.00
150	2.50	0.800	Maximum potential volume of Water		(m <sup>3</sup> )	0.23
180	3.00	0.850	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.06
210	3.50	0.890	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.19
240	4.00	0.900				
			Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.11
			Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	1.43
			Time at 75% effective depth (p <sub>75</sub> )		(s)	53
			Time at 25% effective depth (p <sub>25</sub> )		(s)	173
			Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	120
			OUTPUT:			
			SOIL INFILTRATION RATE (f)	V <sub>p75 - 25</sub>	(m/s)	6.58E-04
				A <sub>p50</sub> × T <sub>p75 - 25</sub>		
			WATER INPUT:		in	
			GEOLOGY OF TEST SECTION:			
			Slightly sandy, slightly clayey GRAVEL.			



<b>DATE:</b>	27/11/2019
<b>PROJECT No:</b>	A110489-4
<b>PROJECT NAME:</b>	Cwmcarn High School
<b>CLIENT:</b>	CCBC
<b>TRIAL PIT ID:</b>	SA105
<b>TEST NUMBER:</b>	3

## SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)	PIT LENGTH (m):	1.50	Pit construction		
			PIT WIDTH (m):	0.60	Open - no gravel.		
			PIT DEPTH (m):	0.90			
0	0.00	0.530	INPUT PARAMETERS:				
30	0.50	0.560	Total volume of pit		(m <sup>3</sup> )	0.33	
60	1.00	0.580	Pit volume between 75% and 25% depths = L x W x ½D		(m <sup>3</sup> )	0.17	
90	1.50	0.600	Effective depth of Pit		(m)	0.37	
120	2.00	0.620	Proportion of pit volume occupied by gravel solids		(0-1)	0.00	
150	2.50	0.640	Maximum potential volume of Water		(m <sup>3</sup> )	0.33	
180	3.00	0.660	Level of water in pit at 75% effective depth (p <sub>75</sub> )		(m)	0.09	
210	3.50	0.680	Level of water in pit at 25% effective depth (p <sub>25</sub> )		(m)	0.28	
240	4.00	0.700					
270	4.50	0.720	Effective volume between 75% & 25% depth V <sub>p75-25</sub> = V x P <sub>g</sub>		(m <sup>3</sup> )	0.17	
300	5.00	0.750	Surface area of pit up to 50% effective depth (A <sub>p50</sub> )		(m <sup>2</sup> )	1.68	
330	5.50	0.770					
360	6.00	0.800	Time at 75% effective depth (p <sub>75</sub> )		(s)	124	
390	6.50	0.830	Time at 25% effective depth (p <sub>25</sub> )		(s)	368	
420	7.00	0.840	Time for outflow for 75% and 25% effective depth (Tp75-25)		(s)	244	
450	7.50	0.880	OUTPUT:				
480	8.00	0.920	SOIL INFILTRATION RATE (f)		V <sub>p75 - 25</sub>	(m/s)	4.07E-04
					A <sub>p50</sub> X T <sub>p75 - 25</sub>		
			WATER INPUT:		in		
			GEOLOGY OF TEST SECTION:				
			Slightly sandy, slightly clayey GRAVEL.				



## **APPENDIX D –TRL DCP RESULTS**





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP01

Position: WS108

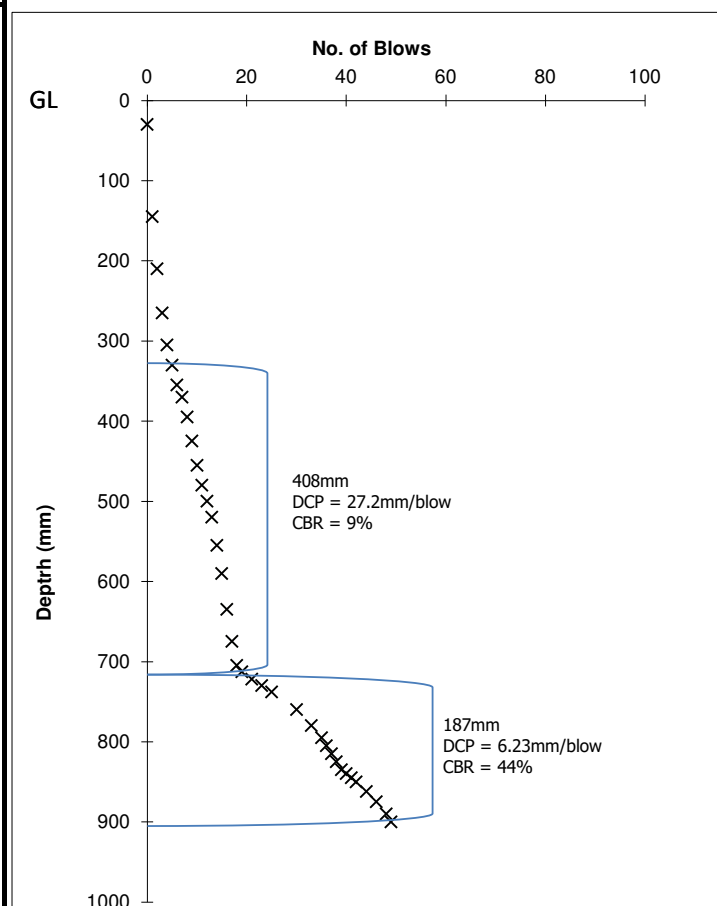
Date: 27 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
30	0	70	30				
115	1	185	145				
65	2	250	210				
55	3	305	265				
40	4	345	305				
25	5	370	330				
25	6	395	355				
15	7	410	370				
25	8	435	395				
30	9	465	425				
30	10	495	455				
25	11	520	480				
20	12	540	500				
20	13	560	520				
35	14	595	555				
35	15	630	590				
45	16	675	635				
40	17	715	675				
30	18	745	705				
8	19	753	713				
9	21	762	722				
8	23	770	730				
8	25	778	738				
22	30	800	760				
20	33	820	780				
15	35	835	795				
10	36	845	805				
10	37	855	815				
10	38	865	825				
10	39	875	835				
5	40	880	840				
5	41	885	845				
5	42	890	850				
12	44	902	862				
13	46	915	875				
15	48	930	890				
10	49	940	900				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP02

Position: WS104

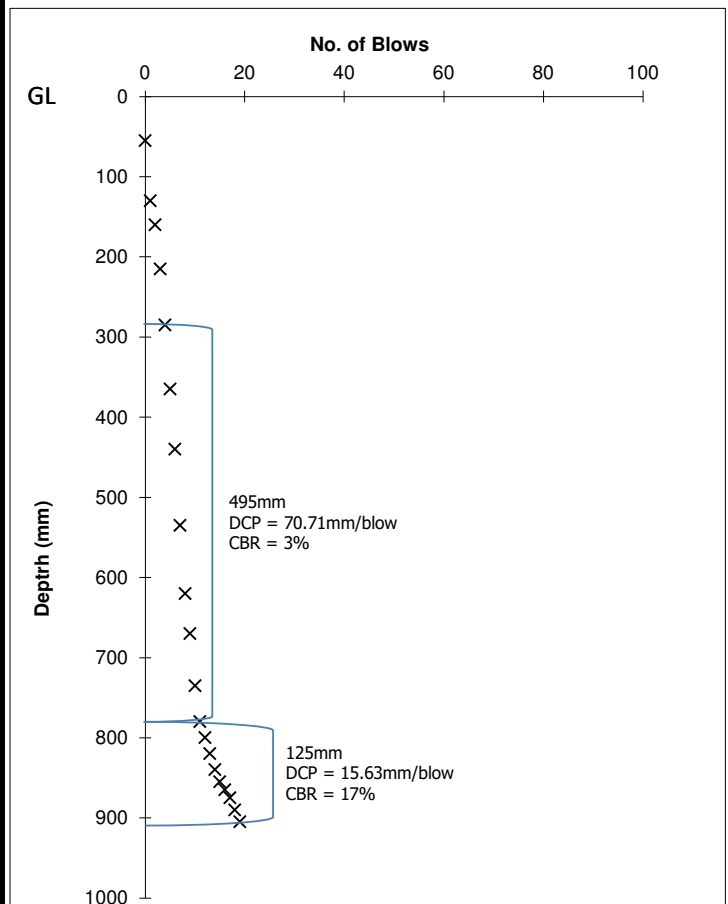
Date: 27 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
55	0	95	55				
75	1	170	130				
30	2	200	160				
55	3	255	215				
70	4	325	285				
80	5	405	365				
75	6	480	440				
95	7	575	535				
85	8	660	620				
50	9	710	670				
65	10	775	735				
45	11	820	780				
20	12	840	800				
20	13	860	820				
20	14	880	840				
15	15	895	855				
10	16	905	865				
10	17	915	875				
15	18	930	890				
15	19	945	905				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP03

Position: TP103

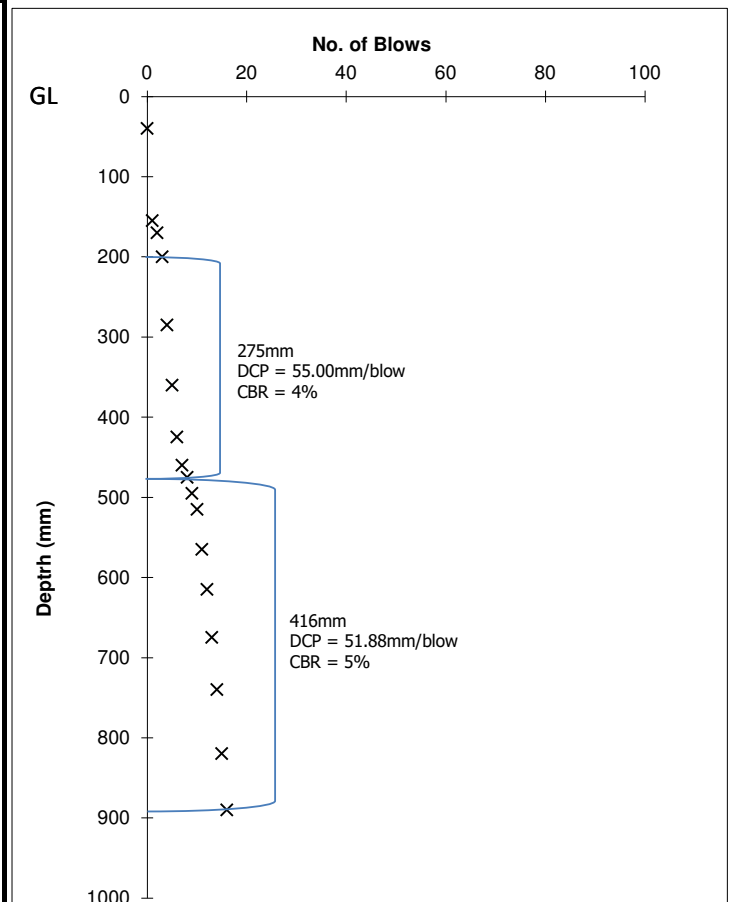
Date: 27 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
40	0	80	40				
115	1	195	155				
15	2	210	170				
30	3	240	200				
85	4	325	285				
75	5	400	360				
65	6	465	425				
35	7	500	460				
15	8	515	475				
20	9	535	495				
20	10	555	515				
50	11	605	565				
50	12	655	615				
60	13	715	675				
65	14	780	740				
80	15	860	820				
70	16	930	890				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP04

Position: TP104

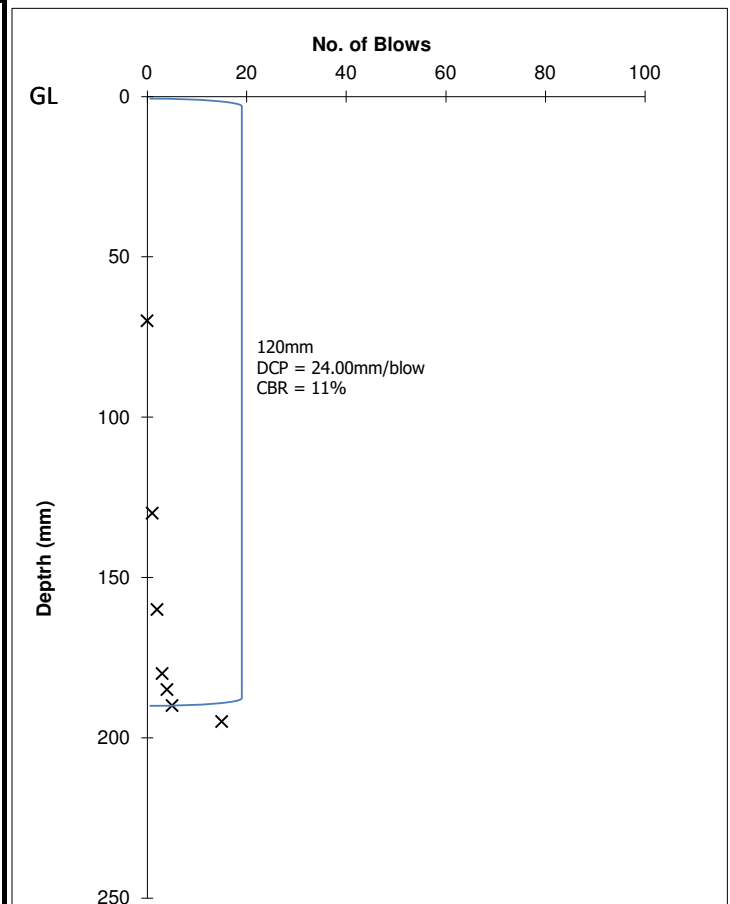
Date: 27 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
70	0	110	70				
60	1	170	130				
30	2	200	160				
20	3	220	180				
5	4	225	185				
5	5	230	190				
5	15	235	195				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

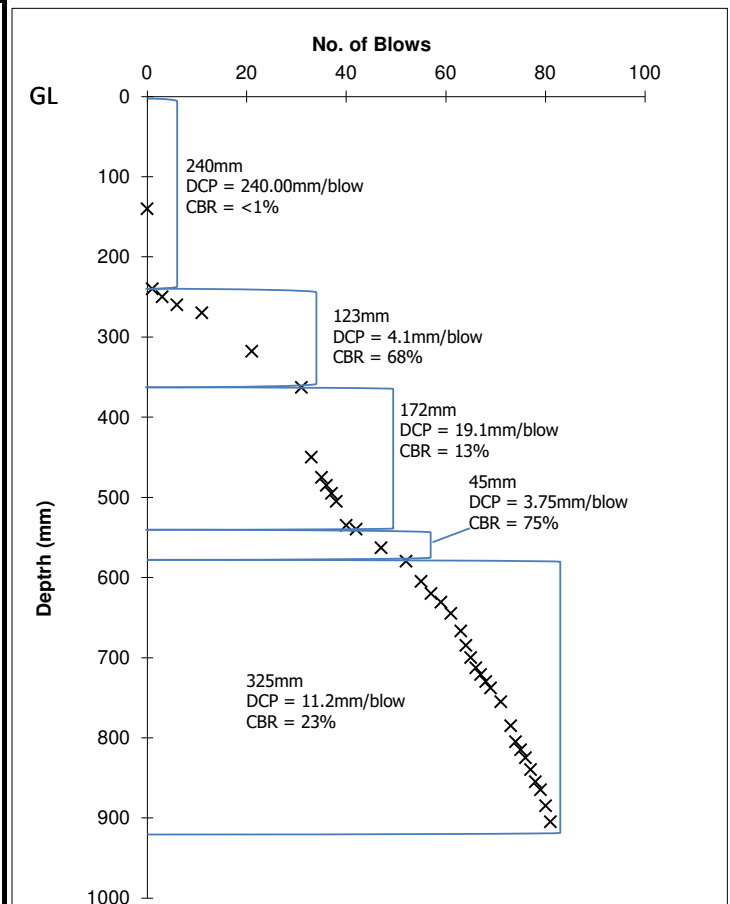
Reference: DCP04A

Position: TP104

Date: 27 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
140	0	180	140				
100	1	280	240				
10	3	290	250				
10	6	300	260				
10	11	310	270				
48	21	358	318				
45	31	403	363				
87	33	490	450				
25	35	515	475				
10	36	525	485				
10	37	535	495				
10	38	545	505				
30	40	575	535				
5	42	580	540				
23	47	603	563				
17	52	620	580				
25	55	645	605				
15	57	660	620				
11	59	671	631				
14	61	685	645				
22	63	707	667				
18	64	725	685				
15	65	740	700				
13	66	753	713				
8	67	761	721				
9	68	770	730				
8	69	778	738				
17	71	795	755				
30	73	825	785				
20	74	845	805				
10	75	855	815				
10	76	865	825				
15	77	880	840				
15	78	895	855				
10	79	905	865				
20	80	925	885				
20	81	945	905				

Test started at: 0 m below ground level  
Zero Reading: 40 mm  
Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP05

Position: TP108

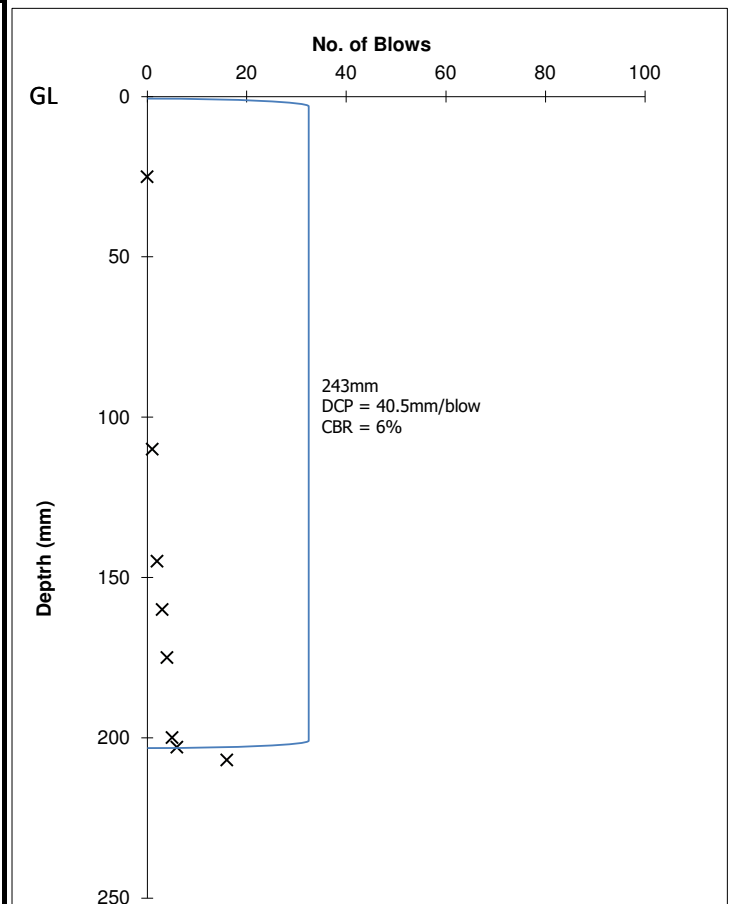
Date: 27 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
25	0	65	25				
85	1	150	110				
35	2	185	145				
15	3	200	160				
15	4	215	175				
25	5	240	200				
3	6	243	203				
4	16	247	207				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface







## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP05A

Position: TP108

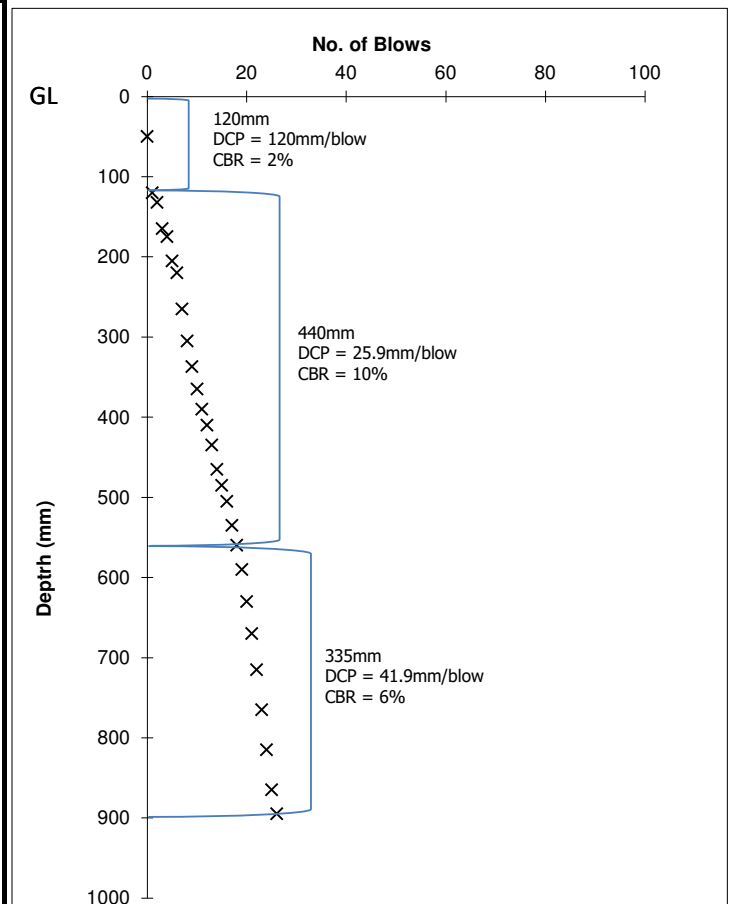
Date: 27 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
50	0	90	50				
70	1	160	120				
12	2	172	132				
33	3	205	165				
10	4	215	175				
30	5	245	205				
15	6	260	220				
45	7	305	265				
40	8	345	305				
32	9	377	337				
28	10	405	365				
25	11	430	390				
20	12	450	410				
25	13	475	435				
30	14	505	465				
20	15	525	485				
20	16	545	505				
30	17	575	535				
25	18	600	560				
30	19	630	590				
40	20	670	630				
40	21	710	670				
45	22	755	715				
50	23	805	765				
50	24	855	815				
50	25	905	865				
30	26	935	895				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP06

Position: TP107

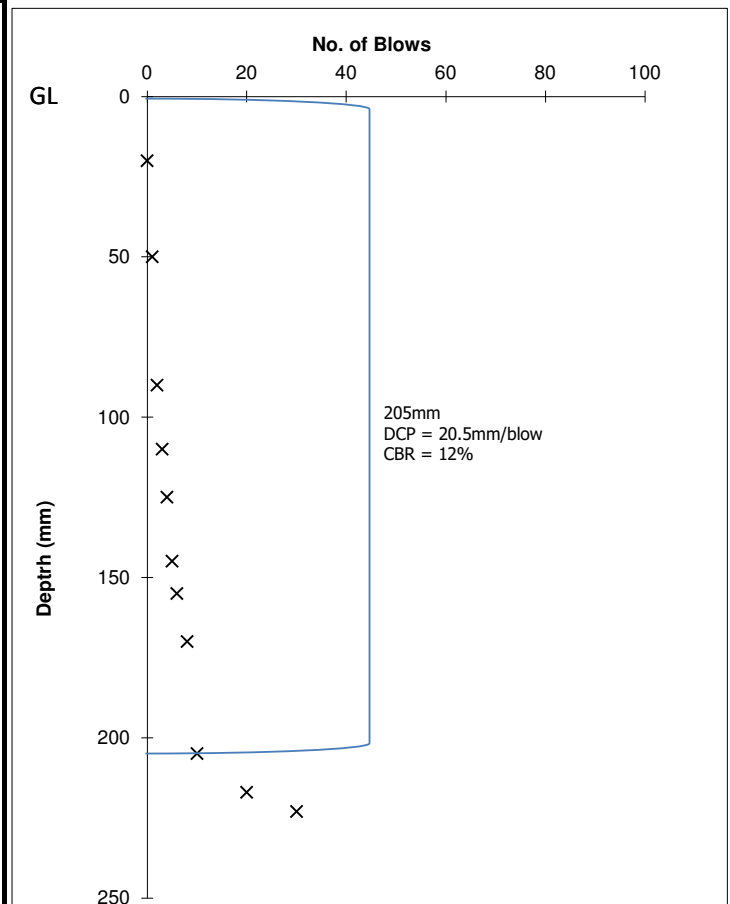
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
20	0	60	20				
30	1	90	50				
40	2	130	90				
20	3	150	110				
15	4	165	125				
20	5	185	145				
10	6	195	155				
15	8	210	170				
35	10	245	205				
12	20	257	217				
6	30	263	223				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP06A

Position: TP107

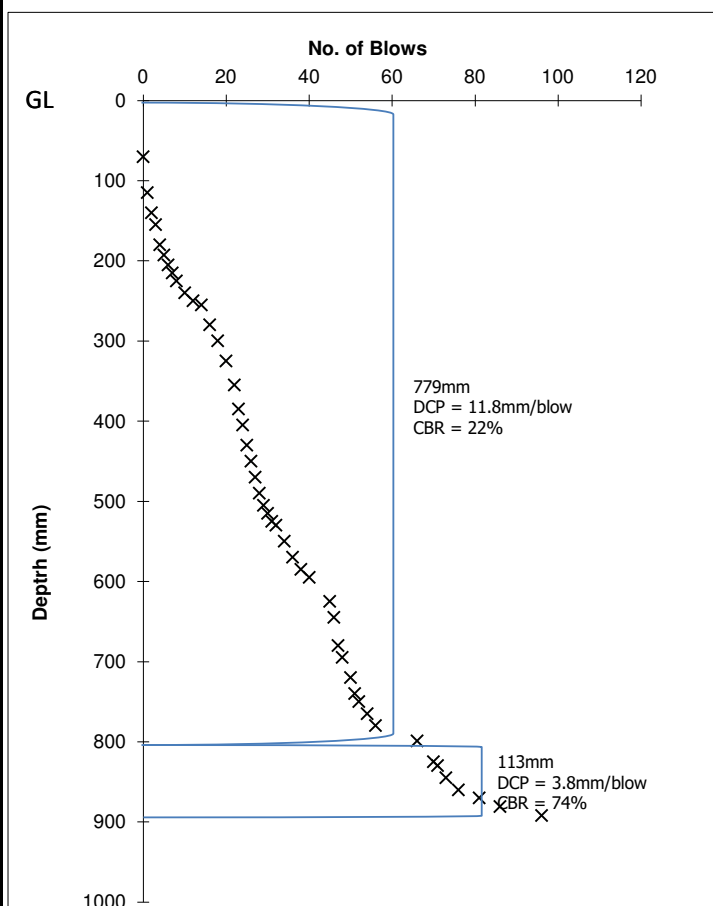
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
70	0	110	70	11	86	921	881
45	1	155	115	11	96	932	892
25	2	180	140				
15	3	195	155				
25	4	220	180				
13	5	233	193				
12	6	245	205				
10	7	255	215				
10	8	265	225				
15	10	280	240				
10	12	290	250				
5	14	295	255				
25	16	320	280				
20	18	340	300				
25	20	365	325				
30	22	395	355				
30	23	425	385				
20	24	445	405				
25	25	470	430				
20	26	490	450				
20	27	510	470				
20	28	530	490				
15	29	545	505				
10	30	555	515				
10	31	565	525				
5	32	570	530				
20	34	590	550				
20	36	610	570				
15	38	625	585				
10	40	635	595				
30	45	665	625				
20	46	685	645				
35	47	720	680				
15	48	735	695				
25	50	760	720				
20	51	780	740				
10	52	790	750				
15	54	805	765				
15	56	820	780				
19	66	839	799				
26	70	865	825				
5	71	870	830				
15	73	885	845				
15	76	900	860				
10	81	910	870				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10}(\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP07

Position: TP105A

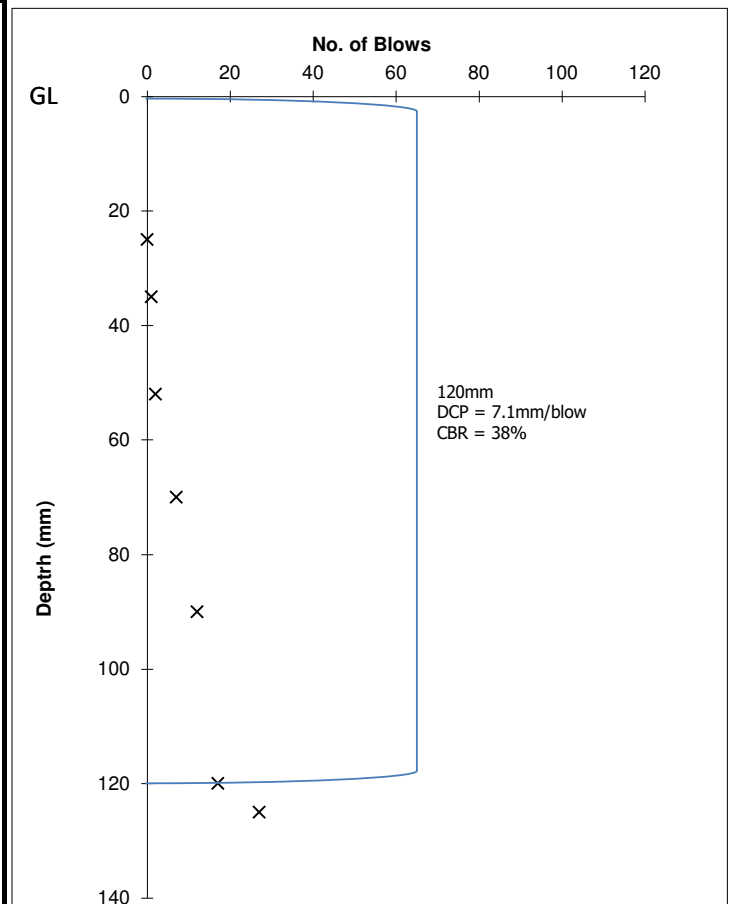
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
25	0	65	25				
10	1	75	35				
17	2	92	52				
18	7	110	70				
20	12	130	90				
30	17	160	120				
5	27	165	125				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP07A

Position: TP105A

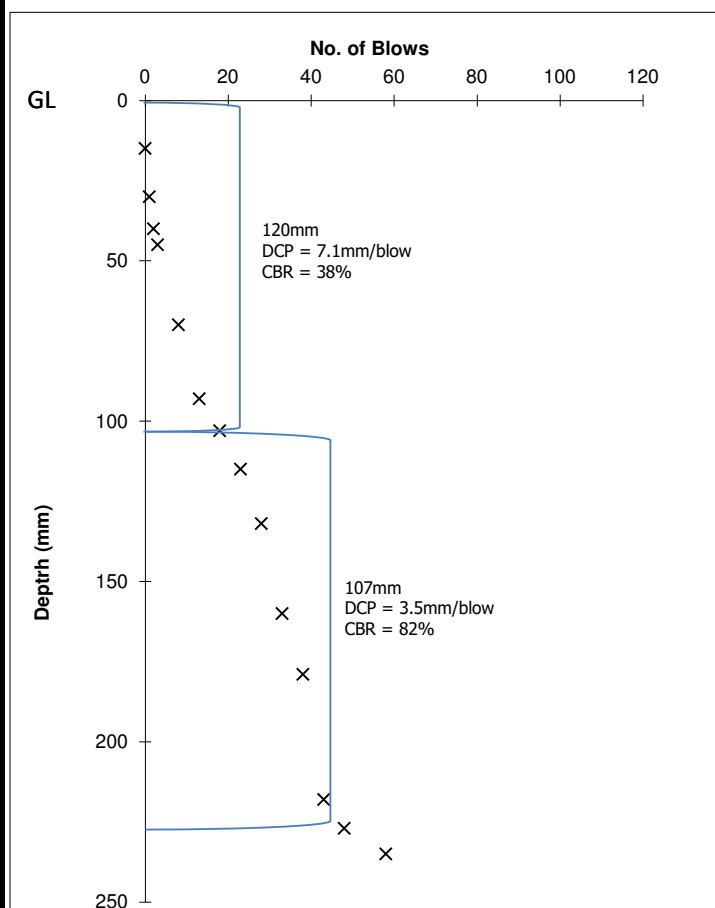
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
15	0	55	15				
15	1	70	30				
10	2	80	40				
5	3	85	45				
25	8	110	70				
23	13	133	93				
10	18	143	103				
12	23	155	115				
17	28	172	132				
28	33	200	160				
19	38	219	179				
39	43	258	218				
9	48	267	227				
8	58	275	235				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP08

Position: TP106

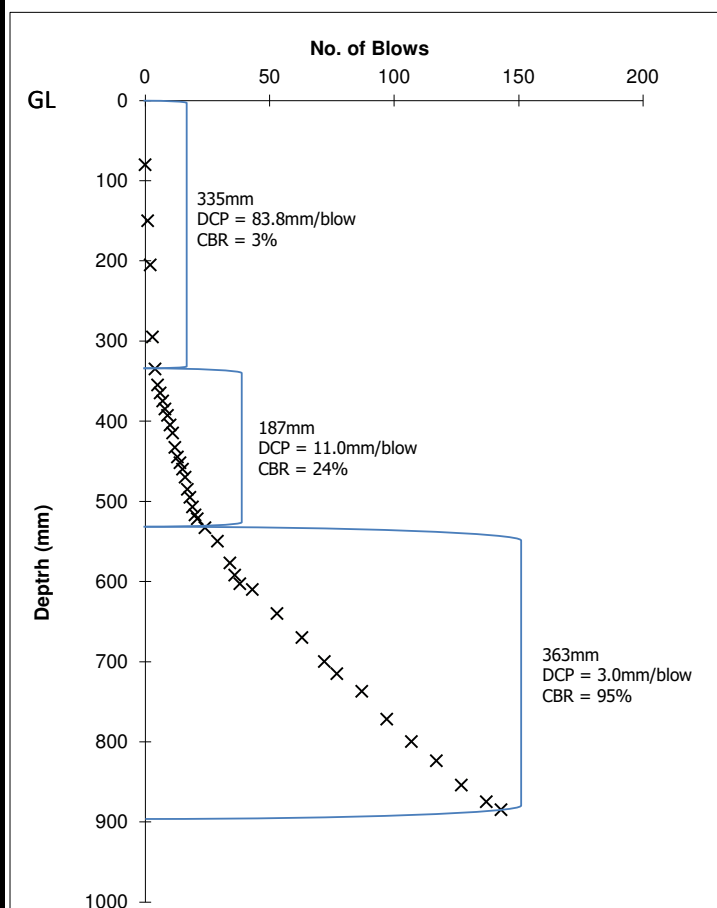
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
80	0	120	80				
70	1	190	150				
55	2	245	205				
90	3	335	295				
40	4	375	335				
20	5	395	355				
10	6	405	365				
10	7	415	375				
10	8	425	385				
8	9	433	393				
12	10	445	405				
10	11	455	415				
18	12	473	433				
12	13	485	445				
7	14	492	452				
8	15	500	460				
10	16	510	470				
15	17	525	485				
10	18	535	495				
12	19	547	507				
10	20	557	517				
5	21	562	522				
11	24	573	533				
17	29	590	550				
27	34	617	577				
15	36	632	592				
11	38	643	603				
7	43	650	610				
30	53	680	640				
30	63	710	670				
30	72	740	700				
15	77	755	715				
22	87	777	737				
35	97	812	772				
28	107	840	800				
24	117	864	824				
30	127	894	854				
21	137	915	875				
10	143	925	885				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface







## DCP-CBR Corellation

$$\log_{10}(\text{CBR}) = 2.48 - 1.057 \times \log_{10}(\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP09

Position: BH106

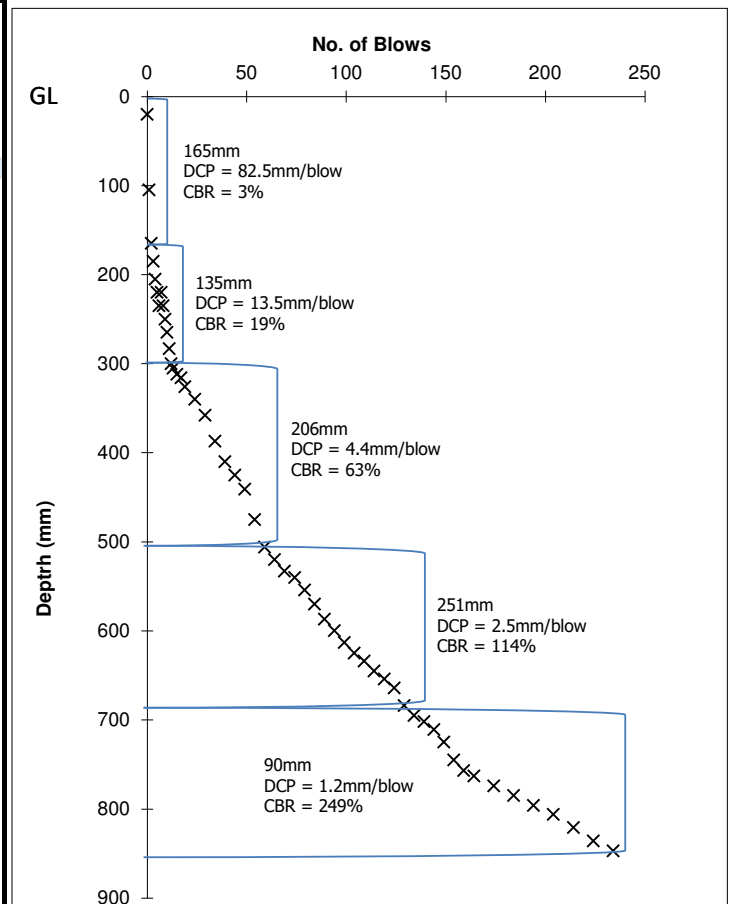
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
20	0	60	20	6	164	803	763
85	1	145	105	11	174	814	774
60	2	205	165	11	184	825	785
20	3	225	185	11	194	836	796
20	4	245	205	10	204	846	806
15	5	260	220	15	214	861	821
15	6	275	235	15	224	876	836
-15	7	260	220	11	234	887	847
15	8	275	235				
15	9	290	250				
15	10	305	265				
18	11	323	283				
17	12	340	300				
5	13	345	305				
7	15	352	312				
4	17	356	316				
10	19	366	326				
14	24	380	340				
18	29	398	358				
29	34	427	387				
23	39	450	410				
15	44	465	425				
16	49	481	441				
34	54	515	475				
31	59	546	506				
14	64	560	520				
13	69	573	533				
7	74	580	540				
14	79	594	554				
16	84	610	570				
17	89	627	587				
13	94	640	600				
13	99	653	613				
12	104	665	625				
9	109	674	634				
11	114	685	645				
9	119	694	654				
10	124	704	664				
20	129	724	684				
11	134	735	695				
7	139	742	702				
9	144	751	711				
14	149	765	725				
20	154	785	745				
12	159	797	757				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP10

Position: BH105

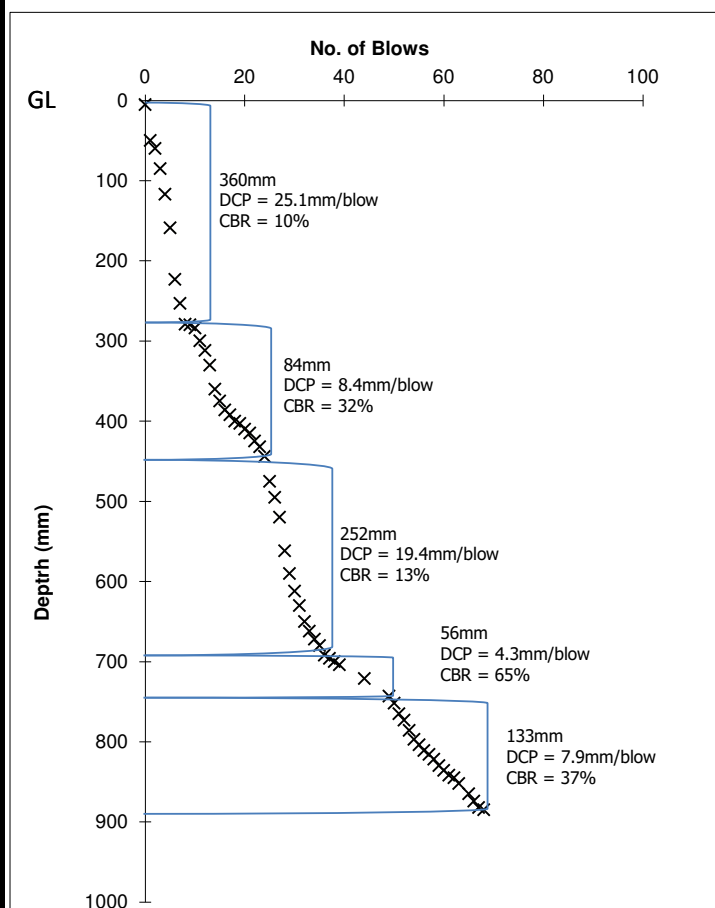
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
5	0	45	5	13	53	826	786
45	1	90	50	11	54	837	797
10	2	100	60	7	55	844	804
25	3	125	85	7	56	851	811
32	4	157	117	5	57	856	816
42	5	199	159	6	58	862	822
64	6	263	223	8	59	870	830
30	7	293	253	6	60	876	836
26	8	319	279	6	61	882	842
1	9	320	280	3	62	885	845
4	10	324	284	7	63	892	852
16	11	340	300	13	65	905	865
12	12	352	312	9	66	914	874
18	13	370	330	8	67	922	882
30	14	400	360	3	68	925	885
15	15	415	375				
11	16	426	386				
6	17	432	392				
8	18	440	400				
3	19	443	403				
7	20	450	410				
5	21	455	415				
10	22	465	425				
7	23	472	432				
12	24	484	444				
31	25	515	475				
20	26	535	495				
25	27	560	520				
42	28	602	562				
28	29	630	590				
22	30	652	612				
18	31	670	630				
20	32	690	650				
12	33	702	662				
10	34	712	672				
8	35	720	680				
12	36	732	692				
4	37	736	696				
4	38	740	700				
4	39	744	704				
17	44	761	721				
22	49	783	743				
9	50	792	752				
13	51	805	765				
8	52	813	773				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP11

Position: BH104

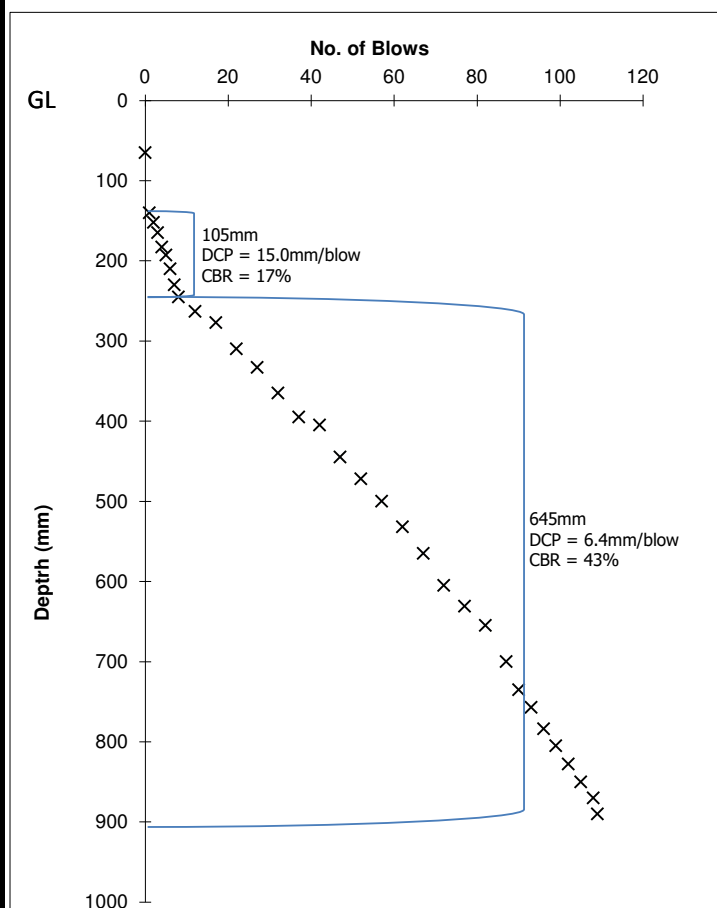
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
65	0	105	65				
75	1	180	140				
12	2	192	152				
13	3	205	165				
18	4	223	183				
10	5	233	193				
17	6	250	210				
20	7	270	230				
15	8	285	245				
18	12	303	263				
14	17	317	277				
33	22	350	310				
23	27	373	333				
32	32	405	365				
30	37	435	395				
10	42	445	405				
40	47	485	445				
27	52	512	472				
28	57	540	500				
32	62	572	532				
33	67	605	565				
40	72	645	605				
26	77	671	631				
24	82	695	655				
45	87	740	700				
35	90	775	735				
22	93	797	757				
27	96	824	784				
21	99	845	805				
23	102	868	828				
22	105	890	850				
20	108	910	870				
20	109	930	890				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP12

Position: BH103

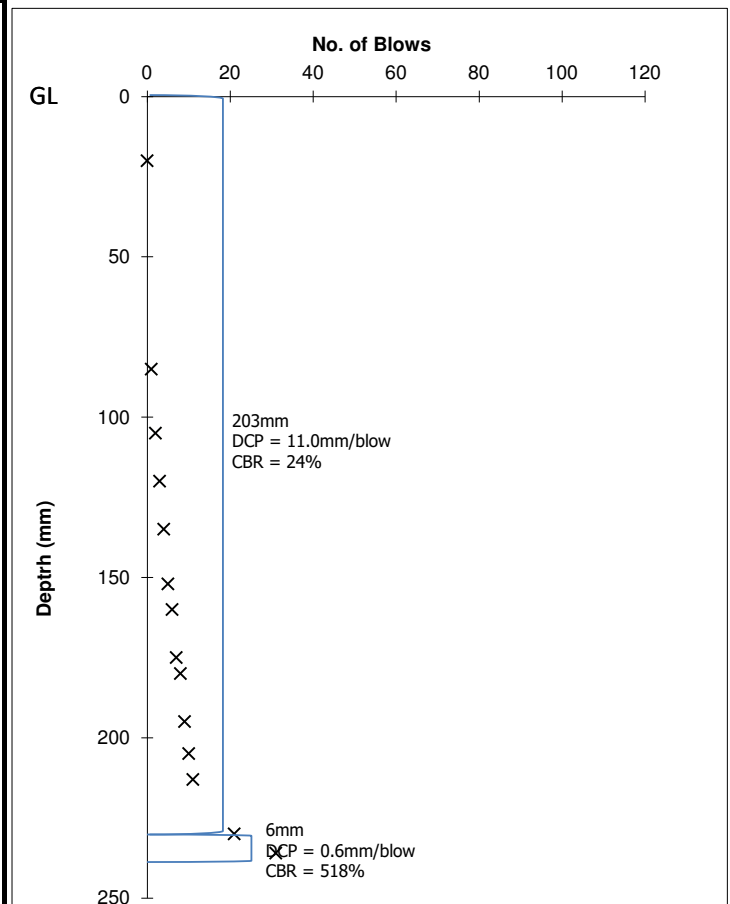
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
20	0	60	20				
65	1	125	85				
20	2	145	105				
15	3	160	120				
15	4	175	135				
17	5	192	152				
8	6	200	160				
15	7	215	175				
5	8	220	180				
15	9	235	195				
10	10	245	205				
8	11	253	213				
17	21	270	230				
6	31	276	236				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## DCP-CBR Corellation

$$\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 \times \text{Log}_{10} (\text{mm/blow})$$

## DCP -Modulus E Corellation

$$E = 17.6 (\text{CBR})^{0.64} \text{ MPa}$$

## In situ CBR by TRL Probe

Reference: DCP12A

Position: BH103

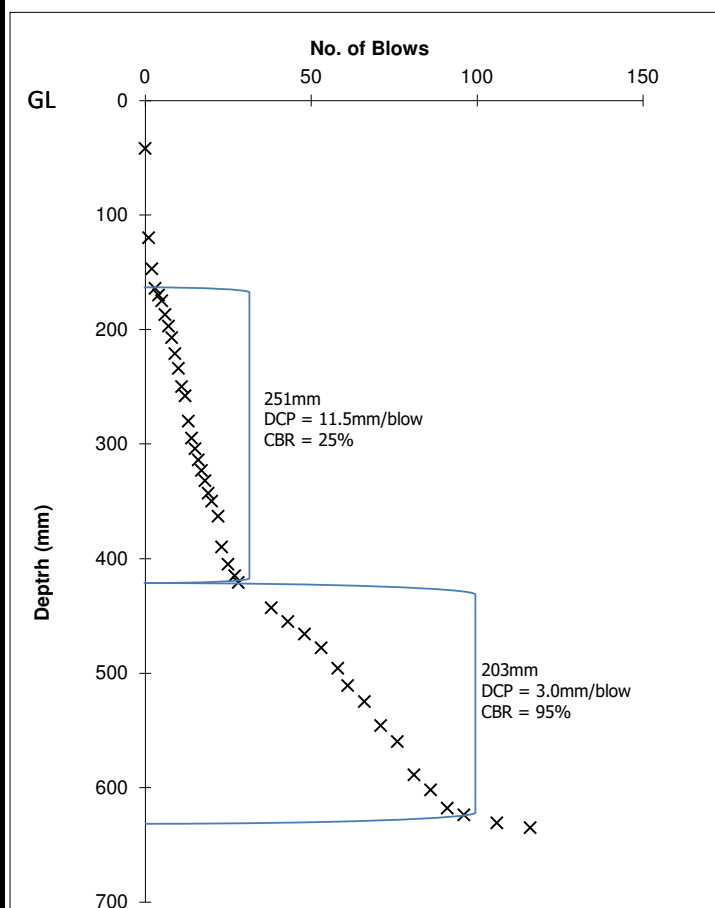
Date: 28 November 2019

mm per blow(s)	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
42	0	82	42				
78	1	160	120				
27	2	187	147				
17	3	204	164				
6	4	210	170				
5	5	215	175				
12	6	227	187				
10	7	237	197				
10	8	247	207				
14	9	261	221				
13	10	274	234				
16	11	290	250				
8	12	298	258				
22	13	320	280				
15	14	335	295				
9	15	344	304				
10	16	354	314				
9	17	363	323				
9	18	372	332				
11	19	383	343				
7	20	390	350				
13	22	403	363				
27	23	430	390				
15	25	445	405				
10	27	455	415				
6	28	461	421				
22	38	483	443				
12	43	495	455				
11	48	506	466				
12	53	518	478				
18	58	536	496				
15	61	551	511				
14	66	565	525				
21	71	586	546				
14	76	600	560				
29	81	629	589				
13	86	642	602				
16	91	658	618				
6	96	664	624				
7	106	671	631				
4	116	675	635				

Test started at: 0 m below ground level

Zero Reading: 40 mm

Zero reading = start depth below ground surface





## **APPENDIX E – GEOTECHNICAL LABORATORY TEST RESULTS**





# Laboratory Report



GEO Site & Testing Services Ltd

## Contract Number: 43788

Client Ref: **A110489-1**

Report Date: **08-05-2019**

Client PO: **C19/407**

Client **WYG Group**  
**Arndale Court**  
**Headingley**  
**Leeds**  
**LS6 2UJ**

Contract Title: **Cwmcarn**  
For the attention of: **Paul Vincent**

Date Received: **08-04-2019**  
Date Commenced: **08-04-2019**  
Date Completed: **08-05-2019**

Test Description	Qty
<b>Moisture Content</b> BS 1377:1990 - Part 2 : 3.2 - * UKAS	9
<b>4 Point Liquid &amp; Plastic Limit</b> BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	9
<b>PSD Wet Sieve method</b> BS 1377:1990 - Part 2 : 9.2 - * UKAS	19
<b>PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected)</b> BS 1377:1990 - Part 2 : 9.4 - * UKAS	7
<b>BRE Reduced Suite</b> <b>includes pH, water &amp; acid soluble sulphate and total sulphur</b> BRE - BR279 - @ Non Accredited Test	19
<b>Dry Den/MC (2.5kg Rammer Method 1 Litre Mould)</b> BS 1377:1990 - Part 4 : 3.3 - * UKAS	12
<b>Disposal of samples for job</b>	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 certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

#### Approved Signatories:

Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager) - Paul Evans (Quality/Technical Manager)

Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Accounts Assistant) - Wayne Honey (Administrative/Quality Assistant)

### LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX ( BS 1377 : Part 2 : 1990 Method 5 )

## DESCRIPTIONS

Contract Number	43788	
Site Name	Cwmcarn	

[illegible]

Operators	Checked	08/05/2019	Paul Evans (Quality/Technical Manager)
Darren Bourne	Approved	08/05/2019	Emma Sharp (Office Manager)



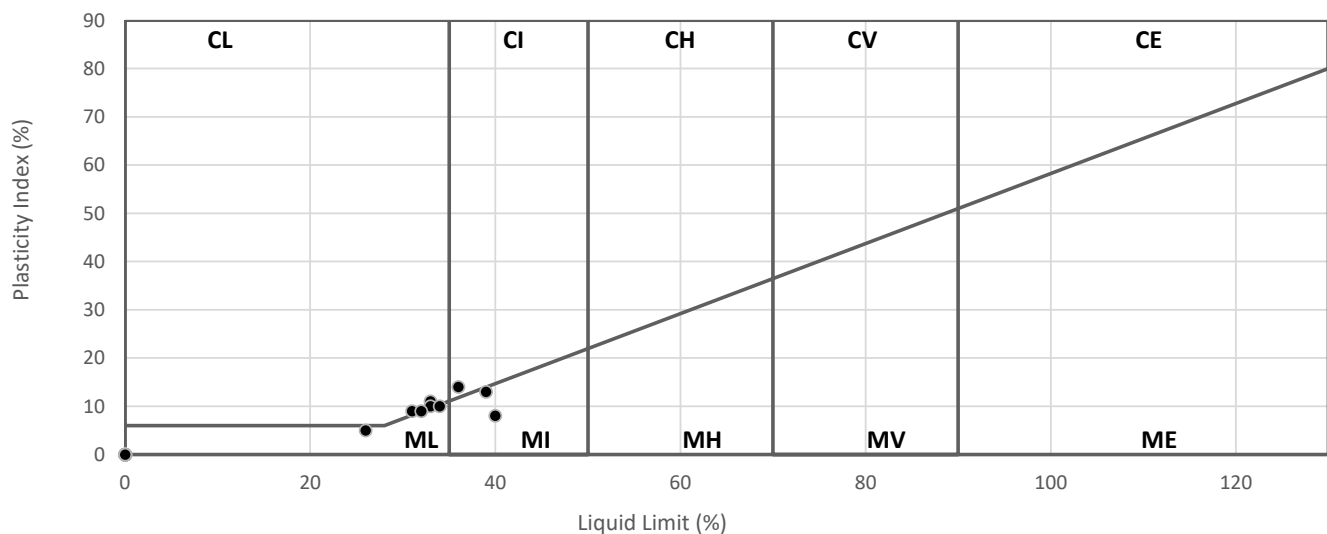
### LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX ( BS 1377 : Part 2 : 1990 Method 5 )

Contract Number	<b>43788</b>	
Site Name	<b>Cwmcarn</b>	

[illegible]

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

### PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION BS 5930:1999+A2:2010



Operators	Checked	08/05/2019	Paul Evans (Quality/Technical Manager)
Darren Bourne	Approved	08/05/2019	Emma Sharp (Office Manager)





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **43788**

Borehole/Pit No. **BH01**

Site Name **Cwmcarn**

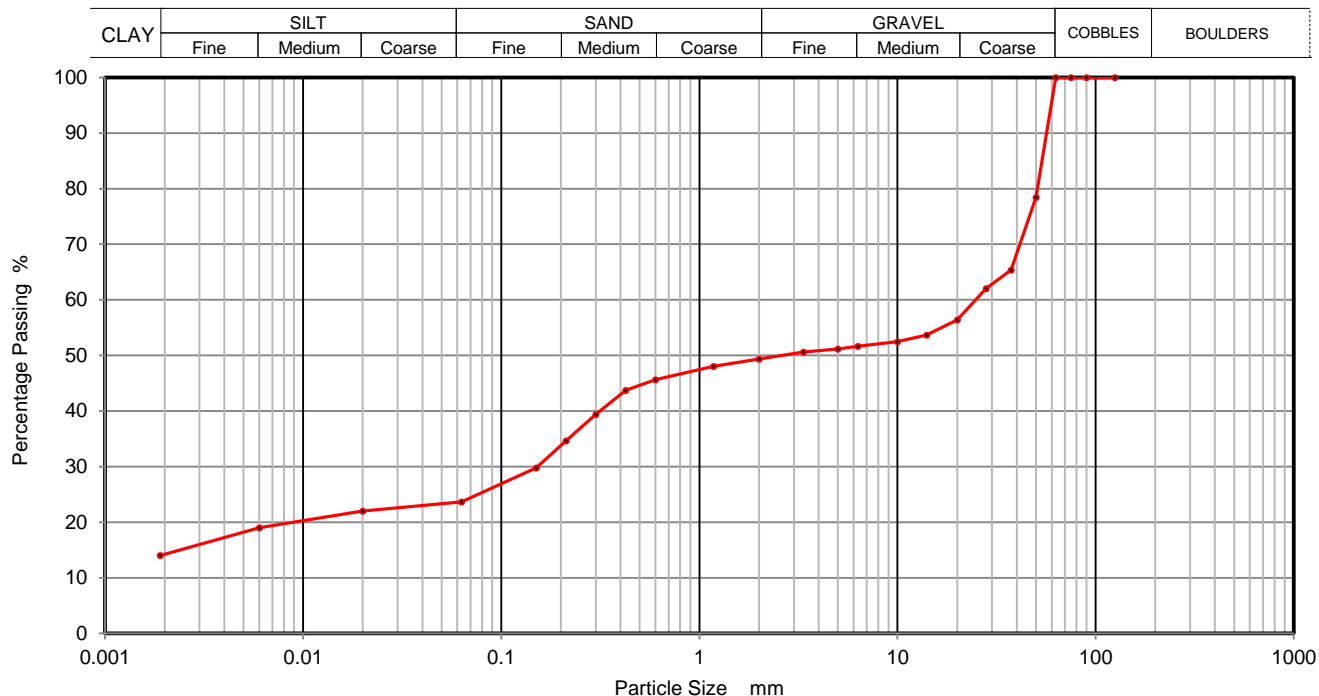
Sample No.

Soil Description  
Brown silty clayey fine to coarse sandy fine to coarse GRAVEL

Depth Top **0.70**

Depth Base **1.00**

Sample Type **B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	22
90	100	0.0060	19
75	100	0.0020	14
63	100		
50	78		
37.5	65		
28	62		
20	56		
14	54		
10	52		
6.3	52		
5	51		
3.35	51		
2	49		
1.18	48		
0.6	46		
0.425	44		
0.3	39		
0.212	35		
0.15	30		
0.063	24		

Sample Proportions	% dry mass
Cobbles	0
Gravel	51
Sand	25
Silt	10
Clay	14

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	



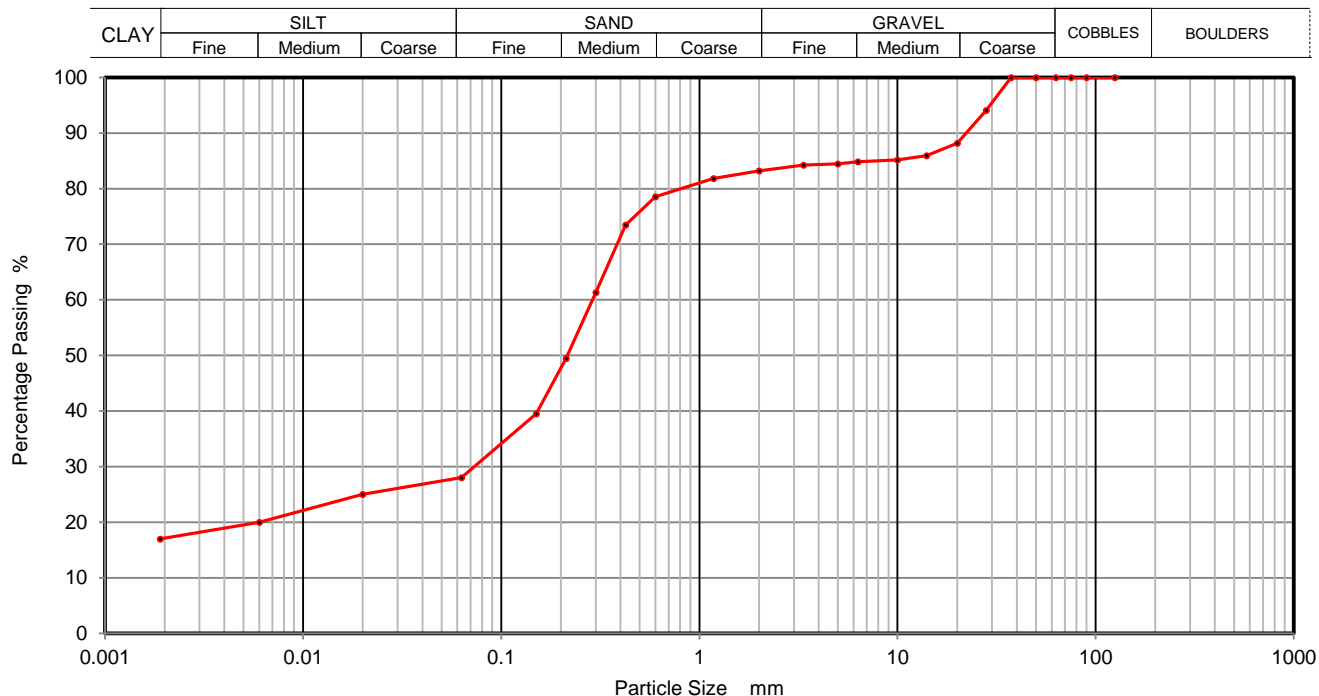


**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **43788**

Borehole/Pit No. **BH01**

Site Name	<b>Cwmcarn</b>	Sample No.	
Soil Description	Brown silty fine to coarse gravelly clayey fine to coarse SAND	Depth Top	<b>1.00</b>
		Depth Base	<b>1.50</b>
		Sample Type	<b>B</b>



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	25
90	100	0.0060	20
75	100	0.0020	17
63	100		
50	100		
37.5	100		
28	94		
20	88		
14	86		
10	85		
6.3	85		
5	84		
3.35	84		
2	83		
1.18	82		
0.6	79		
0.425	73		
0.3	61		
0.212	49		
0.15	39		
0.063	28		

Sample Proportions	% dry mass
Cobbles	0
Gravel	17
Sand	55
Silt	11
Clay	17

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number

**43788**

Borehole/Pit No.

**BH01**

Site Name

**Cwmcarn**

Sample No.

Soil Description

Brown clayey/silty fine to coarse sandy fine to coarse GRAVEL

Depth Top

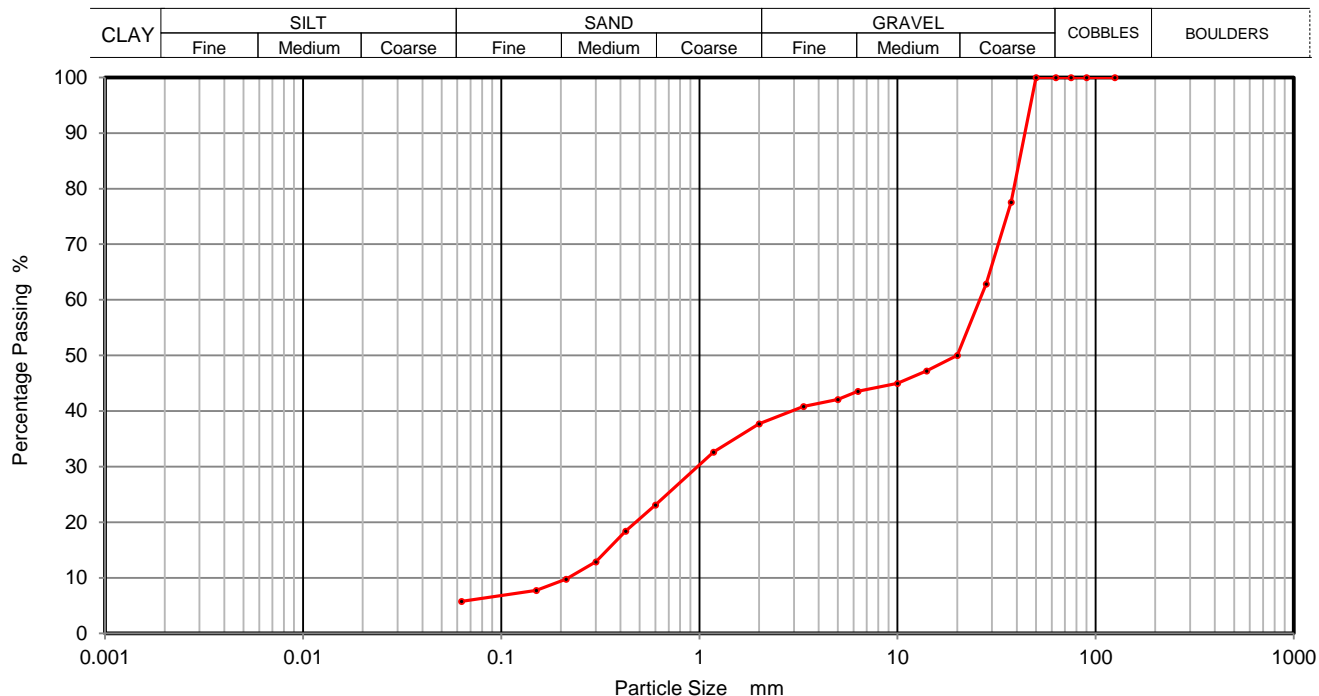
**2.00**

Depth Base

**2.20**

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	78		
28	63		
20	50		
14	47		
10	45		
6.3	44		
5	42		
3.35	41		
2	38		
1.18	33		
0.6	23		
0.425	18		
0.3	13		
0.212	10		
0.15	8		
0.063	6		

Sample Proportions	% dry mass
Cobbles	0
Gravel	62
Sand	32
Silt and Clay	6

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	







**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number **43788**

Borehole/Pit No. **BH01**

Site Name **Cwmcarn**

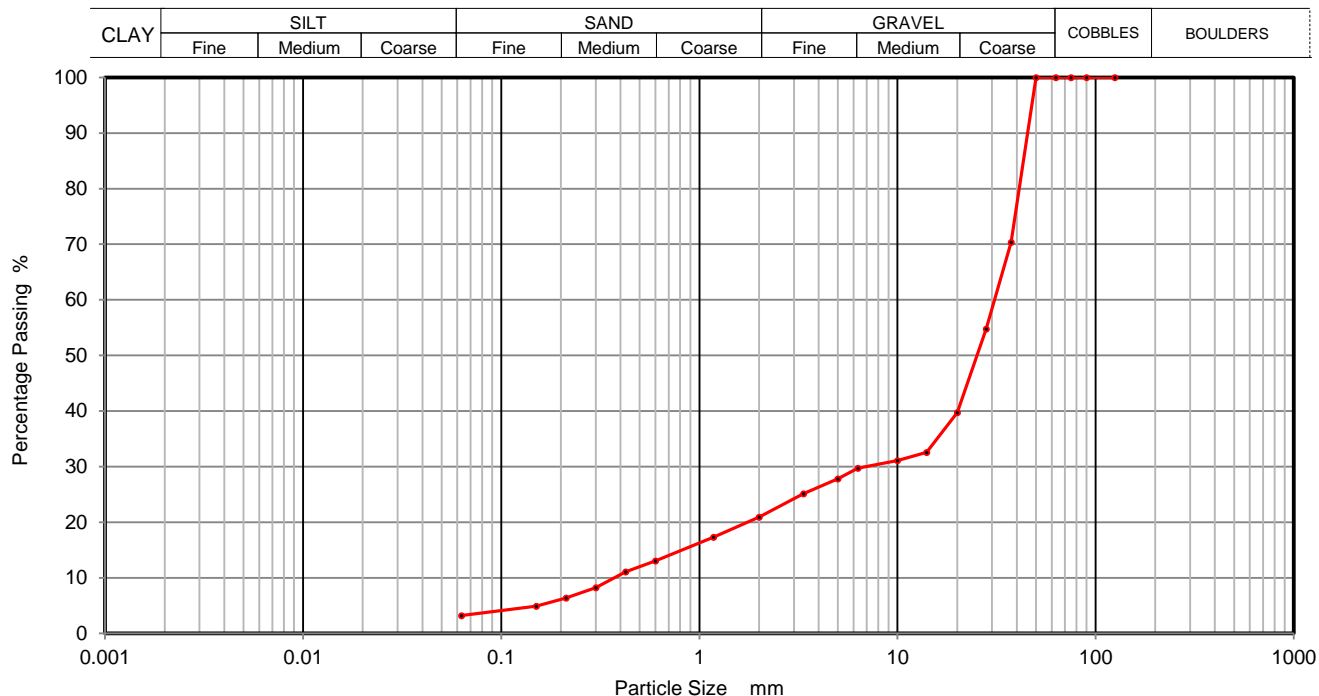
Sample No.

Soil Description **Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL**

Depth Top **5.00**

Depth Base **5.40**

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	70		
28	55		
20	40		
14	33		
10	31		
6.3	30		
5	28		
3.35	25		
2	21		
1.18	17		
0.6	13		
0.425	11		
0.3	8		
0.212	6		
0.15	5		
0.063	3		

Sample Proportions	% dry mass
Cobbles	0
Gravel	79
Sand	18
Silt and Clay	3

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **43788**

Borehole/Pit No. **BH02**

Site Name **Cwmcarn**

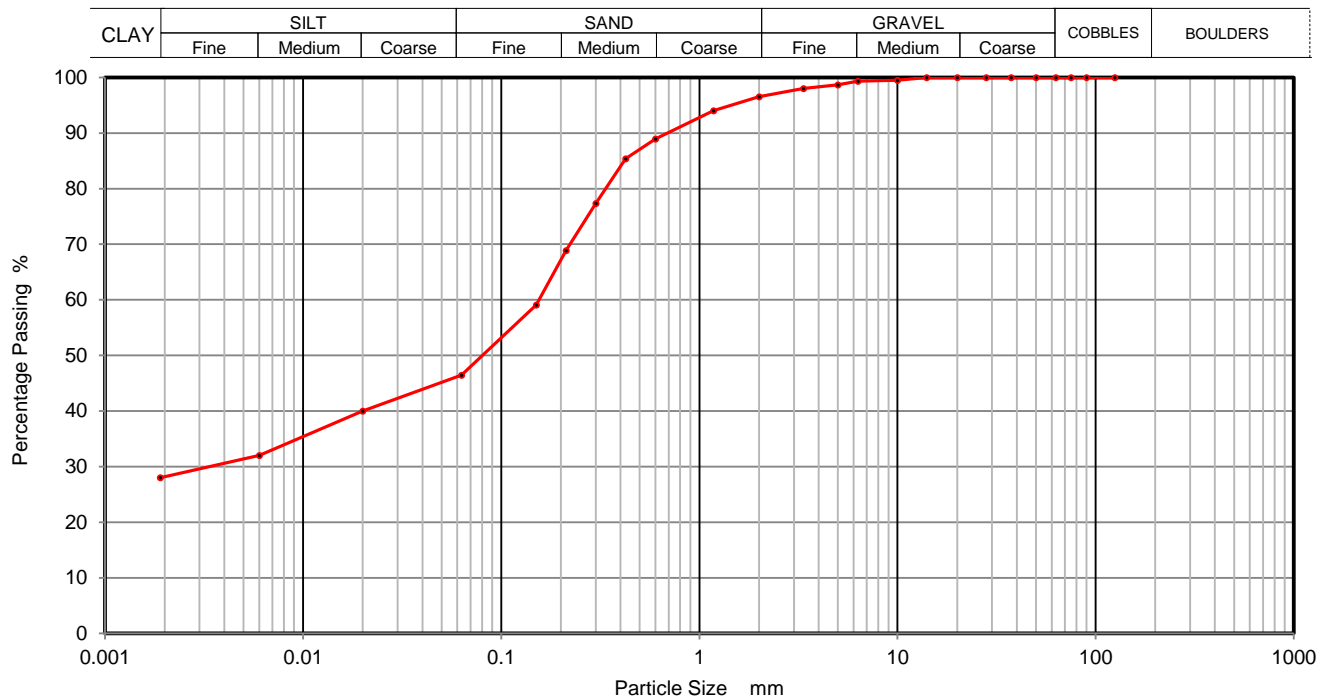
Sample No.

Soil Description  
Brown slightly fine to medium gravelly slightly silty clayey fine to coarse SAND

Depth Top **0.40**

Depth Base **0.80**

Sample Type **B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	40
90	100	0.0060	32
75	100	0.0020	28
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	99		
5	99		
3.35	98		
2	97		
1.18	94		
0.6	89		
0.425	85		
0.3	77		
0.212	69		
0.15	59		
0.063	46		

Sample Proportions	% dry mass
Cobbles	0
Gravel	3
Sand	51
Silt	18
Clay	28

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number

**43788**

Borehole/Pit No.

**BH02**

Site Name

**Cwmcarn**

Sample No.

Soil Description

Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL

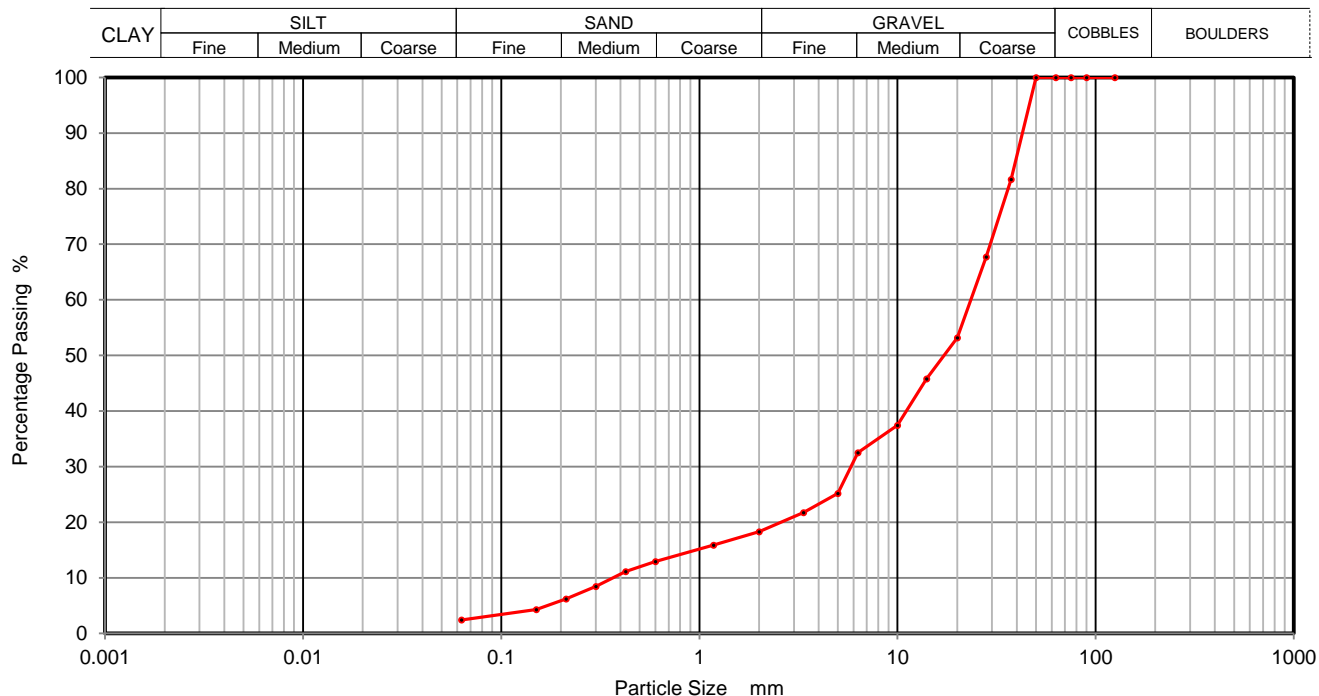
Depth Top

**1.00**

Depth Base

**1.50**

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	68		
20	53		
14	46		
10	37		
6.3	33		
5	25		
3.35	22		
2	18		
1.18	16		
0.6	13		
0.425	11		
0.3	8		
0.212	6		
0.15	4		
0.063	2		

**Sample Proportions**

% dry mass

Cobbles	0
Gravel	82
Sand	16
Silt and Clay	2

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number

**43788**

Borehole/Pit No.

**BH02**

Site Name

**Cwmcarn**

Sample No.

Soil Description

Brown fine to coarse sandy fine to coarse GRAVEL

Depth Top

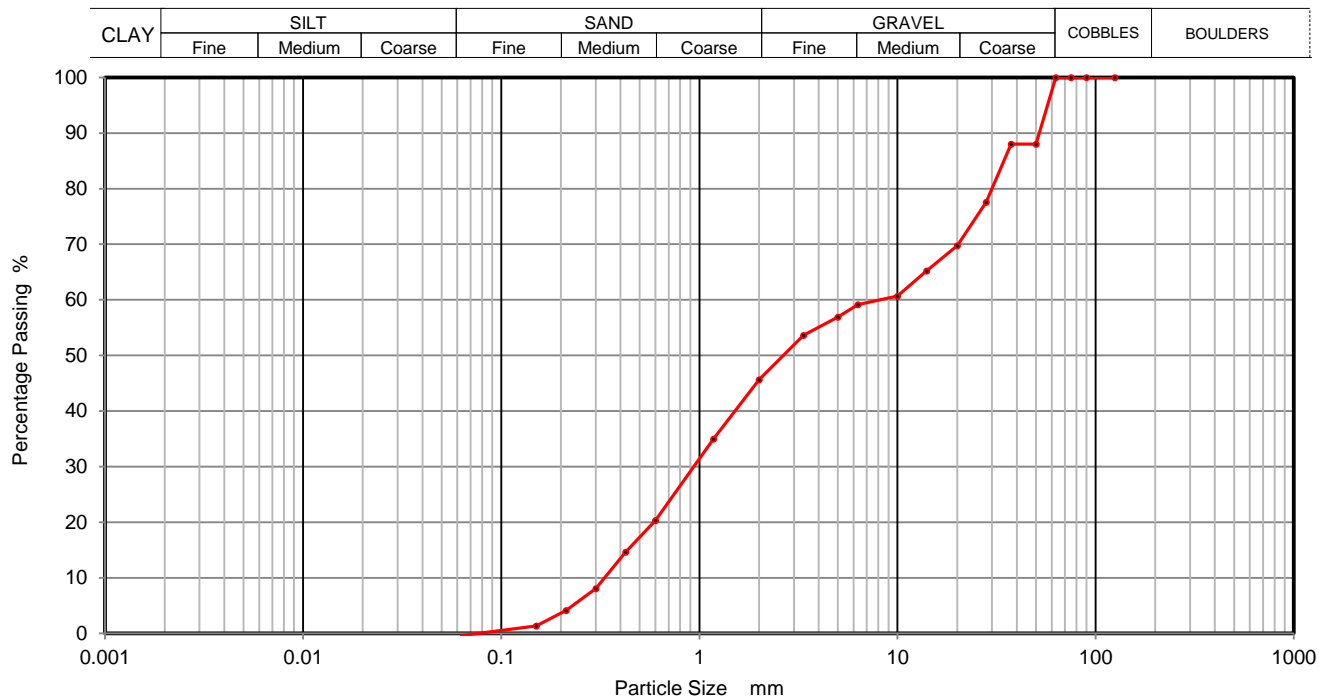
**2.00**

Depth Base

**2.50**

Sample Type

**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	88		
37.5	88		
28	78		
20	70		
14	65		
10	61		
6.3	59		
5	57		
3.35	54		
2	46		
1.18	35		
0.6	20		
0.425	15		
0.3	8		
0.212	4		
0.15	1		
0.063	0		

Sample Proportions	% dry mass
Cobbles	0
Gravel	54
Sand	46
Silt and Clay	0

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	



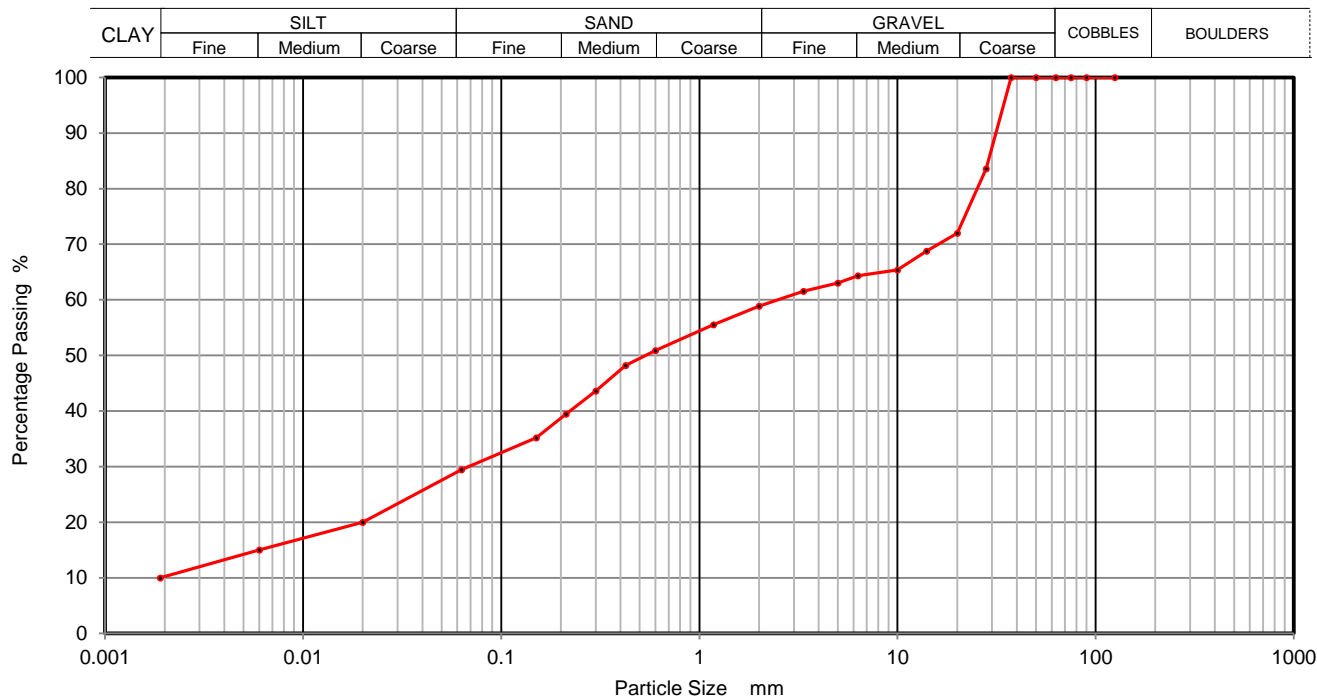


**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **43788**

Borehole/Pit No. **BH03A**

Site Name	<b>Cwmcarn</b>	Sample No.	
Soil Description	Brown clayey silty fine to coarse sandy fine to coarse GRAVEL	Depth Top	<b>0.30</b>
		Depth Base	<b>0.80</b>
		Sample Type	<b>B</b>



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	20
90	100	0.0060	15
75	100	0.0020	10
63	100		
50	100		
37.5	100		
28	84		
20	72		
14	69		
10	65		
6.3	64		
5	63		
3.35	62		
2	59		
1.18	56		
0.6	51		
0.425	48		
0.3	44		
0.212	39		
0.15	35		
0.063	29		

Sample Proportions	% dry mass
Cobbles	0
Gravel	41
Sand	30
Silt	19
Clay	10

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number

**43788**

Borehole/Pit No.

**BH03A**

Site Name

**Cwmcarn**

Sample No.

Soil Description

Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL

Depth Top

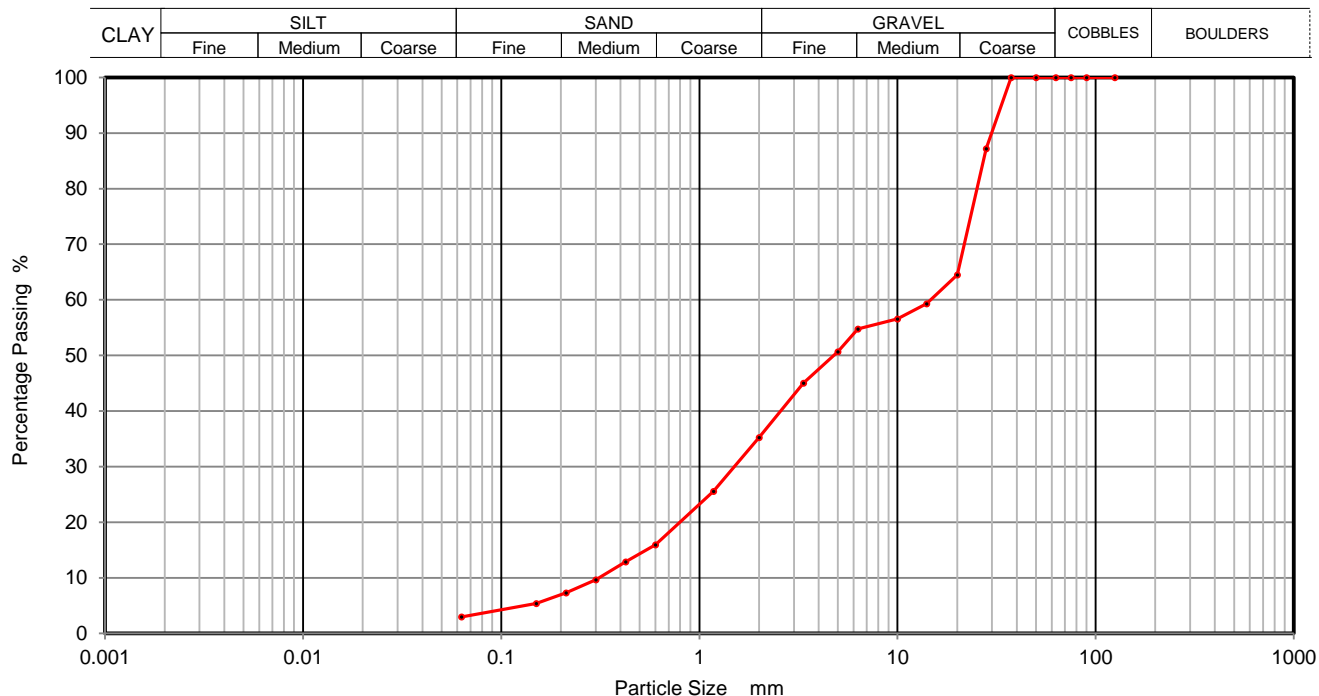
**1.00**

Depth Base

**1.20**

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	87		
20	65		
14	59		
10	57		
6.3	55		
5	51		
3.35	45		
2	35		
1.18	26		
0.6	16		
0.425	13		
0.3	10		
0.212	7		
0.15	5		
0.063	3		

Sample Proportions	% dry mass
Cobbles	0
Gravel	65
Sand	32
Silt and Clay	3

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





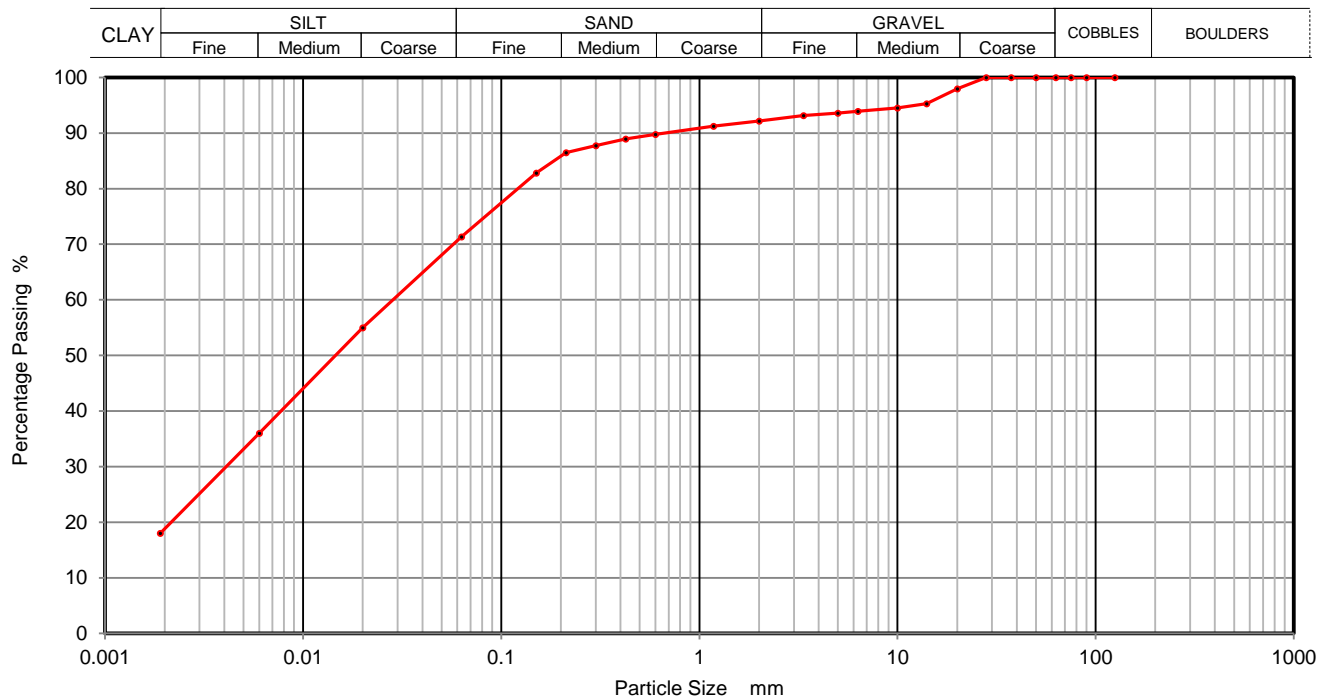


**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **43788**

Borehole/Pit No. **BH03A**

Site Name	<b>Cwmcarn</b>	Sample No.	
Soil Description	Brown slightly fine to coarse gravelly clayey fine to coarse sandy SILT	Depth Top	<b>3.00</b>
		Depth Base	<b>3.50</b>
		Sample Type	<b>B</b>



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	55
90	100	0.0060	36
75	100	0.0020	18
63	100		
50	100		
37.5	100		
28	100		
20	98		
14	95		
10	95		
6.3	94		
5	94		
3.35	93		
2	92		
1.18	91		
0.6	90		
0.425	89		
0.3	88		
0.212	86		
0.15	83		
0.063	71		

Sample Proportions	% dry mass
Cobbles	0
Gravel	8
Sand	21
Silt	53
Clay	18

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	



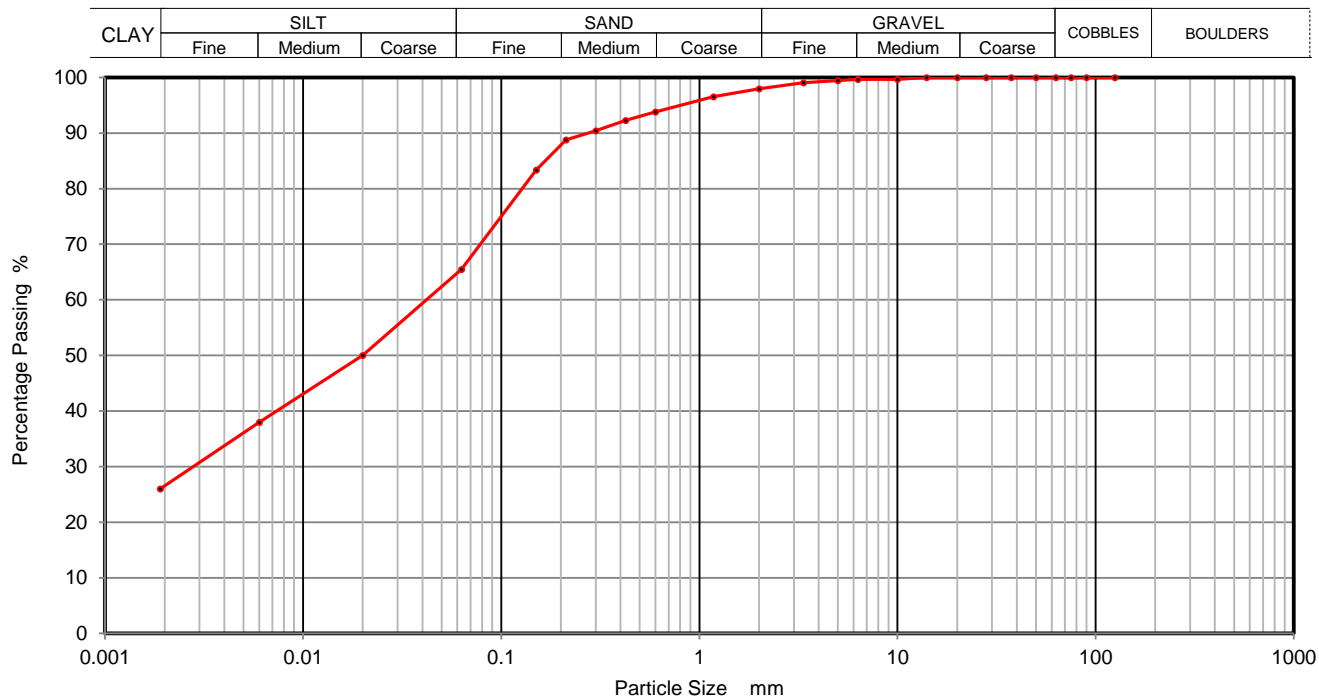


**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **43788**

Borehole/Pit No. **BH03A**

Site Name	<b>Cwmcarn</b>	Sample No.	
Soil Description	Brown slightly fine to medium gravelly clayey fine to coarse sandy SILT	Depth Top	<b>6.00</b>
		Depth Base	
		Sample Type	<b>B</b>



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	50
90	100	0.0060	38
75	100	0.0020	26
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	98		
1.18	97		
0.6	94		
0.425	92		
0.3	90		
0.212	89		
0.15	83		
0.063	66		

Sample Proportions	% dry mass
Cobbles	0
Gravel	2
Sand	32
Silt	40
Clay	26

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number

**43788**

Borehole/Pit No.

**TP01A**

Site Name

**Cwmcarn**

Sample No.

Soil Description

Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL  
(with cobbles)

Depth Top

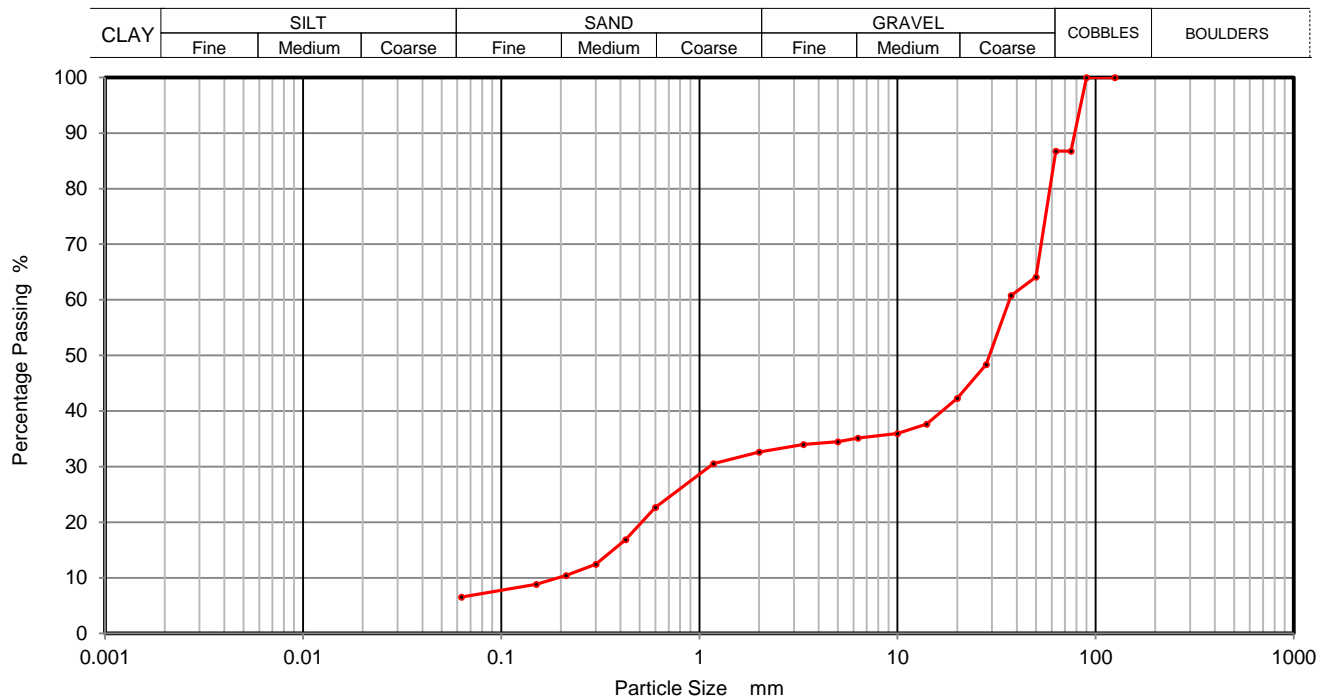
**0.20**

Depth Base

**1.30**

Sample Type

**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	87		
63	87		
50	64		
37.5	61		
28	48		
20	42		
14	38		
10	36		
6.3	35		
5	35		
3.35	34		
2	33		
1.18	31		
0.6	23		
0.425	17		
0.3	12		
0.212	10		
0.15	9		
0.063	7		

Sample Proportions	% dry mass
Cobbles	13
Gravel	54
Sand	26
Silt and Clay	7

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	



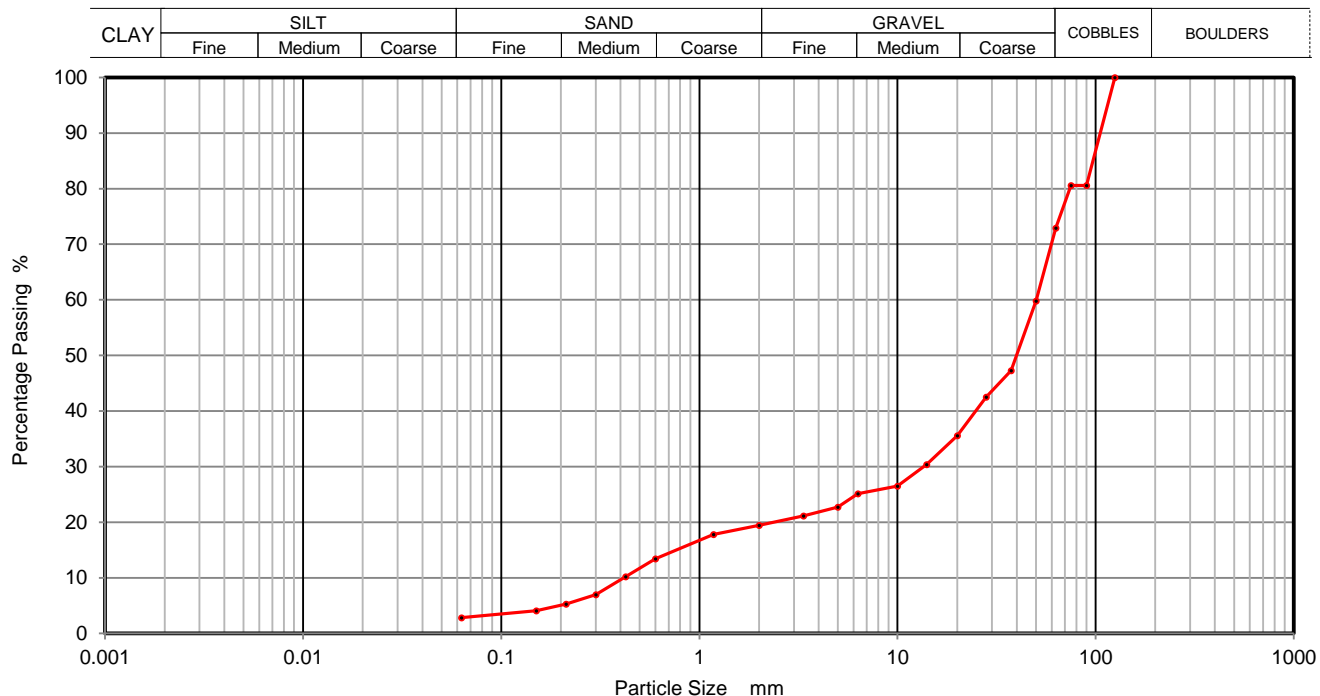


**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number **43788**

Borehole/Pit No. **TP01A**

Site Name	<b>Cwmcarn</b>	Sample No.	
Soil Description	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	<b>1.30</b>
		Depth Base	<b>2.00</b>
		Sample Type	<b>B</b>



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	81		
75	81		
63	73		
50	60		
37.5	47		
28	42		
20	36		
14	30		
10	27		
6.3	25		
5	23		
3.35	21		
2	19		
1.18	18		
0.6	13		
0.425	10		
0.3	7		
0.212	5		
0.15	4		
0.063	3		

Sample Proportions	% dry mass
Cobbles	27
Gravel	54
Sand	16
Silt and Clay	3

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION  
BS 1377 Part 2:1990  
Wet Sieve, Clause 9.2**

Contract Number **43788**

Borehole/Pit No. **TP02**

Site Name **Cwmcarn**

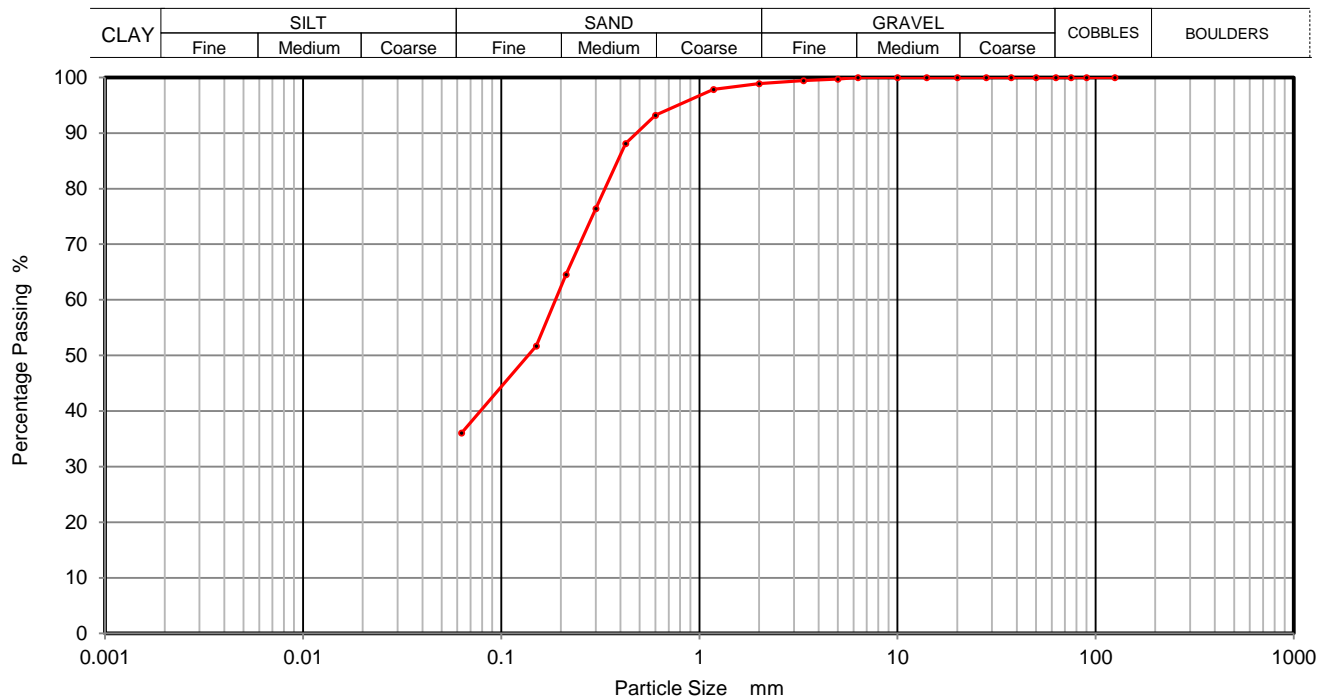
Sample No.

Soil Description  
Brown slightly fine gravelly silty/clayey fine to coarse SAND

Depth Top **0.30**

Depth Base **1.00**

Sample Type **B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	99		
1.18	98		
0.6	93		
0.425	88		
0.3	76		
0.212	65		
0.15	52		
0.063	36		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	63
Silt and Clay	36

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	06/05/2019	Ben Sharp	
RO/MH	Approved	07/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number

**43788**

Borehole/Pit No.

**TP02**

Site Name

**Cwmcarn**

Sample No.

Soil Description

Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL  
(with cobbles)

Depth Top

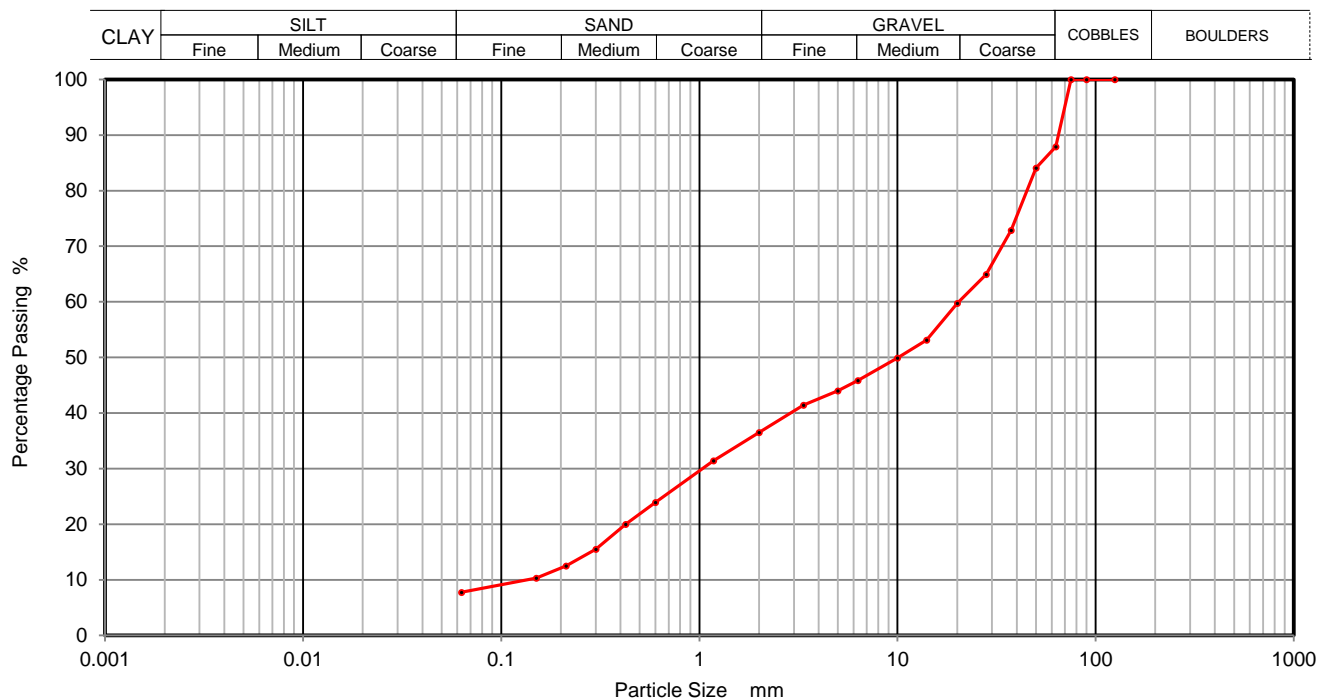
**1.00**

Depth Base

**1.50**

Sample Type

**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	88		
50	84		
37.5	73		
28	65		
20	60		
14	53		
10	50		
6.3	46		
5	44		
3.35	41		
2	37		
1.18	31		
0.6	24		
0.425	20		
0.3	16		
0.212	12		
0.15	10		
0.063	8		

Sample Proportions	% dry mass
Cobbles	12
Gravel	51
Sand	29
Silt and Clay	8

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	07/05/2019	Ben Sharp	
RO/MH	Approved	08/05/2019	Paul Evans	





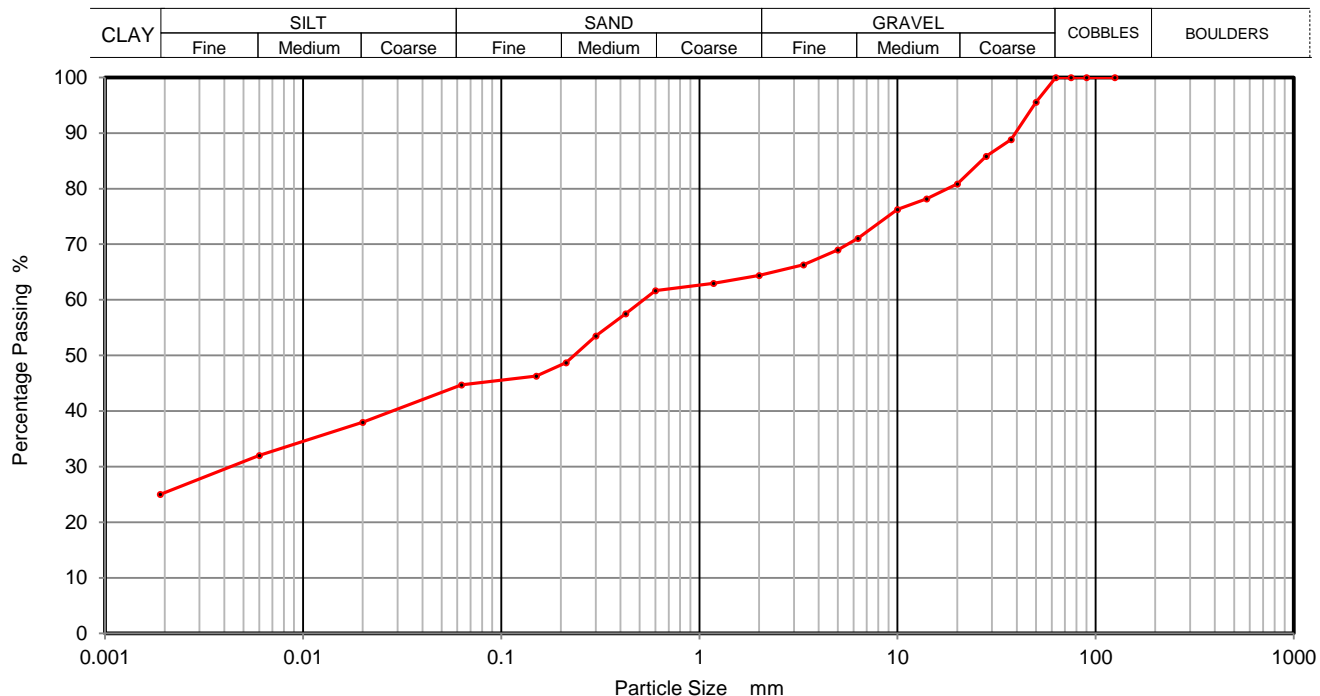


**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **43788**

Borehole/Pit No. **TP03**

Site Name	<b>Cwmccarn</b>	Sample No.	
Soil Description	Brown fine to coarse sandy silty clayey fine to coarse GRAVEL	Depth Top	<b>0.40</b>
		Depth Base	<b>0.90</b>
		Sample Type	<b>B</b>



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	38
90	100	0.0060	32
75	100	0.0020	25
63	100		
50	96		
37.5	89		
28	86		
20	81		
14	78		
10	76		
6.3	71		
5	69		
3.35	66		
2	64		
1.18	63		
0.6	62		
0.425	57		
0.3	54		
0.212	49		
0.15	46		
0.063	45		

Sample Proportions	% dry mass
Cobbles	0
Gravel	36
Sand	19
Silt	20
Clay	25

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	07/05/2019	Ben Sharp	
RO/MH	Approved	08/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number

**43788**

Borehole/Pit No.

**TP03**

Site Name

**Cwmcarn**

Sample No.

Soil Description

Brown fine to coarse sandy SILT/CLAY

Depth Top

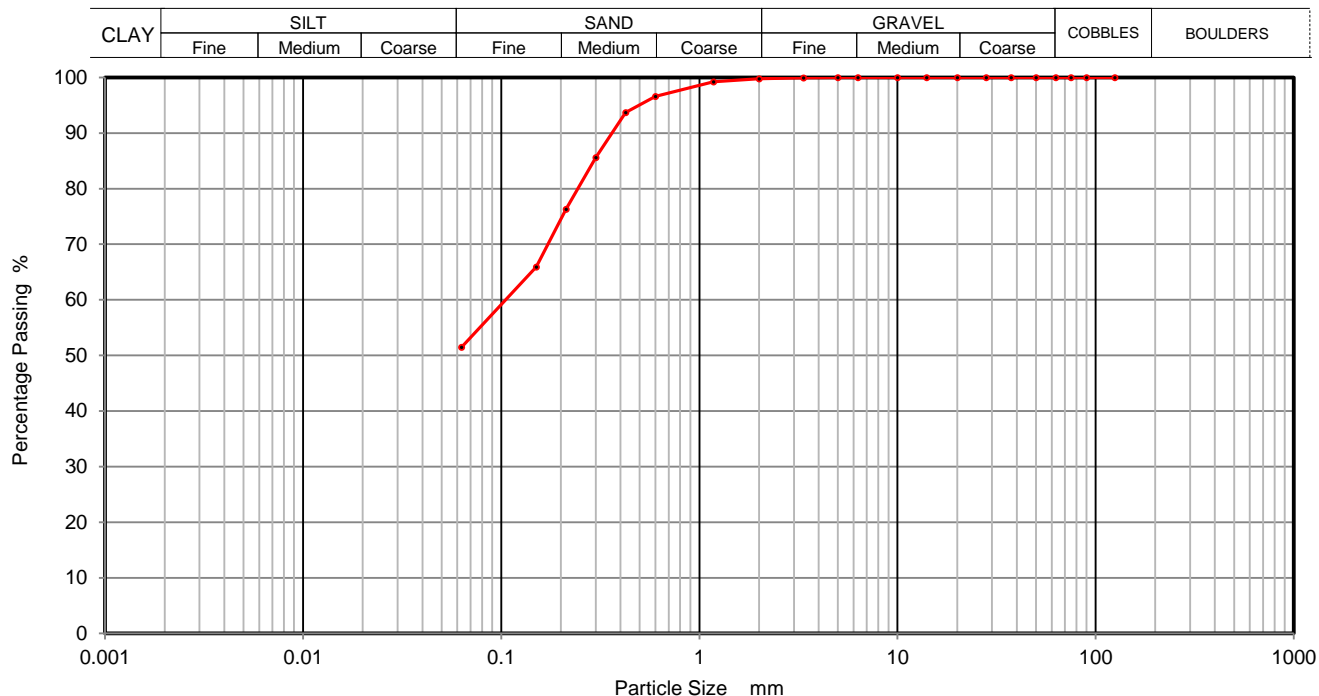
**0.90**

Depth Base

**1.70**

Sample Type

**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	97		
0.425	94		
0.3	86		
0.212	76		
0.15	66		
0.063	51		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	49
Silt and Clay	51

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	07/05/2019	Ben Sharp	
RO/MH	Approved	08/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number

**43788**

Borehole/Pit No.

**TP04**

Site Name

**Cwmcarn**

Sample No.

Soil Description

Brown slightly fine to medium gravelly clayey/silty fine to coarse  
SAND

Depth Top

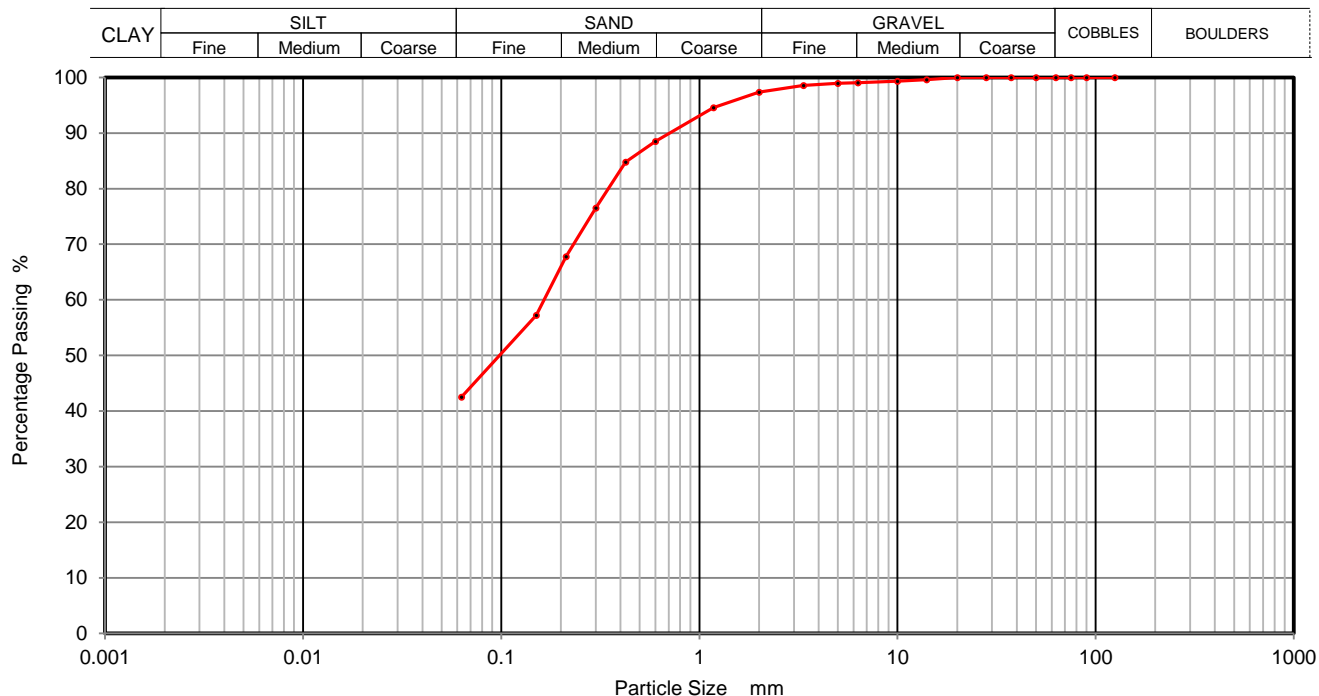
**0.40**

Depth Base

**1.20**

Sample Type

**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	99		
5	99		
3.35	99		
2	97		
1.18	95		
0.6	89		
0.425	85		
0.3	77		
0.212	68		
0.15	57		
0.063	43		

Sample Proportions	% dry mass
Cobbles	0
Gravel	3
Sand	54
Silt and Clay	43

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	07/05/2019	Ben Sharp	
RO/MH	Approved	08/05/2019	Paul Evans	





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number **43788**

Borehole/Pit No. **TP04**

Site Name **Cwmcarn**

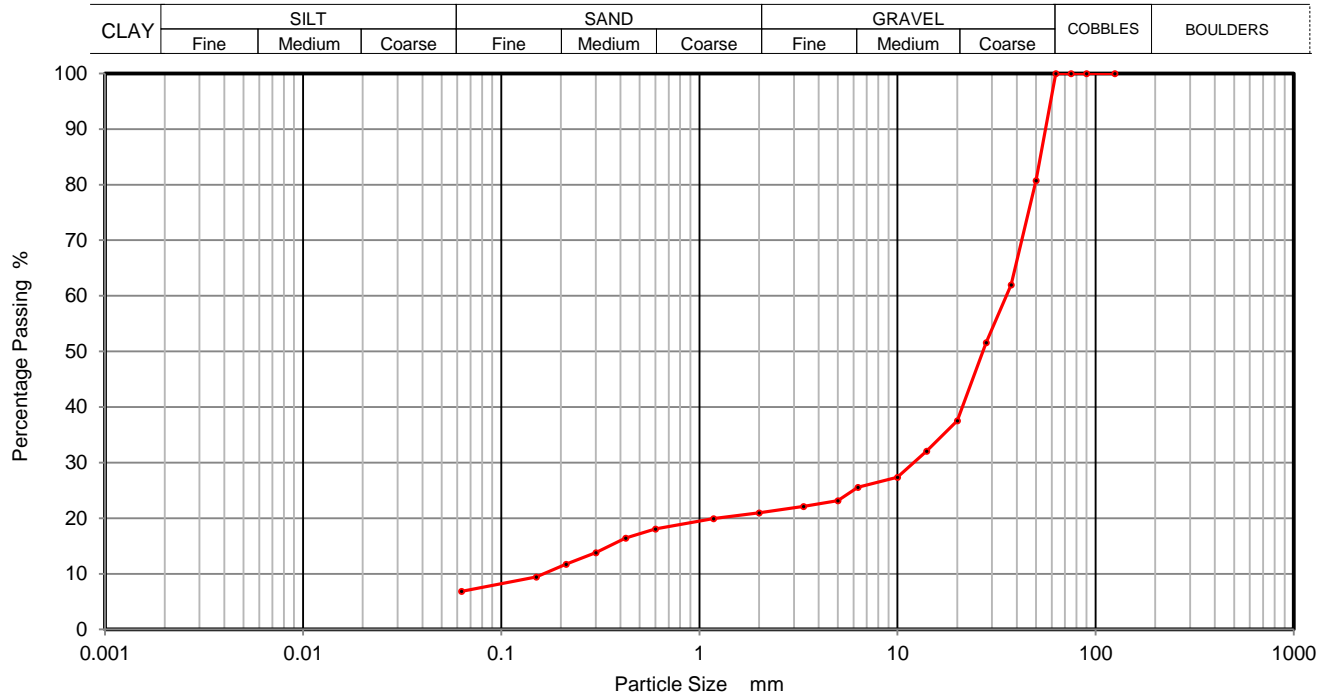
Sample No.

Soil Description **Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL**

Depth Top **1.20**

Depth Base **1.90**

Sample Type **B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	81		
37.5	62		
28	52		
20	38		
14	32		
10	27		
6.3	26		
5	23		
3.35	22		
2	21		
1.18	20		
0.6	18		
0.425	16		
0.3	14		
0.212	12		
0.15	9		
0.063	7		

Sample Proportions	% dry mass
Cobbles	0
Gravel	79
Sand	14
Silt and Clay	7

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	07/05/2019	Ben Sharp	
RO/MH	Approved	08/05/2019	Paul Evans	



<b>GSTL</b>	<b>Certificate of Chemical Analysis (BRE BR 279)</b>	<b>Contract Number</b>	43788
		<b>Client Reference</b>	A110489-4
<b>Client</b>	WYG	<b>Date Received</b>	
<b>Site Name</b>	Cwmcam	<b>Date Started</b>	24/04/2019
		<b>Date Completed</b>	08/05/2019
		<b>No. of Samples</b>	19

Hole Number	Sample Number	Sample Type	Depth (m)			Acid Soluble Sulphate	Aqueous Extract Sulphate	Chloride Content	Ph Value	Total Sulphur	Magnesium	Nitrate
BH01		B	0.70	-	1.00	0.25	0.03		8.25	0.11		
BH01		B	1.00	-	1.50	0.21	0.03		8.21	0.09		
BH01		B	2.00	-	2.20	0.25	0.03		8.18	0.11		
BH01		B	5.00	-	5.40	0.27	0.03		8.00	0.11		
BH02		B	0.40	-	0.80	0.33	0.04		7.93	0.14		
BH02		B	1.00	-	1.50	0.47	0.03		8.05	0.18		
BH02		B	2.00	-	2.50	0.33	0.04		8.12	0.14		
BH03A		B	0.30	-	0.80	0.19	0.03		8.10	0.08		
BH03A		B	1.00	-	1.20	0.14	0.04		8.06	0.07		
BH03A		B	3.00	-	3.50	0.23	0.04		7.96	0.10		
BH03A		B	6.00	-		0.31	0.04		7.82	0.13		
TP01A		B	0.20	-	1.30	0.29	0.03		7.75	0.12		
TP01A		B	1.30	-	2.00	0.27	0.03		7.82	0.11		
TP02		B	0.30	-	1.00	0.31	0.03		7.94	0.13		
TP02		B	1.00	-	1.50	0.27	0.03		7.89	0.11		
TP03		B	0.40	-	0.90	0.31	0.04		7.67	0.13		
TP03		B	0.90	-	1.70	0.31	0.03		7.70	0.13		
TP04		B	0.40	-	1.20	0.29	0.03		7.59	0.12		
TP04		B	1.20	-	1.90	0.29	0.03		7.68	0.12		
				-								
				-								
				-								
				-								
				-								
				-								
				-								
				-								
				-								
				-								
				-								
				-								
				-								
				-								


**Key**

**Reported As**

Acid Soluble Sulphate	% SO <sub>4</sub>
Aqueous Extract Sulphate	g/l SO <sub>4</sub>
Chloride Content (Semi)	mg Cl/l
PH Value	@ 25°
Total Sulphur	% S
Magnesium	g/l SO <sub>4</sub>
Nitrate	NO <sub>3</sub> mg/l

**Remarks**

NCP = No Chloride Present

Test Operator	Checked and Authorised by		Ben Sharp	
Darren Bourne	Date	08/05/2019		

Site Name

Cwmcarn

Sample No

Soil Description

Brown silty clayey fine to coarse sandy fine to coarse GRAVEL

Depth Top

0.70

Compaction Method

2.5 Kg Rammer

Depth Base

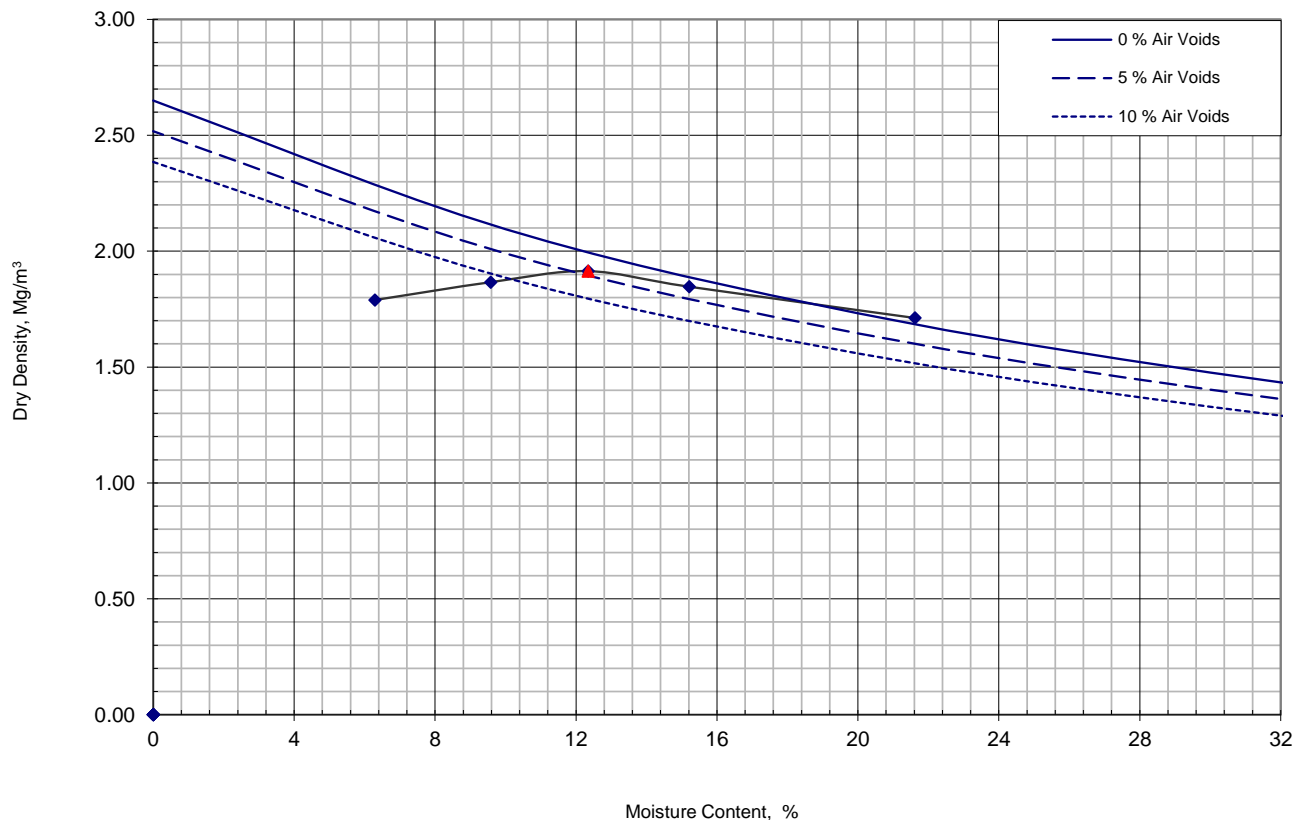
1.00

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5						
Moisture Content	6.3	9.6	12	15	22						
Bulk Density	1.90	2.05	2.15	2.13	2.08						
Dry Density	1.79	1.87	1.91	1.85	1.71						

Initial Moisture Content	22	%
Maximum Dry Density	1.91	Mg/m3
Optimum Moisture Content	12	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	35	%
Material Retained 20mm	9	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans



Site Name

Cwmcarn

Sample No

Soil Description

Brown silty fine to coarse gravelly clayey fine to coarse SAND

Depth Top

1.00

Compaction Method

2.5 Kg Rammer

Depth Base

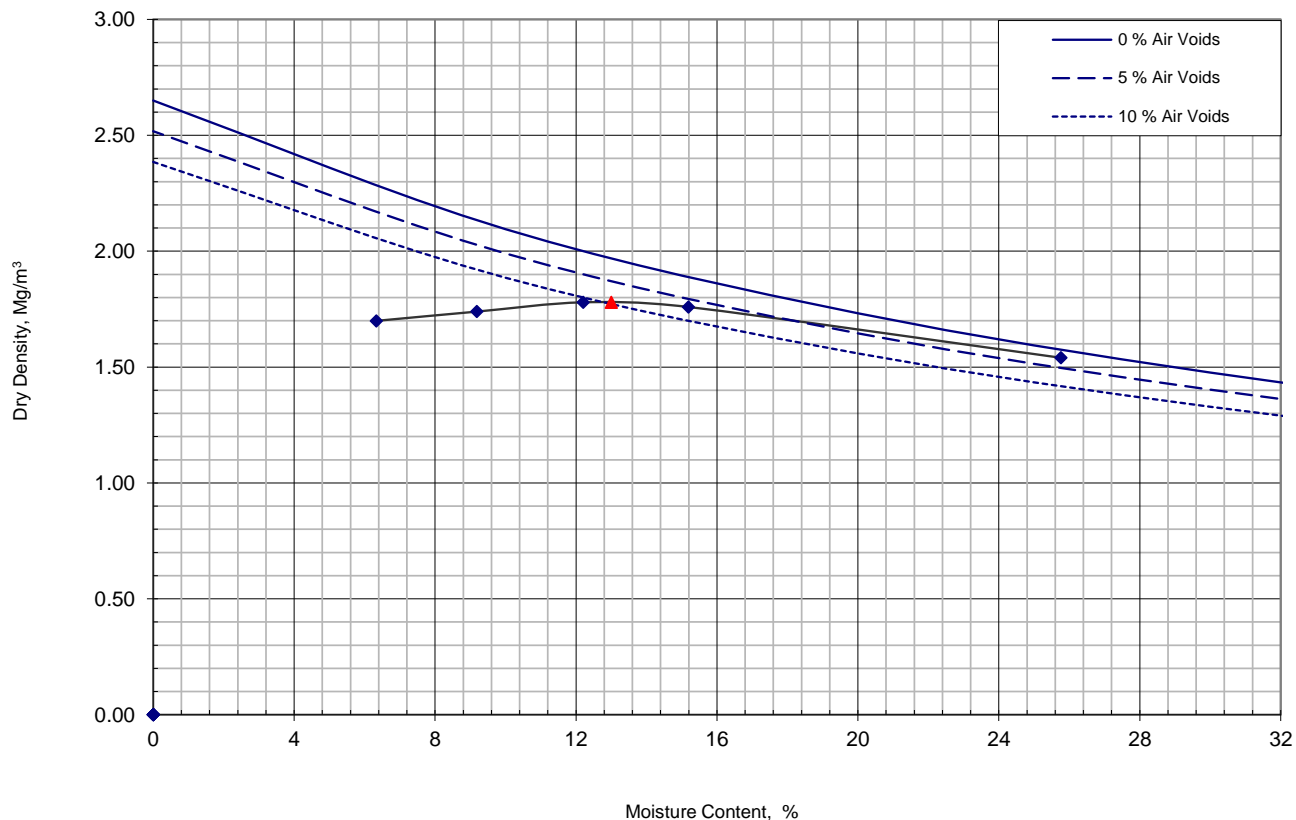
1.50

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	6.3	9.2	12	15	26							
Bulk Density	1.81	1.90	2.00	2.03	1.94							
Dry Density	1.70	1.74	1.78	1.76	1.54							

Initial Moisture Content	26	%
Maximum Dry Density	1.78	Mg/m3
Optimum Moisture Content	13	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	12	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans

Site Name

Cwmcarn

Sample No

Soil Description

Brown clayey silty fine to coarse sandy fine to coarse GRAVEL

Depth Top

0.30

Compaction Method

2.5 Kg Rammer

Depth Base

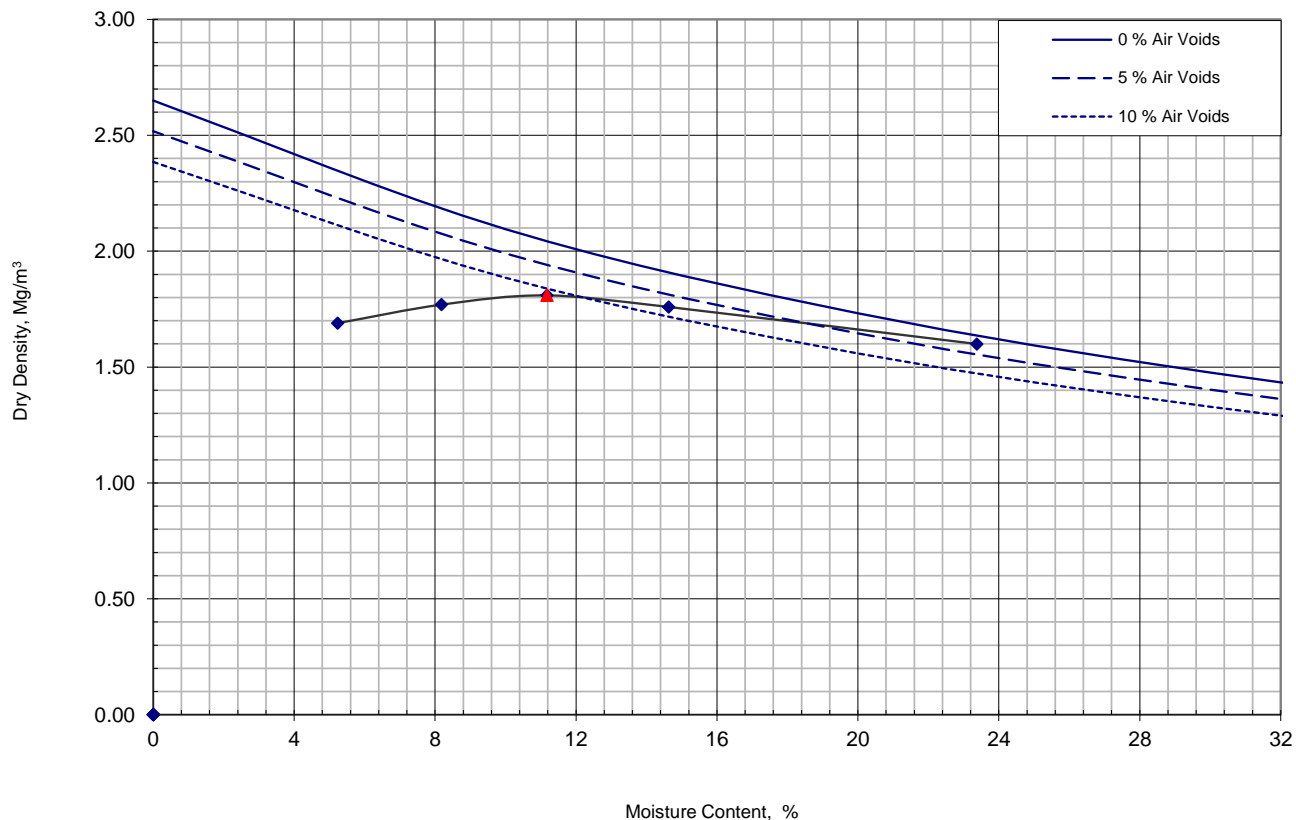
0.80

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	5.2	8.2	11	15	23							
Bulk Density	1.78	1.91	2.01	2.02	1.97							
Dry Density	1.69	1.77	1.81	1.76	1.60							

Initial Moisture Content	23	%
Maximum Dry Density	1.81	Mg/m3
Optimum Moisture Content	11	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	28	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans

Site Name

Cwmcarn

Sample No

Soil Description

Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL

Depth Top

1.00

Compaction Method

2.5 Kg Rammer

Depth Base

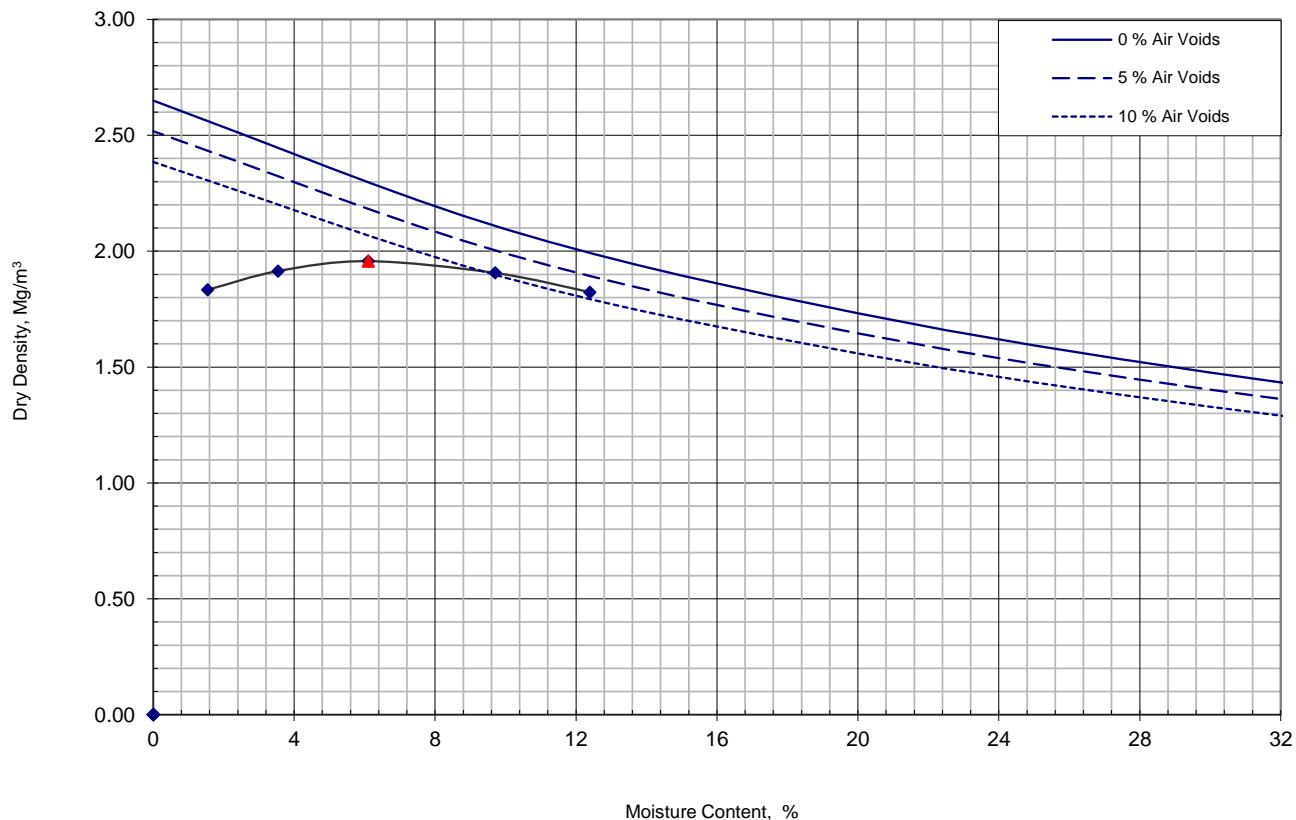
1.20

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	1.5	3.5	6.1	9.7	12							
Bulk Density	1.86	1.98	2.08	2.09	2.05							
Dry Density	1.83	1.91	1.96	1.91	1.82							

Initial Moisture Content	9.7	%
Maximum Dry Density	1.96	Mg/m3
Optimum Moisture Content	6	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	35	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans

Site Name Cwmcarn

Sample No

Soil Description Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (with cobbles)

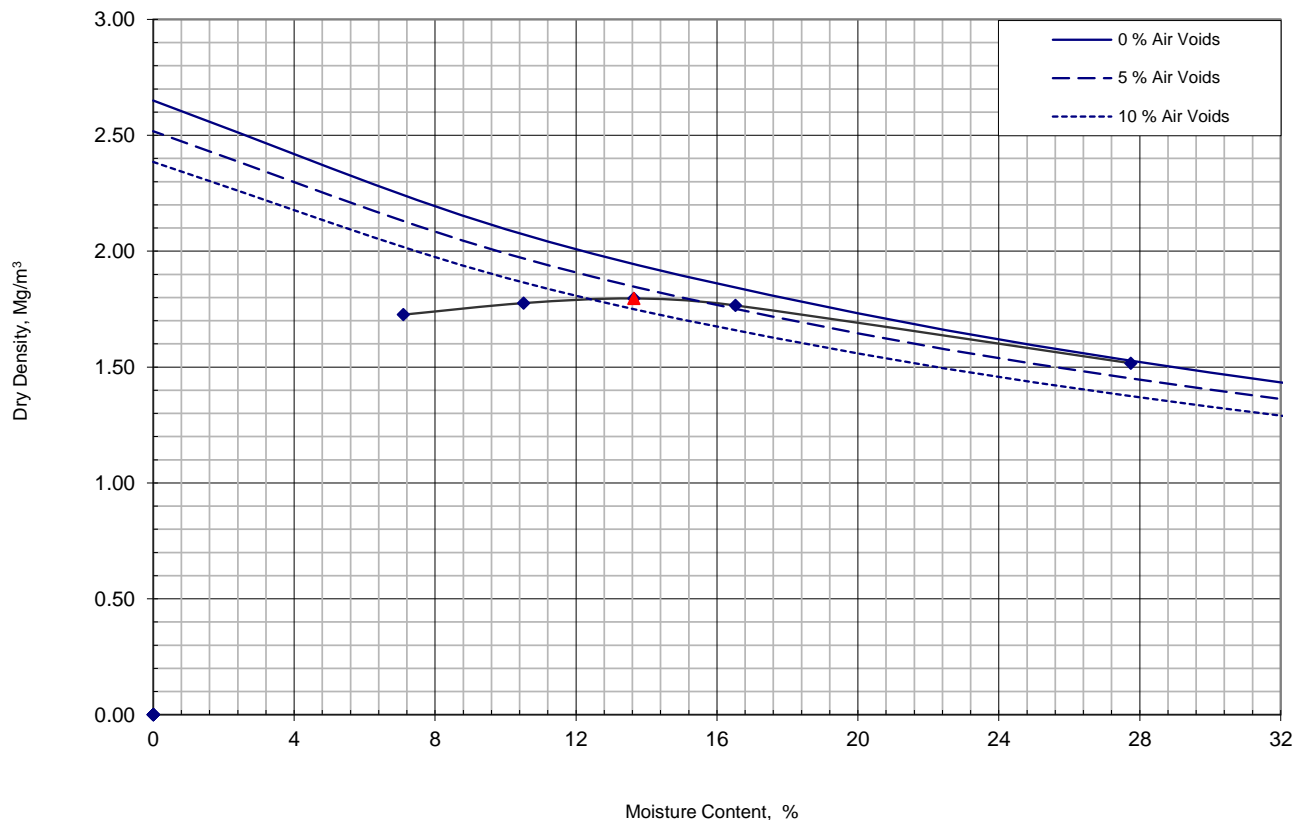
Depth Top 0.20

Compaction Method 2.5 Kg Rammer

Depth Base 1.30

Compaction Clause BS1377:Part 4:1990, Clause 3.3

Sample Type B



Compaction Point	1	2	3	4	5							
Moisture Content	7.1	11	14	17	28							
Bulk Density	1.85	1.96	2.04	2.06	1.94							
Dry Density	1.73	1.78	1.80	1.77	1.52							

Initial Moisture Content	28	%
Maximum Dry Density	1.80	Mg/m3
Optimum Moisture Content	14	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	41	%
Material Retained 20mm	19	%

Operators	Checked	07/05/2019	Ben Sharp	
CA	Approved	08/05/2019	Paul Evans	

Site Name

Cwmcarn

Sample No

Soil Description

Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (with cobbles)

Depth Top

1.30

Compaction Method

2.5 Kg Rammer

Depth Base

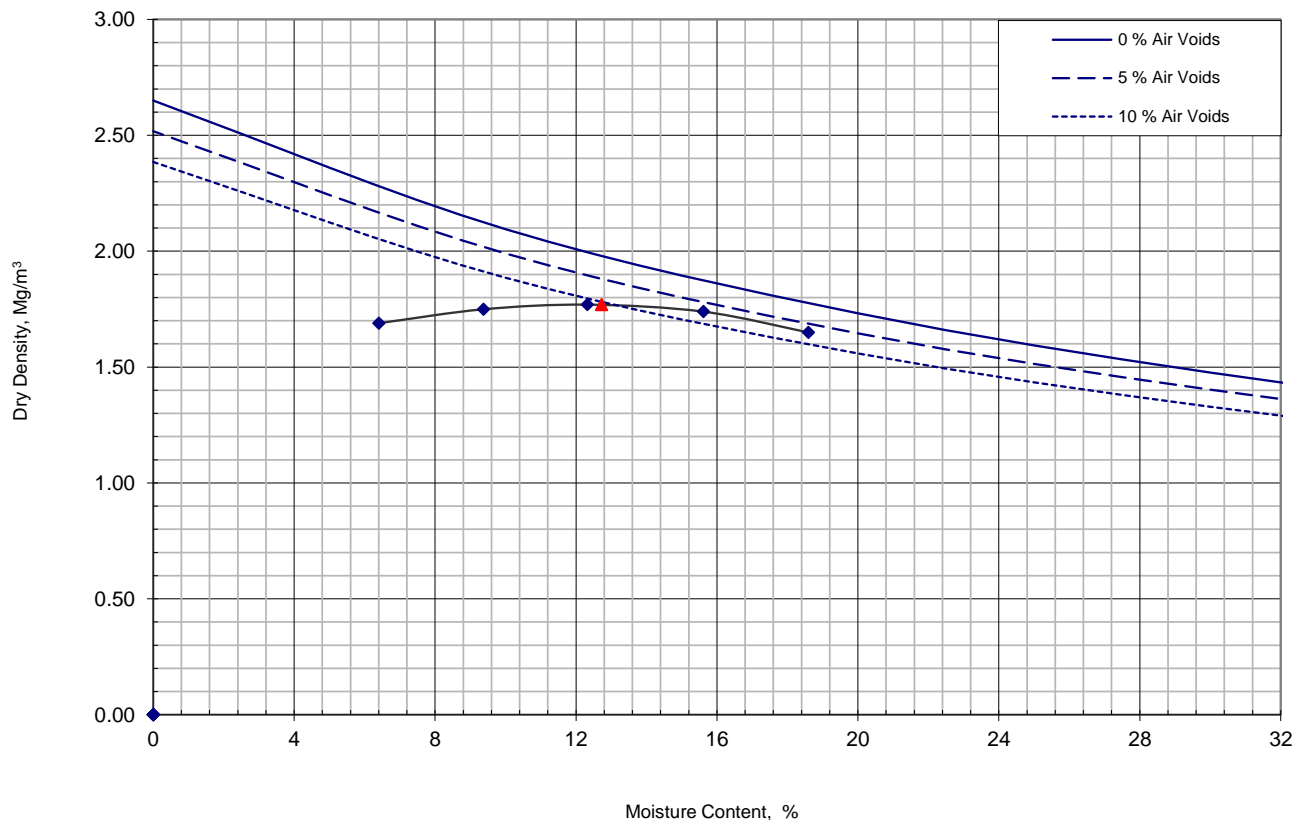
2.00

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	6.4	9.4	12	16	19							
Bulk Density	1.80	1.91	1.99	2.01	1.96							
Dry Density	1.69	1.75	1.77	1.74	1.65							

Initial Moisture Content	16	%
Maximum Dry Density	1.77	Mg/m3
Optimum Moisture Content	13	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	53	%
Material Retained 20mm	17	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans

Site Name

Cwmcarn

Sample No

Soil Description

Brown slightly fine gravelly silty/clayey fine to coarse SAND

Depth Top

0.30

Compaction Method

2.5 Kg Rammer

Depth Base

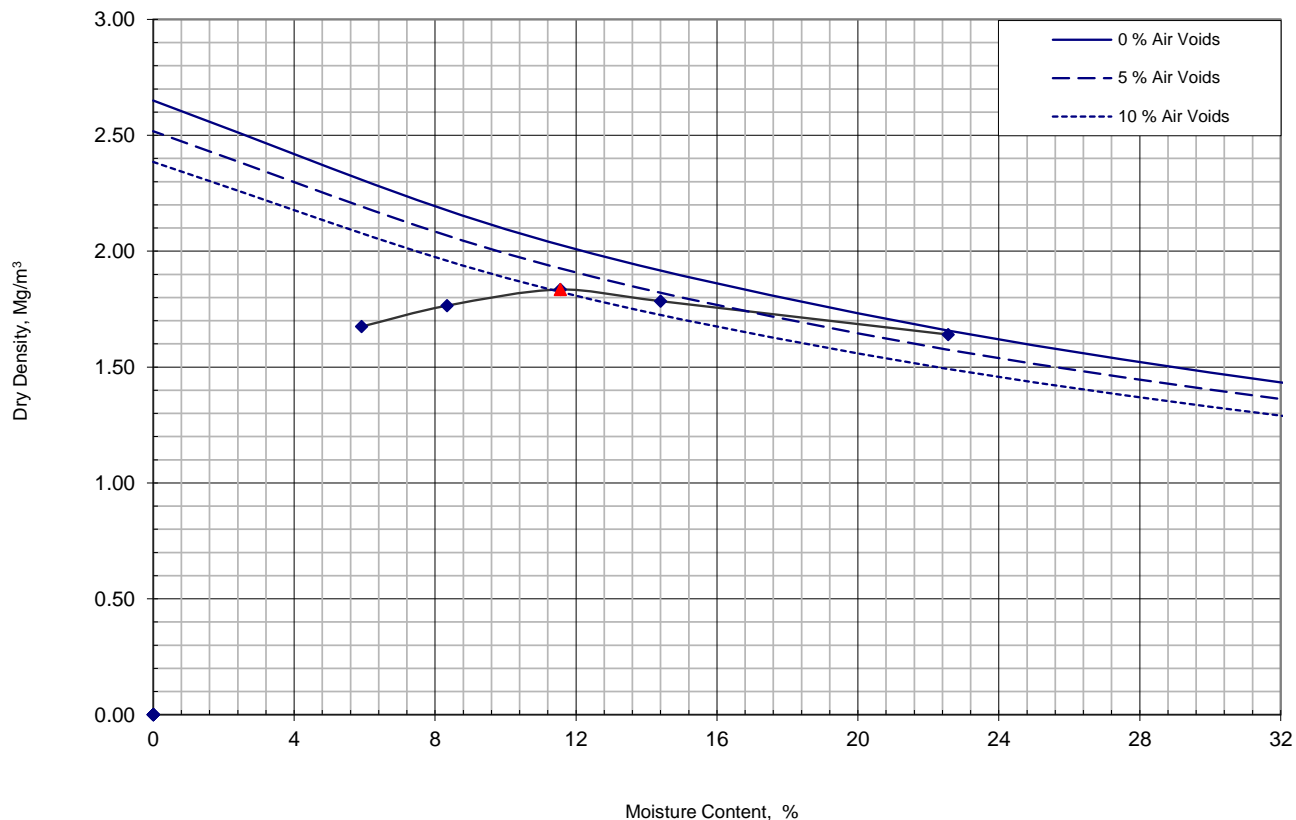
1.00

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	5.9	8.3	12	14	23							
Bulk Density	1.77	1.91	2.05	2.04	2.01							
Dry Density	1.67	1.76	1.83	1.78	1.64							

Initial Moisture Content	23	%
Maximum Dry Density	1.83	Mg/m3
Optimum Moisture Content	12	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans



Site Name

Cwmcarn

Sample No

Soil Description

Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (with cobbles)

Depth Top

1.00

Compaction Method

2.5 Kg Rammer

Depth Base

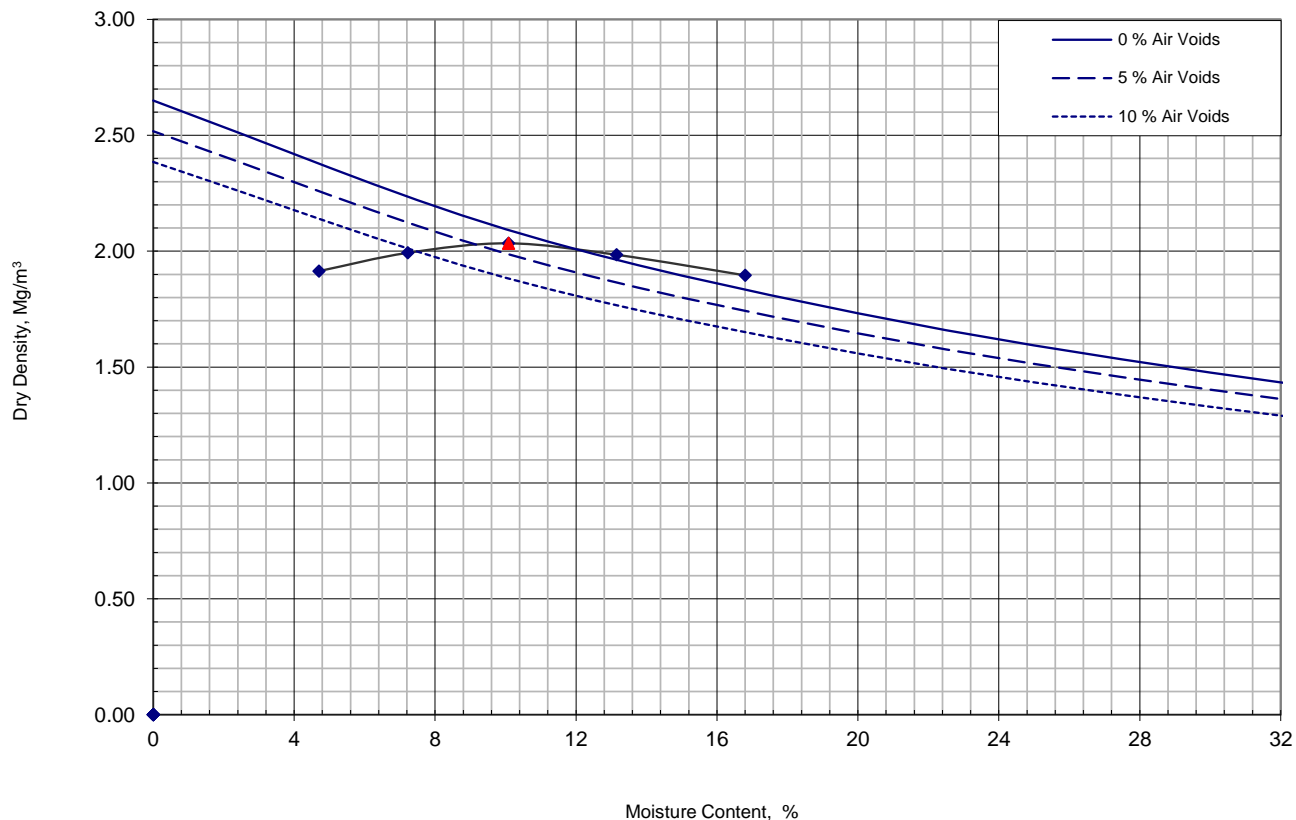
1.50

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	4.7	7.2	10	13	17							
Bulk Density	2.00	2.14	2.24	2.25	2.21							
Dry Density	1.91	1.99	2.03	1.98	1.90							

Initial Moisture Content	17	%
Maximum Dry Density	2.03	Mg/m3
Optimum Moisture Content	10	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	27	%
Material Retained 20mm	13	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans

Site Name

Cwmcarn

Sample No

Soil Description

Brown fine to coarse sandy silty clayey fine to coarse GRAVEL

Depth Top

0.40

Compaction Method

2.5 Kg Rammer

Depth Base

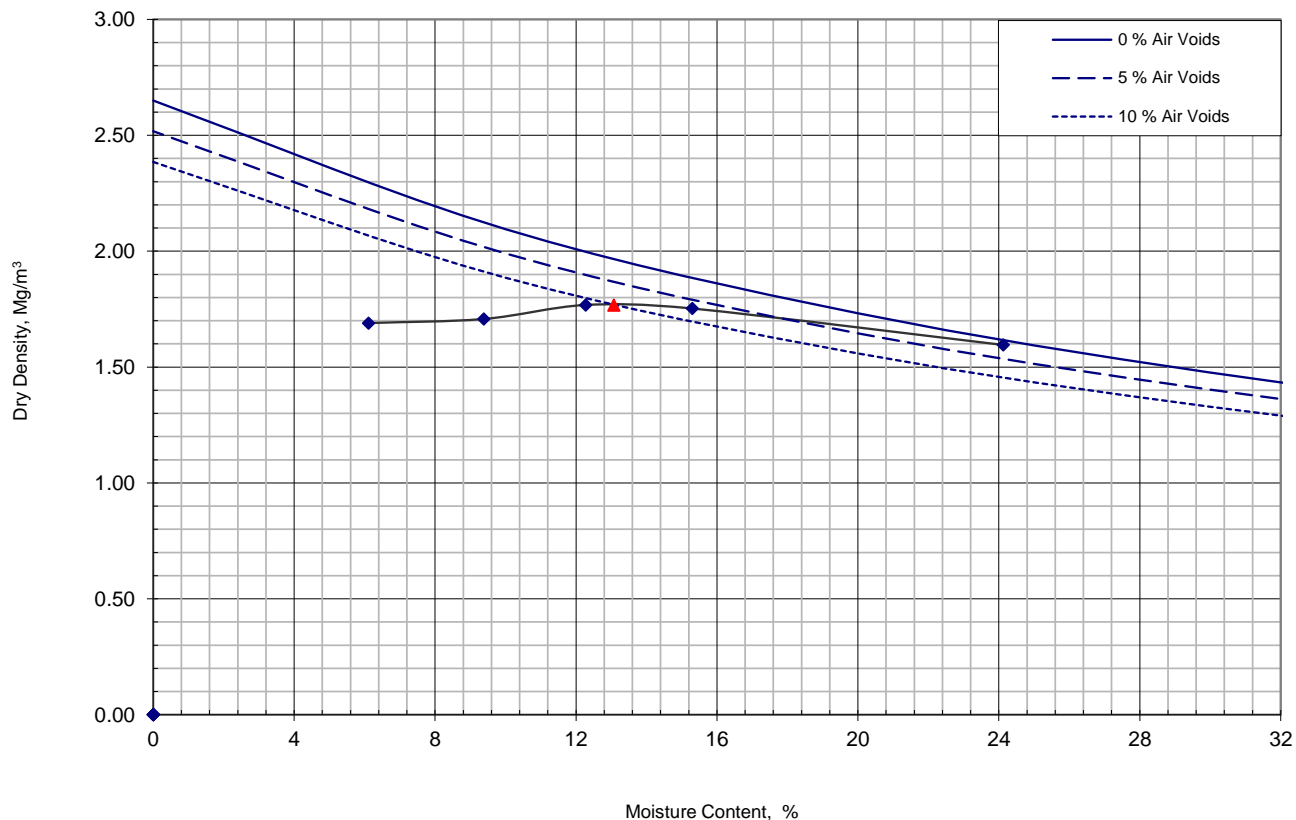
0.90

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	6.1	9.4	12	15	24							
Bulk Density	1.79	1.87	1.98	2.02	1.98							
Dry Density	1.69	1.71	1.77	1.75	1.60							

Initial Moisture Content	24	%
Maximum Dry Density	1.77	Mg/m3
Optimum Moisture Content	13	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	11	%
Material Retained 20mm	8	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans

Site Name Cwmcarn

Sample No

Soil Description Brown fine to coarse sandy SILT/CLAY

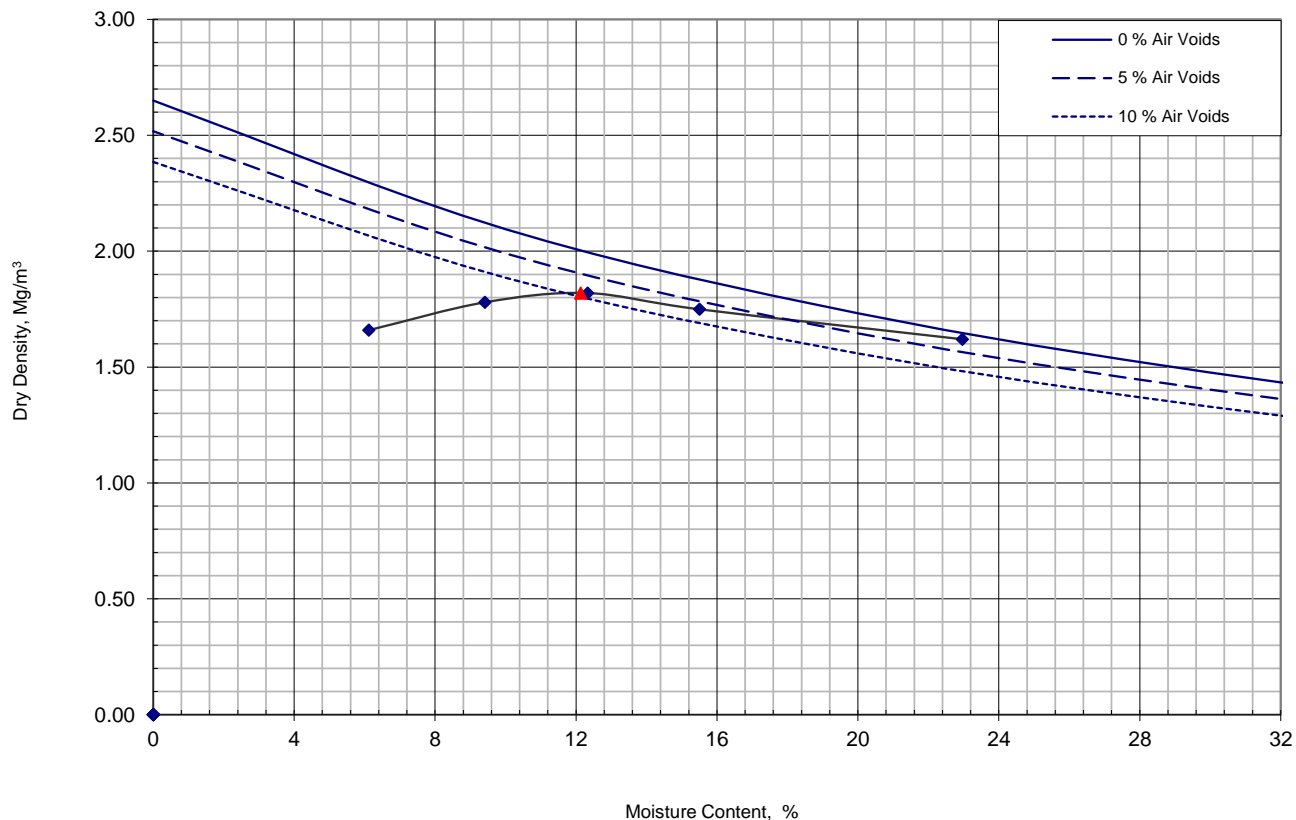
Depth Top 0.90

Compaction Method 2.5 Kg Rammer

Depth Base 1.70

Compaction Clause BS1377:Part 4:1990, Clause 3.3

Sample Type B



Compaction Point	1	2	3	4	5							
Moisture Content	6.1	9.4	12	16	23							
Bulk Density	1.76	1.95	2.04	2.02	1.99							
Dry Density	1.66	1.78	1.82	1.75	1.62							

Initial Moisture Content	23	%
Maximum Dry Density	1.82	Mg/m3
Optimum Moisture Content	12	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators Checked 07/05/2019 Ben Sharp

CA Approved 08/05/2019 Paul Evans

Site Name

Cwmcarn

Sample No

Soil Description

Brown slightly fine to medium gravelly clayey/silty fine to coarse SAND

Depth Top

0.40

Compaction Method

2.5 Kg Rammer

Depth Base

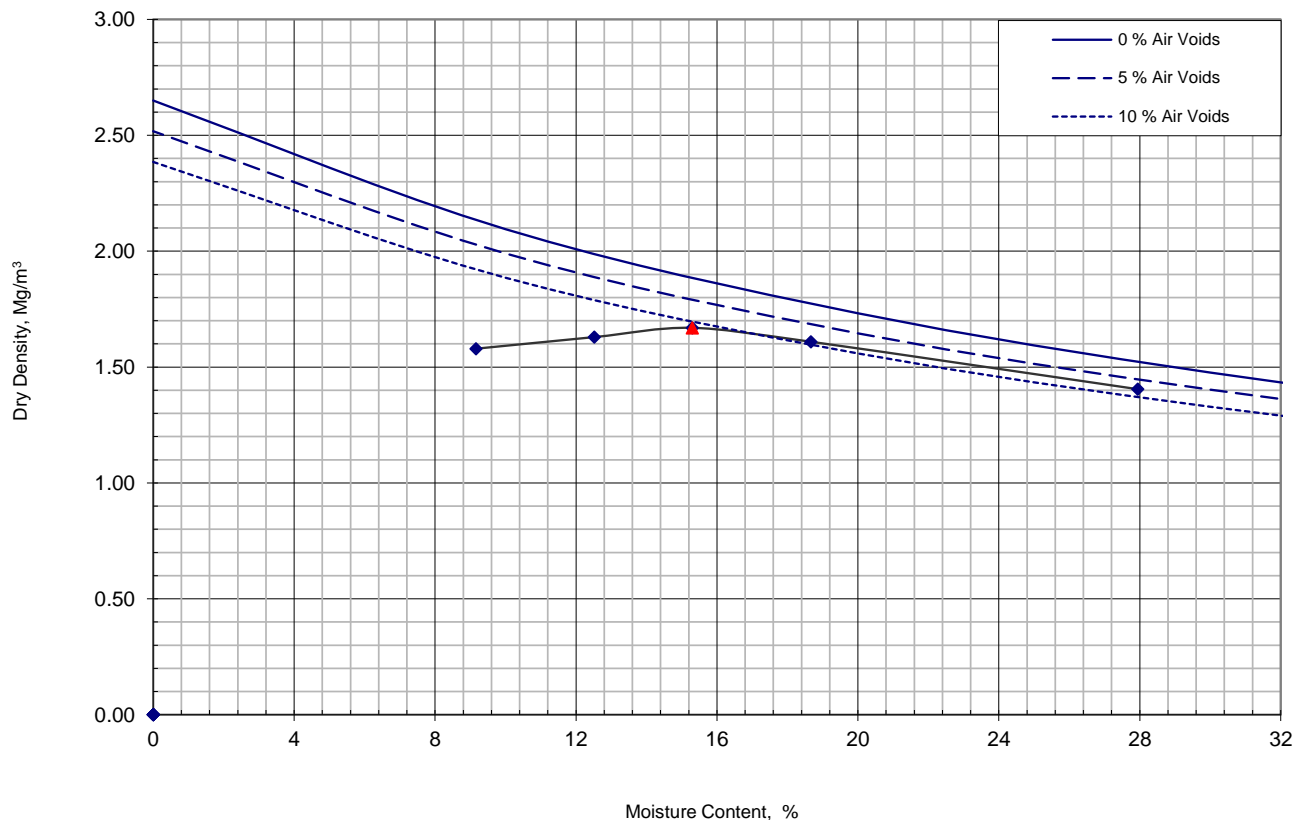
1.20

Compaction Clause

BS1377:Part 4:1990, Clause 3.3

Sample Type

B



Compaction Point	1	2	3	4	5							
Moisture Content	9.2	13	15	19	28							
Bulk Density	1.72	1.83	1.92	1.91	1.80							
Dry Density	1.58	1.63	1.67	1.61	1.40							

Initial Moisture Content	28	%
Maximum Dry Density	1.67	Mg/m3
Optimum Moisture Content	15	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators

Checked

07/05/2019

Ben Sharp

CA

Approved

08/05/2019

Paul Evans

Site Name Cwmcarn

Sample No

Soil Description Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL

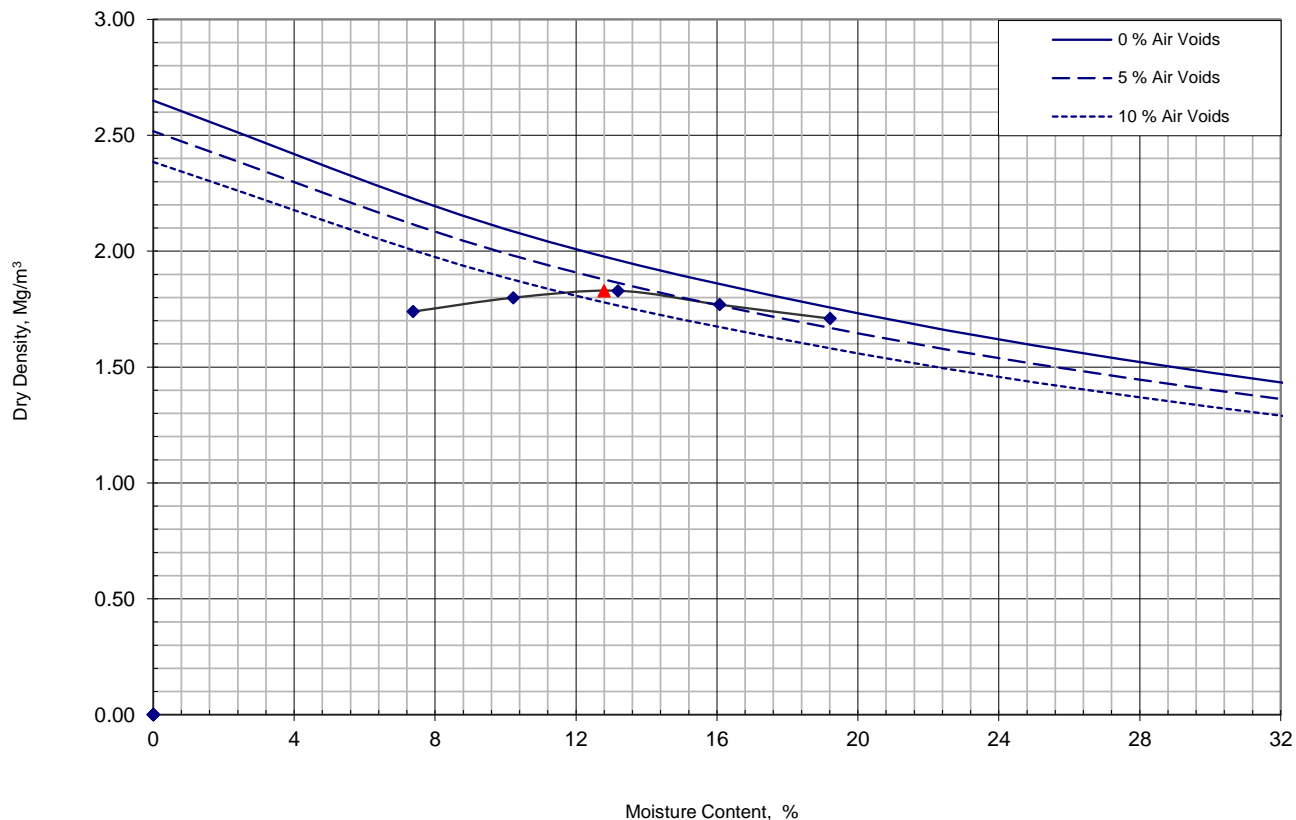
Depth Top 1.20

Compaction Method 2.5 Kg Rammer

Depth Base 1.90

Compaction Clause BS1377:Part 4:1990, Clause 3.3

Sample Type B



Compaction Point	1	2	3	4	5							
Moisture Content	7.4	10	13	16	19							
Bulk Density	1.87	1.98	2.07	2.05	2.04							
Dry Density	1.74	1.80	1.83	1.77	1.71							

Initial Moisture Content	19	%
Maximum Dry Density	1.83	Mg/m3
Optimum Moisture Content	13	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	38	%
Material Retained 20mm	24	%

Operators	Checked	07/05/2019	Ben Sharp	
CA	Approved	08/05/2019	Paul Evans	



## Contract Number: 46882

Client Ref: **Cwmcarn**

Report Date: **21-01-2020**

Client PO:

Client **WYG Group**  
**Arndale Court**  
**Headingley**  
**Leeds**  
**LS6 2UJ**

Contract Title: **Cwmcarn School**  
For the attention of: **Nicholas Bool**

Date Received: **03-12-2019**

Date Completed: **21-01-2020**

Test Description	Qty
<b>Moisture Content</b> BS 1377:1990 - Part 2 : 3.2 - * UKAS	8
<b>4 Point Liquid &amp; Plastic Limit</b> BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	8
<b>PSD Wet Sieve method</b> BS 1377:1990 - Part 2 : 9.2 - * UKAS	13
<b>PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected)</b> BS 1377:1990 - Part 2 : 9.4 - * UKAS	8
<b>BRE Suite C Brownfield Site (pyrite absent)</b> <b>includes pH, water soluble sulphate, magnesium, chloride and nitrate</b> BRE - BR279 - @ Non Accredited Test	5
<b>One-dimensional Consolidation 75mm or 50mm diameter specimens (5 days)</b> BS 1377:1990 - Part 5 : 3 - * UKAS	6

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 certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

#### Approved Signatories:

Emma Sharp (Office Manager) - Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager)

Sean Penn (Administrative/Accounts Assistant) - Shaun Jones (Laboratory manager) - Wayne Honey (Administrative/Quality Assistant)



# Laboratory Report



GEO Site & Testing Services Ltd

## Contract Number: 46882

Test Description	Qty
<b>Quick Undrained Triaxial Compression Test - Multi-stage Loading of a single specimen (100mm diameter)</b> BS 1377:1990 - Part 7 : 9 - * UKAS	2
<b>Disposal of samples for job</b>	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 certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

**Approved Signatories:**

Emma Sharp (Office Manager) - Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager)

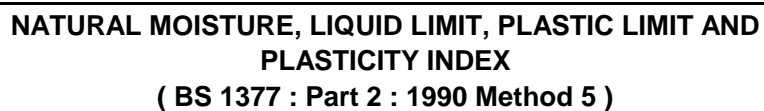
Sean Penn (Administrative/Accounts Assistant) - Shaun Jones (Laboratory manager) - Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd

Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk



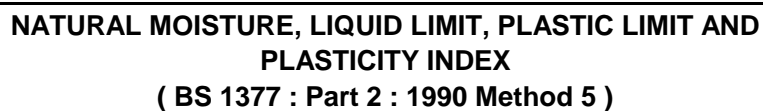


Contract Number	46882	
Site Name	Cwmcarn School	
Date Tested	15/01/2020	
	DESCRIPTIONS	

[illegible]

Operators	Checked	21/01/2020	Wayne Honey (Administrative/Quality Assistant)
Clayton Jenkins	Approved	21/01/2020	Paul Evans (Quality/Technical Manager)







**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **46882**

Borehole/Pit No. **BH101**

Site Name **Cwmcairn School**

Sample No.

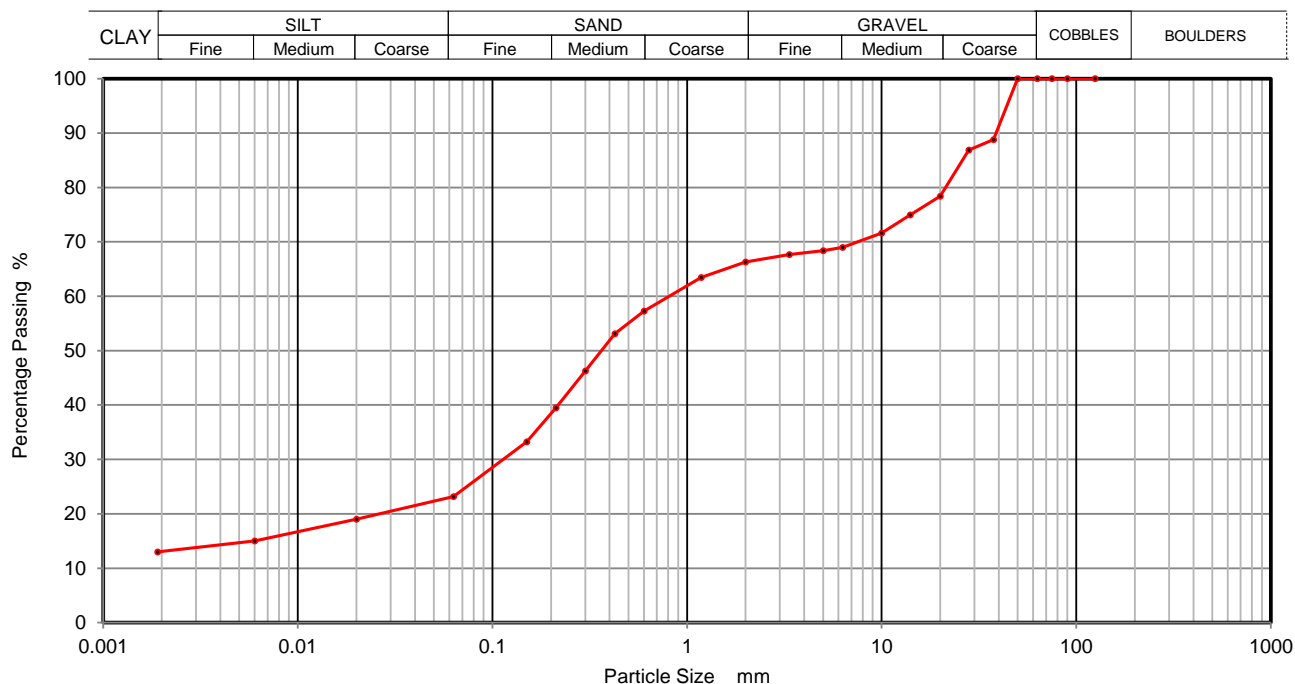
Soil Description **Brown silty clayey fine to coarse gravel fine to coarse SAND**

Depth Top **0.30**

Depth Base **0.50**

Date Tested **10/01/2020**

Sample Type **B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	19
90	100	0.0060	15
75	100	0.0020	13
63	100		
50	100		
37.5	89		
28	87		
20	78		
14	75		
10	72		
6.3	69		
5	68		
3.35	68		
2	66		
1.18	63		
0.6	57		
0.425	53		
0.3	46		
0.212	39		
0.15	33		
0.063	23		

Sample Proportions	% dry mass
Cobbles	0
Gravel	34
Sand	43
Silt	10
Clay	13

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>



2788



**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **46882**  
Borehole/Pit No. **BH101A**

Site Name **Cwmcarn School**

Sample No.

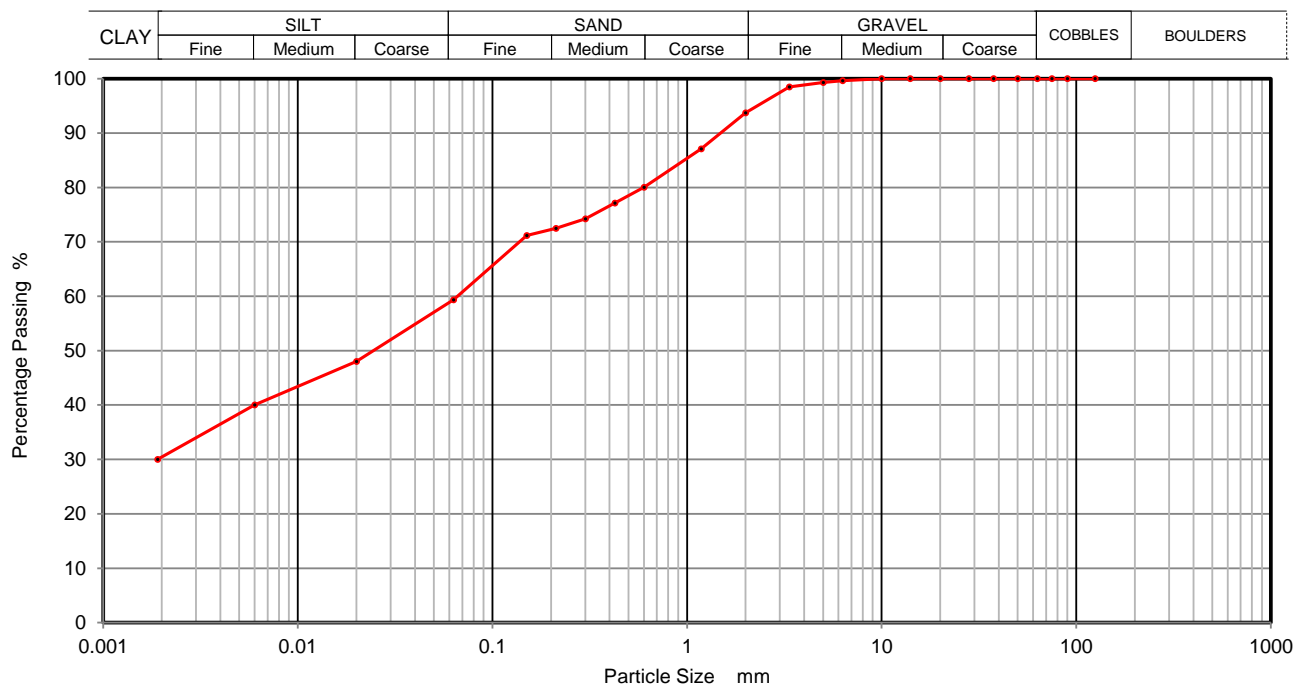
Soil Description **Grey/ brown slightly fine gravelly silty clayey fine to coarse SAND**

Depth Top **3.20**

Depth Base **3.60**

Date Tested **10/01/2020**

Sample Type **UT**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	48
90	100	0.0060	40
75	100	0.0020	30
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	98		
2	94		
1.18	87		
0.6	80		
0.425	77		
0.3	74		
0.212	72		
0.15	71		
0.063	59		

Sample Proportions	% dry mass
Cobbles	0
Gravel	6
Sand	35
Silt	29
Clay	30

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>

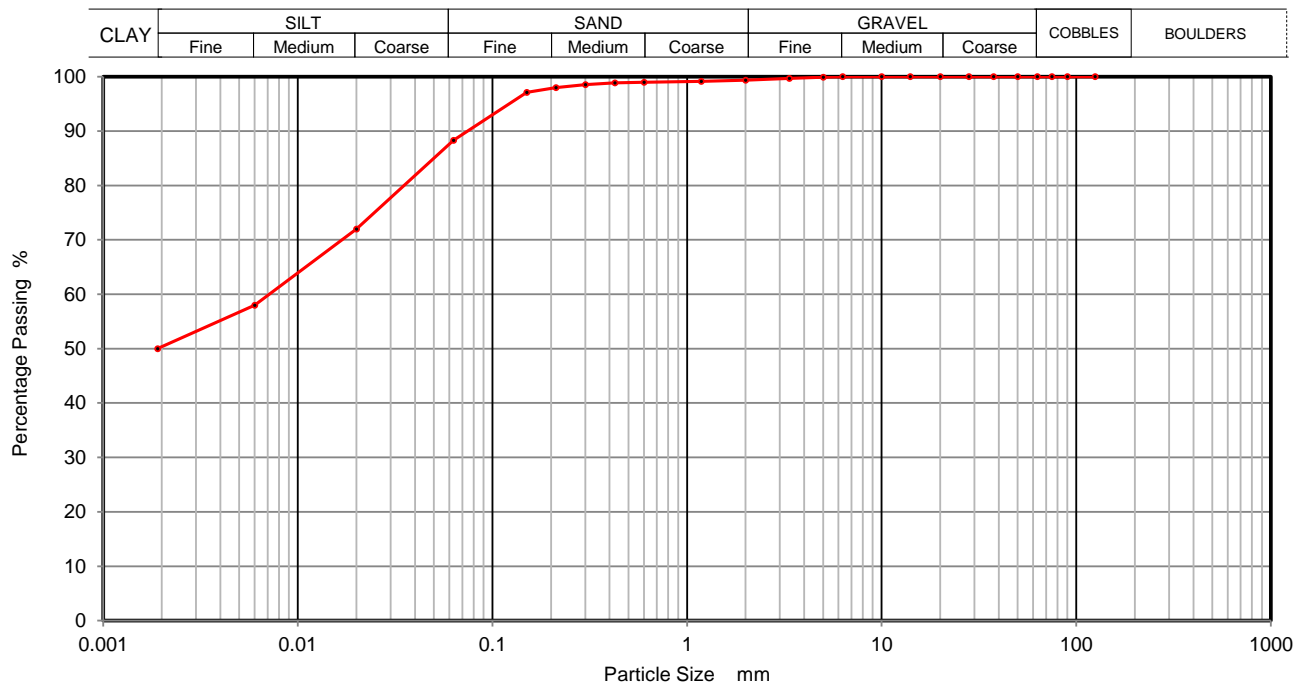




**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number	<b>46882</b>
Borehole/Pit No.	<b>BH101A</b>

Site Name	<b>Cwmcarn School</b>	Sample No.	
Soil Description	Brown slightly fine gravelly fine to coarse sandy silty CLAY	Depth Top	<b>8.20</b>
		Depth Base	<b>8.60</b>
Date Tested	10/01/2020	Sample Type	<b>UT</b>



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	72
90	100	0.0060	58
75	100	0.0020	50
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	98		
0.15	97		
0.063	88		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	11
Silt	38
Clay	50

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **46882**

Borehole/Pit No. **BH102**

Site Name **Cwmcarn School**

Sample No.

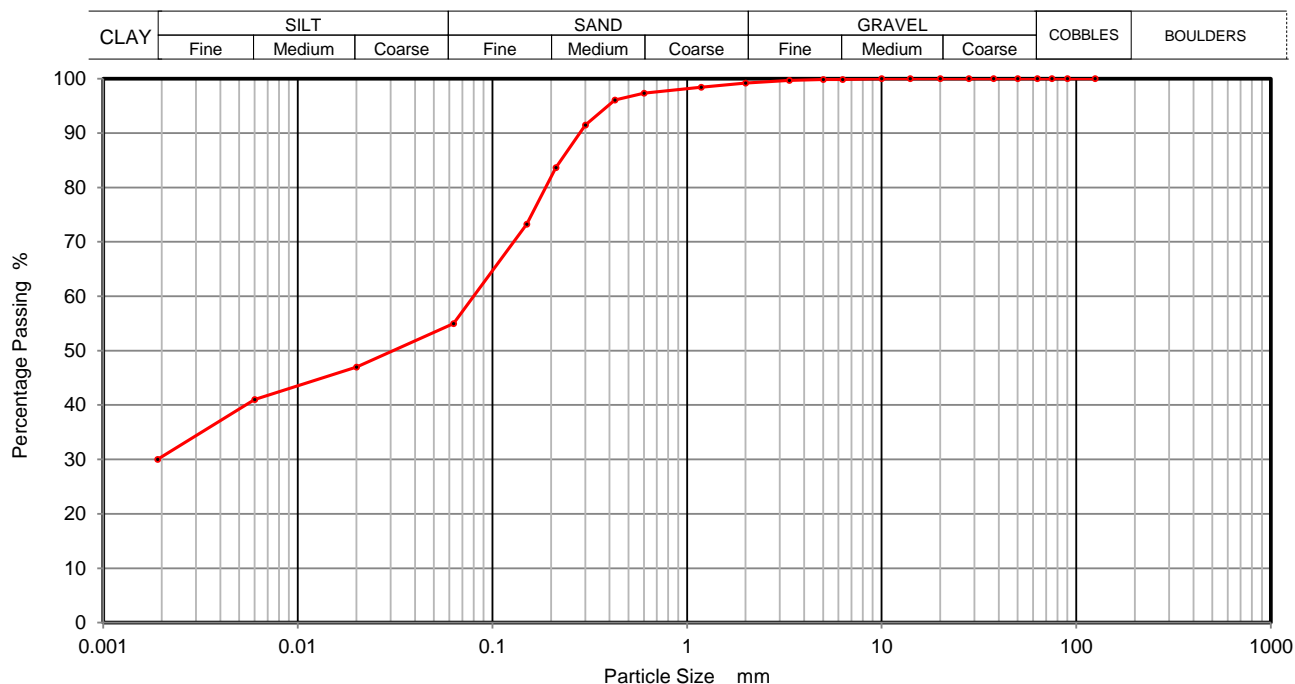
Soil Description **Brown slightly fine gravelly silty clayey fine to coarse SAND**

Depth Top **0.30**

Depth Base **1.20**

Date Tested **10/01/2020**

Sample Type **B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	47
90	100	0.0060	41
75	100	0.0020	30
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	98		
0.6	97		
0.425	96		
0.3	91		
0.212	84		
0.15	73		
0.063	55		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	44
Silt	25
Clay	30

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>



2788



**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number **46882**

Borehole/Pit No. **BH102**

Site Name **Cwmcairn School**

Sample No.

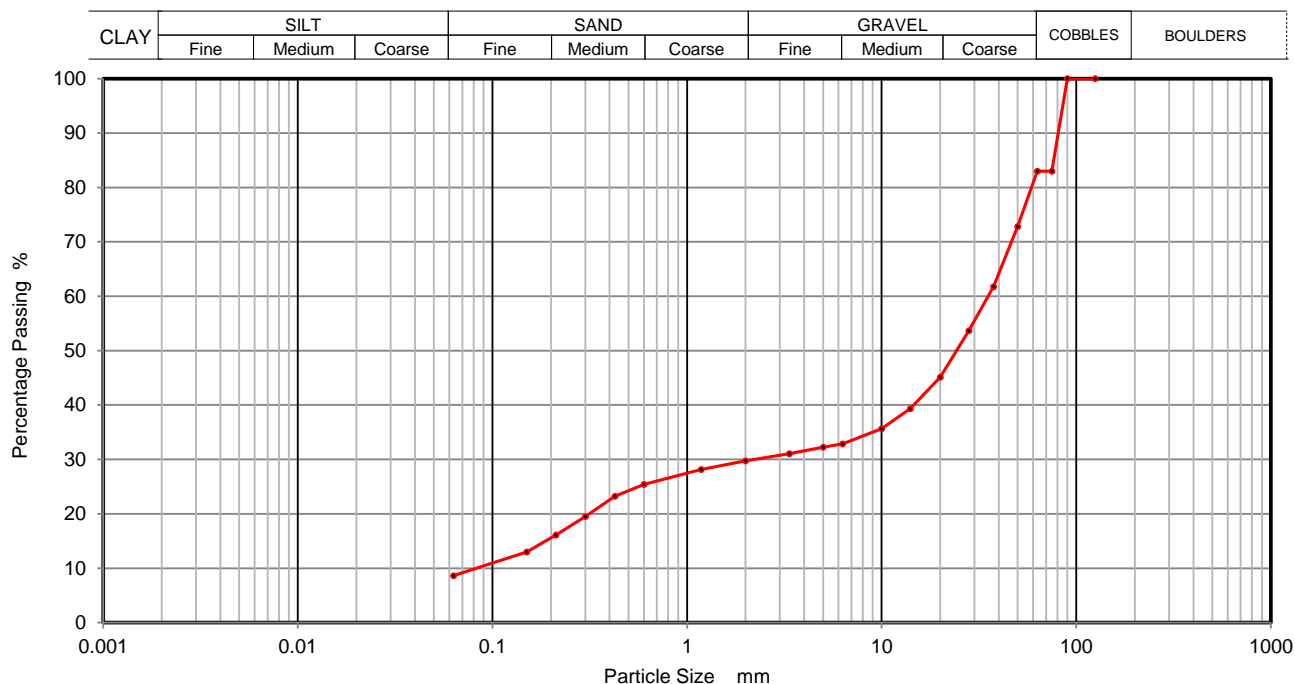
Soil Description **Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL with some cobbles**

Depth Top **1.20**

Depth Base **2.20**

Date Tested **10/01/2020**

Sample Type **B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	83		
63	83		
50	73		
37.5	62		
28	54		
20	45		
14	39		
10	36		
6.3	33		
5	32		
3.35	31		
2	30		
1.18	28		
0.6	25		
0.425	23		
0.3	19		
0.212	16		
0.15	13		
0.063	9		

Sample Proportions	% dry mass
Cobbles	17
Gravel	53
Sand	21
Silt and Clay	9

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>



2788





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **46882**

Borehole/Pit No. **BH102**

Site Name **Cwmcarn School**

Sample No.

Soil Description

Grey/ brown fine to coarse sandy silty fine to coarse gravelly CLAY

Depth Top

**3.20**

Depth Base

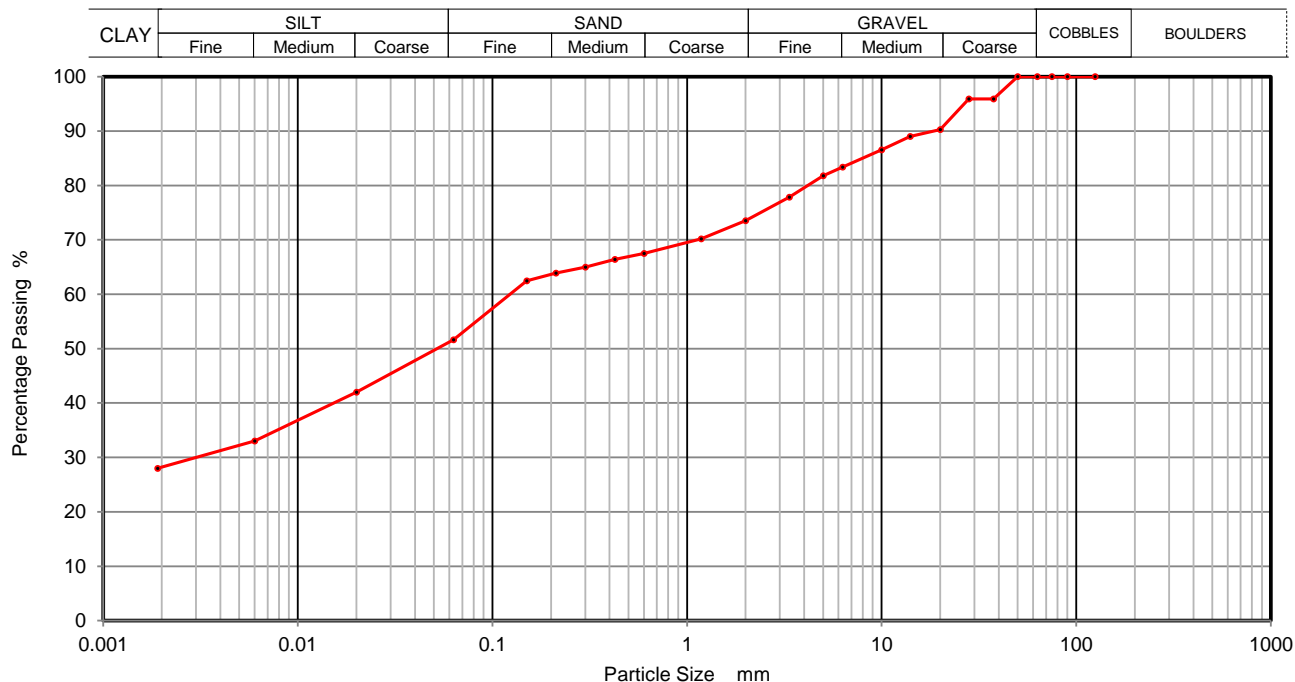
**4.20**

Date Tested

10/01/2020

Sample Type

**UT**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	42
90	100	0.0060	33
75	100	0.0020	28
63	100		
50	100		
37.5	96		
28	96		
20	90		
14	89		
10	87		
6.3	83		
5	82		
3.35	78		
2	74		
1.18	70		
0.6	68		
0.425	66		
0.3	65		
0.212	64		
0.15	62		
0.063	52		

Sample Proportions	% dry mass
Cobbles	0
Gravel	26
Sand	22
Silt	24
Clay	28

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>



2788



**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **46882**

Borehole/Pit No. **BH102**

Site Name **Cwmcarn School**

Sample No.

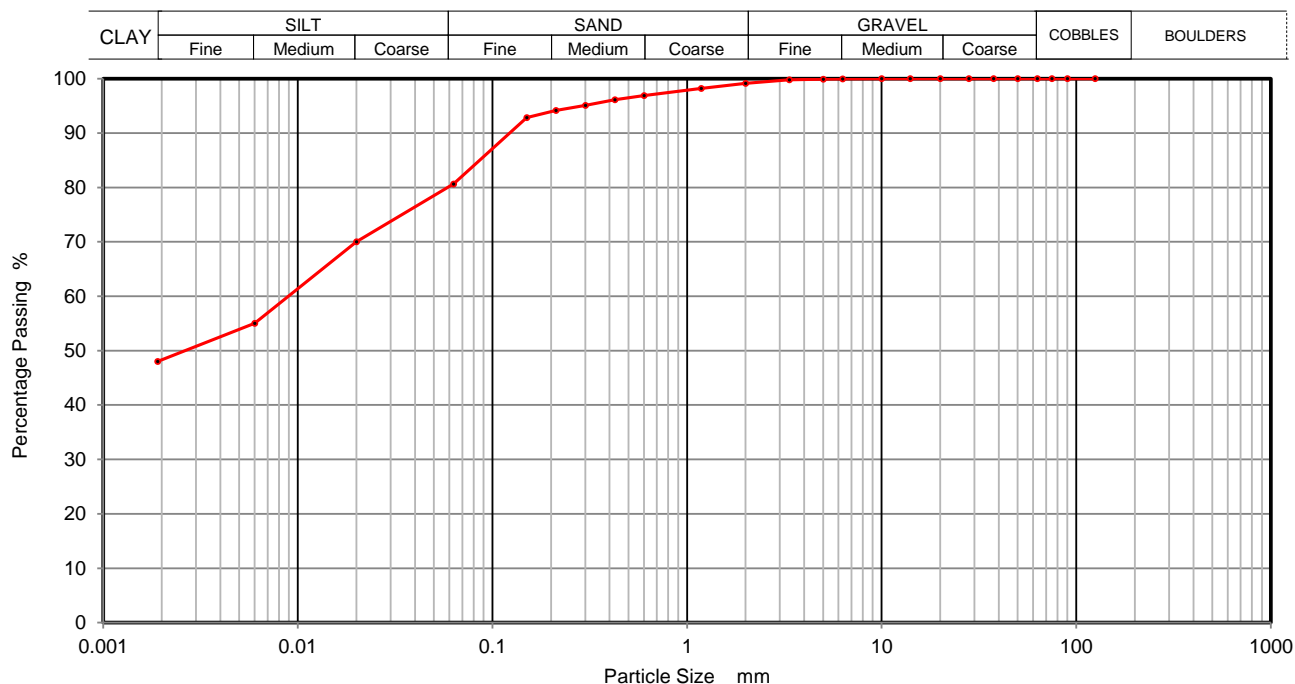
Soil Description **Grey/ brown slightly fine gravelly fine to coarse sandy silty CLAY**

Depth Top **4.00**

Depth Base **4.40**

Date Tested **10/01/2020**

Sample Type **UT**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	70
90	100	0.0060	55
75	100	0.0020	48
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	98		
0.6	97		
0.425	96		
0.3	95		
0.212	94		
0.15	93		
0.063	81		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	18
Silt	33
Clay	48

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below


Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>

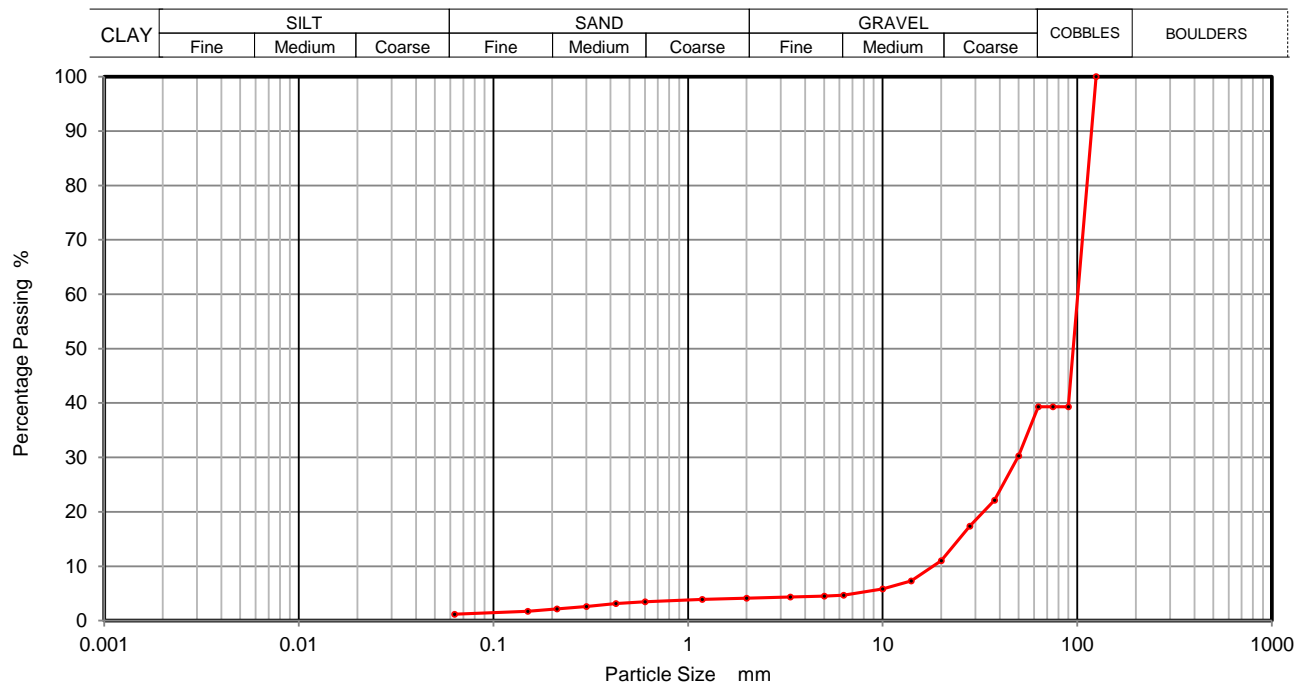


2788



**PARTICLE SIZE DISTRIBUTION  
BS 1377 Part 2:1990  
Wet Sieve, Clause 9.2**

	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	46882
		Borehole/Pit No.	BH103
Site Name	Cwmcarn School	Sample No.	
Soil Description	Brown slightly silty/ clayey slightly fine to coarse sandy fine to coarse GRAVEL with many cobbles	Depth Top	0.30
		Depth Base	1.20
Date Tested	10/01/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	39		
75	39		
63	39		
50	30		
37.5	22		
28	17		
20	11		
14	7		
10	6		
6.3	5		
5	4		
3.35	4		
2	4		
1.18	4		
0.6	3		
0.425	3		
0.3	3		
0.212	2		
0.15	2		
0.063	1		

Sample Proportions	% dry mass
Cobbles	61
Gravel	35
Sand	3
Silt and Clay	1

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

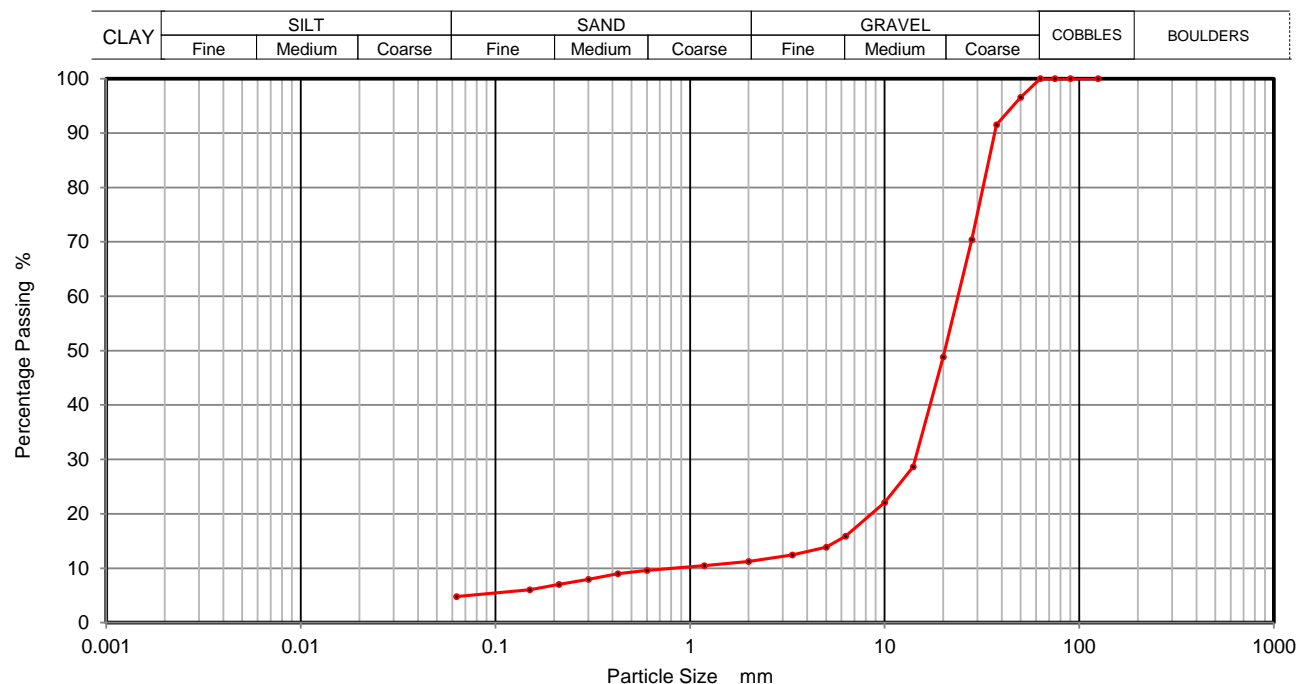
Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>





**PARTICLE SIZE DISTRIBUTION  
BS 1377 Part 2:1990  
Wet Sieve, Clause 9.2**

Contract Number	46882	
	Borehole/Pit No.	
BH104		
Site Name	Cwmcairn School	
Soil Description	Brown slightly silty/ clayey slightly fine to coarse sandy fine to coarse GRAVEL	Sample No.
Depth Top	1.20	
Depth Base	2.00	
Date Tested	10/01/2020	Sample Type
		B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	97		
37.5	92		
28	70		
20	49		
14	29		
10	22		
6.3	16		
5	14		
3.35	12		
2	11		
1.18	10		
0.6	10		
0.425	9		
0.3	8		
0.212	7		
0.15	6		
0.063	5		

Sample Proportions	% dry mass
Cobbles	0
Gravel	89
Sand	6
Silt and Clay	5

Remarks  
Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	19/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	20/01/2020	Paul Evans	<i>P. Evans</i>

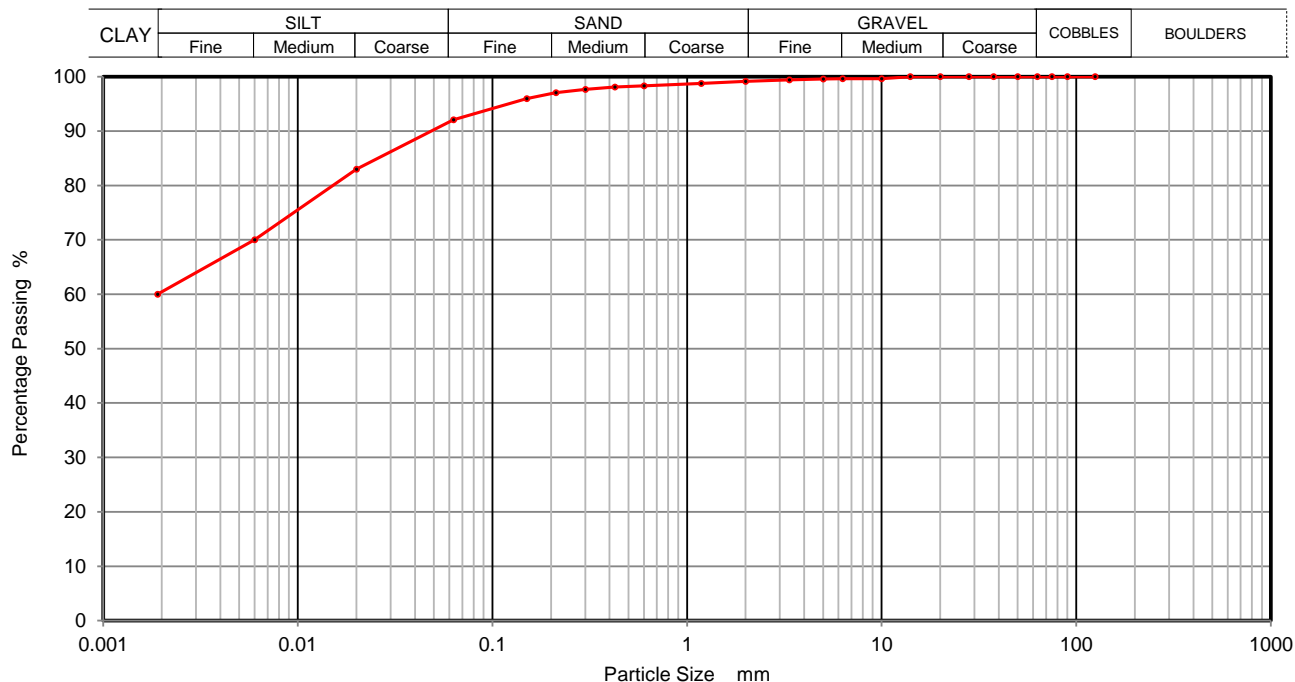




**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number	<b>46882</b>
Borehole/Pit No.	<b>BH104A</b>

Site Name	<b>Cwmcarn School</b>	Sample No.	
Soil Description	Grey slightly fine gravelly slightly fine to coarse snady silty CLAY	Depth Top	<b>6.50</b>
		Depth Base	<b>6.95</b>
Date Tested	10/01/2020	Sample Type	<b>UT</b>



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	83
90	100	0.0060	70
75	100	0.0020	60
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	99		
1.18	99		
0.6	98		
0.425	98		
0.3	98		
0.212	97		
0.15	96		
0.063	92		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	7
Silt	32
Clay	60

Remarks  
 Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number **46882**

Borehole/Pit No. **BH105**

Site Name **Cwmcairn School**

Sample No.

Soil Description

Brown silty/ clayey fine to coarse sandy fine to coarse GRAVEL with some cobbles

Depth Top

**0.90**

Depth Base

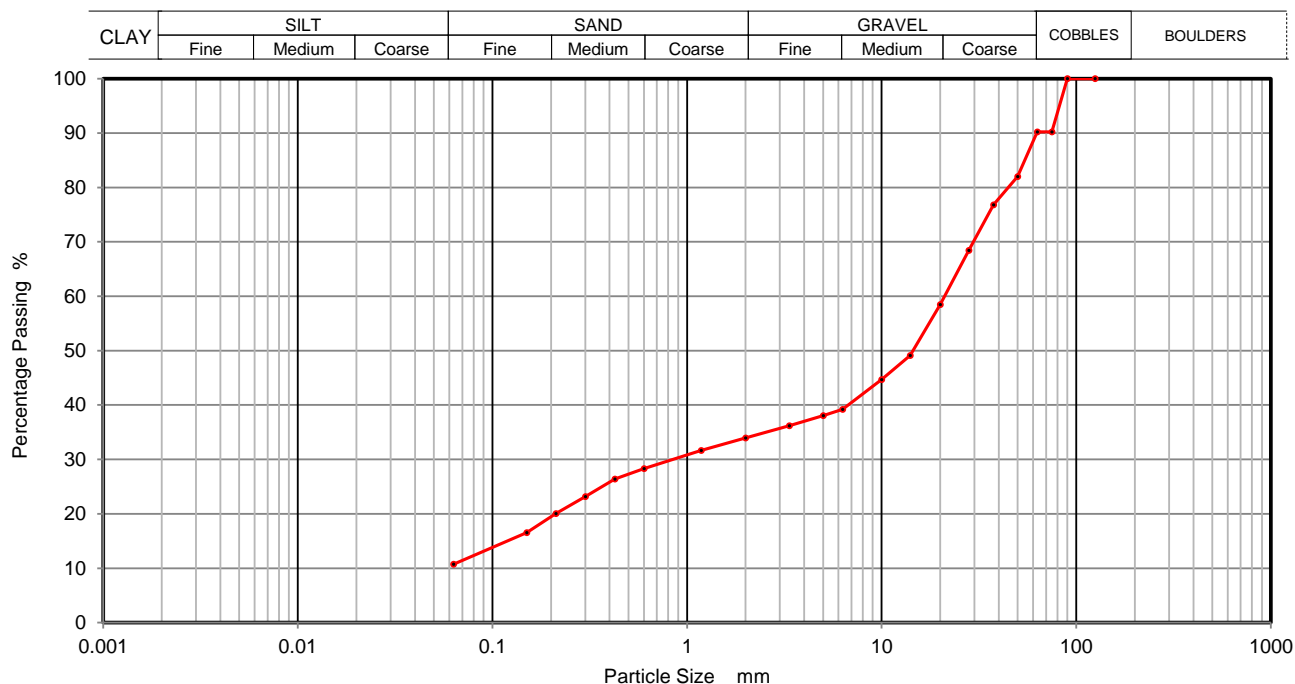
**1.20**

Date Tested

10/01/2020

Sample Type

**B**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	90		
63	90		
50	82		
37.5	77		
28	68		
20	58		
14	49		
10	45		
6.3	39		
5	38		
3.35	36		
2	34		
1.18	32		
0.6	28		
0.425	26		
0.3	23		
0.212	20		
0.15	17		
0.063	11		

Sample Proportions	% dry mass
Cobbles	10
Gravel	56
Sand	23
Silt and Clay	11

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>



2788



**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve, Clause 9.2**

Contract Number **46882**

Borehole/Pit No. **BH106**

Site Name **Cwmcarn School**

Sample No.

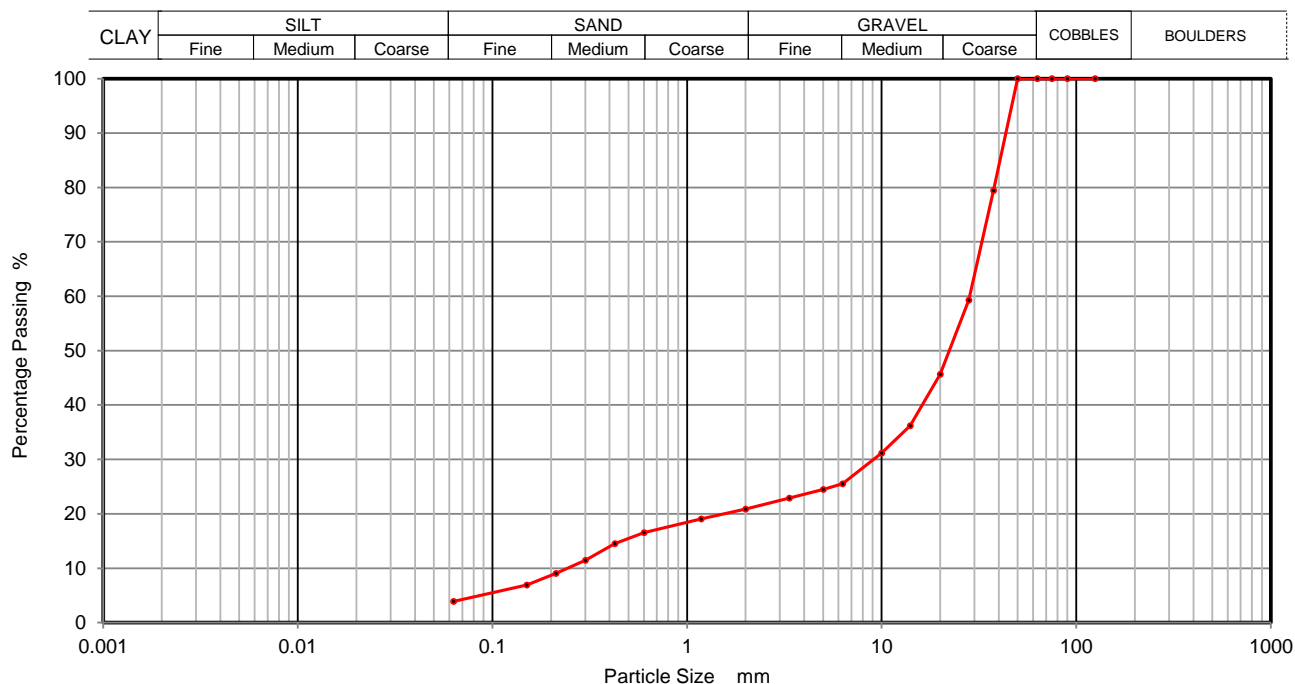
Soil Description **Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL**

Depth Top **0.40**

Depth Base **1.20**

Date Tested **10/01/2020**

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	79		
28	59		
20	46		
14	36		
10	31		
6.3	26		
5	24		
3.35	23		
2	21		
1.18	19		
0.6	17		
0.425	15		
0.3	11		
0.212	9		
0.15	7		
0.063	4		

Sample Proportions	% dry mass
Cobbles	0
Gravel	79
Sand	17
Silt and Clay	4

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	19/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	20/01/2020	Paul Evans	<i>P. Evans</i>



2788





**PARTICLE SIZE DISTRIBUTION**  
**BS 1377 Part 2:1990**  
**Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4**

Contract Number **46882**

Borehole/Pit No. **BH106**

Site Name **Cwmcarn School**

Sample No.

Soil Description

Grey/ brown slightly fine gravelly slightly fine to coarse sandy silty  
CLAY

Depth Top

**3.20**

Depth Base

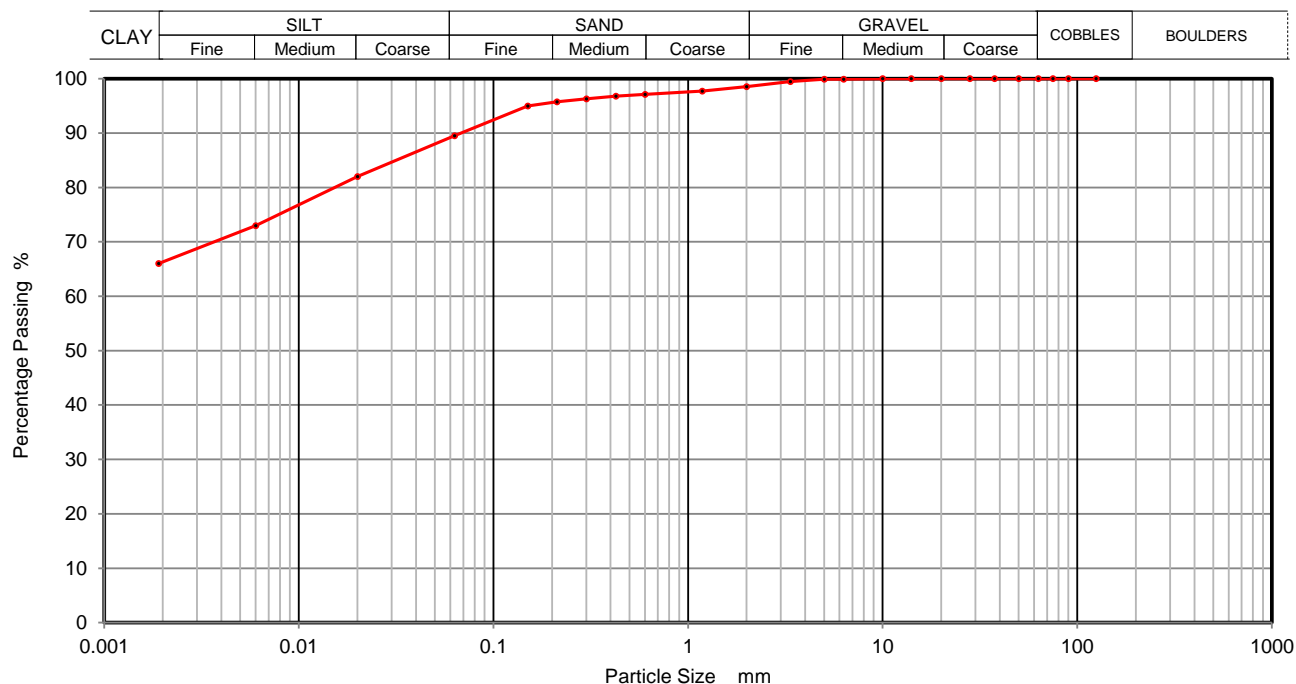
**3.60**

Date Tested

10/01/2020

Sample Type

**UT**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	82
90	100	0.0060	73
75	100	0.0020	66
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	99		
1.18	98		
0.6	97		
0.425	97		
0.3	96		
0.212	96		
0.15	95		
0.063	90		

Sample Proportions	% dry mass
Cobbles	0
Gravel	1
Sand	9
Silt	24
Clay	66

**Remarks**

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	20/01/2020	Wayne Honey	<i>W. Honey</i>
RO/MH	Approved	21/01/2020	Paul Evans	<i>P. Evans</i>



2788





**ONE DIMENSIONAL CONSOLIDATION TEST**  
**BS1377:Part 5:1990, clause 3**

Contract Number

46882

Borehole/Trialpit No.

BH101A

Site Name

Cwmcarn School

Sample No.

Soil Description

Grey sandy CLAY

Depth Top (m)

3.20

Depth Base (m)

3.60

Lab Temperature

20°C

Sample Location

Middle

Remarks

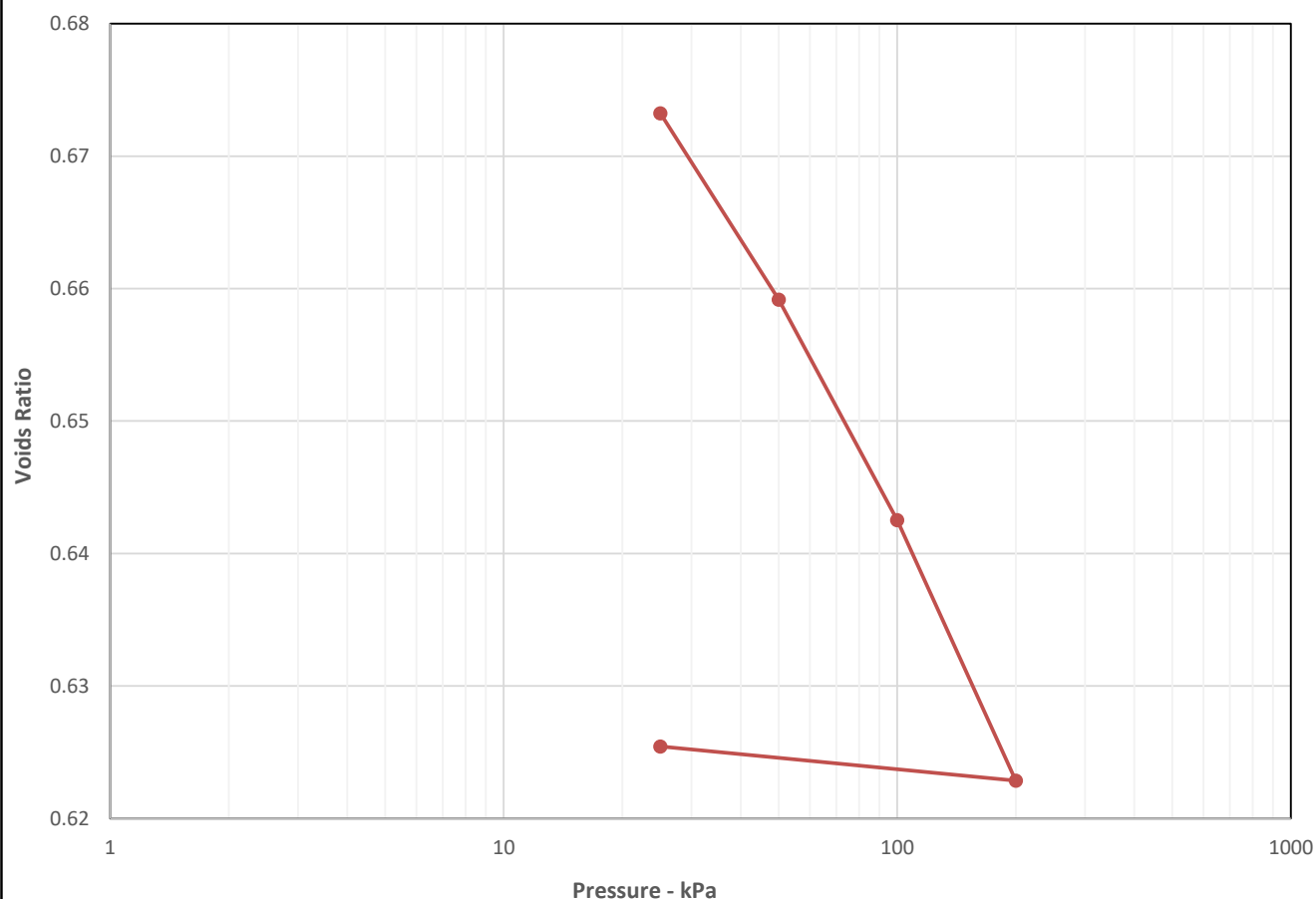
Cv Calculated Using T90  
Particle Density Assumed Unless Stated Otherwise

Sample Type

UT

Date Tested

10/01/2020



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	22	0	-	25	0.74	8.9		-			
Bulk Density (Mg/m3)	1.89	25	-	50	0.34	10		-			
Dry Density (Mg/m3)	1.55	50	-	100	0.2	13		-			
Voids Ratio	0.7046	100	-	200	0.1	10		-			
Degree of saturation	81.6	200	-	25	0.0091	12		-			
Height (mm)	19.76		-					-			
Diameter (mm)	75.08		-					-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	20/01/2020	Emma Sharp	
LG	Approved	21/01/2020	Paul Evans	





**ONE DIMENSIONAL CONSOLIDATION TEST**  
**BS1377:Part 5:1990, clause 3**

Contract Number 46882

Borehole/Trialpit No. BH101A

Site Name Cwmcarn School

Sample No.

Soil Description

Grey sandy CLAY

Depth Top (m)

5.20

Depth Base (m)

5.60

Lab Temperature

20°C

Sample Location

Middle

Remarks

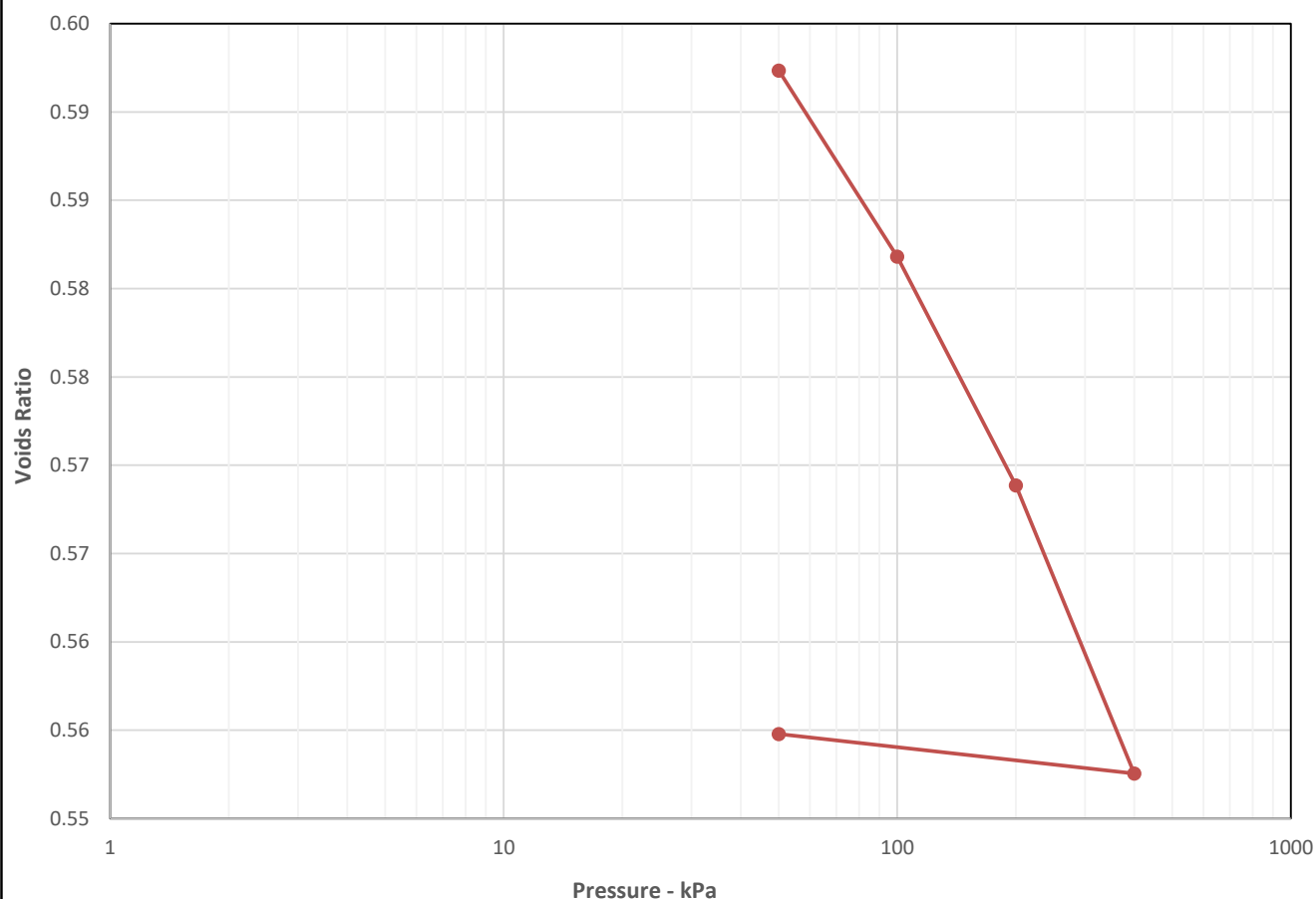
Cv Calculated Using T90  
Particle Density Assumed Unless Stated Otherwise

Sample Type

UT

Date Tested

10/01/2020



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	22	0	-	50	0.37	20		-			
Bulk Density (Mg/m3)	2.14	50	-	100	0.13	7.8		-			
Dry Density (Mg/m3)	1.76	100	-	200	0.082	9.4		-			
Voids Ratio	0.6220	200	-	400	0.1	11		-			
Degree of saturation	99.7	400	-	50	0.0041	18		-			
Height (mm)	18.79		-					-			
Diameter (mm)	74.96		-					-			
Particle Density (Mg/m3)	2.85		-					-			

Operators	Checked	20/01/2020	Emma Sharp	
LG	Approved	21/01/2020	Paul Evans	





**ONE DIMENSIONAL CONSOLIDATION TEST**  
**BS1377:Part 5:1990, clause 3**

Contract Number 46882

Borehole/Trialpit No. BH101A

Site Name Cwmcam School

Sample No.

Soil Description

Grey slightly fine gravelly sandy CLAY

Depth Top (m)

8.20

Depth Base (m)

8.60

Lab Temperature

20°C

Sample Location

Middle

Remarks

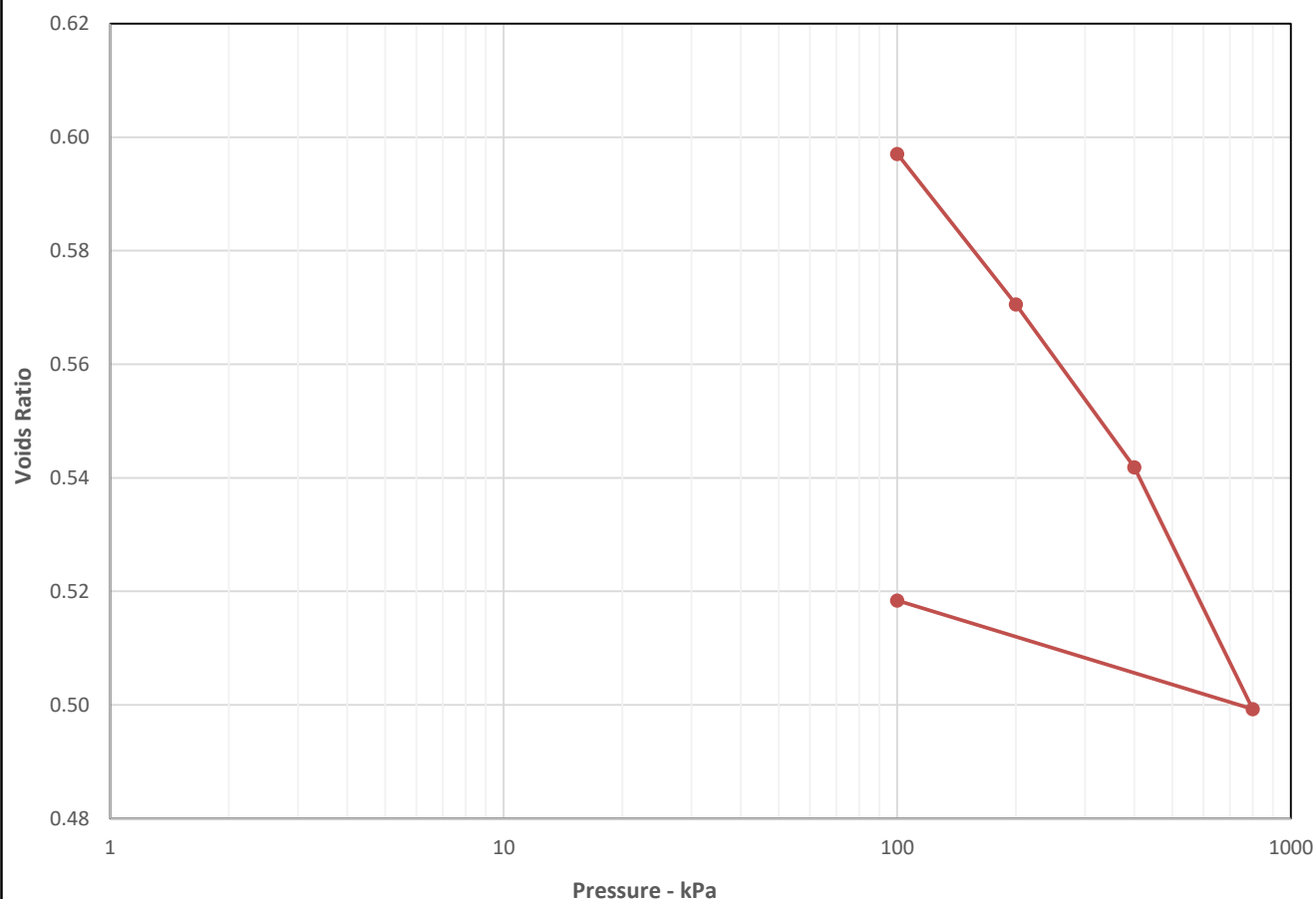
Cv Calculated Using T90  
Particle Density Assumed Unless Stated Otherwise

Sample Type

UT

Date Tested

10/01/2020



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	23	0	-	100	0.5	9.8		-			
Bulk Density (Mg/m3)	1.94	100	-	200	0.17	14		-			
Dry Density (Mg/m3)	1.58	200	-	400	0.091	11		-			
Voids Ratio	0.6813	400	-	800	0.1	13		-			
Degree of saturation	89.0	800	-	100	0.018	10		-			
Height (mm)	19.77		-					-			
Diameter (mm)	74.9		-					-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	20/01/2020	Emma Sharp	
LG	Approved	21/01/2020	Paul Evans	





**ONE DIMENSIONAL CONSOLIDATION TEST**  
**BS1377:Part 5:1990, clause 3**

Contract Number 46882

Borehole/Trialpit No. BH102

Site Name Cwmcam School

Sample No.

Soil Description Grey sandy CLAY

Depth Top (m) 4.00

Depth Base (m) 4.40

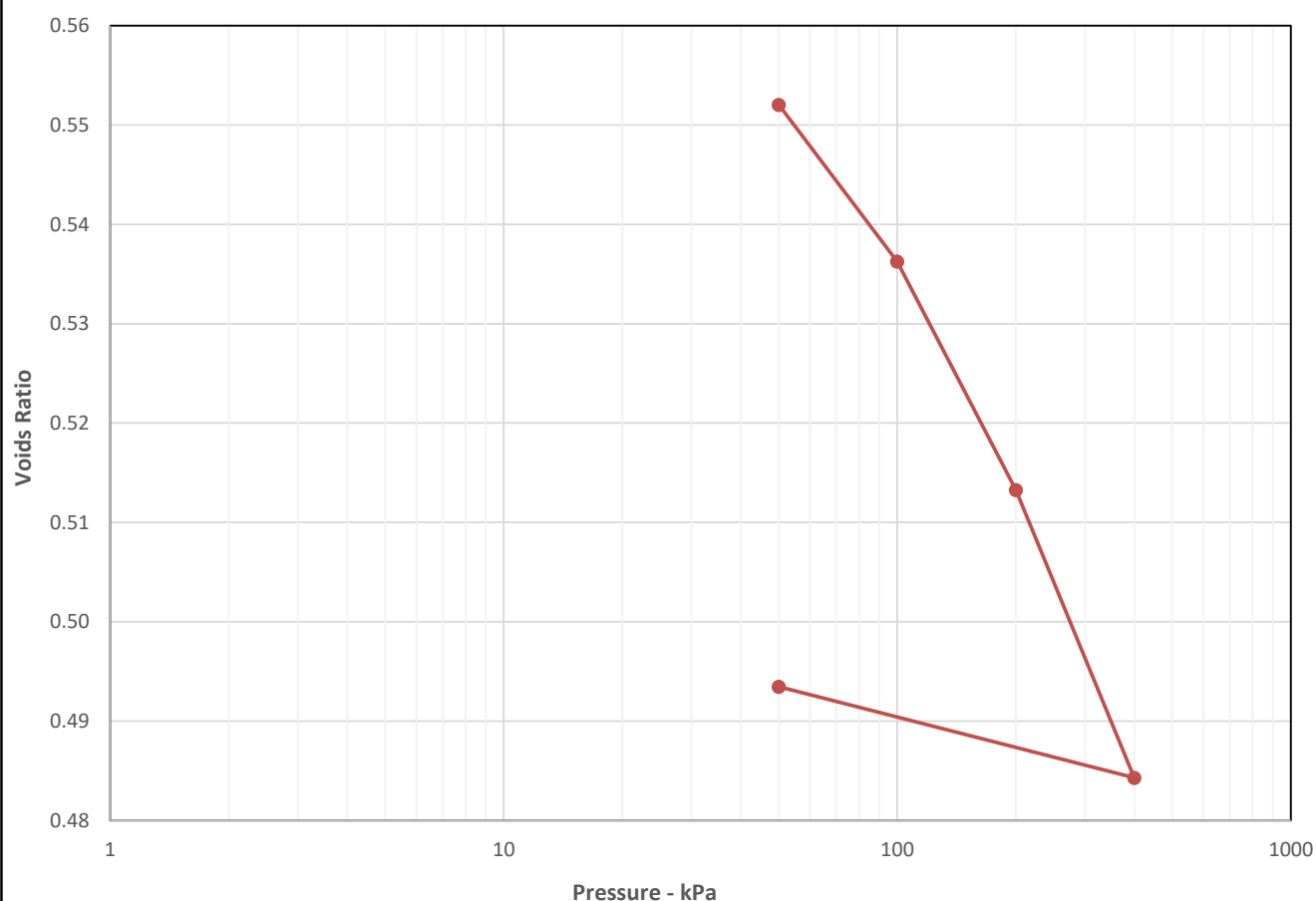
Lab Temperature 20°C

Sample Location Middle

Remarks Cv Calculated Using T90  
Particle Density Assumed Unless Stated Otherwise

Sample Type UT

Date Tested 11/01/2020



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	22	0	-	50	0.57	7.5		-			
Bulk Density (Mg/m3)	2.09	50	-	100	0.2	8.8		-			
Dry Density (Mg/m3)	1.72	100	-	200	0.15	8.6		-			
Voids Ratio	0.5973	200	-	400	0.1	13		-			
Degree of saturation	99.5	400	-	50	0.018	13		-			
Height (mm)	18.82		-					-			
Diameter (mm)	74.83		-					-			
Particle Density (Mg/m3)	2.75		-					-			

Operators	Checked	20/01/2020	Emma Sharp	
LG	Approved	21/01/2020	Paul Evans	





**ONE DIMENSIONAL CONSOLIDATION TEST**  
**BS1377:Part 5:1990, clause 3**

Contract Number

46882

Borehole/Trialpit No.

BH104A

Site Name

Cwmcam School

Sample No.

Soil Description

Grey sandy CLAY

Depth Top (m)

6.50

Depth Base (m)

6.95

Lab Temperature

20°C

Sample Location

Middle

Remarks

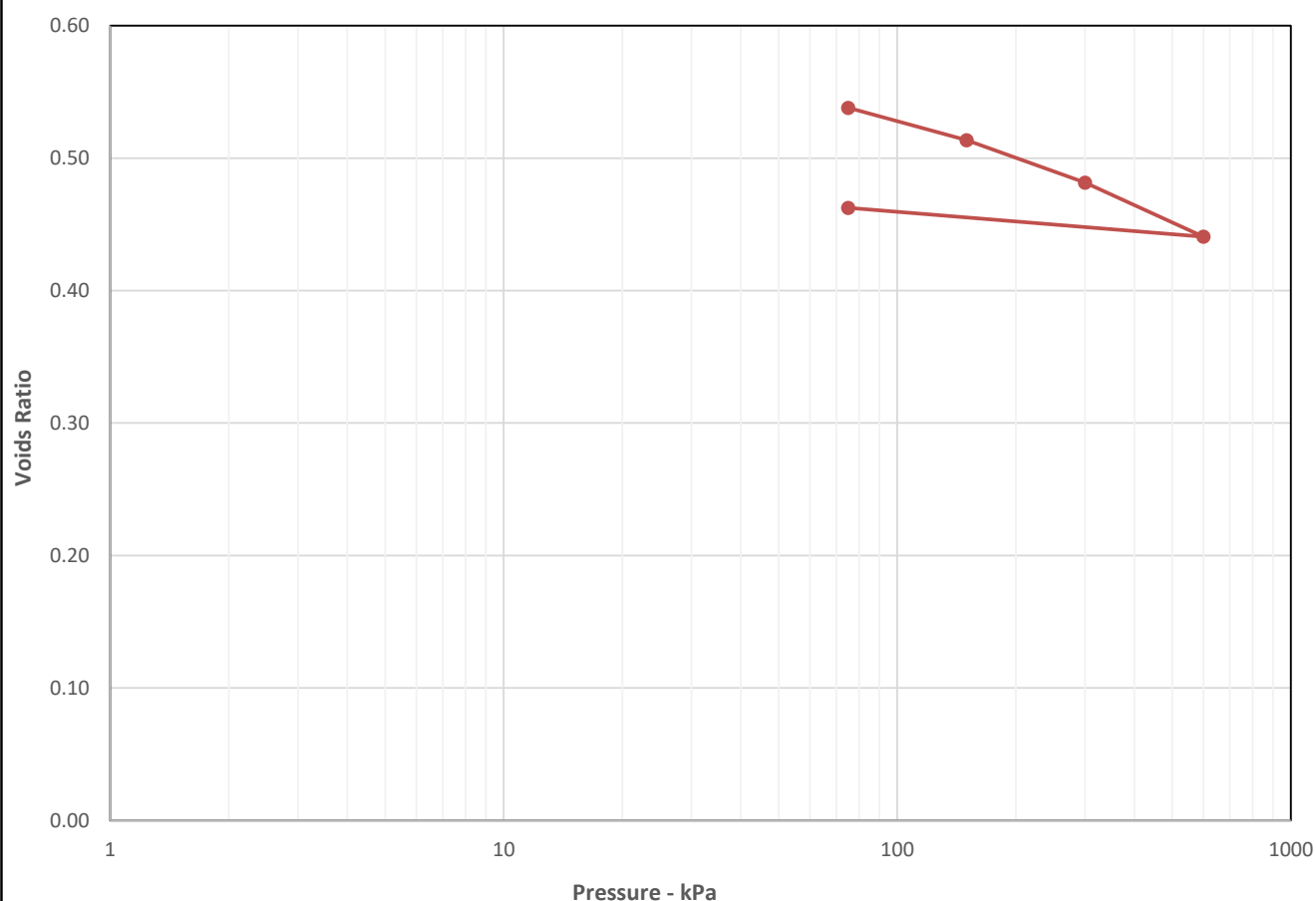
Cv Calculated Using T90  
Particle Density Assumed Unless Stated Otherwise

Sample Type

UT

Date Tested

11/01/2020



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	21	0	-	75	0.36	6.3		-			
Bulk Density (Mg/m3)	2.09	75	-	150	0.21	8.4		-			
Dry Density (Mg/m3)	1.72	150	-	300	0.14	9.8		-			
Voids Ratio	0.5812	300	-	600	0.1	15		-			
Degree of saturation	99.8	600	-	75	0.029	7.1		-			
Height (mm)	19.73		-					-			
Diameter (mm)	74.79		-					-			
Particle Density (Mg/m3)	2.72		-					-			

Operators	Checked	20/01/2020	Emma Sharp	
LG	Approved	21/01/2020	Paul Evans	







**ONE DIMENSIONAL CONSOLIDATION TEST**  
**BS1377:Part 5:1990, clause 3**

Contract Number 46882

Borehole/Trialpit No. BH106

Site Name Cwmcam School

Sample No.

Soil Description

Brown sandy CLAY

Depth Top (m)

3.20

Depth Base (m)

3.60

Lab Temperature

20°C

Sample Location

Middle

Remarks

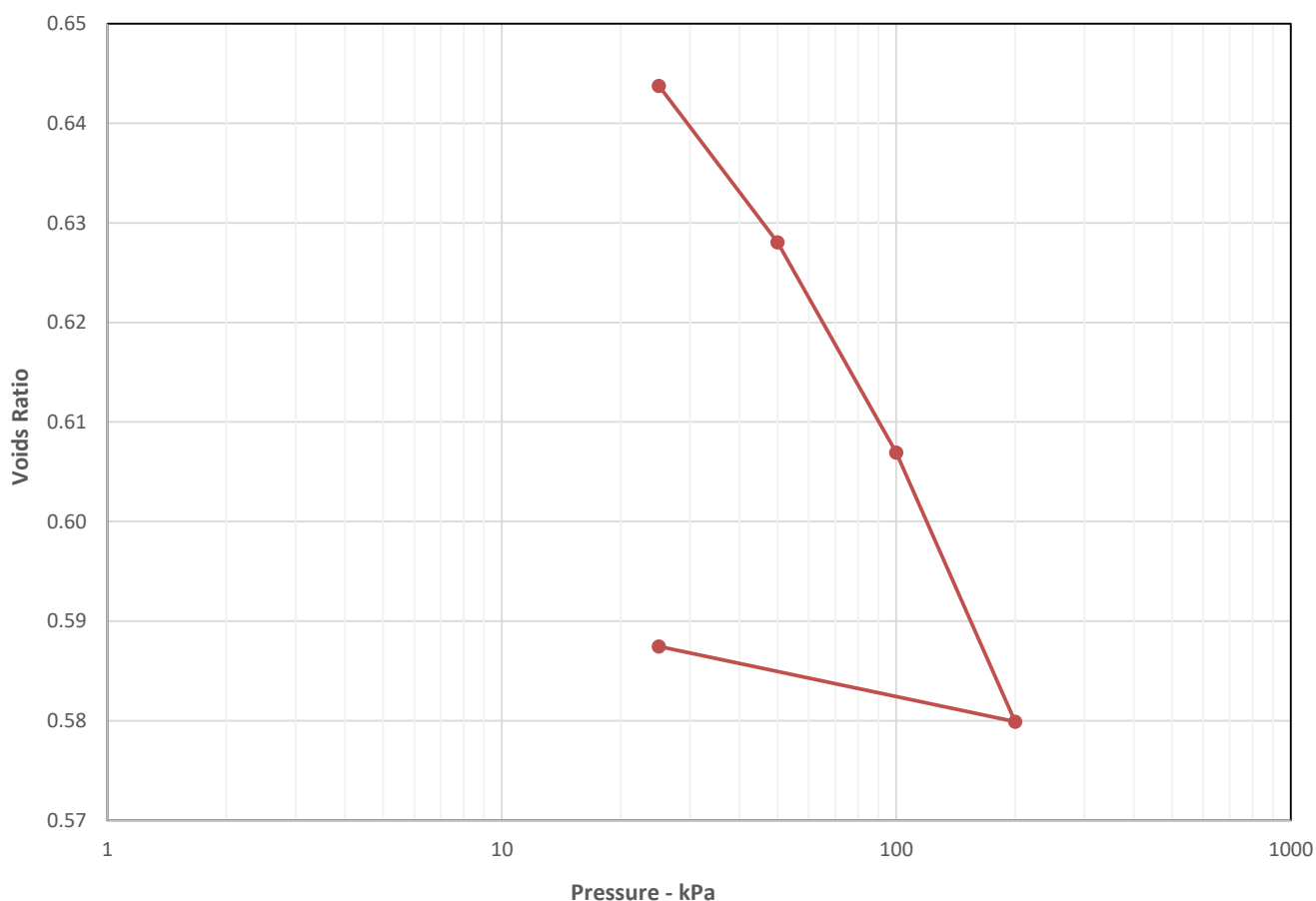
Cv Calculated Using T90  
Particle Density Assumed Unless Stated Otherwise

Sample Type

UT

Date Tested

11/01/2020



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	25	0	-	25	0.91	15		-			
Bulk Density (Mg/m3)	1.96	25	-	50	0.38	14		-			
Dry Density (Mg/m3)	1.58	50	-	100	0.26	8.9		-			
Voids Ratio	0.6822	100	-	200	0.2	13		-			
Degree of saturation	95.7	200	-	25	0.027	10		-			
Height (mm)	18.73		-					-			
Diameter (mm)	74.87		-					-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	20/01/2020	Emma Sharp	
LG	Approved	21/01/2020	Paul Evans	

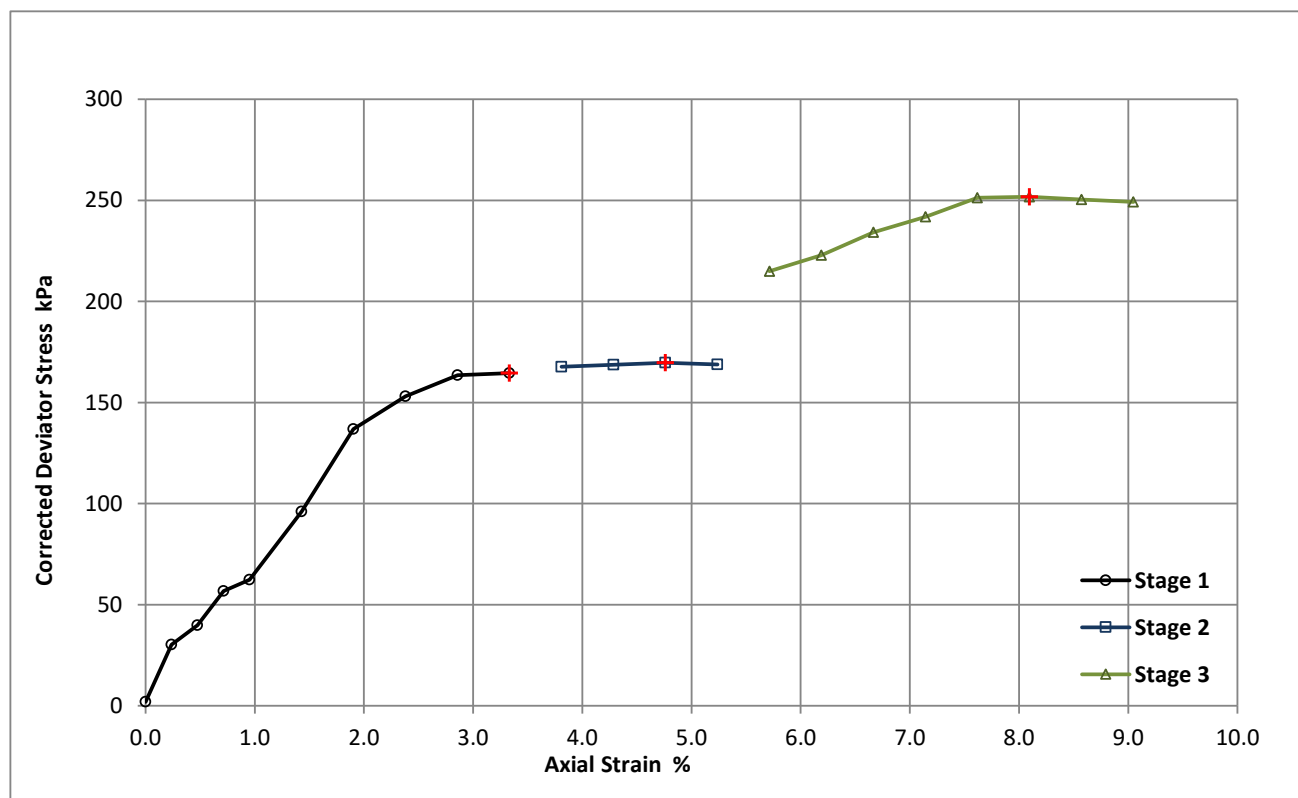




**Multi Stage Unconsolidated-Undrained Triaxial Test**  
**BS 1377 : 1990 Part 7 : 9**

Contract Number	46882
Borehole/Pit No.	BH101A
Sample No.	
Depth Top	3.20
Depth Base	3.60
Sample Type	UT

Site Name	Cwmcam School
Soil Description	Brown silty CLAY
Date Tested	09/01/2020



Moisture Content (%)	24		
Bulk Density (Mg/m <sup>3</sup> )	1.96		
Dry Density (Mg/m <sup>3</sup> )	1.58		
Specimen Length (mm)	210		
Specimen Diamteter (mm)	105		
Cell Pressures (kPa)	25	50	100
Deviator Stress (kPa)	165	170	252
Undrained Shear Strength (kPa)	82	85	126
Failure Strain (%)	3.3	4.8	8.1
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.3mm		
Rate of Strain (%/min)	3.00		

Specimen Post Test

Sample Split



Checked	19/01/2020	Emma Sharp	
Approved	20/01/2020	Paul Evans	

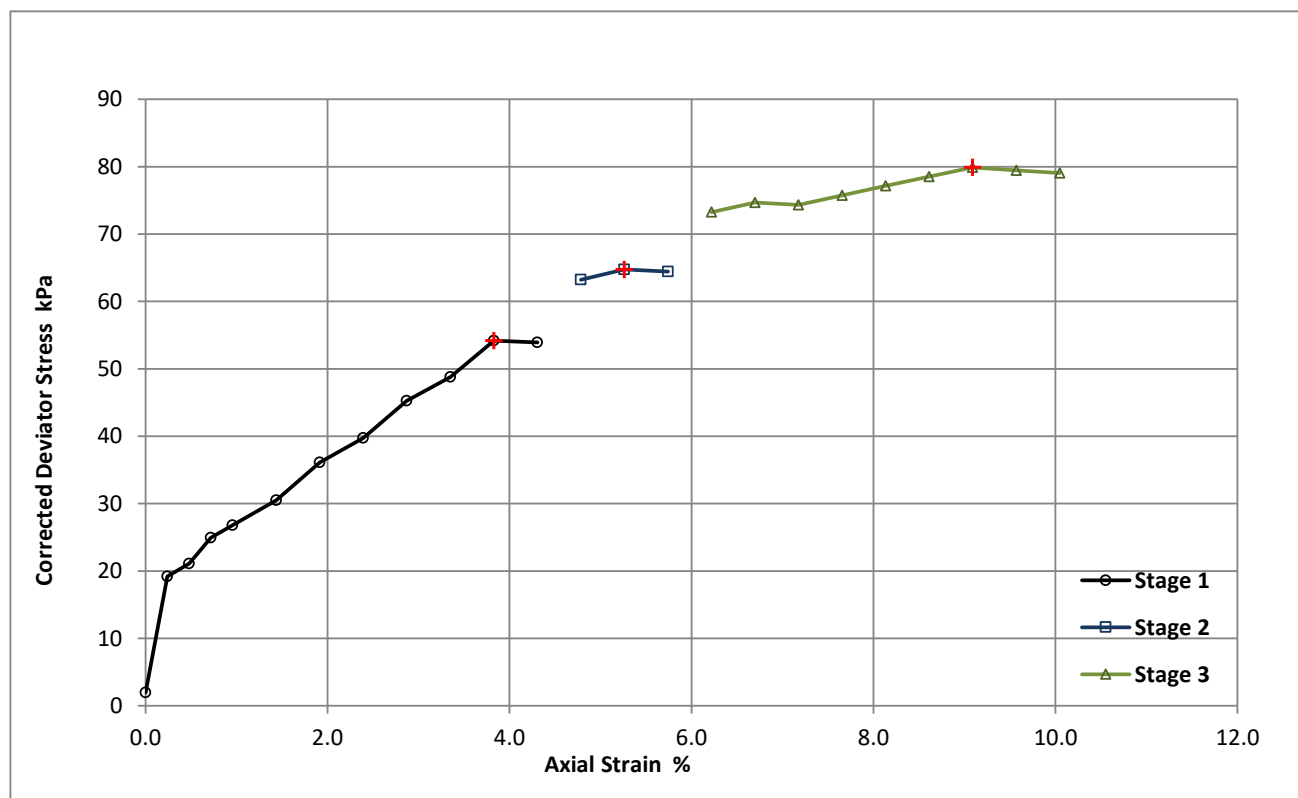




**Multi Stage Unconsolidated-Undrained Triaxial Test**  
**BS 1377 : 1990 Part 7 : 9**

Contract Number	46882
Borehole/Pit No.	BH104A
Sample No.	
Depth Top	6.50
Depth Base	6.95
Sample Type	UT

Site Name	Cwmcam School
Soil Description	Brown silty CLAY
Date Tested	09/01/2020



Moisture Content (%)	20		
Bulk Density (Mg/m <sup>3</sup> )	1.97		
Dry Density (Mg/m <sup>3</sup> )	1.64		
Specimen Length (mm)	209		
Specimen Diamteter (mm)	104		
Cell Pressures (kPa)	60	120	240
Deviator Stress (kPa)	54	65	80
Undrained Shear Strength (kPa)	27	32	40
Failure Strain (%)	3.8	5.3	9.1
Mode Of Failure	Compound		
Membrane Used/Thickness	Rubber/0.3mm		
Rate of Strain (%/min)	3.00		

Specimen Post Test



Sample Split



Checked	19/01/2020	Emma Sharp	
Approved	20/01/2020	Paul Evans	





## **APPENDIX F – ENVIRONMENTAL LABORATORY TEST RESULTS**



Unit 7-8 Hawarden Business Park  
Manor Road (off Manor Lane)  
Hawarden  
Deeside  
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

WYG Geo-Environment  
5th Floor  
Longcross Court  
47 Newport Road  
Cardiff  
CF24 0AD

**Attention:** Katy Woodhouse

## CERTIFICATE OF ANALYSIS

<b>Date of report Generation:</b>	09 April 2019
<b>Customer:</b>	H_WYG_CDF
<b>Sample Delivery Group (SDG):</b>	190402-103
<b>Your Reference:</b>	A110489-4
<b>Location:</b>	Cwmcarn High School
<b>Report No:</b>	500420

We received 26 samples on Tuesday April 02, 2019 and 10 of these samples were scheduled for analysis which was completed on Tuesday April 09, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

**Sonia McWhan**

Operations Manager





# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
19683138	BH02	ES10	0.20 - 0.20	28/03/2019
19683143	BH02	ES11	0.90 - 0.90	28/03/2019
19683241	BH03		1.20	
19683230	CP01		0.40	
19697238	CPO3		0.50	01/04/2019
19683190	HP01	ES22	0.30 - 0.30	28/03/2019
19683194	HP02	ES23	0.25 - 0.25	28/03/2019
19683234	RP01		0.50	
19683203	SA01	ES4	0.20 - 0.20	25/03/2019
19683199	SA01	ES3	0.60 - 0.60	25/03/2019
19683207	SA02	ES5	0.70 - 0.70	25/03/2019
19683181	TP02	ES2	0.50 - 0.50	25/03/2019
19683226	TP03	ES9	0.60 - 0.60	25/03/2019
19683221	TP03	ES8	1.00 - 1.00	25/03/2019
19683212	TP04	ES6	0.30 - 0.30	25/03/2019
19683217	TP04	ES7	0.70 - 0.70	25/03/2019
19683133	TP01A	ES1	0.50 - 0.50	25/03/2019
19683147	WS01	ES12	0.40 - 0.40	28/03/2019
19683151	WS02	ES13	0.20 - 0.20	28/03/2019
19683156	WS02	ES14	0.80 - 0.80	28/03/2019
19683160	WS03	ES15	0.30 - 0.30	28/03/2019
19683165	WS03	ES16	1.00 - 1.00	28/03/2019
19683169	WS04	ES17	0.20 - 0.20	28/03/2019
19683173	WS04	ES18	0.50 - 0.50	29/03/2019
19683186	WS06	ES20	0.90 - 0.90	29/03/2019
19683177	WS05A	ES19	0.80 - 0.80	29/03/2019

### Maximum Sample/Coolbox Temperature (°C) :

#### ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

### 9.6

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.









# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## Results Legend

**X** Test  
**N** No Determination Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	19683156	WS02	ES14	0.80 - 0.80	1kg TUB	S						
	19683147	WS01	ES12	0.40 - 0.40	60g VOC (ALE215)	S						
	19683212	TP04	ES6	0.30 - 0.30	250g Amber Jar (ALE210)	S						
	19683181	TP02	ES2	0.50 - 0.50	1kg TUB	S						
	19683203	SA01	ES4	0.20 - 0.20	60g VOC (ALE215)	S						
Sample Types -	19683194	HP02	ES23	0.25 - 0.25	250g Amber Jar (ALE210)	S						
	19683138	BH02	ES10	0.20 - 0.20	1kg TUB	S						
					60g VOC (ALE215)	S						
					250g Amber Jar (ALE210)	S						
					1kg TUB	S						
					60g VOC (ALE215)	S						
GRO by GC-FID (S)	All	NDPs: 0 Tests: 10										
GRO by GC-FID (W)	All	NDPs: 0 Tests: 4										
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 10										
Mercury Dissolved	All	NDPs: 0 Tests: 4										
Metals in solid samples by OES	All	NDPs: 0 Tests: 10										
Nitrite by Kone (w)	All	NDPs: 0 Tests: 4										
PAH by GCMS	All	NDPs: 0 Tests: 10										
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 4										
pH	All	NDPs: 0 Tests: 10										
pH Value of Filtered Water	All	NDPs: 0 Tests: 4										
Phenols by HPLC (S)	All	NDPs: 0 Tests: 10										
Phenols by HPLC (W)	All	NDPs: 0 Tests: 4										
Sample description	All	NDPs: 0 Tests: 10										
Total Organic Carbon	All	NDPs: 0 Tests: 10										
TPH CWG Filtered (W)	All	NDPs: 0 Tests: 4										





19683186	WS06	ES20	0.90 - 0.90	60g VOC (ALE215)	S			X
				250g Amber Jar (ALE210)	S	X		
				1kg TUB	S			
19683169	WS04	ES17	0.20 - 0.20	60g VOC (ALE215)	S			X
				250g Amber Jar (ALE210)	S	X		
				1kg TUB	S			
19683165	WS03	ES16	1.00 - 1.00	60g VOC (ALE215)	S			X
				250g Amber Jar (ALE210)	S	X		
				1kg TUB	S			
19683156	WS02	ES14	0.80 - 0.80	60g VOC (ALE215)	S			X
				250g Amber Jar (ALE210)	S	X		
				1kg TUB	S			



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## Sample Descriptions

### Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
19683138	BH02	0.20 - 0.20	Dark Brown	Sandy Loam	Vegetation	Stones
19683194	HP02	0.25 - 0.25	Dark Brown	Silt Loam	Stones	Vegetation
19683203	SA01	0.20 - 0.20	Dark Brown	Loamy Sand	Stones	Vegetation
19683181	TP02	0.50 - 0.50	Dark Brown	Loamy Sand	Stones	Vegetation
19683212	TP04	0.30 - 0.30	Dark Brown	Loamy Sand	Brick	Vegetation
19683147	WS01	0.40 - 0.40	Dark Brown	Sandy Loam	Stones	Vegetation
19683156	WS02	0.80 - 0.80	Dark Brown	Loamy Sand	Stones	Vegetation
19683165	WS03	1.00 - 1.00	Dark Brown	Loamy Sand	Stones	Vegetation
19683169	WS04	0.20 - 0.20	Dark Brown	Silt Loam	Stones	Vegetation
19683186	WS06	0.90 - 0.90	Dark Brown	Loamy Sand	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.























# CERTIFICATE OF ANALYSIS

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## Asbestos Identification - Solid Samples

### Results Legend

# ISO17025 accredited.  
M mCERTS accredited.  
\* Subcontracted test.  
(F) Trigger breach confirmed  
1-5&+5@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH02ES10 0.20 - 0.20 SOLID 28/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683138 TM048	06/04/2019	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	HP02ES23 0.25 - 0.25 SOLID 28/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683194 TM048	06/04/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	SA01ES4 0.20 - 0.20 SOLID 25/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683203 TM048	06/04/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP02ES2 0.50 - 0.50 SOLID 25/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683181 TM048	06/04/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP04ES6 0.30 - 0.30 SOLID 25/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683212 TM048	08/04/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS01ES12 0.40 - 0.40 SOLID 28/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683147 TM048	06/04/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS02ES14 0.80 - 0.80 SOLID 28/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683156 TM048	06/04/2019	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS03ES16 1.00 - 1.00 SOLID 28/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683165 TM048	06/04/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



## CERTIFICATE OF ANALYSIS

**SDG:** 190402-103  
**Location:** Cwmcam High School**Client Reference:** A110489-4  
**Order Number:** C19/333**Report Number:** 500420  
**Superseded Report:**

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS04ES17 0.20 - 0.20 SOLID 28/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683169 TM048	06/04/19	Andrzej Fernecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS06ES20 0.90 - 0.90 SOLID 29/03/2019 00:00:00 02/04/2019 17:49:00 190402-103 19683186 TM048	06/04/19	Andrzej Fernecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.107

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 19

Dry Matter Content (%) 84

#### Case

SDG 190402-103

Lab Sample Number(s) 19683165

Sampled Date 28-Mar-2019

Customer Sample Ref. WS03 ES16

Depth (m) 1.00 - 1.00

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	3.64	<3	36.4	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	<0.0005	<0.0005	<0.005	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.00189	<0.0002	0.0189	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	0.807	<0.3	8.07	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000418	<0.000005	0.000418	<0.00005	-	-	-
Anthracene (diss.filt)	0.0000104	<0.000005	0.000104	<0.00005	-	-	-
Boron	<0.01	<0.01	<0.1	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000476	<0.000005	0.000476	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	4.5	<2	45	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.00000688	<0.000005	0.0000688	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 03-Apr-2019  
pH (pH Units) 7.76  
Conductivity (µS/cm) 11.10  
Temperature (°C) 18.00  
Volume Leachant (Litres) 0.883



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.107

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 19

Dry Matter Content (%) 84

#### Case

SDG 190402-103

Lab Sample Number(s) 19683165

Sampled Date 28-Mar-2019

Customer Sample Ref. WS03 ES16

Depth (m) 1.00 - 1.00

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000309	<0.000005	0.000309	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	<0.0003	<0.0003	<0.003	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000332	<0.0002	0.00332	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000138	<0.000082	0.00138	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.0044	<0.001	0.044	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 03-Apr-2019  
pH (pH Units) 7.76  
Conductivity (µS/cm) 11.10  
Temperature (°C) 18.00  
Volume Leachant (Litres) 0.883



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.100

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 11.1

Dry Matter Content (%) 90

#### Case

SDG 190402-103

Lab Sample Number(s) 19683186

Sampled Date 29-Mar-2019

Customer Sample Ref. WS06 ES20

Depth (m) 0.90 - 0.90

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	3.88	<3	38.8	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.00557	<0.0005	0.0557	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.014	<0.0002	0.14	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	0.799	<0.3	7.99	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000358	<0.000005	0.000358	<0.00005	-	-	-
Anthracene (diss.filt)	0.00000531	<0.000005	0.0000531	<0.00005	-	-	-
Boron	0.0105	<0.01	0.105	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000229	<0.000005	0.000229	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	50	<2	500	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 03-Apr-2019  
pH (pH Units) 8.46  
Conductivity (µS/cm) 84.80  
Temperature (°C) 18.40  
Volume Leachant (Litres) 0.890



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.100

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 11.1

Dry Matter Content (%) 90

#### Case

SDG 190402-103

Lab Sample Number(s) 19683186

Sampled Date 29-Mar-2019

Customer Sample Ref. WS06 ES20

Depth (m) 0.90 - 0.90

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000227	<0.000005	0.000227	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.0000071	<0.000005	0.000071	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	<0.0003	<0.0003	<0.003	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.00032	<0.0002	0.0032	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	0.00716	<0.003	0.0716	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.0000938	<0.000082	0.000938	<0.00082	-	-	-
Nickel	0.000509	<0.0004	0.00509	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	<0.001	<0.001	<0.01	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 03-Apr-2019  
pH (pH Units) 8.46  
Conductivity (µS/cm) 84.80  
Temperature (°C) 18.40  
Volume Leachant (Litres) 0.890



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.114

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 26.6

Dry Matter Content (%) 79

#### Case

SDG 190402-103

Lab Sample Number(s) 19683203

Sampled Date 25-Mar-2019

Customer Sample Ref. SA01 ES4

Depth (m) 0.20 - 0.20

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	0.023	<0.01	0.23	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	5.73	<3	57.3	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	<0.0005	<0.0005	<0.005	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.00603	<0.0002	0.0603	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	2.65	<0.3	26.5	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000764	<0.000005	0.000764	<0.00005	-	-	-
Anthracene (diss.filt)	0.00000791	<0.000005	0.0000791	<0.00005	-	-	-
Boron	<0.01	<0.01	<0.1	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000404	<0.000005	0.000404	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	17	<2	170	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.00000542	<0.000005	0.0000542	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 03-Apr-2019  
pH (pH Units) 8.29  
Conductivity (µS/cm) 28.20  
Temperature (°C) 18.40  
Volume Leachant (Litres) 0.876





# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.114

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 26.6

Dry Matter Content (%) 79

#### Case

SDG 190402-103

Lab Sample Number(s) 19683203

Sampled Date 25-Mar-2019

Customer Sample Ref. SA01 ES4

Depth (m) 0.20 - 0.20

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.000049	<0.000005	0.00049	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	<0.0003	<0.0003	<0.003	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000605	<0.0002	0.00605	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000179	<0.000082	0.00179	<0.00082	-	-	-
Nickel	0.000668	<0.0004	0.00668	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00229	<0.001	0.0229	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	0.021	<0.01	0.21	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	0.021	<0.004	0.21	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 03-Apr-2019  
pH (pH Units) 8.29  
Conductivity (µS/cm) 28.20  
Temperature (°C) 18.40  
Volume Leachant (Litres) 0.876



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.097

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 7.53

Dry Matter Content (%) 93

#### Case

SDG 190402-103

Lab Sample Number(s) 19683212

Sampled Date 25-Mar-2019

Customer Sample Ref. TP04 ES6

Depth (m) 0.30 - 0.30

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	5.5	<2	55	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	4.18	<3	41.8	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.00106	<0.0005	0.0106	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.283	<0.0002	2.83	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	0.64	<0.3	6.4	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000229	<0.000005	0.000229	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	<0.01	<0.01	<0.1	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000195	<0.000005	0.000195	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	50	<2	500	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 03-Apr-2019  
pH (pH Units) 7.76  
Conductivity (µS/cm) 11.10  
Temperature (°C) 18.00  
Volume Leachant (Litres) 0.893



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.097

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 7.53

Dry Matter Content (%) 93

#### Case

SDG 190402-103

Lab Sample Number(s) 19683212

Sampled Date 25-Mar-2019

Customer Sample Ref. TP04 ES6

Depth (m) 0.30 - 0.30

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000155	<0.000005	0.000155	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	<0.0003	<0.0003	<0.003	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.00082	<0.00082	-	-	-
Nickel	0.000574	<0.0004	0.00574	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	<0.001	<0.001	<0.01	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 03-Apr-2019  
pH (pH Units) 7.76  
Conductivity (µS/cm) 11.10  
Temperature (°C) 18.00  
Volume Leachant (Litres) 0.893



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103 Client Reference: A110489-4 Report Number: 500420  
Location: Cwmcam High School Order Number: C19/333 Superseded Report:

## Table of Results - Appendix

Method No	Reference	Description
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990:BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM243		Mixed Anions In Soils By Kone
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## Test Completion Dates

**Lab Sample No(s)**  
**Customer Sample Ref.**

**AGS Ref.**  
**Depth**  
**Type**

	19683138	19683194	19683203	19683181	19683212	19683147	19683156	19683165	19683169	19683186
	BH02	HP02	SA01	TP02	TP04	WS01	WS02	WS03	WS04	WS06
	ES10	ES23	ES4	ES2	ES6	ES12	ES14	ES16	ES17	ES20
	0.20 - 0.20	0.25 - 0.25	0.20 - 0.20	0.50 - 0.50	0.30 - 0.30	0.40 - 0.40	0.80 - 0.80	1.00 - 1.00	0.20 - 0.20	0.90 - 0.90
	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO3			08-Apr-2019		05-Apr-2019			08-Apr-2019		05-Apr-2019
Ammoniacal Nitrogen			05-Apr-2019		05-Apr-2019			05-Apr-2019		05-Apr-2019
Anions by Kone (soil)	06-Apr-2019	08-Apr-2019	06-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	06-Apr-2019	06-Apr-2019	06-Apr-2019	08-Apr-2019
Anions by Kone (w)			09-Apr-2019		09-Apr-2019			09-Apr-2019		09-Apr-2019
Asbestos ID in Solid Samples	06-Apr-2019	06-Apr-2019	06-Apr-2019	06-Apr-2019	08-Apr-2019	06-Apr-2019	06-Apr-2019	06-Apr-2019	06-Apr-2019	06-Apr-2019
Boron Water Soluble	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	08-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019
CEN 10:1 Leachate (1 Stage)			03-Apr-2019		03-Apr-2019			03-Apr-2019		03-Apr-2019
CEN Readings			05-Apr-2019		05-Apr-2019			05-Apr-2019		05-Apr-2019
Chromium III	05-Apr-2019	08-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	08-Apr-2019	05-Apr-2019	05-Apr-2019	09-Apr-2019	05-Apr-2019
Cyanide Comp/Free/Total/Thiocyanate	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	09-Apr-2019	08-Apr-2019
Dissolved Metals by ICP-MS			09-Apr-2019		09-Apr-2019			09-Apr-2019		09-Apr-2019
Dissolved Organic/Inorganic Carbon			05-Apr-2019		05-Apr-2019			05-Apr-2019		05-Apr-2019
EPH CWG (Aliphatic) Filtered GC (W)			08-Apr-2019		08-Apr-2019			08-Apr-2019		08-Apr-2019
EPH CWG (Aliphatic) GC (S)	05-Apr-2019	05-Apr-2019	09-Apr-2019	05-Apr-2019	08-Apr-2019	05-Apr-2019	09-Apr-2019	08-Apr-2019	09-Apr-2019	05-Apr-2019
EPH CWG (Aromatic) Filtered GC (W)			08-Apr-2019		08-Apr-2019			08-Apr-2019		08-Apr-2019
EPH CWG (Aromatic) GC (S)	05-Apr-2019	05-Apr-2019	09-Apr-2019	05-Apr-2019	08-Apr-2019	05-Apr-2019	09-Apr-2019	08-Apr-2019	09-Apr-2019	05-Apr-2019
GRO by GC-FID (S)	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019
GRO by GC-FID (W)			08-Apr-2019		08-Apr-2019			08-Apr-2019		08-Apr-2019
Hexavalent Chromium (s)	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	09-Apr-2019	05-Apr-2019
Mercury Dissolved			05-Apr-2019		05-Apr-2019			05-Apr-2019		05-Apr-2019
Metals in solid samples by OES	05-Apr-2019	08-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	08-Apr-2019	05-Apr-2019	05-Apr-2019	04-Apr-2019	05-Apr-2019
Nitrite by Kone (w)			05-Apr-2019		05-Apr-2019			05-Apr-2019		05-Apr-2019
PAH by GCMS	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	09-Apr-2019	08-Apr-2019
PAH in waters by GC-MS (diss.filt)			08-Apr-2019		08-Apr-2019			08-Apr-2019		08-Apr-2019
pH	04-Apr-2019	04-Apr-2019	04-Apr-2019	05-Apr-2019	05-Apr-2019	04-Apr-2019	04-Apr-2019	04-Apr-2019	05-Apr-2019	04-Apr-2019
pH Value of Filtered Water			09-Apr-2019		05-Apr-2019			09-Apr-2019		05-Apr-2019
Phenols by HPLC (S)	08-Apr-2019	06-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	06-Apr-2019	08-Apr-2019	08-Apr-2019	06-Apr-2019	08-Apr-2019
Phenols by HPLC (W)			08-Apr-2019		08-Apr-2019			09-Apr-2019		09-Apr-2019
Sample description	02-Apr-2019	02-Apr-2019	02-Apr-2019	02-Apr-2019	03-Apr-2019	02-Apr-2019	02-Apr-2019	02-Apr-2019	02-Apr-2019	02-Apr-2019
Total Organic Carbon	05-Apr-2019	08-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	08-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019	05-Apr-2019
TPH CWG Filtered (W)			08-Apr-2019		08-Apr-2019			08-Apr-2019		08-Apr-2019
TPH CWG GC (S)	08-Apr-2019	08-Apr-2019	09-Apr-2019	08-Apr-2019	08-Apr-2019	08-Apr-2019	09-Apr-2019	08-Apr-2019	09-Apr-2019	08-Apr-2019
VOC MS (S)	06-Apr-2019	06-Apr-2019	09-Apr-2019	06-Apr-2019	06-Apr-2019	06-Apr-2019	06-Apr-2019	06-Apr-2019	09-Apr-2019	09-Apr-2019



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## ASSOCIATED AQC DATA

### Alkalinity Filtered as CaCO<sub>3</sub>

Component	Method Code	QC 1915	QC 1952
Total Alkalinity Filtered as CaCO <sub>3</sub>	TM043	<b>101.01</b> 95.62 : 106.88	<b>107.5</b> 100.35 : 114.15

### Ammoniacal Nitrogen

Component	Method Code	QC 1913
Ammoniacal Nitrogen as N	TM099	<b>97.2</b> 93.14 : 108.60

### Anions by Kone (soil)

Component	Method Code	QC 1999	QC 1953	QC 1933
Chloride (soluble)	TM243	<b>90.0</b> 78.01 : 122.19	<b>96.19</b> 78.01 : 122.19	 78.01 : 122.19
Water Soluble Sulphate as SO <sub>4</sub> 2:1 Extract	TM243	<b>94.97</b> 75.60 : 131.10	<b>111.06</b> 75.60 : 131.10	 75.60 : 131.10

### Anions by Kone (w)

Component	Method Code	QC 1907	QC 1992
Chloride	TM184	<b>107.0</b> 92.93 : 115.43	<b>108.0</b> 92.93 : 115.43
Phosphate (Ortho as PO <sub>4</sub> )	TM184	 96.40 : 108.40	 96.40 : 108.40
Sulphate (soluble)	TM184	<b>97.2</b> 90.53 : 113.03	<b>96.8</b> 90.53 : 113.03
TON as NO <sub>3</sub>	TM184	<b>105.0</b> 96.26 : 111.21	<b>106.5</b> 96.26 : 111.21

### Boron Water Soluble

Component	Method Code	QC 1993	QC 1956	QC 1962
Water Soluble Boron	TM222	<b>99.5</b> 86.05 : 109.75	<b>103.5</b> 86.05 : 109.75	<b>99.5</b> 86.05 : 109.75

### Cyanide Comp/Free/Total/Thiocyanate



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1983	QC 1936	QC 1987	QC 1913	QC 1985
Free Cyanide	TM153	<b>98.0</b> 87.60 : 108.63	<b>105.0</b> 87.60 : 108.63	<b>99.0</b> 87.60 : 108.63		<b>100.0</b> 87.60 : 108.63
Free Cyanide (W)	TM227				<b>102.5</b> 93.25 : 112.75	
Thiocyanate	TM153	<b>92.22</b> 92.90 : 108.39	<b>98.2</b> 92.90 : 108.39	<b>91.62</b> 92.90 : 108.39		<b>92.81</b> 92.90 : 108.39
Thiocyanate (W)	TM227				<b>101.25</b> 96.25 : 111.25	
Total Cyanide	TM153	<b>104.29</b> 87.00 : 103.00	<b>110.0</b> 87.00 : 103.00	<b>102.86</b> 87.00 : 103.00		<b>106.43</b> 87.00 : 103.00
Total Cyanide (W)	TM227				<b>101.75</b> 92.25 : 111.75	

## Dissolved Metals by ICP-MS

Component	Method Code	QC 1925
Aluminium	TM152	<b>101.33</b> 94.19 : 114.31
Antimony	TM152	<b>105.67</b> 79.80 : 122.00
Arsenic	TM152	<b>104.0</b> 90.42 : 111.32
Barium	TM152	<b>108.17</b> 90.79 : 113.16
Beryllium	TM152	<b>96.83</b> 93.25 : 120.04
Bismuth	TM152	<b>105.0</b> 94.65 : 117.05
Borate	TM152	<b>94.44</b> 88.00 : 112.00
Boron	TM152	<b>94.33</b> 86.68 : 117.67
Cadmium	TM152	<b>106.67</b> 94.60 : 112.40
Calcium	TM152	<b>106.0</b> 83.40 : 121.11
Chromium	TM152	<b>101.67</b> 93.28 : 110.91
Cobalt	TM152	<b>102.67</b> 84.39 : 114.26
Copper	TM152	<b>102.67</b> 88.86 : 118.72
Iron	TM152	<b>103.33</b> 92.00 : 113.00
Lead	TM152	<b>104.5</b> 89.25 : 115.12
Lithium	TM152	<b>99.0</b> 89.26 : 119.04
Magnesium	TM152	<b>104.67</b> 86.35 : 113.36
Manganese	TM152	<b>103.67</b> 94.24 : 112.74
Molybdenum	TM152	<b>102.83</b> 87.00 : 108.89





# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## Dissolved Metals by ICP-MS

		QC 1925
Nickel	TM152	<b>103.83</b> 92.11 : 110.56
Phosphorus	TM152	<b>104.17</b> 90.52 : 115.47
Potassium	TM152	<b>104.67</b> 98.63 : 110.48
Selenium	TM152	<b>105.17</b> 88.44 : 113.86
Silver	TM152	<b>105.67</b> 94.40 : 114.74
Sodium	TM152	<b>104.0</b> 97.63 : 110.31
Strontium	TM152	<b>105.67</b> 90.72 : 114.82
Tellurium	TM152	<b>107.5</b> 90.72 : 112.62
Thallium	TM152	<b>105.5</b> 86.08 : 122.48
Tin	TM152	<b>105.17</b> 91.00 : 109.00
Titanium	TM152	<b>95.83</b> 91.87 : 102.47
Tungsten	TM152	<b>103.0</b> 78.12 : 132.82
Uranium	TM152	<b>102.67</b> 90.58 : 113.28
Vanadium	TM152	<b>104.5</b> 88.43 : 114.30
Zinc	TM152	<b>105.67</b> 86.52 : 115.27

## Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1907
Dissolved Inorganic Carbon	TM090	<b>101.33</b> 91.15 : 111.35
Dissolved Organic Carbon	TM090	<b>104.5</b> 97.18 : 109.58

## EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1991	QC 1940	QC 1991	QC 1996
Total Aliphatics >C12-C35	TM173	<b>85.63</b> 71.82 : 103.92	<b>86.46</b> 70.76 : 104.69	<b>92.71</b> 66.17 : 105.28	<b>96.25</b> 70.71 : 106.26

## EPH CWG (Aromatic) Filtered GC (W)



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190402-103  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/333

Report Number: 500420  
Superseded Report:

## EPH CWG (Aromatic) Filtered GC (W)

Component	Method Code	QC 1941
Total Aromatics >EC10-EC40	TM174	<b>111.22</b> 73.75 : 120.32

## EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1991	QC 1940	QC 1991	QC 1996
Total Aromatics >EC12-EC35	TM173	<b>71.33</b> 68.32 : 103.07	<b>87.33</b> 68.16 : 102.29	<b>88.67</b> 65.78 : 102.90	<b>90.0</b> 65.82 : 105.00

## GRO by GC-FID (S)

Component	Method Code	QC 1984
QC	TM089	<b>85.96</b> 70.34 : 111.95

## GRO by GC-FID (W)

Component	Method Code	QC 1966
Benzene by GC	TM245	<b>95.0</b> 81.54 : 119.70
Ethylbenzene by GC	TM245	<b>99.5</b> 80.99 : 121.09
m & p Xylene by GC	TM245	<b>97.75</b> 82.77 : 123.19
MTBE GC-FID	TM245	<b>94.5</b> 80.06 : 123.27
o Xylene by GC	TM245	<b>100.0</b> 84.26 : 121.50
QC	TM245	<b>142.42</b> 76.13 : 145.89
Toluene by GC	TM245	<b>97.0</b> 82.78 : 121.99

## Hexavalent Chromium (s)

Component	Method Code	QC 1945	QC 1961	QC 1937
Hexavalent Chromium	TM151	<b>98.0</b> 90.20 : 107.00	<b>96.0</b> 90.20 : 107.00	<b>98.0</b> 90.20 : 107.00

## Mercury Dissolved



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## Mercury Dissolved

Component	Method Code	QC 1993
Mercury Dissolved (CVAF)	TM183	<b>98.8</b> 75.00 : 111.00

## Metals in solid samples by OES

Component	Method Code	QC 1987	QC 1964	QC 1938	QC 1902
Aluminium	TM181	<b>101.77</b> 77.84 : 119.01	<b>93.81</b> 77.84 : 119.01	<b>93.81</b> 77.84 : 119.01	<b>97.35</b> 77.84 : 119.01
Antimony	TM181	<b>98.78</b> 84.28 : 107.67	<b>94.31</b> 84.28 : 107.67	<b>92.28</b> 84.28 : 107.67	<b>98.37</b> 84.28 : 107.67
Arsenic	TM181	<b>103.2</b> 87.05 : 109.36	<b>94.19</b> 87.05 : 109.36	<b>94.48</b> 87.05 : 109.36	<b>103.2</b> 87.05 : 109.36
Barium	TM181	<b>102.75</b> 82.49 : 109.34	<b>94.5</b> 82.49 : 109.34	<b>87.8</b> 82.49 : 109.34	<b>98.17</b> 82.49 : 109.34
Beryllium	TM181	<b>103.73</b> 85.44 : 109.61	<b>96.27</b> 85.44 : 109.61	<b>91.79</b> 85.44 : 109.61	<b>98.51</b> 85.44 : 109.61
Boron	TM181	<b>94.84</b> 73.51 : 104.66	<b>79.37</b> 73.51 : 104.66	<b>87.97</b> 73.51 : 104.66	<b>92.26</b> 73.51 : 104.66
Cadmium	TM181	<b>100.41</b> 81.46 : 106.43	<b>88.07</b> 81.46 : 106.43	<b>89.71</b> 81.46 : 106.43	<b>94.24</b> 81.46 : 106.43
Chromium	TM181	<b>96.55</b> 79.78 : 102.80	<b>91.48</b> 79.78 : 102.80	<b>89.25</b> 79.78 : 102.80	<b>95.94</b> 79.78 : 102.80
Cobalt	TM181	<b>94.03</b> 80.74 : 99.26	<b>87.42</b> 80.74 : 99.26	<b>86.48</b> 80.74 : 99.26	<b>89.94</b> 80.74 : 99.26
Copper	TM181	<b>101.41</b> 82.40 : 105.45	<b>94.72</b> 82.40 : 105.45	<b>91.55</b> 82.40 : 105.45	<b>97.71</b> 82.40 : 105.45
Iron	TM181	<b>102.38</b> 82.95 : 110.58	<b>96.03</b> 82.95 : 110.58	<b>88.89</b> 82.95 : 110.58	<b>96.03</b> 82.95 : 110.58
Lead	TM181	<b>92.79</b> 78.24 : 104.05	<b>86.04</b> 78.24 : 104.05	<b>86.26</b> 78.24 : 104.05	<b>93.24</b> 78.24 : 104.05
Manganese	TM181	<b>115.0</b> 94.29 : 119.51	<b>104.72</b> 94.29 : 119.51	<b>100.83</b> 94.29 : 119.51	<b>109.44</b> 94.29 : 119.51
Mercury	TM181	<b>97.34</b> 83.74 : 105.34	<b>93.48</b> 83.74 : 105.34	<b>91.06</b> 83.74 : 105.34	<b>95.89</b> 83.74 : 105.34
Molybdenum	TM181	<b>101.65</b> 87.11 : 106.87	<b>93.0</b> 87.11 : 106.87	<b>91.77</b> 87.11 : 106.87	<b>97.12</b> 87.11 : 106.87
Nickel	TM181	<b>96.58</b> 81.92 : 102.18	<b>86.8</b> 81.92 : 102.18	<b>87.53</b> 81.92 : 102.18	<b>92.42</b> 81.92 : 102.18
Phosphorus	TM181	<b>115.35</b> 94.56 : 124.28	<b>108.08</b> 94.56 : 124.28	<b>105.05</b> 94.56 : 124.28	<b>113.94</b> 94.56 : 124.28
Selenium	TM181	<b>105.1</b> 86.28 : 110.48	<b>96.08</b> 86.28 : 110.48	<b>97.65</b> 86.28 : 110.48	<b>101.18</b> 86.28 : 110.48
Strontium	TM181	<b>97.55</b> 79.13 : 102.79	<b>86.86</b> 79.13 : 102.79	<b>87.53</b> 79.13 : 102.79	<b>95.1</b> 79.13 : 102.79
Thallium	TM181	<b>100.44</b> 82.94 : 111.86	<b>94.25</b> 82.94 : 111.86	<b>93.36</b> 82.94 : 111.86	<b>101.33</b> 82.94 : 111.86
Tin	TM181	<b>101.9</b> 90.25 : 108.86	<b>96.58</b> 90.25 : 108.86	<b>93.54</b> 90.25 : 108.86	<b>99.24</b> 90.25 : 108.86
Titanium	TM181	<b>90.84</b> 66.23 : 102.06	<b>75.42</b> 66.23 : 102.06	<b>90.84</b> 66.23 : 102.06	<b>84.73</b> 66.23 : 102.06



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## Metals in solid samples by OES

		QC 1987	QC 1964	QC 1938	QC 1902
Vanadium	TM181	<b>98.9</b> 86.37 : 107.94	<b>91.58</b> 86.37 : 107.94	<b>91.58</b> 86.37 : 107.94	<b>98.17</b> 86.37 : 107.94
Zinc	TM181	<b>103.7</b> 84.68 : 113.99	<b>91.79</b> 84.68 : 113.99	<b>93.84</b> 84.68 : 113.99	<b>100.21</b> 84.68 : 113.99

## PAH by GCMS

Component	Method Code	QC 1944	QC 1949	QC 1902
Acenaphthene	TM218	<b>104.0</b> 70.00 : 130.00	<b>94.0</b> 76.79 : 103.90	<b>103.5</b> 76.82 : 113.72
Acenaphthylene	TM218	<b>102.5</b> 70.00 : 130.00	<b>93.0</b> 78.40 : 108.66	<b>102.5</b> 75.95 : 108.85
Anthracene	TM218	<b>105.5</b> 70.00 : 130.00	<b>98.0</b> 76.15 : 110.07	<b>104.0</b> 76.67 : 109.58
Benz(a)anthracene	TM218	<b>97.5</b> 68.12 : 118.39	<b>104.0</b> 73.77 : 119.26	<b>109.0</b> 70.05 : 119.30
Benzo(a)pyrene	TM218	<b>101.5</b> 71.72 : 115.31	<b>103.5</b> 73.20 : 114.18	<b>107.0</b> 68.22 : 116.60
Benzo(b)fluoranthene	TM218	<b>94.0</b> 66.89 : 120.40	<b>105.5</b> 75.36 : 117.58	<b>101.0</b> 75.44 : 113.45
Benzo(ghi)perylene	TM218	<b>101.0</b> 67.82 : 118.49	<b>107.0</b> 70.73 : 116.12	<b>102.5</b> 70.79 : 114.76
Benzo(k)fluoranthene	TM218	<b>105.5</b> 73.10 : 117.03	<b>106.5</b> 75.98 : 116.59	<b>105.0</b> 81.43 : 115.17
Chrysene	TM218	<b>103.0</b> 69.58 : 115.47	<b>104.0</b> 74.82 : 114.18	<b>107.5</b> 75.94 : 114.39
Dibenzo(ah)anthracene	TM218	<b>102.0</b> 67.32 : 121.35	<b>98.0</b> 69.17 : 115.30	<b>98.0</b> 71.87 : 118.97
Fluoranthene	TM218	<b>104.0</b> 75.16 : 117.28	<b>107.5</b> 75.88 : 112.84	<b>106.0</b> 77.92 : 113.69
Fluorene	TM218	<b>105.5</b> 70.00 : 130.00	<b>100.0</b> 78.50 : 114.02	<b>99.5</b> 82.02 : 108.34
Indeno(123cd)pyrene	TM218	<b>99.0</b> 70.00 : 130.00	<b>88.5</b> 70.26 : 117.95	<b>100.0</b> 67.80 : 113.60
Naphthalene	TM218	<b>105.0</b> 70.00 : 130.00	<b>100.5</b> 75.24 : 111.26	<b>111.0</b> 88.41 : 116.04
Phenanthrene	TM218	<b>106.5</b> 70.00 : 130.00	<b>98.5</b> 77.07 : 107.43	<b>107.0</b> 78.26 : 113.22
Pyrene	TM218	<b>106.0</b> 75.68 : 119.23	<b>107.5</b> 78.74 : 112.56	<b>109.0</b> 74.86 : 116.81

## PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC 1919
Acenaphthene (diss.filt)	TM178	<b>110.0</b> 94.00 : 120.40
Acenaphthylene (diss.filt)	TM178	<b>95.2</b> 91.20 : 117.60
Anthracene (diss.filt)	TM178	<b>99.6</b> 91.20 : 112.80
Benzo(a)anthracene (diss.filt)	TM178	<b>92.0</b> 86.80 : 115.60
Benzo(a)pyrene (diss.filt)	TM178	<b>94.4</b> 90.40 : 116.80



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## PAH in waters by GC-MS (diss.filt)

		QC 1919
Benzo(b)fluoranthene (diss.filt)	TM178	<b>106.4</b> 86.40 : 117.60
Benzo(g,h,i)perylene (diss.filt)	TM178	<b>111.6</b> 87.60 : 121.20
Benzo(k)fluoranthene (diss.filt)	TM178	<b>112.8</b> 91.20 : 124.80
Chrysene (diss.filt)	TM178	<b>111.6</b> 95.20 : 124.00
Dibenzo(a,h)anthracene (diss.filt)	TM178	<b>107.2</b> 84.80 : 118.40
Fluoranthene (diss.filt)	TM178	<b>108.0</b> 91.20 : 120.00
Fluorene (diss.filt)	TM178	<b>111.6</b> 93.20 : 119.60
Indeno(1,2,3-cd)pyrene (diss.filt)	TM178	<b>96.0</b> 86.80 : 115.60
Naphthalene (diss.filt)	TM178	<b>106.8</b> 90.40 : 126.40
Phenanthrene (diss.filt)	TM178	<b>110.4</b> 94.40 : 118.40
Pyrene (diss.filt)	TM178	<b>108.4</b> 93.60 : 120.00

## pH

Component	Method Code	QC 1915	QC 1977
pH	TM133	<b>98.95</b> 97.57 : 101.94	<b>101.51</b> 97.57 : 101.94

## pH Value of Filtered Water

Component	Method Code	QC 1974
pH Value of Filtered Water	TM256	<b>101.35</b> 99.73 : 102.16

## Phenols by HPLC (S)

Component	Method Code	QC 1911	QC 1939
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	<b>97.4</b> 70.10 : 89.90	<b>99.35</b> 83.23 : 109.71
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	<b>89.47</b> 93.33 : 105.33	<b>84.21</b> 76.34 : 104.11
Catechol by HPLC (S)	TM062 (S)	<b>81.9</b> 47.70 : 158.70	<b>76.19</b> 22.43 : 157.02
Cresols by HPLC (S)	TM062 (S)	<b>104.8</b> 95.80 : 107.80	<b>107.31</b> 89.80 : 112.60
Napthol by HPLC (S)	TM062 (S)	<b>130.0</b> 71.00 : 98.00	<b>123.57</b> 75.62 : 124.38



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

## Phenols by HPLC (S)

		QC 1911	QC 1939
Phenol by HPLC (S)	TM062 (S)	<b>108.61</b> 84.00 : 124.00	<b>107.95</b> 79.53 : 120.47
Resorcinol HPLC (S)	TM062 (S)	<b>94.34</b> 80.00 : 160.00	<b>95.6</b> 71.43 : 129.59
Xylenols by HPLC (S)	TM062 (S)	<b>96.77</b> 88.20 : 96.60	<b>95.1</b> 89.90 : 107.23

## Phenols by HPLC (W)

Component	Method Code	QC 1979	QC 1967
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	<b>102.0</b> 84.40 : 108.40	<b>101.0</b> 93.10 : 108.70
2-Isopropyl Phenol by HPLC (W)	TM259	<b>105.0</b> 84.00 : 138.00	<b>102.0</b> 83.72 : 106.28
Cresols by HPLC (W)	TM259	<b>107.67</b> 93.98 : 117.98	<b>114.33</b> 90.02 : 130.15
Napthol by HPLC (W)	TM259	<b>107.0</b> 92.60 : 116.60	<b>112.0</b> 101.61 : 116.04
Phenol by HPLC (W)	TM259	<b>113.0</b> 94.53 : 118.53	<b>114.0</b> 95.00 : 119.00
Xylenols by HPLC (W)	TM259	<b>100.5</b> 90.50 : 113.50	<b>102.0</b> 98.67 : 108.67

## Total Organic Carbon

Component	Method Code	QC 1968	QC 1909	QC 1937
Total Organic Carbon	TM132	<b>93.75</b> 88.47 : 112.82	<b>101.17</b> 88.47 : 112.82	<b>96.88</b> 88.47 : 112.82

## VOC MS (S)

Component	Method Code	QC 1947	QC 1986
1,1,1,2-tetrachloroethane	TM116	<b>99.4</b> 77.56 : 115.55	<b>103.8</b> 79.10 : 119.66
1,1,1-Trichloroethane	TM116	<b>96.2</b> 73.73 : 118.05	<b>103.0</b> 88.88 : 119.66
1,1,2-Trichloroethane	TM116	<b>93.0</b> 77.12 : 116.04	<b>97.2</b> 75.16 : 112.70
1,1-Dichloroethane	TM116	<b>100.4</b> 74.46 : 129.15	<b>106.6</b> 77.84 : 124.12
1,2-Dichloroethane	TM116	<b>103.8</b> 87.98 : 127.86	<b>109.0</b> 86.58 : 129.62
1,4-Dichlorobenzene	TM116	<b>98.0</b> 72.76 : 126.34	<b>100.0</b> 71.61 : 124.63
2-Chlorotoluene	TM116	<b>90.8</b> 72.40 : 116.20	<b>91.2</b> 66.81 : 118.43
4-Chlorotoluene	TM116	<b>87.8</b> 66.90 : 112.46	<b>89.2</b> 65.88 : 114.76
Benzene	TM116	<b>96.6</b> 91.01 : 117.67	<b>103.4</b> 93.16 : 123.63
Carbon Disulphide	TM116	<b>92.4</b> 74.91 : 122.14	<b>112.8</b> 75.11 : 124.81



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190402-103  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/333

**Report Number:** 500420  
**Superseded Report:**

VOC MS (S)

		QC 1947	QC 1986
Carbontetrachloride	TM116	<b>99.4</b> 80.31 : 124.50	<b>100.8</b> 82.35 : 126.46
Chlorobenzene	TM116	<b>103.2</b> 75.00 : 115.53	<b>102.6</b> 82.88 : 122.42
Chloroform	TM116	<b>100.4</b> 87.40 : 122.49	<b>105.6</b> 82.52 : 123.25
Chloromethane	TM116	<b>98.0</b> 65.05 : 142.63	<b>122.4</b> 55.37 : 133.35
Cis-1,2-Dichloroethene	TM116	<b>99.0</b> 80.67 : 126.72	<b>107.0</b> 78.27 : 128.90
Dibromomethane	TM116	<b>90.4</b> 67.80 : 121.75	<b>89.0</b> 71.69 : 119.43
Dichloromethane	TM116	<b>109.0</b> 81.11 : 133.25	<b>116.2</b> 81.68 : 125.21
Ethylbenzene	TM116	<b>89.0</b> 75.92 : 110.41	<b>90.8</b> 83.56 : 122.99
Hexachlorobutadiene	TM116	<b>46.6</b> 12.82 : 152.73	<b>64.0</b> 7.32 : 139.00
Isopropylbenzene	TM116	<b>81.6</b> 54.21 : 117.17	<b>86.0</b> 52.15 : 132.52
Naphthalene	TM116	<b>99.6</b> 80.86 : 128.81	<b>99.8</b> 79.29 : 125.59
o-Xylene	TM116	<b>89.0</b> 82.80 : 107.93	<b>91.8</b> 68.16 : 107.61
p/m-Xylene	TM116	<b>85.7</b> 68.32 : 108.91	<b>90.0</b> 77.41 : 112.71
Sec-Butylbenzene	TM116	<b>62.8</b> 44.91 : 118.40	<b>70.0</b> 44.71 : 117.87
Tetrachloroethene	TM116	<b>97.8</b> 76.95 : 121.02	<b>98.6</b> 81.43 : 126.65
Toluene	TM116	<b>87.8</b> 74.24 : 107.42	<b>92.0</b> 87.82 : 116.21
Trichloroethene	TM116	<b>94.2</b> 77.61 : 111.54	<b>98.2</b> 79.80 : 112.33
Trichlorofluoromethane	TM116	<b>95.4</b> 71.31 : 128.41	<b>110.2</b> 80.52 : 132.12
Vinyl Chloride	TM116	<b>93.4</b> 68.26 : 133.45	<b>115.6</b> 64.90 : 133.10

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .





# CERTIFICATE OF ANALYSIS

<b>SDG:</b>	190402-103	<b>Client Reference:</b>	A110489-4	<b>Report Number:</b>	500420
<b>Location:</b>	Cwmcam High School	<b>Order Number:</b>	C19/333	<b>Superseded Report:</b>	

## Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH<sub>4</sub> by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

## General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

## Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

## Asbestos

### Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

### Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

**Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.**

**The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**



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47 Newport Road  
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CF24 0AD

**Attention:** Katy Woodhouse

## CERTIFICATE OF ANALYSIS

<b>Date of report Generation:</b>	18 April 2019
<b>Customer:</b>	H_WYG_CDF
<b>Sample Delivery Group (SDG):</b>	190410-7
<b>Your Reference:</b>	A110489-4
<b>Location:</b>	Cwmcarn High School
<b>Report No:</b>	501691

We received 5 samples on Wednesday April 10, 2019 and 5 of these samples were scheduled for analysis which was completed on Thursday April 18, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

**Sonia McWhan**

Operations Manager





## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190410-7  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/398

**Report Number:** 501691  
**Superseded Report:**

### Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
19746700	BH01	EW4	0.00 - 0.00	08/04/2019
19746691	BH02	EW3	0.00 - 0.00	08/04/2019
19746673	BH03A	EW1	0.00 - 0.00	08/04/2019
19746682	WS02	EW2	0.00 - 0.00	08/04/2019
19746709	WS03	EW5	0.00 - 0.00	08/04/2019

#### Maximum Sample/Coolbox Temperature (°C) :

##### ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

#### 5.2

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

**Only received samples which have had analysis scheduled will be shown on the following pages.**



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190410-7  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/398

Report Number: 501691  
Superseded Report:

## Results Legend

**X** Test  
**N** No Determination Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
19746700	BH01	EW4	0.00 - 0.00	NaOH (ALE245) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml Amber Gl. PTFE/PE (ALE219) Vial (ALE297)	GW
19746891	BH02	EW3	0.00 - 0.00	NaOH (ALE245) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml Amber Gl. PTFE/PE (ALE219) Vial (ALE297)	GW
19746873	BH03A	EW1	0.00 - 0.00	NaOH (ALE245) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml Amber Gl. PTFE/PE (ALE219) Vial (ALE297)	GW
19746882	WS02	EW2	0.00 - 0.00	NaOH (ALE245) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml Amber Gl. PTFE/PE (ALE219) Vial (ALE297)	GW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 5			
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 5			
Anions by Kone (w)	All	NDPs: 0 Tests: 5			
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 5			
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 5			
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 5			
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 5			
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 5			
GRO by GC-FID (W)	All	NDPs: 0 Tests: 5			
Mercury Dissolved	All	NDPs: 0 Tests: 5			
Nitrite by Kone (w)	All	NDPs: 0 Tests: 5			
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 5			
pH Value	All	NDPs: 0 Tests: 5			
Phenols by HPLC (W)	All	NDPs: 0 Tests: 5			
TPH CWG (W)	All	NDPs: 0 Tests: 5			











# CERTIFICATE OF ANALYSIS

Validated

SDG: 190410-7 Client Reference: A110489-4 Report Number: 501691  
Location: Cwmcam High School Order Number: C19/398 Superseded Report:

## TPH CWG (W)

Results Legend			Customer Sample Ref.	BH01	BH02	BH03A	WS02	WS03	
#	ISO17025 accredited.								
M	mCERTS accredited.								
sq	Aqueous / settled sample.								
dis.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted - refer to subcontractor report for accreditation status.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery								
(F)	Trigger breach confirmed								
1-3*5@	Sample deviation (see appendix)								
Component	LOD/Units	Method	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
GRO Surrogate % recovery**	%	TM245		114	108	114	110	113	
GRO >C5-C12	<50 µg/l	TM245		<50	<50	<50	<50	<50	
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245		<3	<3	<3	<3	<3	
Benzene	<7 µg/l	TM245		<7	<7	<7	<7	<7	
Toluene	<4 µg/l	TM245		<4	<4	<4	<4	<4	
Ethylbenzene	<5 µg/l	TM245		<5	<5	<5	<5	<5	
m,p-Xylene	<8 µg/l	TM245		<8	<8	<8	<8	<8	
o-Xylene	<3 µg/l	TM245		<3	<3	<3	<3	<3	
Sum of detected Xylenes	<11 µg/l	TM245		<11	<11	<11	<11	<11	
Sum of detected BTEX	<28 µg/l	TM245		<28	<28	<28	<28	<28	
Aliphatics >C5-C6	<10 µg/l	TM245		<10	<10	<10	<10	<10	
Aliphatics >C6-C8	<10 µg/l	TM245		<10	<10	<10	<10	<10	
Aliphatics >C8-C10	<10 µg/l	TM245		<10	<10	<10	<10	<10	
Aliphatics >C10-C12	<10 µg/l	TM245		<10	<10	<10	<10	<10	
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Aromatics >EC5-EC7	<10 µg/l	TM245		<10	<10	<10	<10	<10	
Aromatics >EC7-EC8	<10 µg/l	TM245		<10	<10	<10	<10	<10	
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	<10	<10	<10	<10	
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	<10	<10	<10	<10	
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174		<10	<10	<10	<10	<10	
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174		<10	<10	<10	<10	<10	



## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190410-7  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/398

**Report Number:** 501691  
**Superseded Report:**

### Table of Results - Appendix

Method No	Reference	Description
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190410-7  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/398

**Report Number:** 501691  
**Superseded Report:**

## Test Completion Dates

Lab Sample No(s)	19746700	19746691	19746673	19746682	19746709
Customer Sample Ref.	BH01	BH02	BH03A	WS02	WS03
AGS Ref.	EW4	EW3	EW1	EW2	EW5
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Alkalinity as CaCO <sub>3</sub>	12-Apr-2019	12-Apr-2019	12-Apr-2019	12-Apr-2019	12-Apr-2019
Ammoniacal Nitrogen	11-Apr-2019	11-Apr-2019	11-Apr-2019	11-Apr-2019	11-Apr-2019
Anions by Kone (w)	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019
Cyanide Comp/Free/Total/Thiocyanate	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019
Dissolved Metals by ICP-MS	18-Apr-2019	18-Apr-2019	18-Apr-2019	18-Apr-2019	18-Apr-2019
Dissolved Organic/Inorganic Carbon	12-Apr-2019	12-Apr-2019	12-Apr-2019	12-Apr-2019	12-Apr-2019
EPH CWG (Aliphatic) Aqueous GC (W)	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019
EPH CWG (Aromatic) Aqueous GC (W)	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019
GRO by GC-FID (W)	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019
Mercury Dissolved	11-Apr-2019	12-Apr-2019	11-Apr-2019	11-Apr-2019	11-Apr-2019
Nitrite by Kone (w)	11-Apr-2019	11-Apr-2019	11-Apr-2019	11-Apr-2019	11-Apr-2019
PAH Spec MS - Aqueous (W)	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019
pH Value	12-Apr-2019	12-Apr-2019	12-Apr-2019	12-Apr-2019	12-Apr-2019
Phenols by HPLC (W)	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019	16-Apr-2019
TPH CWG (W)	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019	15-Apr-2019



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190410-7  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/398

Report Number: 501691  
Superseded Report:

## ASSOCIATED AQC DATA

### Alkalinity as CaCO<sub>3</sub>

Component	Method Code	QC 1995
Total Alkalinity as CaCO <sub>3</sub>	TM043	<b>101.01</b> 96.56 : 106.57

### Ammoniacal Nitrogen

Component	Method Code	QC 1950
Ammoniacal Nitrogen as N	TM099	<b>98.8</b> 93.14 : 108.60

### Anions by Kone (w)

Component	Method Code	QC 1923
Chloride	TM184	<b>101.0</b> 94.04 : 108.61
Phosphate (Ortho as PO <sub>4</sub> )	TM184	<b>95.74</b> 95.74 : 105.80
Sulphate (soluble)	TM184	<b>100.8</b> 96.38 : 107.58
TON as NO <sub>3</sub>	TM184	<b>96.5</b> 92.98 : 109.90

### Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1928	QC 1964
Free Cyanide (W)	TM227	<b>100.5</b> 92.00 : 113.00	<b>103.25</b> 92.00 : 113.00
Thiocyanate (W)	TM227	<b>102.75</b> 95.50 : 107.50	<b>104.25</b> 95.50 : 107.50
Total Cyanide (W)	TM227	<b>102.75</b> 95.50 : 110.50	<b>106.0</b> 95.50 : 110.50

### Dissolved Metals by ICP-MS

Component	Method Code	QC 1923	QC 1946
Aluminium	TM152	<b>102.67</b> 94.19 : 114.31	<b>101.67</b> 94.19 : 114.31
Antimony	TM152	<b>104.0</b> 79.80 : 122.00	<b>106.0</b> 79.80 : 122.00
Arsenic	TM152	<b>99.17</b> 90.42 : 111.32	<b>106.0</b> 90.42 : 111.32
Barium	TM152	<b>104.33</b> 90.79 : 113.16	<b>108.83</b> 90.79 : 113.16
Beryllium	TM152	<b>91.17</b> 93.25 : 120.04	<b>97.83</b> 93.25 : 120.04
Bismuth	TM152	<b>101.67</b> 94.65 : 117.05	<b>102.67</b> 94.65 : 117.05



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190410-7  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/398

**Report Number:** 501691  
**Superseded Report:**

## Dissolved Metals by ICP-MS

		QC 1923	QC 1946
Borate	TM152	<b>98.15</b> 88.00 : 112.00	<b>98.77</b> 88.00 : 112.00
Boron	TM152	<b>98.0</b> 86.68 : 117.67	<b>99.0</b> 86.68 : 117.67
Cadmium	TM152	<b>104.0</b> 94.60 : 112.40	<b>104.17</b> 94.60 : 112.40
Calcium	TM152	<b>99.33</b> 83.40 : 121.11	<b>106.0</b> 83.40 : 121.11
Chromium	TM152	<b>98.33</b> 93.28 : 110.91	<b>100.17</b> 93.28 : 110.91
Cobalt	TM152	<b>95.67</b> 84.39 : 114.26	<b>100.5</b> 84.39 : 114.26
Copper	TM152	<b>95.83</b> 88.86 : 118.72	<b>101.83</b> 88.86 : 118.72
Iron	TM152	<b>98.67</b> 92.00 : 113.00	<b>102.0</b> 92.00 : 113.00
Lead	TM152	<b>101.5</b> 89.25 : 115.12	<b>102.67</b> 89.25 : 115.12
Lithium	TM152	<b>92.67</b> 89.26 : 119.04	<b>96.33</b> 89.26 : 119.04
Magnesium	TM152	<b>96.0</b> 86.35 : 113.36	<b>102.0</b> 86.35 : 113.36
Manganese	TM152	<b>100.67</b> 94.24 : 112.74	<b>101.83</b> 94.24 : 112.74
Molybdenum	TM152	<b>98.33</b> 87.00 : 108.89	<b>96.33</b> 87.00 : 108.89
Nickel	TM152	<b>94.17</b> 92.11 : 110.56	<b>101.17</b> 92.11 : 110.56
Phosphorus	TM152	<b>96.67</b> 90.52 : 115.47	<b>105.67</b> 90.52 : 115.47
Potassium	TM152	<b>101.33</b> 98.63 : 110.48	<b>108.0</b> 98.63 : 110.48
Selenium	TM152	<b>103.0</b> 88.44 : 113.86	<b>105.17</b> 88.44 : 113.86
Silver	TM152	<b>101.83</b> 94.40 : 114.74	<b>103.17</b> 94.40 : 114.74
Sodium	TM152	<b>96.0</b> 97.63 : 110.31	<b>102.0</b> 97.63 : 110.31
Strontium	TM152	<b>105.33</b> 90.72 : 114.82	<b>105.0</b> 90.72 : 114.82
Tellurium	TM152	<b>101.83</b> 90.72 : 112.62	<b>105.17</b> 90.72 : 112.62
Thallium	TM152	<b>103.67</b> 86.08 : 122.48	<b>103.67</b> 86.08 : 122.48
Tin	TM152	<b>102.67</b> 91.00 : 109.00	<b>105.33</b> 91.00 : 109.00
Titanium	TM152	<b>96.17</b> 91.87 : 102.47	<b>96.0</b> 91.87 : 102.47
Tungsten	TM152	<b>97.33</b> 78.12 : 132.82	<b>97.0</b> 78.12 : 132.82
Uranium	TM152	<b>100.67</b> 90.58 : 113.28	<b>99.17</b> 90.58 : 113.28
Vanadium	TM152	<b>101.17</b> 88.43 : 114.30	<b>99.83</b> 88.43 : 114.30



# CERTIFICATE OF ANALYSIS

Validated

SDG: 190410-7  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C19/398

Report Number: 501691  
Superseded Report:

## Dissolved Metals by ICP-MS

		QC 1923	QC 1946
Zinc	TM152	<b>100.33</b> 86.52 : 115.27	<b>106.0</b> 86.52 : 115.27

## Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1929
Dissolved Inorganic Carbon	TM090	<b>107.33</b> 91.15 : 111.35
Dissolved Organic Carbon	TM090	<b>107.33</b> 97.18 : 109.58

## EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 1955
Total Aliphatics >C10-C40	TM174	<b>100.83</b> 68.59 : 134.82

## EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 1958
Total Aromatics >EC10-EC40	TM174	<b>93.41</b> 60.75 : 129.09

## GRO by GC-FID (W)

Component	Method Code	QC 1921
Benzene by GC	TM245	<b>103.0</b> 77.76 : 121.54
Ethylbenzene by GC	TM245	<b>103.5</b> 76.04 : 121.93
m & p Xylene by GC	TM245	<b>102.0</b> 75.79 : 121.81
MTBE GC-FID	TM245	<b>103.5</b> 78.56 : 122.20
o Xylene by GC	TM245	<b>103.0</b> 76.38 : 121.51
QC	TM245	<b>104.31</b> 66.08 : 129.83
Toluene by GC	TM245	<b>102.5</b> 76.66 : 123.55

## Mercury Dissolved



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190410-7  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/398

**Report Number:** 501691  
**Superseded Report:**

## Mercury Dissolved

Component	Method Code	QC 1929	QC 1932
Mercury Dissolved (CVAF)	TM183	<b>87.1</b> 75.00 : 111.00	<b>78.4</b> 75.00 : 111.00

## PAH Spec MS - Aqueous (W)

Component	Method Code	QC 1959
Acenaphthene by GCMS	TM178	<b>108.4</b> 88.80 : 117.60
Acenaphthylene by GCMS	TM178	<b>96.0</b> 91.66 : 114.36
Anthracene by GCMS	TM178	<b>99.6</b> 97.60 : 107.20
Benz(a)anthracene by GCMS	TM178	<b>94.8</b> 87.31 : 114.17
Benzo(a)pyrene by GCMS	TM178	<b>97.2</b> 90.00 : 114.00
Benzo(b)fluoranthene by GCMS	TM178	<b>104.4</b> 88.00 : 114.40
Benzo(ghi)perylene by GCMS	TM178	<b>107.6</b> 96.80 : 113.60
Benzo(k)fluoranthene by GCMS	TM178	<b>113.2</b> 92.80 : 116.80
Chrysene by GCMS	TM178	<b>108.8</b> 100.00 : 121.60
Dibenzo(ah)anthracene by GCMS	TM178	<b>102.4</b> 88.00 : 114.40
Fluoranthene by GCMS	TM178	<b>112.4</b> 93.49 : 118.20
Fluorene by GCMS	TM178	<b>111.2</b> 94.39 : 118.66
Indeno(123cd)pyrene by GCMS	TM178	<b>95.6</b> 90.40 : 114.40
Naphthalene by GCMS	TM178	<b>112.4</b> 99.60 : 121.20
Phenanthrene by GCMS	TM178	<b>109.6</b> 99.20 : 116.00
Pyrene by GCMS	TM178	<b>112.0</b> 96.40 : 115.60

## pH Value

Component	Method Code	QC 1953
pH	TM256	<b>101.08</b> 99.73 : 102.16

## Phenols by HPLC (W)





## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 190410-7  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C19/398

**Report Number:** 501691  
**Superseded Report:**

### Phenols by HPLC (W)

Component	Method Code	QC 1952	QC 1938
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	<b>95.0</b> 84.40 : 108.40	<b>99.0</b> 93.10 : 108.70
2-Isopropyl Phenol by HPLC (W)	TM259	<b>98.0</b> 84.00 : 138.00	<b>100.0</b> 83.72 : 106.28
Cresols by HPLC (W)	TM259	<b>102.67</b> 93.98 : 117.98	<b>111.33</b> 90.02 : 130.15
Napthol by HPLC (W)	TM259	<b>116.0</b> 92.60 : 116.60	<b>119.0</b> 101.61 : 116.04
Phenol by HPLC (W)	TM259	<b>110.0</b> 94.53 : 118.53	<b>112.0</b> 95.00 : 119.00
Xylenols by HPLC (W)	TM259	<b>98.5</b> 90.50 : 113.50	<b>101.67</b> 98.67 : 108.67

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.



# CERTIFICATE OF ANALYSIS

<b>SDG:</b>	190410-7	<b>Client Reference:</b>	A110489-4	<b>Report Number:</b>	501691
<b>Location:</b>	Cwmcam High School	<b>Order Number:</b>	C19/398	<b>Superseded Report:</b>	

## Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH<sub>4</sub> by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

## General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

## Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

## Asbestos

### Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

### Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

**Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.**

**The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**



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WYG Geo-Environment  
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Longcross Court  
47 Newport Road  
Cardiff  
CF24 0AD

**Attention:** Sarah Roberts

## CERTIFICATE OF ANALYSIS

<b>Date of report Generation:</b>	28 December 2019
<b>Customer:</b>	WYG Geo-Environment
<b>Sample Delivery Group (SDG):</b>	191210-82
<b>Your Reference:</b>	A110489-4-1
<b>Location:</b>	Cwmcarn High School
<b>Report No:</b>	535551

We received 16 samples on Tuesday December 10, 2019 and 3 of these samples were scheduled for analysis which was completed on Saturday December 28, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

**Sonia McWhan**

Operations Manager





## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

### Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21329440	SA101	ES1	0.00 - 0.05	26/11/2019
21329514	SA101	ES2	0.60 - 0.70	26/11/2019
21329544	SA102	ES1	0.10 - 0.20	26/11/2019
21329554	SA102	ES2	0.60 - 0.70	26/11/2019
21329524	SA103	ES1	0.10 - 0.20	26/11/2019
21329533	SA103	ES2	1.20 - 1.30	26/11/2019
21329565	SA104	ES1	0.10 - 0.20	26/11/2019
21329573	SA104	ES2	0.60 - 0.70	26/11/2019
21329582	WS101	ES1	0.20	26/11/2019
21329449	WS101	ES2	0.50	26/12/2019
21329461	WS102	ES1	0.20	26/12/2019
21329468	WS102	ES2	0.50	26/12/2019
21329505	WS104	ES1	0.20	26/12/2019
21329591	WS104		0.50 - 0.50	
21329485	WS107	ES1	0.20	26/12/2019
21329496	WS107	ES2	0.50	26/12/2019

#### Maximum Sample/Coolbox Temperature (°C) :

##### ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

#### 9.5

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

**Only received samples which have had analysis scheduled will be shown on the following pages.**



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C12/1273

Report Number: 535551  
Superseded Report:

## Results Legend



Test



No Determination Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Alkalinity Filtered as CaCO3

All

NDPs: 0  
Tests: 3

X

X

X

Ammoniacal Nitrogen

All

NDPs: 0  
Tests: 3

X

X

X

Anions by Kone (soil)

All

NDPs: 0  
Tests: 3

X

X

X

Anions by Kone (w)

All

NDPs: 0  
Tests: 3

X

X

X

Asbestos ID in Solid Samples

All

NDPs: 0  
Tests: 3

X

X

X

Boron Water Soluble

All

NDPs: 0  
Tests: 3

X

X

X

CEN Readings

All

NDPs: 0  
Tests: 3

X

X

X

Chromium III

All

NDPs: 0  
Tests: 3

X

X

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0  
Tests: 6

X

X

X

X

X

X

Dissolved Metals by ICP-MS

All

NDPs: 0  
Tests: 3

X

X

X

Dissolved Organic/Inorganic Carbon

All

NDPs: 0  
Tests: 3

X

X

X

EPH CWG (Aliphatic) Filtered GC (W)

All

NDPs: 0  
Tests: 3

X

X

X

EPH CWG (Aromatic) Filtered GC (W)

All

NDPs: 0  
Tests: 3

X

X

X

EPH CWG GC (S)

All

NDPs: 0  
Tests: 3

X

X

X

GRO by GC-FID (S)

All

NDPs: 0  
Tests: 3

X

X

X



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

## Results Legend

- X** Test  
**N** No Determination Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

Results Legend	Lab Sample No(s)		21329514		21329544		21329461	
	Customer Sample Reference		SA101		SA102		WS102	
	AGS Reference		ES2		ES1		ES1	
	Depth (m)		0.60 - 0.70		0.10 - 0.20		0.20	
	Container		60g VOC (ALE215) 1kg TUB with Handle (ALE260)		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)		60g VOC (ALE215) 250g Amber Jar (ALE210)	
	Sample Type		S		S		S	
GRO by GC-FID (W)	All	NDPs: 0 Tests: 3	X		X		X	
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 3		X		X		X
Mercury Dissolved	All	NDPs: 0 Tests: 3	X		X		X	
Metals in solid samples by OES	All	NDPs: 0 Tests: 3		X		X		X
Nitrite by Kone (w)	All	NDPs: 0 Tests: 3	X		X		X	
PAH by GCMS	All	NDPs: 0 Tests: 3		X		X		X
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 3	X		X		X	
pH	All	NDPs: 0 Tests: 3		X		X		X
pH Value of Filtered Water	All	NDPs: 0 Tests: 3	X		X		X	
Phenols by HPLC (S)	All	NDPs: 0 Tests: 3		X		X		X
Phenols by HPLC (W)	All	NDPs: 0 Tests: 3	X		X		X	
Sample description	All	NDPs: 0 Tests: 3		X		X		X
Total Organic Carbon	All	NDPs: 0 Tests: 3		X		X		X
TPH CWG Filtered (W)	All	NDPs: 0 Tests: 3	X		X		X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 3		X		X		X



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

## Results Legend



Test


No Determination  
Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

Lab Sample No(s)

Customer  
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

VOC MS (S)

All

NDPs: 0  
Tests: 3

21329514

SA101

ES2

0.60 - 0.70

60g VOC (ALE215)

250g Amber Jar  
(ALE210)

1kg TUB with  
Handle (ALE260)

60g VOC (ALE215)

250g Amber Jar  
(ALE210)

1kg TUB with  
Handle (ALE260)

60g VOC (ALE215)

250g Amber Jar  
(ALE210)

1kg TUB with  
Handle (ALE260)

60g VOC (ALE215)

250g Amber Jar  
(ALE210)

1kg TUB with  
Handle (ALE260)

60g VOC (ALE215)

250g Amber Jar  
(ALE210)

1kg TUB with  
Handle (ALE260)

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250g Amber Jar  
(ALE210)

1kg TUB with  
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250g Amber Jar  
(ALE210)

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(ALE210)

1kg TUB with  
Handle (ALE260)

60g VOC (ALE215)

250g Amber Jar  
(ALE210)

1kg TUB with  
Handle (ALE260)

60g VOC (ALE215)

250g Amber Jar  
(ALE210)

1kg TUB with  
Handle (ALE260)

60g VOC (ALE215)

X

X

X





## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

### Sample Descriptions

#### Grain Sizes

<b>very fine</b>	<0.063mm	<b>fine</b>	0.063mm - 0.1mm	<b>medium</b>	0.1mm - 2mm	<b>coarse</b>	2mm - 10mm	<b>very coarse</b>	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21329514	SA101	0.60 - 0.70	Dark Brown	Loamy Sand	Stones	None
21329544	SA102	0.10 - 0.20	Dark Brown	Sandy Loam	Stones	Vegetation
21329461	WS102	0.20	Dark Brown	Loamy Sand	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.











# CERTIFICATE OF ANALYSIS

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

## Asbestos Identification - Solid Samples

### Results Legend

# ISO17025 accredited.  
M mCERTS accredited.  
\* Subcontracted test.  
(F) Trigger breach confirmed  
1-5&\*&@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	SA101ES2 0.60 - 0.70 SOLID 26/11/2019 00:00:00 10/12/2019 14:10:00 191210-82 21329514 TM048	12/12/19	Andrzej Ferrecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	SA102ES1 0.10 - 0.20 SOLID 26/11/2019 00:00:00 10/12/2019 14:10:00 191210-82 21329544 TM048	12/12/19	Andrzej Ferrecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS102ES1 0.20 SOLID 26/12/2019 00:00:00 10/12/2019 14:10:00 191210-82 21329461 TM048	16/12/19	Andrzej Ferrecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C12/1273

Report Number: 535551  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.118

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 32

Dry Matter Content (%) 75.7

#### Case

SDG 191210-82

Lab Sample Number(s) 21329461

Sampled Date 26-Dec-2019

Customer Sample Ref. WS102 ES1

Depth (m) 0.20

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	6.03	<3	60.3	<30	-	-	-
Mercury Dissolved (CVAf)	0.0000148	<0.00001	0.000148	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.00055	<0.0005	0.0055	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.0698	<0.0002	0.698	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	2.36	<0.3	23.6	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000206	<0.000005	0.000206	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0862	<0.01	0.862	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000224	<0.000005	0.000224	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	4	<2	40	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.00000547	<0.000005	0.0000547	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 13-Dec-2019  
pH (pH Units) 6.20  
Conductivity (µS/cm) 12.50  
Temperature (°C) 18.40  
Volume Leachant (Litres) 0.872





# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C12/1273

Report Number: 535551  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.118

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 32

Dry Matter Content (%) 75.7

#### Case

SDG 191210-82

Lab Sample Number(s) 21329461

Sampled Date 26-Dec-2019

Customer Sample Ref. WS102 ES1

Depth (m) 0.20

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000152	<0.000005	0.000152	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00248	<0.0003	0.0248	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000987	<0.0002	0.00987	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.00082	<0.00082	-	-	-
Nickel	0.00119	<0.0004	0.0119	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.0311	<0.001	0.311	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 13-Dec-2019  
pH (pH Units) 6.20  
Conductivity (µS/cm) 12.50  
Temperature (°C) 18.40  
Volume Leachant (Litres) 0.872



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C12/1273

Report Number: 535551  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.102

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 13.4

Dry Matter Content (%) 88.2

#### Case

SDG 191210-82

Lab Sample Number(s) 21329514

Sampled Date 26-Nov-2019

Customer Sample Ref. SA101 ES2

Depth (m) 0.60 - 0.70

#### Eluate Analysis

Eluate Analysis	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	4.04	<3	40.4	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.0000149	<0.000005	0.000149	<0.00005	-	-	-
Arsenic	<0.0005	<0.0005	<0.005	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.226	<0.0002	2.26	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	0.332	<0.3	3.32	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.000235	<0.000005	0.00235	<0.00005	-	-	-
Anthracene (diss.filt)	0.0000187	<0.000005	0.000187	<0.00005	-	-	-
Boron	0.0368	<0.01	0.368	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000901	<0.000005	0.000901	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	60	<2	600	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.0000252	<0.000005	0.000252	<0.00005	-	-	-
Chrysene (diss.filt)	0.0000924	<0.000005	0.000924	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 11-Dec-2019  
pH (pH Units) 8.06  
Conductivity (µS/cm) 86.30  
Temperature (°C) 20.70  
Volume Leachant (Litres) 0.888



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C12/1273

Report Number: 535551  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.102

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 13.4

Dry Matter Content (%) 88.2

#### Case

SDG 191210-82

Lab Sample Number(s) 21329514

Sampled Date 26-Nov-2019

Customer Sample Ref. SA101 ES2

Depth (m) 0.60 - 0.70

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.000195	<0.000005	0.00195	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.0000744	<0.000005	0.000744	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.0000403	<0.000005	0.000403	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.0000199	<0.000005	0.000199	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00118	<0.0003	0.0118	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	0.0037	<0.003	0.037	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000806	<0.000082	0.00806	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00267	<0.001	0.0267	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 11-Dec-2019  
pH (pH Units) 8.06  
Conductivity (µS/cm) 86.30  
Temperature (°C) 20.70  
Volume Leachant (Litres) 0.888



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C12/1273

Report Number: 535551  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.117

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 30.7

Dry Matter Content (%) 76.5

#### Case

SDG 191210-82

Lab Sample Number(s) 21329544

Sampled Date 26-Nov-2019

Customer Sample Ref. SA102 ES1

Depth (m) 0.10 - 0.20

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	4.24	<3	42.4	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	0.0000102	<0.00001	0.000102	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.0000182	<0.000005	0.000182	<0.00005	-	-	-
Arsenic	0.000569	<0.0005	0.00569	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.00273	<0.0002	0.0273	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	2.39	<0.3	23.9	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000491	<0.000005	0.000491	<0.00005	-	-	-
Anthracene (diss.filt)	0.00000861	<0.000005	0.0000861	<0.00005	-	-	-
Boron	<0.01	<0.01	<0.1	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000306	<0.000005	0.000306	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	3	<2	30	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.0000233	<0.000005	0.000233	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 11-Dec-2019  
pH (pH Units) 7.54  
Conductivity (µS/cm) 10.10  
Temperature (°C) 20.07  
Volume Leachant (Litres) 0.873



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C12/1273

Report Number: 535551  
Superseded Report:

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.117

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 30.7

Dry Matter Content (%) 76.5

#### Case

SDG 191210-82

Lab Sample Number(s) 21329544

Sampled Date 26-Nov-2019

Customer Sample Ref. SA102 ES1

Depth (m) 0.10 - 0.20

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000336	<0.000005	0.000336	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00305	<0.0003	0.0305	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000976	<0.0002	0.00976	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000174	<0.000082	0.00174	<0.00082	-	-	-
Nickel	0.000646	<0.0004	0.00646	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.0038	<0.001	0.038	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 11-Dec-2019  
pH (pH Units) 7.54  
Conductivity (µS/cm) 10.10  
Temperature (°C) 20.07  
Volume Leachant (Litres) 0.873



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82 Client Reference: A110489-4-1 Report Number: 535551  
Location: Cwmcam High School Order Number: C12/1273 Superseded Report:

## Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990:BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM243		Mixed Anions In Soils By Kone
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

## Test Completion Dates

Lab Sample No(s)	21329514	21329544	21329461
Customer Sample Ref.	SA101	SA102	WS102
AGS Ref.	ES2	ES1	ES1
Depth	0.60 - 0.70	0.10 - 0.20	0.20
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO <sub>3</sub>	17-Dec-2019	17-Dec-2019	17-Dec-2019
Ammoniacal Nitrogen	17-Dec-2019	17-Dec-2019	17-Dec-2019
Anions by Kone (soil)	14-Dec-2019	17-Dec-2019	16-Dec-2019
Anions by Kone (w)	17-Dec-2019	17-Dec-2019	17-Dec-2019
Asbestos ID in Solid Samples	12-Dec-2019	12-Dec-2019	16-Dec-2019
Boron Water Soluble	13-Dec-2019	13-Dec-2019	16-Dec-2019
CEN 10:1 Leachate (1 Stage)	12-Dec-2019	12-Dec-2019	13-Dec-2019
CEN Readings	17-Dec-2019	17-Dec-2019	17-Dec-2019
Chromium III	16-Dec-2019	16-Dec-2019	16-Dec-2019
Cyanide Comp/Free/Total/Thiocyanate	18-Dec-2019	18-Dec-2019	18-Dec-2019
Dissolved Metals by ICP-MS	17-Dec-2019	17-Dec-2019	17-Dec-2019
Dissolved Organic/Inorganic Carbon	18-Dec-2019	18-Dec-2019	18-Dec-2019
EPH CWG (Aliphatic) Filtered GC (W)	28-Dec-2019	28-Dec-2019	28-Dec-2019
EPH CWG (Aromatic) Filtered GC (W)	28-Dec-2019	28-Dec-2019	28-Dec-2019
EPH CWG GC (S)	16-Dec-2019	16-Dec-2019	20-Dec-2019
GRO by GC-FID (S)	13-Dec-2019	13-Dec-2019	16-Dec-2019
GRO by GC-FID (W)	17-Dec-2019	17-Dec-2019	17-Dec-2019
Hexavalent Chromium (s)	16-Dec-2019	16-Dec-2019	16-Dec-2019
Mercury Dissolved	17-Dec-2019	17-Dec-2019	23-Dec-2019
Metals in solid samples by OES	16-Dec-2019	16-Dec-2019	16-Dec-2019
Nitrite by Kone (w)	17-Dec-2019	17-Dec-2019	17-Dec-2019
PAH by GCMS	17-Dec-2019	13-Dec-2019	18-Dec-2019
PAH in waters by GC-MS (diss.filt)	24-Dec-2019	24-Dec-2019	24-Dec-2019
pH	17-Dec-2019	17-Dec-2019	17-Dec-2019
pH Value of Filtered Water	17-Dec-2019	17-Dec-2019	17-Dec-2019
Phenols by HPLC (S)	13-Dec-2019	13-Dec-2019	16-Dec-2019
Phenols by HPLC (W)	18-Dec-2019	18-Dec-2019	18-Dec-2019
Sample description	11-Dec-2019	11-Dec-2019	12-Dec-2019
Total Organic Carbon	13-Dec-2019	17-Dec-2019	16-Dec-2019
TPH CWG Filtered (W)	28-Dec-2019	28-Dec-2019	28-Dec-2019
TPH CWG GC (S)	16-Dec-2019	16-Dec-2019	20-Dec-2019
VOC MS (S)	12-Dec-2019	12-Dec-2019	13-Dec-2019





## CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High SchoolClient Reference: A110489-4-1  
Order Number: C12/1273Report Number: 535551  
Superseded Report:

## ASSOCIATED AQC DATA

Alkalinity Filtered as CaCO<sub>3</sub>

Component	Method Code	QC 2103	QC 2123
Total Alkalinity Filtered as CaCO <sub>3</sub>	TM043	<b>101.01</b> 95.62 : 106.88	<b>107.5</b> 100.35 : 114.15

## Ammoniacal Nitrogen

Component	Method Code	QC 2124
Ammoniacal Nitrogen as N	TM099	<b>101.2</b> 93.14 : 108.60

## Anions by Kone (w)

Component	Method Code	QC 2100
Chloride	TM184	<b>103.0</b> 92.93 : 115.43
Sulphate (soluble)	TM184	<b>100.8</b> 90.53 : 113.03
TON as NO <sub>3</sub>	TM184	<b>100.5</b> 96.26 : 111.21

## Boron Water Soluble

Component	Method Code	QC 2190	QC 2152	QC 2103
Water Soluble Boron	TM222	<b>104.0</b> 85.80 : 112.50	<b>105.0</b> 85.80 : 112.50	<b>94.0</b> 85.80 : 112.50

## Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2128	QC 2104	QC 2178
Free Cyanide	TM153	<b>88.4</b> 83.05 : 112.74	<b>95.7</b> 83.05 : 112.74	
Free Cyanide (W)	TM227			<b>98.5</b> 93.25 : 112.75
Thiocyanate	TM153	<b>83.83</b> 89.81 : 110.19	<b>90.42</b> 89.81 : 110.19	
Thiocyanate (W)	TM227			<b>99.25</b> 94.00 : 112.00
Total Cyanide	TM153	<b>91.43</b> 88.29 : 111.43	<b>98.57</b> 88.29 : 111.43	
Total Cyanide (W)	TM227			<b>99.0</b> 92.25 : 111.75

## Dissolved Metals by ICP-MS



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

## Dissolved Metals by ICP-MS

Component	Method Code	QC 2149
Aluminium	TM152	<b>106.0</b> 95.37 : 118.13
Antimony	TM152	<b>103.17</b> 88.37 : 130.57
Arsenic	TM152	<b>100.5</b> 92.62 : 113.52
Barium	TM152	<b>104.5</b> 93.15 : 115.52
Beryllium	TM152	<b>103.17</b> 89.98 : 116.88
Bismuth	TM152	<b>100.67</b> 92.62 : 115.02
Boron	TM152	<b>106.33</b> 86.31 : 120.88
Cadmium	TM152	<b>103.0</b> 93.85 : 111.65
Calcium	TM152	<b>105.33</b> 89.20 : 126.91
Chromium	TM152	<b>100.5</b> 92.22 : 109.85
Cobalt	TM152	<b>99.33</b> 85.01 : 114.87
Copper	TM152	<b>102.0</b> 89.87 : 119.73
Iron	TM152	<b>102.0</b> 93.02 : 113.86
Lead	TM152	<b>104.0</b> 91.11 : 116.98
Lithium	TM152	<b>105.0</b> 91.30 : 123.00
Magnesium	TM152	<b>104.67</b> 89.60 : 116.61
Manganese	TM152	<b>101.5</b> 93.97 : 112.46
Molybdenum	TM152	<b>99.67</b> 89.07 : 110.96
Nickel	TM152	<b>99.0</b> 93.70 : 112.15
Phosphorus	TM152	<b>101.0</b> 89.24 : 114.18
Potassium	TM152	<b>106.0</b> 97.98 : 117.40
Selenium	TM152	<b>103.83</b> 91.69 : 117.12
Silver	TM152	<b>99.83</b> 96.95 : 117.30
Sodium	TM152	<b>104.0</b> 92.42 : 113.24
Strontium	TM152	<b>102.67</b> 92.14 : 116.24
Tellurium	TM152	<b>96.5</b> 89.88 : 111.78
Thallium	TM152	<b>98.5</b> 86.08 : 122.48



## CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-82  
Location: Cwmcam High SchoolClient Reference: A110489-4-1  
Order Number: C12/1273Report Number: 535551  
Superseded Report:

## Dissolved Metals by ICP-MS

		QC 2149
Tin	TM152	<b>103.83</b> 91.00 : 109.00
Titanium	TM152	<b>106.17</b> 88.23 : 109.83
Tungsten	TM152	<b>99.83</b> 77.61 : 132.31
Uranium	TM152	<b>99.83</b> 86.97 : 115.76
Vanadium	TM152	<b>104.83</b> 89.61 : 115.48
Zinc	TM152	<b>101.67</b> 87.51 : 116.26

## Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2107	QC 2166
Dissolved Inorganic Carbon	TM090	<b>111.0</b> 93.58 : 112.28	<b>101.67</b> 93.58 : 112.28
Dissolved Organic Carbon	TM090	<b>104.5</b> 96.28 : 110.58	<b>101.83</b> 96.28 : 110.58

## EPH CWG GC (S)

Component	Method Code	QC 2113	QC 2197
EPH >C8-C40 Raw	TM414	<b>80.14</b> 77.66 : 104.66	<b>85.62</b> 56.39 : 129.94
Total Aliphatics Raw	TM414	<b>85.77</b> 84.39 : 115.61	<b>92.37</b> 62.55 : 133.12
Total Aromatics Raw	TM414	<b>84.82</b> 57.00 : 150.27	<b>85.14</b> 57.00 : 150.27

## GRO by GC-FID (S)

Component	Method Code	QC 2165
QC	TM089	<b>95.78</b> 72.28 : 114.54

## GRO by GC-FID (W)

Component	Method Code	QC 2190
Benzene by GC	TM245	<b>91.0</b> 83.48 : 117.21
Ethylbenzene by GC	TM245	<b>93.0</b> 84.11 : 114.89
m & p Xylene by GC	TM245	<b>92.5</b> 83.73 : 116.33
MTBE GC-FID	TM245	<b>89.5</b> 84.42 : 117.50
o Xylene by GC	TM245	<b>93.5</b> 85.03 : 117.59



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

## GRO by GC-FID (W)

		QC 2190
QC	TM245	<b>91.18</b> 60.71 : 137.65
Toluene by GC	TM245	<b>90.5</b> 84.73 : 116.85

## Hexavalent Chromium (s)

Component	Method Code	QC 2187	QC 2172
Hexavalent Chromium	TM151	<b>104.0</b> 90.20 : 107.00	<b>100.0</b> 90.20 : 107.00

## Mercury Dissolved

Component	Method Code	QC 2159	QC 2162
Mercury Dissolved (CVAf)	TM183	<b>109.0</b> 76.80 : 117.12	<b>85.8</b> 76.80 : 117.12

## Metals in solid samples by OES

Component	Method Code	QC 2167	QC 2134	QC 2192
Aluminium	TM181	<b>80.44</b> 77.84 : 119.01	<b>76.64</b> 77.84 : 119.01	<b>84.78</b> 77.84 : 119.01
Antimony	TM181	<b>95.12</b> 84.28 : 107.67	<b>84.55</b> 84.28 : 107.67	<b>95.93</b> 84.28 : 107.67
Arsenic	TM181	<b>98.26</b> 87.05 : 109.36	<b>96.51</b> 87.05 : 109.36	<b>98.84</b> 87.05 : 109.36
Barium	TM181	<b>86.79</b> 82.49 : 109.34	<b>85.5</b> 82.49 : 109.34	<b>88.07</b> 82.49 : 109.34
Beryllium	TM181	<b>100.37</b> 85.44 : 109.61	<b>100.0</b> 85.44 : 109.61	<b>98.13</b> 85.44 : 109.61
Boron	TM181	<b>87.11</b> 73.51 : 104.66	<b>84.24</b> 73.51 : 104.66	<b>87.68</b> 73.51 : 104.66
Cadmium	TM181	<b>91.77</b> 81.46 : 106.43	<b>93.42</b> 81.46 : 106.43	<b>89.3</b> 81.46 : 106.43
Chromium	TM181	<b>92.9</b> 82.26 : 104.55	<b>93.31</b> 82.26 : 104.55	<b>91.68</b> 82.26 : 104.55
Cobalt	TM181	<b>88.99</b> 86.54 : 106.87	<b>88.05</b> 86.54 : 106.87	<b>88.99</b> 86.54 : 106.87
Copper	TM181	<b>94.54</b> 82.40 : 105.45	<b>94.01</b> 82.40 : 105.45	<b>92.61</b> 82.40 : 105.45
Iron	TM181	<b>79.37</b> 82.95 : 110.58	<b>80.16</b> 82.95 : 110.58	<b>102.38</b> 82.95 : 110.58
Lead	TM181	<b>91.89</b> 78.24 : 104.05	<b>89.41</b> 78.24 : 104.05	<b>90.32</b> 78.24 : 104.05
Manganese	TM181	<b>109.44</b> 94.29 : 119.51	<b>108.61</b> 94.29 : 119.51	<b>106.94</b> 94.29 : 119.51
Mercury	TM181	<b>94.93</b> 83.74 : 105.34	<b>93.72</b> 83.74 : 105.34	<b>93.72</b> 83.74 : 105.34



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

## Metals in solid samples by OES

		QC 2167	QC 2134	QC 2192
Molybdenum	TM181	<b>98.77</b> 87.11 : 106.87	<b>100.41</b> 87.11 : 106.87	<b>94.24</b> 87.11 : 106.87
Nickel	TM181	<b>92.42</b> 81.92 : 102.18	<b>92.67</b> 81.92 : 102.18	<b>90.46</b> 81.92 : 102.18
Phosphorus	TM181	<b>104.44</b> 94.56 : 124.28	<b>104.85</b> 94.56 : 124.28	<b>106.87</b> 94.56 : 124.28
Selenium	TM181	<b>101.18</b> 86.28 : 110.48	<b>101.96</b> 86.28 : 110.48	<b>99.22</b> 86.28 : 110.48
Strontium	TM181	<b>85.75</b> 79.13 : 102.79	<b>84.63</b> 79.13 : 102.79	<b>85.75</b> 79.13 : 102.79
Thallium	TM181	<b>95.58</b> 82.94 : 111.86	<b>94.25</b> 82.94 : 111.86	<b>93.81</b> 82.94 : 111.86
Tin	TM181	<b>100.38</b> 90.25 : 108.86	<b>101.9</b> 90.25 : 108.86	<b>98.86</b> 90.25 : 108.86
Titanium	TM181	<b>78.63</b> 66.23 : 102.06	<b>79.39</b> 66.23 : 102.06	<b>75.88</b> 66.23 : 102.06
Vanadium	TM181	<b>93.41</b> 86.37 : 107.94	<b>90.84</b> 86.37 : 107.94	<b>90.11</b> 86.37 : 107.94
Zinc	TM181	<b>97.74</b> 84.68 : 113.99	<b>96.92</b> 84.68 : 113.99	<b>98.15</b> 84.68 : 113.99

## PAH by GCMS

Component	Method Code	QC 2196	QC 2156	QC 2111
Acenaphthene	TM218	<b>98.5</b> 80.97 : 105.99	<b>96.5</b> 70.00 : 130.00	<b>93.5</b> 76.79 : 103.90
Acenaphthylene	TM218	<b>96.5</b> 80.24 : 105.29	<b>94.0</b> 70.00 : 130.00	<b>91.5</b> 78.40 : 108.66
Anthracene	TM218	<b>93.0</b> 73.72 : 109.23	<b>94.0</b> 70.00 : 130.00	<b>98.0</b> 76.15 : 110.07
Benz(a)anthracene	TM218	<b>97.0</b> 79.72 : 116.84	<b>91.0</b> 68.12 : 118.39	<b>105.0</b> 73.77 : 119.26
Benzo(a)pyrene	TM218	<b>100.5</b> 69.58 : 110.26	<b>87.5</b> 71.72 : 115.31	<b>98.5</b> 73.20 : 114.18
Benzo(b)fluoranthene	TM218	<b>93.5</b> 77.35 : 112.97	<b>80.5</b> 66.89 : 120.40	<b>83.5</b> 75.36 : 117.58
Benzo(ghi)perylene	TM218	<b>94.0</b> 77.68 : 107.38	<b>87.0</b> 67.82 : 118.49	<b>89.5</b> 70.73 : 116.12
Benzo(k)fluoranthene	TM218	<b>94.0</b> 82.61 : 111.93	<b>90.0</b> 73.10 : 117.03	<b>82.0</b> 75.98 : 116.59
Chrysene	TM218	<b>95.5</b> 80.28 : 111.42	<b>86.5</b> 69.58 : 115.47	<b>99.0</b> 74.82 : 114.18
Dibenzo(ah)anthracene	TM218	<b>92.5</b> 79.17 : 106.41	<b>85.5</b> 67.32 : 121.35	<b>99.0</b> 69.17 : 115.30
Fluoranthene	TM218	<b>101.0</b> 79.07 : 112.75	<b>87.5</b> 75.16 : 117.28	<b>105.0</b> 75.88 : 112.84
Fluorene	TM218	<b>97.5</b> 80.52 : 110.90	<b>96.5</b> 70.00 : 130.00	<b>95.0</b> 78.50 : 114.02
Indeno(123cd)pyrene	TM218	<b>93.5</b> 76.97 : 113.36	<b>85.0</b> 68.91 : 117.62	<b>86.5</b> 70.26 : 117.95
Naphthalene	TM218	<b>96.5</b> 83.50 : 110.02	<b>95.5</b> 70.00 : 130.00	<b>89.0</b> 75.24 : 111.26
Phenanthrene	TM218	<b>94.5</b> 79.34 : 111.91	<b>93.0</b> 70.00 : 130.00	<b>100.5</b> 77.07 : 107.43



# CERTIFICATE OF ANALYSIS

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**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

## PAH by GCMS

		QC 2196	QC 2156	QC 2111
Pyrene	TM218	<b>100.0</b> 74.43 : 114.36	<b>90.5</b> 75.68 : 119.23	<b>105.5</b> 78.74 : 112.56

## PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC 2131
Acenaphthene (diss.filt)	TM178	<b>106.8</b> 93.20 : 119.60
Acenaphthylene (diss.filt)	TM178	<b>105.2</b> 92.00 : 118.40
Anthracene (diss.filt)	TM178	<b>104.8</b> 90.80 : 114.80
Benzo(a)anthracene (diss.filt)	TM178	<b>98.0</b> 91.60 : 115.60
Benzo(a)pyrene (diss.filt)	TM178	<b>100.0</b> 91.20 : 120.00
Benzo(b)fluoranthene (diss.filt)	TM178	<b>105.6</b> 86.80 : 120.40
Benzo(g,h,i)perylene (diss.filt)	TM178	<b>100.0</b> 89.20 : 118.00
Benzo(k)fluoranthene (diss.filt)	TM178	<b>103.2</b> 94.40 : 125.60
Chrysene (diss.filt)	TM178	<b>101.6</b> 96.40 : 122.80
Dibenzo(a,h)anthracene (diss.filt)	TM178	<b>100.8</b> 93.60 : 132.00
Fluoranthene (diss.filt)	TM178	<b>104.4</b> 92.80 : 121.60
Fluorene (diss.filt)	TM178	<b>106.8</b> 93.60 : 120.00
Indeno(1,2,3-cd)pyrene (diss.filt)	TM178	<b>103.2</b> 82.40 : 120.80
Naphthalene (diss.filt)	TM178	<b>108.4</b> 88.40 : 126.80
Phenanthrene (diss.filt)	TM178	<b>104.8</b> 92.40 : 118.80
Pyrene (diss.filt)	TM178	<b>102.0</b> 90.40 : 124.00

## pH

Component	Method Code	QC 2192	QC 2198
pH	TM133	<b>98.49</b> 97.44 : 100.93	<b>99.65</b> 97.44 : 100.93

## pH Value of Filtered Water



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**Superseded Report:**

## pH Value of Filtered Water

Component	Method Code	QC 2117
pH Value of Filtered Water	TM256	<b>100.94</b> 99.73 : 102.16

## Phenols by HPLC (S)

Component	Method Code	QC 2184	QC 2189
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	<b>92.21</b> 65.50 : 89.50	<b>101.3</b> 65.50 : 89.50
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	<b>82.46</b> 86.25 : 116.25	<b>90.06</b> 86.25 : 116.25
Catechol by HPLC (S)	TM062 (S)	<b>74.29</b> 19.39 : 135.70	<b>80.0</b> 19.39 : 135.70
Cresols by HPLC (S)	TM062 (S)	<b>87.47</b> 81.00 : 112.20	<b>94.99</b> 81.00 : 112.20
Napthol by HPLC (S)	TM062 (S)	<b>112.14</b> 57.50 : 102.50	<b>112.14</b> 57.50 : 102.50
Phenol by HPLC (S)	TM062 (S)	<b>98.68</b> 88.67 : 124.67	<b>105.3</b> 88.67 : 124.67
Resorcinol HPLC (S)	TM062 (S)	<b>89.94</b> 69.99 : 127.22	<b>94.97</b> 69.99 : 127.22
Xylenols by HPLC (S)	TM062 (S)	<b>92.81</b> 90.22 : 114.22	<b>97.08</b> 90.22 : 114.22

## Phenols by HPLC (W)

Component	Method Code	QC 2159
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	<b>100.0</b> 91.00 : 109.00
2-Isopropyl Phenol by HPLC (W)	TM259	<b>96.0</b> 90.00 : 114.00
Cresols by HPLC (W)	TM259	<b>108.33</b> 90.02 : 130.15
Napthol by HPLC (W)	TM259	<b>96.0</b> 86.00 : 128.00
Phenol by HPLC (W)	TM259	<b>101.0</b> 85.89 : 109.89
Xylenols by HPLC (W)	TM259	<b>102.17</b> 93.33 : 107.33

## Total Organic Carbon

Component	Method Code	QC 2135	QC 2111	QC 2142
Total Organic Carbon	TM132	<b>100.39</b> 84.82 : 117.61	<b>101.17</b> 84.82 : 117.61	<b>100.39</b> 84.82 : 117.61

## VOC MS (S)





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SDG: 191210-82  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C12/1273

Report Number: 535551  
Superseded Report:

VOC MS (S)

Component	Method Code	QC 2135
1,1,1,2-tetrachloroethane	TM116	<b>106.0</b> 77.56 : 115.55
1,1,1-Trichloroethane	TM116	<b>109.6</b> 73.73 : 118.05
1,1,2-Trichloroethane	TM116	<b>103.8</b> 77.12 : 116.04
1,1-Dichloroethane	TM116	<b>112.0</b> 74.46 : 129.15
1,2-Dichloroethane	TM116	<b>111.8</b> 92.38 : 131.65
1,4-Dichlorobenzene	TM116	<b>97.0</b> 72.76 : 126.34
2-Chlorotoluene	TM116	<b>89.4</b> 81.66 : 118.02
4-Chlorotoluene	TM116	<b>86.2</b> 66.90 : 112.46
Benzene	TM116	<b>104.0</b> 89.71 : 111.93
Carbon Disulphide	TM116	<b>98.8</b> 74.91 : 122.14
Carbontetrachloride	TM116	<b>117.0</b> 80.31 : 124.50
Chlorobenzene	TM116	<b>101.0</b> 86.73 : 118.34
Chloroform	TM116	<b>113.2</b> 87.40 : 122.49
Chloromethane	TM116	<b>113.2</b> 65.05 : 142.63
Cis-1,2-Dichloroethene	TM116	<b>111.8</b> 80.67 : 126.72
Dibromomethane	TM116	<b>111.8</b> 67.80 : 121.75
Dichloromethane	TM116	<b>119.2</b> 81.11 : 133.25
Ethylbenzene	TM116	<b>94.6</b> 75.92 : 110.41
Hexachlorobutadiene	TM116	<b>88.8</b> 12.82 : 152.73
Isopropylbenzene	TM116	<b>84.0</b> 54.21 : 117.17
Naphthalene	TM116	<b>95.8</b> 80.86 : 128.81
o-Xylene	TM116	<b>89.6</b> 69.99 : 108.74
p/m-Xylene	TM116	<b>89.7</b> 68.32 : 108.91
Sec-Butylbenzene	TM116	<b>90.2</b> 44.91 : 118.40
Tetrachloroethene	TM116	<b>106.4</b> 76.95 : 121.02
Toluene	TM116	<b>96.4</b> 74.24 : 107.42
Trichloroethene	TM116	<b>102.0</b> 77.61 : 111.54



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**SDG:** 191210-82  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C12/1273

**Report Number:** 535551  
**Superseded Report:**

VOC MS (S)

		QC 2135
Trichlorofluoromethane	TM116	<b>111.2</b> 84.55 : 133.27
Vinyl Chloride	TM116	<b>103.2</b> 70.29 : 138.58

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



# CERTIFICATE OF ANALYSIS

<b>SDG:</b>	191210-82	<b>Client Reference:</b>	A110489-4-1	<b>Report Number:</b>	535551
<b>Location:</b>	Cwmcam High School	<b>Order Number:</b>	C12/1273	<b>Superseded Report:</b>	

## Appendix

## General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH<sub>4</sub> by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

### 18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

### 19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

#### Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

#### Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

#### Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

**Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.**

**The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**



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47 Newport Road  
Cardiff  
CF24 0AD

**Attention:** Sarah Roberts

## CERTIFICATE OF ANALYSIS

<b>Date of report Generation:</b>	28 December 2019
<b>Customer:</b>	WYG Geo-Environment
<b>Sample Delivery Group (SDG):</b>	191210-86
<b>Your Reference:</b>	A110489-4-1
<b>Location:</b>	Cwmcarn High School
<b>Report No:</b>	535552

**This report has been revised and directly supersedes 535249 in its entirety.**

We received 42 samples on Tuesday December 10, 2019 and 27 of these samples were scheduled for analysis which was completed on Saturday December 28, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

**Sonia McWhan**

Operations Manager





# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21330138	BH102	ES1	0.20	02/12/2019
21330149	BH102	ES2	0.50	02/12/2019
21330116	BH103	ES1	0.20	02/12/2019
21330134	BH103	ES2	0.50	02/12/2019
21330104	BH104	ES1	0.20	02/12/2019
21330110	BH104	ES2	0.50	02/12/2019
21330072	BH105	ES1	0.00 - 0.90	02/12/2019
21330100	BH105	ES2	0.90 - 1.20	02/12/2019
21330064	BH106	ES1	0.30	02/12/2019
21330068	BH106	ES2	0.60	02/12/2019
21329834	S1	ES1	0.40	28/11/2019
21329979	S2	ES1	0.10	02/12/2019
21329992	S2	ES2	0.50	02/12/2019
21329997	S3	ES1	0.30	02/12/2019
21330059	S4	ES1	0.10	02/12/2019
21330026	S5	ES1	0.30	02/12/2019
21330020	S6	ES1	0.10	02/12/2019
21330010	S7	ES1	0.20	02/12/2019
21330014	S8	ES1	0.50	02/12/2019
21329966	S9	ES1	0.30	29/11/2019
21329972	S10	ES1	0.20	29/11/2019
21329920	S11	ES1	0.30	29/11/2019
21329936	S12	ES1	0.30	29/11/2019
21329797	SA105	ES1	0.10 - 0.20	27/11/2019
21329929	SA105	ES1	0.50 - 0.60	27/11/2019
21330052	TP101	ES1	0.10 - 0.20	27/11/2019
21330144	TP101	ES2	0.40 - 0.50	27/11/2019
21330187	TP102	ES1	0.20	28/11/2019
21330195	TP102	ES2	0.50	28/11/2019
21329801	TP104	ES1	0.50	28/11/2019
21329807	TP104	ES2	1.00	28/11/2019
21329841	TP105	ES1	0.30	29/11/2019
21329885	TP106	ES1	0.10	29/11/2019
21329912	TP106	ES2	0.50	29/11/2019
21329817	TP108	ES1	0.20	28/11/2019
21329825	TP108	ES2	0.60	28/11/2019
21329829	TP107A	ES1	1.50 - 2.50	28/11/2019
21329791	WS103		0.50 - 0.50	
21330173	WS105	ES1	0.50	27/11/2019
21329795	WS106		0.50 - 0.50	
21330159	WS108	ES1	0.20	27/11/2019
21330165	WS108	ES2	0.50	27/11/2019

### Maximum Sample/Coolbox Temperature (°C) :

#### ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

### 3.8

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.







# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## Results Legend

**X** Test  
**N** No Determination Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	21329834		S1		ES1		0.40		1kg TUB with Handle (ALE280)		S	
	21330068		BH106		ES2		0.60		60g VOC (ALE215)		S	
	21330064		BH106		ES1		0.30		250g Amber Jar (ALE210)		S	
	21330072		BH105		ES1		0.00 - 0.90		1kg TUB with Handle (ALE260)		S	
	21330104		BH104		ES1		0.20		60g VOC (ALE215)		S	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 15										
GRO by GC-FID (W)	All	NDPs: 0 Tests: 4										
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 15										
Mercury Dissolved	All	NDPs: 0 Tests: 4										
Metals in solid samples by OES	All	NDPs: 0 Tests: 15										
Nitrite by Kone (w)	All	NDPs: 0 Tests: 4										
PAH by GCMS	All	NDPs: 0 Tests: 14										
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 4										
pH	All	NDPs: 0 Tests: 15										
pH Value of Filtered Water	All	NDPs: 0 Tests: 4										
Phenols by HPLC (S)	All	NDPs: 0 Tests: 15										
Phenols by HPLC (W)	All	NDPs: 0 Tests: 4										
Sample description	All	NDPs: 0 Tests: 15										
Total Organic Carbon	All	NDPs: 0 Tests: 15										
TPH CWG Filtered (W)	All	NDPs: 0 Tests: 4										







Validated

# CERTIFICATE OF ANALYSIS

**SDG:** 191210-86  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

## Results Legend



Test



No Determination Possible

## Sample Types -

S - Soil/Solid  
 UNS - Unspecified Solid  
 GW - Ground Water  
 SW - Surface Water  
 LE - Land Leachate  
 PL - Prepared Leachate  
 PR - Process Water  
 SA - Saline Water  
 TE - Trade Effluent  
 TS - Treated Sewage  
 US - Untreated Sewage  
 RE - Recreational Water  
 DW - Drinking Water Non-regulatory  
 UNL - Unspecified Liquid  
 SL - Sludge  
 G - Gas  
 OTH - Other

TPH CWG GC (S)

VOC MS (S)

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

			21330138		21330116		21330104		21330072		21330064		21330068		21329834
			BH102		BH103		BH104		BH105		BH106		BH106		S1
			ES1		ES1		ES1		ES1		ES1		ES2		ES1
			0.20		0.20		0.20		0.00 - 0.90		0.30		0.60		0.40
			1kg TUB with Handle (ALE260)		250g Amber Jar (ALE210)		1kg TUB with Handle (ALE260)		60g VOC (ALE215)		250g Amber Jar (ALE210)		1kg TUB with Handle (ALE260)		1kg TUB with Handle (ALE260)
			S		S		S		S		S		S		S
	All	NDPs: 0 Tests: 15													
			X		X		X		X		X		X		
	All	NDPs: 0 Tests: 15													
				X		X		X		X		X		X	

21329801	TP104	ES1	0.50	1kg TUB with Handle (ALE260)	S			
21330195	TP102	ES2	0.50	60g VOC (ALE215)	S			X
				250g Amber Jar (ALE210)	S	X		
				1kg TUB with Handle (ALE260)	S			
				60g VOC (ALE215)	S			X
21330144	TP101	ES2	0.40 - 0.50	250g Amber Jar (ALE210)	S	X		
				1kg TUB with Handle (ALE260)	S			
				60g VOC (ALE215)	S			X
				250g Amber Jar (ALE210)	S	X		
				1kg TUB with Handle (ALE260)	S			
21330052	TP101	ES1	0.10 - 0.20	60g VOC (ALE215)	S			X
				250g Amber Jar (ALE210)	S	X		
				1kg TUB with Handle (ALE260)	S			
				1kg TUB with Handle (ALE260)	S			
				1kg TUB with Handle (ALE260)	S			
21329936	S12	ES1	0.30	1kg TUB with Handle (ALE260)	S			
21329920	S11	ES1	0.30	1kg TUB with Handle (ALE260)	S			
21329972	S10	ES1	0.20	1kg TUB with Handle (ALE260)	S			
21329966	S9	ES1	0.30	1kg TUB with Handle (ALE260)	S			
21330014	S8	ES1	0.50	1kg TUB with Handle (ALE260)	S			
21330010	S7	ES1	0.20	1kg TUB with Handle (ALE260)	S			
21330020	S6	ES1	0.10	1kg TUB with Handle (ALE260)	S			
21330026	S5	ES1	0.30	1kg TUB with Handle (ALE260)	S			
21330059	S4	ES1	0.10	1kg TUB with Handle (ALE260)	S			
21329997	S3	ES1	0.30	1kg TUB with Handle (ALE260)	S			
21329979	S2	ES1	0.10	1kg TUB with Handle (ALE260)	S			



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## Results Legend



Test



No Determination Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	21330159	WS108	ES1	0.20	60g VOC (ALE215)	S						
	21330173	WS105	ES1	0.50	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
	21329885	TP106	ES1	0.10	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
	21329841	TP105	ES1	0.30	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
	21329807	TP104	ES2	1.00	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
	21329801	TP104	ES1	0.50	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
Alkalinity Filtered as CaCO <sub>3</sub>	All	NDPs: 0 Tests: 4										
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 4										
Anions by Kone (soil)	All	NDPs: 0 Tests: 15										
Anions by Kone (w)	All	NDPs: 0 Tests: 4										
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 27										
Asbestos Quantification - Full	All	NDPs: 0 Tests: 2										
Boron Water Soluble	All	NDPs: 0 Tests: 15										
CEN Readings	All	NDPs: 0 Tests: 4										
Chromium III	All	NDPs: 0 Tests: 15										
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 19										
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 4										
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 4										
EPH CWG (Aliphatic) Filtered GC (W)	All	NDPs: 0 Tests: 4										
EPH CWG (Aromatic) Filtered GC (W)	All	NDPs: 0 Tests: 4										
EPH CWG GC (S)	All	NDPs: 0 Tests: 15										



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## Results Legend



Test



No Determination Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	21330159	WS108	ES1	0.20	60g VOC (ALE215)	S						
	21330173	WS105	ES1	0.50	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
	21329885	TP106	ES1	0.10	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
	21329841	TP105	ES1	0.30	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
	21329807	TP104	ES2	1.00	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
Sample Types -	21329801	TP104	ES1	0.50	250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S						
GRO by GC-FID (S)	All	NDPs: 0 Tests: 15										
GRO by GC-FID (W)	All	NDPs: 0 Tests: 4										
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 15										
Mercury Dissolved	All	NDPs: 0 Tests: 4										
Metals in solid samples by OES	All	NDPs: 0 Tests: 15										
Nitrite by Kone (w)	All	NDPs: 0 Tests: 4										
PAH by GCMS	All	NDPs: 0 Tests: 14										
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 4										
pH	All	NDPs: 0 Tests: 15										
pH Value of Filtered Water	All	NDPs: 0 Tests: 4										
Phenols by HPLC (S)	All	NDPs: 0 Tests: 15										
Phenols by HPLC (W)	All	NDPs: 0 Tests: 4										
Sample description	All	NDPs: 0 Tests: 15										
Total Organic Carbon	All	NDPs: 0 Tests: 15										
TPH CWG Filtered (W)	All	NDPs: 0 Tests: 4										



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-86  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

## Results Legend



Test


No Determination  
Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
21330159	WS108	ES1	0.20	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)	S
21330173	WS105	ES1	0.50	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)	S
21329885	TP106	ES1	0.10	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)	S
21329841	TP105	ES1	0.30	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)	S
21329807	TP104	ES2	1.00	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)	S
21329801	TP104	ES1	0.50	60g VOC (ALE215) 250g Amber Jar (ALE210)	S
TPH CWG GC (S)	All	NDPs: 0 Tests: 15			
VOC MS (S)	All	NDPs: 0 Tests: 15			



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-86  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

## Sample Descriptions

### Grain Sizes

<b>very fine</b>	<0.063mm	<b>fine</b>	0.063mm - 0.1mm	<b>medium</b>	0.1mm - 2mm	<b>coarse</b>	2mm - 10mm	<b>very coarse</b>	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
21330138	BH102	0.20	Dark Brown	Loamy Sand	Vegetation	Stones
21330116	BH103	0.20	Dark Brown	Silt Loam	Stones	Vegetation
21330104	BH104	0.20	Dark Brown	Silt Loam	Stones	Vegetation
21330072	BH105	0.00 - 0.90	Dark Brown	Sand	Stones	None
21330064	BH106	0.30	Dark Brown	Sand	Stones	None
21330068	BH106	0.60	Light Brown	Loamy Sand	Stones	None
21330052	TP101	0.10 - 0.20	Dark Brown	Loamy Sand	Stones	Vegetation
21330144	TP101	0.40 - 0.50	Dark Brown	Loamy Sand	Stones	Vegetation
21330195	TP102	0.50	Dark Brown	Loamy Sand	Vegetation	Stones
21329801	TP104	0.50	Dark Brown	Sandy Loam	Stones	Vegetation
21329807	TP104	1.00	Dark Brown	Sandy Loam	Stones	None
21329841	TP105	0.30	Black	Sand	Stones	None
21329885	TP106	0.10	Dark Brown	Sand	Stones	None
21330173	WS105	0.50	Dark Brown	Sandy Loam	Stones	Vegetation
21330159	WS108	0.20	Dark Brown	Sandy Loam	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.















<b>SDG:</b>	191210-86
<b>Location:</b>	Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

**TPH CWG (S)**

[illegible]















# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-86  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

## Asbestos Identification - Solid Samples

### Results Legend

# ISO17025 accredited.  
M mCERTS accredited.  
\* Subcontracted test.  
(F) Trigger breach confirmed  
1-5&#9@ Sample deviation (see appendix)

M * mCERTS accredited. (F) Subcontracted test. 1-5&*&@ Trigger breach confirmed Sample deviation (see appendix)		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH102ES1 0.20 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330138 TM048	16/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH103ES1 0.20 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330116 TM048	16/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH104ES1 0.20 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330104 TM048	16/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH105ES1 0.00 - 0.90 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330072 TM048	16/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH106ES1 0.30 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330064 TM048	16/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH106ES2 0.60 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330068 TM048	16/12/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S1ES1 0.40 SOLID 28/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329834 TM048	16/12/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S2ES1 0.10 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329979 TM048	16/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86 Client Reference: A110489-4-1 Report Number: 535552  
Location: Cwmcam High School Order Number: C19/1273 Superseded Report: 535249

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S3ES1 0.30 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329997 TM048	16/12/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S4ES1 0.10 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330059 TM048	12/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S5ES1 0.30 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330026 TM048	16/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S6ES1 0.10 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330020 TM048	16/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S7ES1 0.20 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330010 TM048	16/12/2019	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S8ES1 0.50 SOLID 02/12/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330014 TM048	16/12/2019	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S9ES1 0.30 SOLID 29/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329966 TM048	16/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S10ES1 0.20 SOLID 29/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329972 TM048	12/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S11ES1 0.30 SOLID 29/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329920 TM048	16/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-86 **Client Reference:** A110489-4-1 **Report Number:** 535552  
**Location:** Cwmcam High School **Order Number:** C19/1273 **Superseded Report:** 535249

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S12ES1 0.30 SOLID 29/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329936 TM048	16/12/2019	James Richards	Loose fibres in soil	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP101ES1 0.10 - 0.20 SOLID 27/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330052 TM048	12/12/19	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP101ES2 0.40 - 0.50 SOLID 27/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330144 TM048	12/12/2019	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP102ES2 0.50 SOLID 28/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330195 TM048	12/12/2019	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP104ES1 0.50 SOLID 28/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329801 TM048	12/12/2019	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP104ES2 1.00 SOLID 28/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329807 TM048	12/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP105ES1 0.30 SOLID 29/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329841 TM048	16/12/2019	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP106ES1 0.10 SOLID 29/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329885 TM048	16/12/2019	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS105ES1 0.50 SOLID 27/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330173 TM048	12/12/2019	Lucy Caroe	Loose fibres in soil	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



Validated

## CERTIFICATE OF ANALYSIS

**SDG:** 191210-86  
**Location:** Cwmcam High School**Client Reference:** A110489-4-1  
**Order Number:** C19/1273**Report Number:** 535552  
**Superseded Report:** 535249

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS108ES1 0.20 SOLID 27/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330159 TM048	16/12/19	Andrzej Fernecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-86  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

## Asbestos Quantification - Full

### Results Legend

# ISO17025 accredited.  
M mCERTS accredited.  
\* Subcontracted test.  
(F) Trigger breach confirmed  
1-5&\*%@ Sample deviation (see appendix)

		Additional Asbestos Components	Analysts Comments	Asbestos Quantification - Gravimetric - %	Asbestos Quantification - PCOM	Asbestos Quantification - Total - %
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	S12ES1 0.30 SOLID 29/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21329936 TM304	None (#)	N/C	0.0030 (#)	<0.001 (#)	0.0034 (#)
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS105ES1 0.50 SOLID 27/11/2019 00:00:00 10/12/2019 14:28:00 191210-86 21330173 TM304	None (#)	N/C	<0.001 (#)	<0.001 (#)	<0.001 (#)





# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.101

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 12.9

Dry Matter Content (%) 88.6

#### Case

SDG 191210-86

Lab Sample Number(s) 21329801

Sampled Date 28-Nov-2019

Customer Sample Ref. TP104 ES1

Depth (m) 0.50

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	2.4	<2	24	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	3.4	<3	34	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	0.00001	<0.00001	0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.0000446	<0.000005	0.000446	<0.00005	-	-	-
Arsenic	0.000583	<0.0005	0.00583	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.0977	<0.0002	0.977	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	0.71	<0.3	7.1	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000426	<0.000005	0.000426	<0.00005	-	-	-
Anthracene (diss.filt)	0.0000167	<0.000005	0.000167	<0.00005	-	-	-
Boron	<0.01	<0.01	<0.1	<0.1	-	-	-
Phenanthrene (diss.filt)	0.000152	<0.000005	0.00152	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	55	<2	550	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.0000607	<0.000005	0.000607	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 11-Dec-2019  
pH (pH Units) 7.99  
Conductivity (µS/cm) 91.00  
Temperature (°C) 20.20  
Volume Leachant (Litres) 0.889



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.101

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 12.9

Dry Matter Content (%) 88.6

#### Case

SDG 191210-86

Lab Sample Number(s) 21329801

Sampled Date 28-Nov-2019

Customer Sample Ref. TP104 ES1

Depth (m) 0.50

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000249	<0.000005	0.000249	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00241	<0.0003	0.0241	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	0.00302	<0.003	0.0302	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000351	<0.000082	0.00351	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.0015	<0.001	0.015	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 11-Dec-2019  
pH (pH Units) 7.99  
Conductivity (µS/cm) 91.00  
Temperature (°C) 20.20  
Volume Leachant (Litres) 0.889



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.102

Mass of dry sample (kg) 0.090

Particle Size <4mm >95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 13.2

Dry Matter Content (%) 88.3

#### Case

SDG 191210-86

Lab Sample Number(s) 21329885

Sampled Date 29-Nov-2019

Customer Sample Ref. TP106 ES1

Depth (m) 0.10

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	20.9	<2	209	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	6.33	<3	63.3	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.0000218	<0.000005	0.000218	<0.00005	-	-	-
Arsenic	0.00241	<0.0005	0.0241	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.155	<0.0002	1.55	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	1.73	<0.3	17.3	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000691	<0.000005	0.000691	<0.00005	-	-	-
Anthracene (diss.filt)	0.00000802	<0.000005	0.0000802	<0.00005	-	-	-
Boron	0.0375	<0.01	0.375	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000494	<0.000005	0.000494	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	36.5	<2	365	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.0000301	<0.000005	0.000301	<0.00005	-	-	-
Chrysene (diss.filt)	0.00000797	<0.000005	0.0000797	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 12-Dec-2019  
pH (pH Units) 9.49  
Conductivity (µS/cm) 106.00  
Temperature (°C) 20.10  
Volume Leachant (Litres) 0.888

Mcerts Certification does not apply to leachates

28/12/2019 12:13:47

12:13:11 28/12/2019



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.102

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 13.2

Dry Matter Content (%) 88.3

#### Case

SDG 191210-86

Lab Sample Number(s) 21329885

Sampled Date 29-Nov-2019

Customer Sample Ref. TP106 ES1

Depth (m) 0.10

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000493	<0.000005	0.000493	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	0.00232	<0.001	0.0232	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.003	<0.0003	0.03	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000236	<0.000082	0.00236	<0.00082	-	-	-
Nickel	0.000416	<0.0004	0.00416	<0.004	-	-	-
Selenium	0.00164	<0.001	0.0164	<0.01	-	-	-
Zinc	0.00105	<0.001	0.0105	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 12-Dec-2019  
pH (pH Units) 9.49  
Conductivity (µS/cm) 106.00  
Temperature (°C) 20.10  
Volume Leachant (Litres) 0.888



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.098

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 9.17

Dry Matter Content (%) 91.6

#### Case

SDG 191210-86

Lab Sample Number(s) 21330064

Sampled Date 02-Dec-2019

Customer Sample Ref. BH106 ES1

Depth (m) 0.30

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	0.064	<0.05	0.64	<0.5	-	-	-
Sulphate (soluble)	7.9	<2	79	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	5.34	<3	53.4	<30	-	-	-
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	0.0000152	<0.00001	0.000152	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	0.0000397	<0.000005	0.000397	<0.00005	-	-	-
Arsenic	0.000935	<0.0005	0.00935	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.105	<0.0002	1.05	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	0.921	<0.3	9.21	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000315	<0.000005	0.000315	<0.00005	-	-	-
Anthracene (diss.filt)	0.00000869	<0.000005	0.0000869	<0.00005	-	-	-
Boron	0.0127	<0.01	0.127	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000516	<0.000005	0.000516	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	60	<2	600	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.0000485	<0.000005	0.000485	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared 12-Dec-2019  
pH (pH Units) 9.06  
Conductivity (µS/cm) 94.70  
Temperature (°C) 14.60  
Volume Leachant (Litres) 0.892



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.098

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 9.17

Dry Matter Content (%) 91.6

#### Case

SDG 191210-86

Lab Sample Number(s) 21330064

Sampled Date 02-Dec-2019

Customer Sample Ref. BH106 ES1

Depth (m) 0.30

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000194	<0.000005	0.000194	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00194	<0.0003	0.0194	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000215	<0.000082	0.00215	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	0.00166	<0.001	0.0166	<0.01	-	-	-
Zinc	0.0017	<0.001	0.017	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 12-Dec-2019  
pH (pH Units) 9.06  
Conductivity (µS/cm) 94.70  
Temperature (°C) 14.60  
Volume Leachant (Litres) 0.892



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-86  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

<b>Client Reference</b>		<b>Site Location</b>	Cwmcam High School
<b>Mass Sample taken (kg)</b>	0.105	<b>Natural Moisture Content (%)</b>	16.9
<b>Mass of dry sample (kg)</b>	0.090	<b>Dry Matter Content (%)</b>	85.6
<b>Particle Size &lt;4mm</b>	>95%		

#### Case

<b>SDG</b>	191210-86
<b>Lab Sample Number(s)</b>	21330159
<b>Sampled Date</b>	27-Nov-2019
<b>Customer Sample Ref.</b>	WS108 ES1
<b>Depth (m)</b>	0.20

Eluate Analysis	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO <sub>2</sub>	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	4.04	<3	40.4	<30	-	-	-
Mercury Dissolved (CVAf)	0.0000134	<0.00001	0.000134	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH <sub>3</sub>	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.000614	<0.0005	0.00614	<0.005	-	-	-
Total Ammonium as NH <sub>4</sub>	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.0241	<0.0002	0.241	<0.002	-	-	-
Nitrate as NO <sub>3</sub>	3.17	<0.3	31.7	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000276	<0.000005	0.000276	<0.00005	-	-	-
Anthracene (diss.filt)	0.00000505	<0.000005	0.0000505	<0.00005	-	-	-
Boron	0.115	<0.01	1.15	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000233	<0.000005	0.000233	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO <sub>3</sub>	5.5	<2	55	<20	-	-	-
Cadmium	0.0000817	<0.00008	0.000817	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

#### Leach Test Information

Date Prepared	11-Dec-2019
pH (pH Units)	5.96
Conductivity (µS/cm)	13.70
Temperature (°C)	18.20
Volume Leachant (Litres)	0.885



# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86  
Location: Cwmcam High School

Client Reference: A110489-4-1  
Order Number: C19/1273

Report Number: 535552  
Superseded Report: 535249

## CEN 10:1 SINGLE STAGE LEACHATE TEST

### CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

#### Client Reference

Mass Sample taken (kg) 0.105

Mass of dry sample (kg) 0.090

Particle Size &lt;4mm &gt;95%

#### Site Location

Cwmcam High School

Natural Moisture Content (%) 16.9

Dry Matter Content (%) 85.6

#### Case

SDG 191210-86

Lab Sample Number(s) 21330159

Sampled Date 27-Nov-2019

Customer Sample Ref. WS108 ES1

Depth (m) 0.20

#### Eluate Analysis

	C <sub>2</sub> Conc <sup>n</sup> in 10:1 eluate (mg/l)		A <sub>2</sub> 10:1 conc <sup>n</sup> leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Pyrene (diss.filt)	0.0000222	<0.000005	0.000222	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00416	<0.0003	0.0416	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.00132	<0.0002	0.0132	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.00082	<0.00082	-	-	-
Nickel	0.00129	<0.0004	0.0129	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.053	<0.001	0.53	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

#### Leach Test Information

Date Prepared 11-Dec-2019  
pH (pH Units) 5.96  
Conductivity (µS/cm) 13.70  
Temperature (°C) 18.20  
Volume Leachant (Litres) 0.885





# CERTIFICATE OF ANALYSIS

Validated

SDG: 191210-86 Client Reference: A110489-4-1 Report Number: 535552  
Location: Cwmcam High School Order Number: C19/1273 Superseded Report: 535249

## Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990:BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM243		Mixed Anions In Soils By Kone
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM304	HSE Contract research Report no 83/1996	Asbestos Quantification in Soil: Fibres identified by morphology only
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-86  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

## Test Completion Dates

**Lab Sample No(s)**  
**Customer Sample Ref.**

**AGS Ref.**  
**Depth**  
**Type**

	21330138	21330116	21330104	21330072	21330064	21330068	21329834	21329979	21329997	21330059
	BH102	BH103	BH104	BH105	BH106	BH106	S1	S2	S3	S4
	ES1	ES1	ES1	ES1	ES1	ES2	ES1	ES1	ES1	ES1
	0.20	0.20	0.20	0.00 - 0.90	0.30	0.60	0.40	0.10	0.30	0.10
	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO3					17-Dec-2019					
Ammoniacal Nitrogen					17-Dec-2019					
Anions by Kone (soil)	17-Dec-2019	17-Dec-2019	17-Dec-2019	16-Dec-2019	16-Dec-2019	17-Dec-2019				
Anions by Kone (w)					17-Dec-2019					
Asbestos ID in Solid Samples	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	12-Dec-2019
Boron Water Soluble	13-Dec-2019	13-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	13-Dec-2019				
CEN 10:1 Leachate (1 Stage)					12-Dec-2019					
CEN Readings					16-Dec-2019					
Chromium III	16-Dec-2019	16-Dec-2019	16-Dec-2019	17-Dec-2019	17-Dec-2019	16-Dec-2019				
Cyanide Comp/Free/Total/Thiocyanate	16-Dec-2019	13-Dec-2019	13-Dec-2019	16-Dec-2019	18-Dec-2019	16-Dec-2019				
Dissolved Metals by ICP-MS					17-Dec-2019					
Dissolved Organic/Inorganic Carbon					17-Dec-2019					
EPH CWG (Aliphatic) Filtered GC (W)					28-Dec-2019					
EPH CWG (Aromatic) Filtered GC (W)					28-Dec-2019					
EPH CWG GC (S)	20-Dec-2019	18-Dec-2019	18-Dec-2019	20-Dec-2019	18-Dec-2019	18-Dec-2019				
GRO by GC-FID (S)	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019				
GRO by GC-FID (W)					17-Dec-2019					
Hexavalent Chromium (s)	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019				
Mercury Dissolved					17-Dec-2019					
Metals in solid samples by OES	16-Dec-2019	16-Dec-2019	16-Dec-2019	17-Dec-2019	17-Dec-2019	16-Dec-2019				
Nitrite by Kone (w)					17-Dec-2019					
PAH by GCMS	17-Dec-2019	17-Dec-2019	13-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019				
PAH in waters by GC-MS (diss.filt)					24-Dec-2019					
pH	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019				
pH Value of Filtered Water					17-Dec-2019					
Phenols by HPLC (S)	16-Dec-2019	13-Dec-2019	13-Dec-2019	16-Dec-2019	16-Dec-2019	13-Dec-2019				
Phenols by HPLC (W)					18-Dec-2019					
Sample description	12-Dec-2019	11-Dec-2019	11-Dec-2019	12-Dec-2019	12-Dec-2019	11-Dec-2019				
Total Organic Carbon	17-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	17-Dec-2019				
TPH CWG Filtered (W)					28-Dec-2019					
TPH CWG GC (S)	20-Dec-2019	18-Dec-2019	18-Dec-2019	20-Dec-2019	18-Dec-2019	18-Dec-2019				
VOC MS (S)	13-Dec-2019	12-Dec-2019	13-Dec-2019	13-Dec-2019	13-Dec-2019	12-Dec-2019				

**Lab Sample No(s)**  
**Customer Sample Ref.**

**AGS Ref.**  
**Depth**  
**Type**

	21330026	21330020	21330010	21330014	21329966	21329972	21329920	21329936	21330052	21330144
	S5	S6	S7	S8	S9	S10	S11	S12	TP101	TP101
	ES1	ES1	ES1	ES1	ES1	ES1	ES1	ES1	ES1	ES2
	0.30	0.10	0.20	0.50	0.30	0.20	0.30	0.30	0.10 - 0.20	0.40 - 0.50
	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (soil)									13-Dec-2019	14-Dec-2019
Asbestos ID in Solid Samples	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	12-Dec-2019	16-Dec-2019	16-Dec-2019	12-Dec-2019	12-Dec-2019
Asbestos Quantification - Full								24-Dec-2019		
Boron Water Soluble									13-Dec-2019	13-Dec-2019
Chromium III									16-Dec-2019	16-Dec-2019
Cyanide Comp/Free/Total/Thiocyanate									16-Dec-2019	13-Dec-2019
EPH CWG GC (S)									16-Dec-2019	16-Dec-2019
GRO by GC-FID (S)									12-Dec-2019	12-Dec-2019
Hexavalent Chromium (s)									16-Dec-2019	16-Dec-2019
Metals in solid samples by OES									16-Dec-2019	16-Dec-2019
PAH by GCMS									17-Dec-2019	17-Dec-2019
pH									17-Dec-2019	17-Dec-2019
Phenols by HPLC (S)									13-Dec-2019	13-Dec-2019
Sample description									11-Dec-2019	11-Dec-2019
Total Organic Carbon									16-Dec-2019	16-Dec-2019
TPH CWG GC (S)									16-Dec-2019	16-Dec-2019
VOC MS (S)									12-Dec-2019	12-Dec-2019



# CERTIFICATE OF ANALYSIS

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SDG: 191210-86  
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Report Number: 535552  
Superseded Report: 535249

Lab Sample No(s)  
Customer Sample Ref.

AGS Ref.  
Depth  
Type

	21330195	21329801	21329807	21329841	21329885	21330173	21330159
	TP102	TP104	TP104	TP105	TP106	WS105	WS108
	ES2	ES1	ES2	ES1	ES1	ES1	ES1
	0.50	0.50	1.00	0.30	0.10	0.50	0.20
	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO <sub>3</sub>		17-Dec-2019			17-Dec-2019		17-Dec-2019
Ammoniacal Nitrogen		17-Dec-2019			17-Dec-2019		17-Dec-2019
Anions by Kone (soil)	14-Dec-2019	14-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	14-Dec-2019	16-Dec-2019
Anions by Kone (w)		17-Dec-2019			17-Dec-2019		17-Dec-2019
Asbestos ID in Solid Samples	12-Dec-2019	12-Dec-2019	12-Dec-2019	16-Dec-2019	16-Dec-2019	12-Dec-2019	16-Dec-2019
Asbestos Quantification - Full						23-Dec-2019	
Boron Water Soluble	13-Dec-2019	17-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	13-Dec-2019	13-Dec-2019
CEN 10:1 Leachate (1 Stage)		12-Dec-2019			12-Dec-2019		13-Dec-2019
CEN Readings		17-Dec-2019			17-Dec-2019		17-Dec-2019
Chromium III	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019
Cyanide Comp/Free/Total/Thiocyanate	13-Dec-2019	18-Dec-2019	16-Dec-2019	16-Dec-2019	18-Dec-2019	16-Dec-2019	18-Dec-2019
Dissolved Metals by ICP-MS		17-Dec-2019			17-Dec-2019		17-Dec-2019
Dissolved Organic/Inorganic Carbon		18-Dec-2019			18-Dec-2019		18-Dec-2019
EPH CWG (Aliphatic) Filtered GC (W)		28-Dec-2019			28-Dec-2019		28-Dec-2019
EPH CWG (Aromatic) Filtered GC (W)		28-Dec-2019			28-Dec-2019		28-Dec-2019
EPH CWG GC (S)	16-Dec-2019	16-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	16-Dec-2019	16-Dec-2019
GRO by GC-FID (S)	12-Dec-2019	12-Dec-2019	17-Dec-2019	16-Dec-2019	16-Dec-2019	12-Dec-2019	13-Dec-2019
GRO by GC-FID (W)		17-Dec-2019			17-Dec-2019		17-Dec-2019
Hexavalent Chromium (s)	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019
Mercury Dissolved		17-Dec-2019			17-Dec-2019		18-Dec-2019
Metals in solid samples by OES	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	13-Dec-2019
Nitrite by Kone (w)		17-Dec-2019			17-Dec-2019		17-Dec-2019
PAH by GCMS	17-Dec-2019	13-Dec-2019	18-Dec-2019	18-Dec-2019	16-Dec-2019	13-Dec-2019	
PAH in waters by GC-MS (diss.filt)		24-Dec-2019			24-Dec-2019		24-Dec-2019
pH	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019	17-Dec-2019
pH Value of Filtered Water		17-Dec-2019			17-Dec-2019		17-Dec-2019
Phenols by HPLC (S)	13-Dec-2019	13-Dec-2019	16-Dec-2019	16-Dec-2019	16-Dec-2019	13-Dec-2019	13-Dec-2019
Phenols by HPLC (W)		18-Dec-2019			18-Dec-2019		18-Dec-2019
Sample description	11-Dec-2019	11-Dec-2019	12-Dec-2019	12-Dec-2019	12-Dec-2019	11-Dec-2019	11-Dec-2019
Total Organic Carbon	16-Dec-2019	13-Dec-2019	17-Dec-2019	17-Dec-2019	16-Dec-2019	16-Dec-2019	13-Dec-2019
TPH CWG Filtered (W)		28-Dec-2019			28-Dec-2019		28-Dec-2019
TPH CWG GC (S)	16-Dec-2019	16-Dec-2019	20-Dec-2019	20-Dec-2019	20-Dec-2019	16-Dec-2019	16-Dec-2019
VOC MS (S)	12-Dec-2019	12-Dec-2019	16-Dec-2019	13-Dec-2019	13-Dec-2019	12-Dec-2019	12-Dec-2019



# CERTIFICATE OF ANALYSIS

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SDG: 191210-86  
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Report Number: 535552  
Superseded Report: 535249

## ASSOCIATED AQC DATA

### Alkalinity Filtered as CaCO<sub>3</sub>

Component	Method Code	QC 2103	QC 2123	QC 2140
Total Alkalinity Filtered as CaCO <sub>3</sub>	TM043	<b>101.01</b> 95.62 : 106.88	<b>107.5</b> 100.35 : 114.15	<b>107.5</b> 100.35 : 114.15

### Ammoniacal Nitrogen

Component	Method Code	QC 2124	QC 2157
Ammoniacal Nitrogen as N	TM099	<b>101.2</b> 93.14 : 108.60	<b>100.4</b> 93.14 : 108.60

### Anions by Kone (soil)

Component	Method Code	QC 2123	QC 2190
Chloride (soluble)	TM243	<b>148.7</b> 77.23 : 120.97	<b>94.82</b> 77.23 : 120.97
Water Soluble Sulphate as SO <sub>4</sub> 2:1 Extract	TM243	<b>108.41</b> 75.60 : 131.10	<b>101.87</b> 75.60 : 131.10

### Anions by Kone (w)

Component	Method Code	QC 2100
Chloride	TM184	<b>103.0</b> 92.93 : 115.43
Sulphate (soluble)	TM184	<b>100.8</b> 90.53 : 113.03
TON as NO <sub>3</sub>	TM184	<b>100.5</b> 96.26 : 111.21

### Boron Water Soluble

Component	Method Code	QC 2190	QC 2152	QC 2103	QC 2106
Water Soluble Boron	TM222	<b>104.0</b> 85.80 : 112.50	<b>105.0</b> 85.80 : 112.50	<b>94.0</b> 85.80 : 112.50	<b>99.0</b> 85.80 : 112.50

### Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2128	QC 2165	QC 2104	QC 2178
Free Cyanide	TM153	<b>88.4</b> 83.05 : 112.74	<b>96.1</b> 83.05 : 112.74	<b>95.7</b> 83.05 : 112.74	
Free Cyanide (W)	TM227				<b>98.5</b> 93.25 : 112.75
Thiocyanate	TM153	<b>83.83</b> 89.81 : 110.19	<b>91.02</b> 89.81 : 110.19	<b>90.42</b> 89.81 : 110.19	



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## Cyanide Comp/Free/Total/Thiocyanate

		QC 2128	QC 2165	QC 2104	QC 2178
Thiocyanate (W)	TM227				<b>99.25</b> 94.00 : 112.00
Total Cyanide	TM153	<b>91.43</b> 88.29 : 111.43	<b>98.57</b> 88.29 : 111.43	<b>98.57</b> 88.29 : 111.43	
Total Cyanide (W)	TM227				<b>99.0</b> 92.25 : 111.75

## Dissolved Metals by ICP-MS

Component	Method Code	QC 2136	QC 2149	QC 2142
Aluminium	TM152	<b>101.33</b> 90.78 : 110.89	<b>106.0</b> 95.37 : 118.13	<b>106.0</b> 95.37 : 118.13
Antimony	TM152	<b>99.5</b> 77.22 : 119.42	<b>103.17</b> 88.37 : 130.57	<b>102.33</b> 88.37 : 130.57
Arsenic	TM152	<b>99.0</b> 86.77 : 107.67	<b>100.5</b> 92.62 : 113.52	<b>102.33</b> 92.62 : 113.52
Barium	TM152	<b>99.0</b> 87.86 : 110.23	<b>104.5</b> 93.15 : 115.52	<b>104.5</b> 93.15 : 115.52
Beryllium	TM152	<b>99.17</b> 86.19 : 112.98	<b>103.17</b> 89.98 : 116.88	<b>101.33</b> 89.98 : 116.88
Bismuth	TM152	<b>98.5</b> 84.06 : 106.46	<b>100.67</b> 92.62 : 115.02	<b>101.17</b> 92.62 : 115.02
Borate	TM152	<b>101.23</b> 88.00 : 112.00		
Boron	TM152	<b>101.0</b> 83.92 : 114.90	<b>106.33</b> 86.31 : 120.88	<b>105.0</b> 86.31 : 120.88
Cadmium	TM152	<b>99.5</b> 88.89 : 106.69	<b>103.0</b> 93.85 : 111.65	<b>102.5</b> 93.85 : 111.65
Calcium	TM152	<b>105.33</b> 80.24 : 117.95	<b>105.33</b> 89.20 : 126.91	<b>105.33</b> 89.20 : 126.91
Chromium	TM152	<b>99.33</b> 83.22 : 110.16	<b>100.5</b> 92.22 : 109.85	<b>101.67</b> 92.22 : 109.85
Cobalt	TM152	<b>99.5</b> 82.49 : 112.36	<b>99.33</b> 85.01 : 114.87	<b>100.5</b> 85.01 : 114.87
Copper	TM152	<b>100.67</b> 83.14 : 113.00	<b>102.0</b> 89.87 : 119.73	<b>102.83</b> 89.87 : 119.73
Iron	TM152	<b>102.0</b> 88.40 : 109.24	<b>102.0</b> 93.02 : 113.86	<b>102.0</b> 93.02 : 113.86
Lead	TM152	<b>101.67</b> 83.71 : 109.58	<b>104.0</b> 91.11 : 116.98	<b>104.0</b> 91.11 : 116.98
Lithium	TM152	<b>98.5</b> 84.50 : 114.28	<b>105.0</b> 91.30 : 123.00	<b>103.17</b> 91.30 : 123.00
Magnesium	TM152	<b>102.67</b> 87.56 : 114.57	<b>104.67</b> 89.60 : 116.61	<b>106.0</b> 89.60 : 116.61
Manganese	TM152	<b>101.67</b> 88.63 : 107.13	<b>101.5</b> 93.97 : 112.46	<b>102.0</b> 93.97 : 112.46
Molybdenum	TM152	<b>98.5</b> 85.53 : 107.42	<b>99.67</b> 89.07 : 110.96	<b>101.0</b> 89.07 : 110.96
Nickel	TM152	<b>98.67</b> 88.05 : 106.42	<b>99.0</b> 93.70 : 112.15	<b>100.33</b> 93.70 : 112.15
Phosphorus	TM152	<b>96.67</b> 82.76 : 107.72	<b>101.0</b> 89.24 : 114.18	<b>99.67</b> 89.24 : 114.18
Potassium	TM152	<b>102.67</b> 97.14 : 108.98	<b>106.0</b> 97.98 : 117.40	<b>106.0</b> 97.98 : 117.40



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**Superseded Report:** 535249

## Dissolved Metals by ICP-MS

		QC 2136	QC 2149	QC 2142
Selenium	TM152	<b>101.5</b> 85.61 : 111.03	<b>103.83</b> 91.69 : 117.12	<b>101.83</b> 91.69 : 117.12
Silver	TM152	<b>98.0</b> 86.73 : 107.07	<b>99.83</b> 96.95 : 117.30	<b>102.33</b> 96.95 : 117.30
Sodium	TM152	<b>102.67</b> 91.84 : 109.17	<b>104.0</b> 92.42 : 113.24	<b>106.0</b> 92.42 : 113.24
Strontium	TM152	<b>98.33</b> 83.77 : 107.87	<b>102.67</b> 92.14 : 116.24	<b>101.33</b> 92.14 : 116.24
Tellurium	TM152	<b>93.83</b> 82.83 : 104.73	<b>96.5</b> 89.88 : 111.78	<b>96.67</b> 89.88 : 111.78
Thallium	TM152	<b>92.0</b> 77.47 : 113.87	<b>98.5</b> 86.08 : 122.48	<b>97.83</b> 86.08 : 122.48
Tin	TM152	<b>102.33</b> 91.00 : 109.00	<b>103.83</b> 91.00 : 109.00	<b>103.67</b> 91.00 : 109.00
Titanium	TM152	<b>98.0</b> 87.29 : 108.31	<b>106.17</b> 88.23 : 109.83	<b>106.17</b> 88.23 : 109.83
Tungsten	TM152	<b>97.5</b> 68.27 : 122.97	<b>99.83</b> 77.61 : 132.31	<b>101.0</b> 77.61 : 132.31
Uranium	TM152	<b>98.17</b> 82.46 : 105.16	<b>99.83</b> 86.97 : 115.76	<b>100.83</b> 86.97 : 115.76
Vanadium	TM152	<b>98.33</b> 88.43 : 114.30	<b>104.83</b> 89.61 : 115.48	<b>96.0</b> 89.61 : 115.48
Zinc	TM152	<b>106.0</b> 85.57 : 114.31	<b>101.67</b> 87.51 : 116.26	<b>102.67</b> 87.51 : 116.26

## Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2180	QC 2107
Dissolved Inorganic Carbon	TM090	<b>100.33</b> 91.27 : 109.87	<b>111.0</b> 93.58 : 112.28
Dissolved Organic Carbon	TM090	<b>100.0</b> 97.87 : 108.77	<b>104.5</b> 96.28 : 110.58

## EPH CWG GC (S)

Component	Method Code	QC 2113	QC 2198	QC 2158
EPH >C8-C40 Raw	TM414	<b>80.14</b> 77.66 : 104.66	<b>103.47</b> 77.66 : 104.66	<b>87.37</b> 77.66 : 104.66
Total Aliphatics Raw	TM414	<b>85.77</b> 84.39 : 115.61	<b>111.55</b> 84.39 : 115.61	<b>92.39</b> 84.39 : 115.61
Total Aromatics Raw	TM414	<b>84.82</b> 57.00 : 150.27	<b>103.43</b> 57.00 : 150.27	<b>100.71</b> 57.00 : 150.27

## GRO by GC-FID (S)

Component	Method Code	QC 2126	QC 2121	QC 2148	QC 2149
QC	TM089	<b>98.36</b> 72.28 : 114.54	<b>104.17</b> 70.75 : 114.19	<b>94.71</b> 70.75 : 114.19	<b>100.75</b> 70.75 : 114.19

## GRO by GC-FID (W)



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## GRO by GC-FID (W)

Component	Method Code	QC 2190
Benzene by GC	TM245	<b>91.0</b> 83.48 : 117.21
Ethylbenzene by GC	TM245	<b>93.0</b> 84.11 : 114.89
m & p Xylene by GC	TM245	<b>92.5</b> 83.73 : 116.33
MTBE GC-FID	TM245	<b>89.5</b> 84.42 : 117.50
o Xylene by GC	TM245	<b>93.5</b> 85.03 : 117.59
QC	TM245	<b>91.18</b> 60.71 : 137.65
Toluene by GC	TM245	<b>90.5</b> 84.73 : 116.85

## Hexavalent Chromium (s)

Component	Method Code	QC 2154	QC 2187	QC 2172	QC 2187	QC 2196
Hexavalent Chromium	TM151	<b>98.0</b> 90.20 : 107.00	<b>104.0</b> 90.20 : 107.00	<b>100.0</b> 90.20 : 107.00	<b>100.0</b> 90.20 : 107.00	<b>102.0</b> 90.20 : 107.00

## Mercury Dissolved

Component	Method Code	QC 2161	QC 2159	QC 2103
Mercury Dissolved (CVAF)	TM183	<b>105.0</b> 76.80 : 117.12	<b>109.0</b> 76.80 : 117.12	<b>97.9</b> 76.80 : 117.12

## Metals in solid samples by OES

Component	Method Code	QC 2120	QC 2167	QC 2134	QC 2183	QC 2192	QC 2101
Aluminium	TM181	<b>94.69</b> 77.84 : 119.01	<b>80.44</b> 77.84 : 119.01	<b>76.64</b> 77.84 : 119.01	<b>94.69</b> 77.84 : 119.01	<b>84.78</b> 77.84 : 119.01	<b>89.38</b> 77.84 : 119.01
Antimony	TM181	<b>97.15</b> 84.28 : 107.67	<b>95.12</b> 84.28 : 107.67	<b>84.55</b> 84.28 : 107.67	<b>95.93</b> 84.28 : 107.67	<b>95.93</b> 84.28 : 107.67	<b>93.09</b> 84.28 : 107.67
Arsenic	TM181	<b>107.85</b> 87.05 : 109.36	<b>98.26</b> 87.05 : 109.36	<b>96.51</b> 87.05 : 109.36	<b>102.62</b> 87.05 : 109.36	<b>98.84</b> 87.05 : 109.36	<b>97.09</b> 87.05 : 109.36
Barium	TM181	<b>102.75</b> 82.49 : 109.34	<b>86.79</b> 82.49 : 109.34	<b>85.5</b> 82.49 : 109.34	<b>91.01</b> 82.49 : 109.34	<b>88.07</b> 82.49 : 109.34	<b>88.99</b> 82.49 : 109.34
Beryllium	TM181	<b>105.6</b> 85.44 : 109.61	<b>100.37</b> 85.44 : 109.61	<b>100.0</b> 85.44 : 109.61	<b>102.99</b> 85.44 : 109.61	<b>98.13</b> 85.44 : 109.61	<b>95.9</b> 85.44 : 109.61
Boron	TM181	<b>92.55</b> 73.51 : 104.66	<b>87.11</b> 73.51 : 104.66	<b>84.24</b> 73.51 : 104.66	<b>93.7</b> 73.51 : 104.66	<b>87.68</b> 73.51 : 104.66	<b>87.11</b> 73.51 : 104.66
Cadmium	TM181	<b>99.18</b> 81.46 : 106.43	<b>91.77</b> 81.46 : 106.43	<b>93.42</b> 81.46 : 106.43	<b>94.65</b> 81.46 : 106.43	<b>89.3</b> 81.46 : 106.43	<b>86.01</b> 81.46 : 106.43
Chromium	TM181	<b>99.8</b> 82.26 : 104.55	<b>92.9</b> 82.26 : 104.55	<b>93.31</b> 82.26 : 104.55	<b>95.74</b> 82.26 : 104.55	<b>91.68</b> 82.26 : 104.55	<b>93.71</b> 82.26 : 104.55
Cobalt	TM181	<b>96.54</b> 86.54 : 106.87	<b>88.99</b> 86.54 : 106.87	<b>88.05</b> 86.54 : 106.87	<b>91.82</b> 86.54 : 106.87	<b>88.99</b> 86.54 : 106.87	<b>87.42</b> 86.54 : 106.87



# CERTIFICATE OF ANALYSIS

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## Metals in solid samples by OES

		QC 2120	QC 2167	QC 2134	QC 2183	QC 2192	QC 2101
Copper	TM181	<b>103.7</b> 82.40 : 105.45	<b>94.54</b> 82.40 : 105.45	<b>94.01</b> 82.40 : 105.45	<b>94.37</b> 82.40 : 105.45	<b>92.61</b> 82.40 : 105.45	<b>93.49</b> 82.40 : 105.45
Iron	TM181	<b>97.62</b> 82.95 : 110.58	<b>79.37</b> 82.95 : 110.58	<b>80.16</b> 82.95 : 110.58	<b>96.03</b> 82.95 : 110.58	<b>102.38</b> 82.95 : 110.58	<b>90.48</b> 82.95 : 110.58
Lead	TM181	<b>95.95</b> 78.24 : 104.05	<b>91.89</b> 78.24 : 104.05	<b>89.41</b> 78.24 : 104.05	<b>93.47</b> 78.24 : 104.05	<b>90.32</b> 78.24 : 104.05	<b>95.72</b> 78.24 : 104.05
Manganese	TM181	<b>116.11</b> 94.29 : 119.51	<b>109.44</b> 94.29 : 119.51	<b>108.61</b> 94.29 : 119.51	<b>108.06</b> 94.29 : 119.51	<b>106.94</b> 94.29 : 119.51	<b>103.06</b> 94.29 : 119.51
Mercury	TM181	<b>102.9</b> 83.74 : 105.34	<b>94.93</b> 83.74 : 105.34	<b>93.72</b> 83.74 : 105.34	<b>97.34</b> 83.74 : 105.34	<b>93.72</b> 83.74 : 105.34	<b>95.17</b> 83.74 : 105.34
Molybdenum	TM181	<b>104.53</b> 87.11 : 106.87	<b>98.77</b> 87.11 : 106.87	<b>100.41</b> 87.11 : 106.87	<b>97.94</b> 87.11 : 106.87	<b>94.24</b> 87.11 : 106.87	<b>90.53</b> 87.11 : 106.87
Nickel	TM181	<b>97.56</b> 81.92 : 102.18	<b>92.42</b> 81.92 : 102.18	<b>92.67</b> 81.92 : 102.18	<b>94.13</b> 81.92 : 102.18	<b>90.46</b> 81.92 : 102.18	<b>87.53</b> 81.92 : 102.18
Phosphorus	TM181	<b>117.58</b> 94.56 : 124.28	<b>104.44</b> 94.56 : 124.28	<b>104.85</b> 94.56 : 124.28	<b>110.51</b> 94.56 : 124.28	<b>106.87</b> 94.56 : 124.28	<b>107.88</b> 94.56 : 124.28
Selenium	TM181	<b>108.24</b> 86.28 : 110.48	<b>101.18</b> 86.28 : 110.48	<b>101.96</b> 86.28 : 110.48	<b>103.14</b> 86.28 : 110.48	<b>99.22</b> 86.28 : 110.48	<b>96.47</b> 86.28 : 110.48
Strontium	TM181	<b>94.88</b> 79.13 : 102.79	<b>85.75</b> 79.13 : 102.79	<b>84.63</b> 79.13 : 102.79	<b>89.98</b> 79.13 : 102.79	<b>85.75</b> 79.13 : 102.79	<b>87.08</b> 79.13 : 102.79
Thallium	TM181	<b>102.65</b> 82.94 : 111.86	<b>95.58</b> 82.94 : 111.86	<b>94.25</b> 82.94 : 111.86	<b>96.9</b> 82.94 : 111.86	<b>93.81</b> 82.94 : 111.86	<b>95.13</b> 82.94 : 111.86
Tin	TM181	<b>106.08</b> 90.25 : 108.86	<b>100.38</b> 90.25 : 108.86	<b>101.9</b> 90.25 : 108.86	<b>101.52</b> 90.25 : 108.86	<b>98.86</b> 90.25 : 108.86	<b>96.2</b> 90.25 : 108.86
Titanium	TM181	<b>83.97</b> 66.23 : 102.06	<b>78.63</b> 66.23 : 102.06	<b>79.39</b> 66.23 : 102.06	<b>83.97</b> 66.23 : 102.06	<b>75.88</b> 66.23 : 102.06	<b>73.66</b> 66.23 : 102.06
Vanadium	TM181	<b>100.37</b> 86.37 : 107.94	<b>93.41</b> 86.37 : 107.94	<b>90.84</b> 86.37 : 107.94	<b>95.6</b> 86.37 : 107.94	<b>90.11</b> 86.37 : 107.94	<b>90.84</b> 86.37 : 107.94
Zinc	TM181	<b>105.95</b> 84.68 : 113.99	<b>97.74</b> 84.68 : 113.99	<b>96.92</b> 84.68 : 113.99	<b>102.67</b> 84.68 : 113.99	<b>98.15</b> 84.68 : 113.99	<b>94.66</b> 84.68 : 113.99

## PAH by GCMS

Component	Method Code	QC 2196	QC 2156	QC 2129	QC 2173	QC 2196	QC 2111
Acenaphthene	TM218	<b>98.5</b> 80.97 : 105.99	<b>96.5</b> 70.00 : 130.00	<b>100.5</b> 80.97 : 105.99	<b>92.5</b> 80.97 : 105.99	<b>101.0</b> 70.00 : 130.00	<b>93.5</b> 76.79 : 103.90
Acenaphthylene	TM218	<b>96.5</b> 80.24 : 105.29	<b>94.0</b> 70.00 : 130.00	<b>98.0</b> 80.24 : 105.29	<b>92.0</b> 80.24 : 105.29	<b>101.5</b> 70.00 : 130.00	<b>91.5</b> 78.40 : 108.66
Anthracene	TM218	<b>93.0</b> 73.72 : 109.23	<b>94.0</b> 70.00 : 130.00	<b>93.0</b> 73.72 : 109.23	<b>86.5</b> 73.72 : 109.23	<b>101.0</b> 70.00 : 130.00	<b>98.0</b> 76.15 : 110.07
Benz(a)anthracene	TM218	<b>97.0</b> 79.72 : 116.84	<b>91.0</b> 68.12 : 118.39	<b>87.5</b> 79.72 : 116.84	<b>84.5</b> 79.72 : 116.84	<b>105.0</b> 68.12 : 118.39	<b>105.0</b> 73.77 : 119.26
Benzo(a)pyrene	TM218	<b>100.5</b> 69.58 : 110.26	<b>87.5</b> 71.72 : 115.31	<b>85.0</b> 69.58 : 110.26	<b>87.0</b> 69.58 : 110.26	<b>109.5</b> 71.72 : 115.31	<b>98.5</b> 73.20 : 114.18
Benzo(b)fluoranthene	TM218	<b>93.5</b> 77.35 : 112.97	<b>80.5</b> 66.89 : 120.40	<b>83.5</b> 77.35 : 112.97	<b>82.0</b> 77.35 : 112.97	<b>75.5</b> 66.89 : 120.40	<b>83.5</b> 75.36 : 117.58
Benzo(ghi)perylene	TM218	<b>94.0</b> 77.68 : 107.38	<b>87.0</b> 67.82 : 118.49	<b>79.0</b> 77.68 : 107.38	<b>84.5</b> 77.68 : 107.38	<b>95.5</b> 67.82 : 118.49	<b>89.5</b> 70.73 : 116.12
Benzo(k)fluoranthene	TM218	<b>94.0</b> 82.61 : 111.93	<b>90.0</b> 73.10 : 117.03	<b>84.5</b> 82.61 : 111.93	<b>83.0</b> 82.61 : 111.93	<b>93.0</b> 73.10 : 117.03	<b>82.0</b> 75.98 : 116.59
Chrysene	TM218	<b>95.5</b> 80.28 : 111.42	<b>86.5</b> 69.58 : 115.47	<b>84.5</b> 80.28 : 111.42	<b>80.5</b> 80.28 : 111.42	<b>100.5</b> 69.58 : 115.47	<b>99.0</b> 74.82 : 114.18
Dibenzo(ah)anthracene	TM218	<b>92.5</b> 79.17 : 106.41	<b>85.5</b> 67.32 : 121.35	<b>81.0</b> 79.17 : 106.41	<b>86.5</b> 79.17 : 106.41	<b>100.0</b> 67.32 : 121.35	<b>99.0</b> 69.17 : 115.30





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## PAH by GCMS

		QC 2196	QC 2156	QC 2129	QC 2173	QC 2196	QC 2111
Fluoranthene	TM218	<b>101.0</b> 79.07 : 112.75	<b>87.5</b> 75.16 : 117.28	<b>88.5</b> 79.07 : 112.75	<b>82.0</b> 79.07 : 112.75	<b>104.5</b> 75.16 : 117.28	<b>105.0</b> 75.88 : 112.84
Fluorene	TM218	<b>97.5</b> 80.52 : 110.90	<b>96.5</b> 70.00 : 130.00	<b>99.0</b> 80.52 : 110.90	<b>90.5</b> 80.52 : 110.90	<b>102.5</b> 70.00 : 130.00	<b>95.0</b> 78.50 : 114.02
Indeno(123cd)pyrene	TM218	<b>93.5</b> 76.97 : 113.36	<b>85.0</b> 68.91 : 117.62	<b>77.0</b> 76.97 : 113.36	<b>91.5</b> 76.97 : 113.36	<b>97.0</b> 68.91 : 117.62	<b>86.5</b> 70.26 : 117.95
Naphthalene	TM218	<b>96.5</b> 83.50 : 110.02	<b>95.5</b> 70.00 : 130.00	<b>102.0</b> 83.50 : 110.02	<b>91.5</b> 83.50 : 110.02	<b>98.0</b> 70.00 : 130.00	<b>89.0</b> 75.24 : 111.26
Phenanthrene	TM218	<b>94.5</b> 79.34 : 111.91	<b>93.0</b> 70.00 : 130.00	<b>95.0</b> 79.34 : 111.91	<b>82.5</b> 79.34 : 111.91	<b>102.0</b> 70.00 : 130.00	<b>100.5</b> 77.07 : 107.43
Pyrene	TM218	<b>100.0</b> 74.43 : 114.36	<b>90.5</b> 75.68 : 119.23	<b>88.5</b> 74.43 : 114.36	<b>84.5</b> 74.43 : 114.36	<b>108.0</b> 75.68 : 119.23	<b>105.5</b> 78.74 : 112.56

## PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC 2131
Acenaphthene (diss.filt)	TM178	<b>106.8</b> 93.20 : 119.60
Acenaphthylene (diss.filt)	TM178	<b>105.2</b> 92.00 : 118.40
Anthracene (diss.filt)	TM178	<b>104.8</b> 90.80 : 114.80
Benzo(a)anthracene (diss.filt)	TM178	<b>98.0</b> 91.60 : 115.60
Benzo(a)pyrene (diss.filt)	TM178	<b>100.0</b> 91.20 : 120.00
Benzo(b)fluoranthene (diss.filt)	TM178	<b>105.6</b> 86.80 : 120.40
Benzo(g,h,i)perylene (diss.filt)	TM178	<b>100.0</b> 89.20 : 118.00
Benzo(k)fluoranthene (diss.filt)	TM178	<b>103.2</b> 94.40 : 125.60
Chrysene (diss.filt)	TM178	<b>101.6</b> 96.40 : 122.80
Dibenzo(a,h)anthracene (diss.filt)	TM178	<b>100.8</b> 93.60 : 132.00
Fluoranthene (diss.filt)	TM178	<b>104.4</b> 92.80 : 121.60
Fluorene (diss.filt)	TM178	<b>106.8</b> 93.60 : 120.00
Indeno(1,2,3-cd)pyrene (diss.filt)	TM178	<b>103.2</b> 82.40 : 120.80
Naphthalene (diss.filt)	TM178	<b>108.4</b> 88.40 : 126.80
Phenanthrene (diss.filt)	TM178	<b>104.8</b> 92.40 : 118.80
Pyrene (diss.filt)	TM178	<b>102.0</b> 90.40 : 124.00

## pH



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pH

Component	Method Code	QC 2192	QC 2198	QC 2149
pH	TM133	<b>98.49</b> 97.44 : 100.93	<b>99.65</b> 97.44 : 100.93	<b>98.26</b> 97.44 : 100.93

## pH Value of Filtered Water

Component	Method Code	QC 2117
pH Value of Filtered Water	TM256	<b>100.94</b> 99.73 : 102.16

## Phenols by HPLC (S)

Component	Method Code	QC 2182	QC 2184	QC 2189
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	<b>92.86</b> 65.50 : 89.50	<b>92.21</b> 65.50 : 89.50	<b>101.3</b> 65.50 : 89.50
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	<b>88.3</b> 86.25 : 116.25	<b>82.46</b> 86.25 : 116.25	<b>90.06</b> 86.25 : 116.25
Catechol by HPLC (S)	TM062 (S)	<b>83.81</b> 19.39 : 135.70	<b>74.29</b> 19.39 : 135.70	<b>80.0</b> 19.39 : 135.70
Cresols by HPLC (S)	TM062 (S)	<b>88.31</b> 81.00 : 112.20	<b>87.47</b> 81.00 : 112.20	<b>94.99</b> 81.00 : 112.20
Napthol by HPLC (S)	TM062 (S)	<b>114.29</b> 57.50 : 102.50	<b>112.14</b> 57.50 : 102.50	<b>112.14</b> 57.50 : 102.50
Phenol by HPLC (S)	TM062 (S)	<b>100.66</b> 88.67 : 124.67	<b>98.68</b> 88.67 : 124.67	<b>105.3</b> 88.67 : 124.67
Resorcinol HPLC (S)	TM062 (S)	<b>91.19</b> 69.99 : 127.22	<b>89.94</b> 69.99 : 127.22	<b>94.97</b> 69.99 : 127.22
Xylenols by HPLC (S)	TM062 (S)	<b>94.79</b> 90.22 : 114.22	<b>92.81</b> 90.22 : 114.22	<b>97.08</b> 90.22 : 114.22

## Phenols by HPLC (W)

Component	Method Code	QC 2159
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	<b>100.0</b> 91.00 : 109.00
2-Isopropyl Phenol by HPLC (W)	TM259	<b>96.0</b> 90.00 : 114.00
Cresols by HPLC (W)	TM259	<b>108.33</b> 90.02 : 130.15
Napthol by HPLC (W)	TM259	<b>96.0</b> 86.00 : 128.00
Phenol by HPLC (W)	TM259	<b>101.0</b> 85.89 : 109.89
Xylenols by HPLC (W)	TM259	<b>102.17</b> 93.33 : 107.33

## Total Organic Carbon



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## Total Organic Carbon

Component	Method Code	QC 2135	QC 2111	QC 2119	QC 2153	QC 2142	QC 2144
Total Organic Carbon	TM132	<b>100.39</b> 84.82 : 117.61	<b>101.17</b> 84.82 : 117.61	<b>102.73</b> 84.82 : 117.61	<b>99.22</b> 84.82 : 117.61	<b>100.39</b> 84.82 : 117.61	<b>101.17</b> 84.82 : 117.61

## VOC MS (S)

Component	Method Code	QC 2144	QC 2181	QC 2178	QC 2143
1,1,1,2-tetrachloroethane	TM116	<b>109.4</b> 77.56 : 115.55	<b>109.6</b> 77.56 : 115.55	<b>101.0</b> 79.10 : 119.66	<b>108.2</b> 77.47 : 121.29
1,1,1-Trichloroethane	TM116	<b>111.6</b> 73.73 : 118.05	<b>110.4</b> 73.73 : 118.05	<b>95.6</b> 87.51 : 115.37	<b>97.2</b> 86.26 : 117.53
1,1,2-Trichloroethane	TM116	<b>106.8</b> 77.12 : 116.04	<b>108.0</b> 77.12 : 116.04	<b>94.6</b> 75.16 : 112.70	<b>99.8</b> 75.16 : 112.70
1,1-Dichloroethane	TM116	<b>113.2</b> 74.46 : 129.15	<b>111.2</b> 74.46 : 129.15	<b>99.2</b> 89.44 : 121.71	<b>99.8</b> 83.27 : 122.16
1,2-Dichloroethane	TM116	<b>115.6</b> 92.38 : 131.65	<b>118.8</b> 92.38 : 131.65	<b>104.4</b> 86.58 : 129.62	<b>113.6</b> 86.58 : 129.62
1,4-Dichlorobenzene	TM116	<b>107.0</b> 72.76 : 126.34	<b>109.2</b> 72.76 : 126.34	<b>96.8</b> 84.04 : 124.40	<b>112.2</b> 82.59 : 123.23
2-Chlorotoluene	TM116	<b>94.8</b> 81.66 : 118.02	<b>96.8</b> 81.66 : 118.02	<b>87.8</b> 80.02 : 116.73	<b>95.6</b> 66.81 : 118.43
4-Chlorotoluene	TM116	<b>92.6</b> 66.90 : 112.46	<b>96.4</b> 66.90 : 112.46	<b>81.0</b> 77.52 : 111.38	<b>92.0</b> 65.88 : 114.76
Benzene	TM116	<b>106.4</b> 89.71 : 111.93	<b>106.4</b> 89.71 : 111.93	<b>95.2</b> 85.63 : 110.10	<b>102.4</b> 93.16 : 123.63
Carbon Disulphide	TM116	<b>99.6</b> 74.91 : 122.14	<b>96.4</b> 74.91 : 122.14	<b>90.6</b> 75.11 : 124.81	<b>91.4</b> 75.11 : 124.81
Carbontetrachloride	TM116	<b>119.2</b> 80.31 : 124.50	<b>118.8</b> 80.31 : 124.50	<b>108.4</b> 82.35 : 126.46	<b>100.8</b> 82.35 : 126.46
Chlorobenzene	TM116	<b>103.2</b> 86.73 : 118.34	<b>104.0</b> 86.73 : 118.34	<b>93.4</b> 82.88 : 122.42	<b>102.8</b> 85.07 : 118.13
Chloroform	TM116	<b>113.6</b> 87.40 : 122.49	<b>114.0</b> 87.40 : 122.49	<b>102.6</b> 91.34 : 123.04	<b>102.0</b> 88.13 : 122.71
Chloromethane	TM116	<b>100.8</b> 65.05 : 142.63	<b>99.6</b> 65.05 : 142.63	<b>94.2</b> 52.88 : 131.36	<b>88.2</b> 55.37 : 133.35
Cis-1,2-Dichloroethene	TM116	<b>111.0</b> 80.67 : 126.72	<b>110.8</b> 80.67 : 126.72	<b>98.4</b> 78.27 : 128.90	<b>99.6</b> 78.27 : 128.90
Dibromomethane	TM116	<b>114.8</b> 67.80 : 121.75	<b>120.6</b> 67.80 : 121.75	<b>104.4</b> 71.69 : 119.43	<b>95.8</b> 77.47 : 121.29
Dichloromethane	TM116	<b>119.0</b> 81.11 : 133.25	<b>122.8</b> 81.11 : 133.25	<b>107.6</b> 89.49 : 128.89	<b>109.4</b> 81.68 : 125.21
Ethylbenzene	TM116	<b>98.0</b> 75.92 : 110.41	<b>98.4</b> 75.92 : 110.41	<b>87.2</b> 70.95 : 113.07	<b>98.4</b> 83.56 : 122.99
Hexachlorobutadiene	TM116	<b>81.2</b> 12.82 : 152.73	<b>88.8</b> 12.82 : 152.73	<b>89.0</b> 7.32 : 139.00	<b>101.0</b> 7.32 : 139.00
Isopropylbenzene	TM116	<b>85.8</b> 54.21 : 117.17	<b>91.2</b> 54.21 : 117.17	<b>74.4</b> 52.15 : 132.52	<b>90.4</b> 69.92 : 116.39
Naphthalene	TM116	<b>96.0</b> 80.86 : 128.81	<b>99.2</b> 80.86 : 128.81	<b>85.4</b> 80.29 : 135.77	<b>112.8</b> 79.29 : 125.59
o-Xylene	TM116	<b>93.8</b> 69.99 : 108.74	<b>94.8</b> 69.99 : 108.74	<b>83.0</b> 68.16 : 107.61	<b>93.8</b> 74.57 : 112.73



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 191210-86  
**Location:** Cwmcam High School

**Client Reference:** A110489-4-1  
**Order Number:** C19/1273

**Report Number:** 535552  
**Superseded Report:** 535249

VOC MS (S)

		QC 2144	QC 2181	QC 2178	QC 2143
p/m-Xylene	TM116	<b>94.3</b> 68.32 : 108.91	<b>94.7</b> 68.32 : 108.91	<b>84.6</b> 73.52 : 108.71	<b>93.7</b> 77.41 : 112.71
Sec-Butylbenzene	TM116	<b>83.2</b> 44.91 : 118.40	<b>91.6</b> 44.91 : 118.40	<b>76.0</b> 49.79 : 125.67	<b>91.2</b> 44.71 : 117.87
Tetrachloroethene	TM116	<b>110.6</b> 76.95 : 121.02	<b>110.4</b> 76.95 : 121.02	<b>100.8</b> 81.43 : 126.65	<b>108.4</b> 81.43 : 126.65
Toluene	TM116	<b>98.6</b> 74.24 : 107.42	<b>97.4</b> 74.24 : 107.42	<b>88.4</b> 79.59 : 101.35	<b>94.0</b> 87.82 : 116.21
Trichloroethene	TM116	<b>105.2</b> 77.61 : 111.54	<b>107.0</b> 77.61 : 111.54	<b>94.2</b> 79.80 : 112.33	<b>101.4</b> 79.80 : 112.33
Trichlorofluoromethane	TM116	<b>107.6</b> 84.55 : 133.27	<b>107.0</b> 84.55 : 133.27	<b>98.8</b> 88.86 : 128.82	<b>97.6</b> 80.52 : 132.12
Vinyl Chloride	TM116	<b>94.2</b> 70.29 : 138.58	<b>91.2</b> 70.29 : 138.58	<b>88.2</b> 69.66 : 136.55	<b>94.2</b> 58.08 : 128.58

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



# CERTIFICATE OF ANALYSIS

<b>SDG:</b>	191210-86	<b>Client Reference:</b>	A110489-4-1	<b>Report Number:</b>	535552
<b>Location:</b>	Cwmcam High School	<b>Order Number:</b>	C19/1273	<b>Superseded Report:</b>	535249

## Appendix

## General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH<sub>4</sub> by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

### 18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

### 19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

#### Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

#### Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

#### Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

**Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.**

**The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**



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Website: www.alsenvironmental.co.uk

WYG Geo-Environment  
5th Floor  
Longcross Court  
47 Newport Road  
Cardiff  
CF24 0AD

**Attention:** Katy Woodhouse

## CERTIFICATE OF ANALYSIS

<b>Date of report Generation:</b>	27 January 2020
<b>Customer:</b>	WYG Geo-Environment
<b>Sample Delivery Group (SDG):</b>	200115-46
<b>Your Reference:</b>	A110489-4
<b>Location:</b>	Cwmcarn High School
<b>Report No:</b>	538469

We received 2 samples on Wednesday January 15, 2020 and 2 of these samples were scheduled for analysis which was completed on Monday January 27, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

**Sonia McWhan**

Operations Manager





## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200115-46  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C20/020

**Report Number:** 538469  
**Superseded Report:**

### Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
21488217	BH104	EW2	1.85	14/01/2020
21488207	BH105	EW1	0.45 - 4.50	14/01/2020

**Maximum Sample/Coolbox Temperature (°C) :**

**6.8**

**ISO5667-3 Water quality - Sampling - Part3 -**

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

**Only received samples which have had analysis scheduled will be shown on the following pages.**











# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200115-46  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C20/020

**Report Number:** 538469  
**Superseded Report:**

## TPH CWG (W)

Results Legend		Customer Sample Ref.	BH104	BH105				
#	ISO17025 accredited.							
M	mCERTS accredited.							
sq	Aqueous / settled sample.							
dis.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-3+5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM245	93	94				
GRO >C5-C12	<50 µg/l	TM245	<50	<50				
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245	<3	<3				
Benzene	<7 µg/l	TM245	<7	<7				
Toluene	<4 µg/l	TM245	<4	<4				
Ethylbenzene	<5 µg/l	TM245	<5	<5				
m,p-Xylene	<8 µg/l	TM245	<8	<8				
o-Xylene	<3 µg/l	TM245	<3	<3				
Sum of detected Xylenes	<11 µg/l	TM245	<11	<11				
Sum of detected BTEX	<28 µg/l	TM245	<28	<28				
Aliphatics >C5-C6	<10 µg/l	TM245	<10	<10				
Aliphatics >C6-C8	<10 µg/l	TM245	<10	<10				
Aliphatics >C8-C10	<10 µg/l	TM245	<10	<10				
Aliphatics >C10-C12	<10 µg/l	TM245	<10	<10				
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<10				
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	<10	<10				
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	<10	<10				
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	<10	<10				
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	<10				
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	<10				
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10				
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10				
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10	<10				
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	<10				
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10	<10				
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10	<10				
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	<10	<10				
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	<10	<10				



## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200115-46  
**Location:** Cwmcam High School**Client Reference:** A110489-4  
**Order Number:** C20/020**Report Number:** 538469  
**Superseded Report:**

### Table of Results - Appendix

Method No	Reference	Description
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200115-46  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C20/020

**Report Number:** 538469  
**Superseded Report:**

## Test Completion Dates

<b>Lab Sample No(s)</b>	21488217	21488207
<b>Customer Sample Ref.</b>	BH104	BH105
<b>AGS Ref.</b>	EW2	EW1
<b>Depth</b>	1.85	0.45 - 4.50
<b>Type</b>	Ground Water	Ground Water

Alkalinity as CaCO <sub>3</sub>	21-Jan-2020	17-Jan-2020
Ammoniacal Nitrogen	15-Jan-2020	15-Jan-2020
Anions by Kone (w)	16-Jan-2020	16-Jan-2020
Cyanide Comp/Free/Total/Thiocyanate	21-Jan-2020	21-Jan-2020
Dissolved Metals by ICP-MS	21-Jan-2020	21-Jan-2020
Dissolved Organic/Inorganic Carbon	17-Jan-2020	17-Jan-2020
EPH CWG (Aliphatic) Aqueous GC (W)	22-Jan-2020	22-Jan-2020
EPH CWG (Aromatic) Aqueous GC (W)	21-Jan-2020	21-Jan-2020
GRO by GC-FID (W)	16-Jan-2020	16-Jan-2020
Mercury Dissolved	27-Jan-2020	27-Jan-2020
Nitrite by Kone (w)	16-Jan-2020	16-Jan-2020
PAH Spec MS - Aqueous (W)	21-Jan-2020	17-Jan-2020
pH Value	16-Jan-2020	16-Jan-2020
Phenols by HPLC (W)	16-Jan-2020	16-Jan-2020
TPH CWG (W)	22-Jan-2020	22-Jan-2020



## CERTIFICATE OF ANALYSIS

Validated

SDG: 200115-46  
Location: Cwmcam High SchoolClient Reference: A110489-4  
Order Number: C20/020Report Number: 538469  
Superseded Report:

## ASSOCIATED AQC DATA

Alkalinity as CaCO<sub>3</sub>

Component	Method Code	QC 2150	QC 2183
Total Alkalinity as CaCO <sub>3</sub>	TM043	<b>103.54</b> 96.56 : 106.57	<b>102.53</b> 94.47 : 104.41

## Ammoniacal Nitrogen

Component	Method Code	QC 2187
Ammoniacal Nitrogen as N	TM099	<b>100.0</b> 93.14 : 108.60

## Anions by Kone (w)

Component	Method Code	QC 2146	QC 2159
Chloride	TM184	<b>107.0</b> 92.93 : 115.43	<b>107.0</b> 92.93 : 115.43
Sulphate (soluble)	TM184	<b>108.4</b> 90.53 : 113.03	<b>108.0</b> 90.53 : 113.03
TON as NO <sub>3</sub>	TM184	<b>105.5</b> 94.00 : 111.10	<b>107.5</b> 94.00 : 111.10

## Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2125	QC 2138
Free Cyanide (W)	TM227	<b>103.25</b> 92.00 : 113.00	<b>101.5</b> 92.00 : 113.00
Thiocyanate (W)	TM227	<b>104.5</b> 95.50 : 107.50	<b>103.0</b> 95.50 : 107.50
Total Cyanide (W)	TM227	<b>102.0</b> 91.75 : 112.75	<b>103.0</b> 91.75 : 112.75

## Dissolved Metals by ICP-MS

Component	Method Code	QC 2167	QC 2161
Aluminium	TM152	<b>109.33</b> 90.78 : 110.89	<b>101.33</b> 90.78 : 110.89
Antimony	TM152	<b>102.17</b> 77.22 : 119.42	<b>98.17</b> 77.22 : 119.42
Arsenic	TM152	<b>97.17</b> 86.77 : 107.67	<b>94.83</b> 86.77 : 107.67
Barium	TM152	<b>103.0</b> 87.86 : 110.23	<b>97.0</b> 87.86 : 110.23
Beryllium	TM152	<b>115.5</b> 86.19 : 112.98	<b>101.33</b> 86.19 : 112.98
Bismuth	TM152	<b>102.17</b> 84.06 : 106.46	<b>99.0</b> 84.06 : 106.46
Borate	TM152	<b>116.05</b> 88.00 : 112.00	<b>102.47</b> 88.00 : 112.00



# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200115-46  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C20/020

**Report Number:** 538469  
**Superseded Report:**

## Dissolved Metals by ICP-MS

		QC 2167	QC 2161
Boron	TM152	<b>116.0</b> 83.92 : 114.90	<b>102.67</b> 83.92 : 114.90
Cadmium	TM152	<b>103.17</b> 88.89 : 106.69	<b>97.33</b> 88.89 : 106.69
Calcium	TM152	<b>103.33</b> 80.24 : 117.95	<b>104.67</b> 80.24 : 117.95
Chromium	TM152	<b>100.83</b> 83.22 : 110.16	<b>96.33</b> 83.22 : 110.16
Cobalt	TM152	<b>100.33</b> 82.49 : 112.36	<b>97.17</b> 82.49 : 112.36
Copper	TM152	<b>100.33</b> 83.14 : 113.00	<b>96.17</b> 83.14 : 113.00
Iron	TM152	<b>104.0</b> 88.40 : 109.24	<b>97.33</b> 88.40 : 109.24
Lead	TM152	<b>103.83</b> 83.71 : 109.58	<b>102.0</b> 83.71 : 109.58
Lithium	TM152	<b>117.33</b> 84.50 : 114.28	<b>100.17</b> 84.50 : 114.28
Magnesium	TM152	<b>110.67</b> 87.56 : 114.57	<b>100.0</b> 87.56 : 114.57
Manganese	TM152	<b>102.67</b> 88.63 : 107.13	<b>95.67</b> 88.63 : 107.13
Molybdenum	TM152	<b>99.83</b> 85.53 : 107.42	<b>96.5</b> 85.53 : 107.42
Nickel	TM152	<b>99.0</b> 88.05 : 106.42	<b>95.83</b> 88.05 : 106.42
Phosphorus	TM152	<b>99.5</b> 82.76 : 107.72	<b>95.33</b> 82.76 : 107.72
Potassium	TM152	<b>102.67</b> 97.14 : 108.98	<b>98.0</b> 97.14 : 108.98
Selenium	TM152	<b>99.5</b> 85.61 : 111.03	<b>94.17</b> 85.61 : 111.03
Silver	TM152	<b>98.67</b> 86.73 : 107.07	<b>94.33</b> 86.73 : 107.07
Sodium	TM152	<b>110.0</b> 91.84 : 109.17	<b>98.67</b> 91.84 : 109.17
Strontium	TM152	<b>100.33</b> 83.77 : 107.87	<b>96.0</b> 83.77 : 107.87
Tellurium	TM152	<b>92.0</b> 82.83 : 104.73	<b>93.67</b> 82.83 : 104.73
Thallium	TM152	<b>92.83</b> 77.47 : 113.87	<b>92.17</b> 77.47 : 113.87
Tin	TM152	<b>103.17</b> 91.00 : 109.00	<b>101.0</b> 91.00 : 109.00
Titanium	TM152	<b>106.83</b> 87.29 : 108.31	<b>101.17</b> 87.29 : 108.31
Tungsten	TM152	<b>100.33</b> 68.27 : 122.97	<b>101.5</b> 68.27 : 122.97
Uranium	TM152	<b>102.0</b> 82.46 : 105.16	<b>98.5</b> 82.46 : 105.16
Vanadium	TM152	<b>99.5</b> 88.43 : 114.30	<b>97.17</b> 88.43 : 114.30
Zinc	TM152	<b>102.67</b> 85.57 : 114.31	<b>103.0</b> 85.57 : 114.31



# CERTIFICATE OF ANALYSIS

Validated

SDG: 200115-46  
Location: Cwmcam High School

Client Reference: A110489-4  
Order Number: C20/020

Report Number: 538469  
Superseded Report:

## Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2186
Dissolved Inorganic Carbon	TM090	<b>99.0</b> 91.27 : 109.87
Dissolved Organic Carbon	TM090	<b>100.67</b> 97.87 : 108.77

## EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 2146
Total Aliphatics >C10-C40	TM174	<b>94.88</b> 69.79 : 134.39

## EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 2149
Total Aromatics >EC10-EC40	TM174	<b>85.37</b> 59.92 : 128.54

## GRO by GC-FID (W)

Component	Method Code	QC 2186
Benzene by GC	TM245	<b>92.5</b> 76.38 : 121.90
Ethylbenzene by GC	TM245	<b>93.0</b> 74.02 : 123.14
m & p Xylene by GC	TM245	<b>92.5</b> 74.03 : 123.21
MTBE GC-FID	TM245	<b>93.0</b> 76.82 : 121.46
o Xylene by GC	TM245	<b>94.0</b> 74.37 : 122.75
QC	TM245	<b>100.35</b> 63.32 : 125.20
Toluene by GC	TM245	<b>94.0</b> 75.75 : 124.83

## Mercury Dissolved

Component	Method Code	QC 2140
Mercury Dissolved (CVAf)	TM183	<b>85.4</b> 75.00 : 111.00

## PAH Spec MS - Aqueous (W)





# CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200115-46  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C20/020

**Report Number:** 538469  
**Superseded Report:**

## PAH Spec MS - Aqueous (W)

Component	Method Code	QC 2180	QC 2162
Acenaphthene by GCMS	TM178	<b>103.6</b> 90.45 : 118.63	<b>103.6</b> 97.60 : 116.80
Acenaphthylene by GCMS	TM178	<b>103.2</b> 90.13 : 116.27	<b>97.2</b> 89.20 : 113.20
Anthracene by GCMS	TM178	<b>96.4</b> 92.40 : 114.00	<b>97.2</b> 92.40 : 116.40
Benz(a)anthracene by GCMS	TM178	<b>103.2</b> 89.51 : 117.69	<b>92.4</b> 84.40 : 110.80
Benzo(a)pyrene by GCMS	TM178	<b>103.2</b> 89.43 : 118.57	<b>95.2</b> 87.20 : 106.40
Benzo(b)fluoranthene by GCMS	TM178	<b>101.6</b> 87.80 : 121.80	<b>92.0</b> 84.80 : 111.20
Benzo(ghi)perylene by GCMS	TM178	<b>102.0</b> 87.10 : 119.30	<b>100.8</b> 93.60 : 112.80
Benzo(k)fluoranthene by GCMS	TM178	<b>105.2</b> 93.23 : 123.57	<b>98.4</b> 90.40 : 119.20
Chrysene by GCMS	TM178	<b>102.8</b> 88.68 : 116.92	<b>100.8</b> 96.80 : 113.60
Dibenzo(ah)anthracene by GCMS	TM178	<b>106.4</b> 86.24 : 118.56	<b>95.2</b> 88.00 : 112.00
Fluoranthene by GCMS	TM178	<b>102.4</b> 86.04 : 121.96	<b>105.6</b> 93.49 : 118.20
Fluorene by GCMS	TM178	<b>105.6</b> 90.76 : 121.24	<b>101.6</b> 94.39 : 118.66
Indeno(123cd)pyrene by GCMS	TM178	<b>111.6</b> 88.39 : 119.61	<b>97.6</b> 90.40 : 114.40
Naphthalene by GCMS	TM178	<b>98.4</b> 89.40 : 121.80	<b>111.2</b> 94.00 : 115.60
Phenanthrene by GCMS	TM178	<b>104.0</b> 90.41 : 119.19	<b>102.0</b> 94.80 : 114.00
Pyrene by GCMS	TM178	<b>102.4</b> 91.00 : 120.20	<b>108.8</b> 96.40 : 115.60

## pH Value

Component	Method Code	QC 2189
pH	TM256	<b>101.62</b> 99.87 : 102.29

## Phenols by HPLC (W)

Component	Method Code	QC 2100
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	<b>100.0</b> 91.00 : 109.00
2-Isopropyl Phenol by HPLC (W)	TM259	<b>96.0</b> 90.00 : 114.00
Cresols by HPLC (W)	TM259	<b>105.0</b> 90.02 : 130.15
Napthol by HPLC (W)	TM259	<b>104.0</b> 86.00 : 128.00



## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200115-46  
**Location:** Cwmcam High School

**Client Reference:** A110489-4  
**Order Number:** C20/020

**Report Number:** 538469  
**Superseded Report:**

### Phenols by HPLC (W)

		QC 2100
Phenol by HPLC (W)	TM259	<b>101.0</b> 85.89 : 109.89
Xylenols by HPLC (W)	TM259	<b>101.17</b> 93.33 : 107.33

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



# CERTIFICATE OF ANALYSIS

<b>SDG:</b>	200115-46	<b>Client Reference:</b>	A110489-4	<b>Report Number:</b>	538469
<b>Location:</b>	Cwmcarn High School	<b>Order Number:</b>	C20/020	<b>Superseded Report:</b>	

## Appendix

## General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH<sub>4</sub> by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

### 18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

### 19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

#### Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

#### Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

#### Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

**Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.**

**The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**

Sample Identity	England and Wales (mg/kg) where		SA01	WS01	BH02	HP02	TP02	WS02	WS03	TP04	WS04	WS06
Depth (m bgl)	Soil Organic Matter <1%		0.20-0.20	0.40-0.40	0.20-0.20	0.25-0.25	0.50-0.50	0.80-0.80	1.00-1.00	0.30-0.30	0.20-0.20	0.90-0.90
Reference		Screen Value	4	12	10	23	2	14	16	6	17	20
Sample Date	Units	Residential (without plant uptake)	3/25/2019	3/28/2019	3/28/2019	3/28/2019	3/25/2019	3/28/2019	3/28/2019	3/25/2019	3/28/2019	3/29/2019
pH		<5, >9	7.03	7.66	7.45	8.33	6.75	7.72	6.87	8.56	6.87	8.05
Asbestos	%	Presence	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present	Not Present
			---	---	---	---	---	---	---	---	---	---
HEAVY METALS/METALLOIDS			---	---	---	---	---	---	---	---	---	---
Arsenic	mg/kg	40	13.4	6.93	9.16	9.08	7.25	7.87	8.66	21.8	21.3	11.2
Cadmium	mg/kg	150	0.284	0.225	0.134	0.71	0.143	0.179	0.164	0.541	0.244	0.313
Chromium (III)	mg/kg	910	8	4.32	7.95	<0.9	4.59	5.5	5.53	7.38	9.49	6.52
Chromium (VI)	mg/kg	21	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Lead	mg/kg	310	30.8	11.7	19.5	22.1	11.5	13.3	13.8	81.1	52.5	26.5
Mercury (Elemental)	mg/kg	1.2	---	---	---	---	---	---	---	---	---	---
Mercury (Inorganic)	mg/kg	56	<0.14	<0.14	<0.14	<1.4	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Mercury (Methyl)	mg/kg	15	---	---	---	---	---	---	---	---	---	---
Nickel	mg/kg	180	16.3	20.4	10.1	19.4	22.6	24	22	11	20.5	15.7
Selenium	mg/kg	430	2.38	1.15	1.36	<10	1.39	1.52	1.44	<1	2.1	<1
Beryllium	mg/kg	1.7	0.313	0.254	0.31	0.343	0.295	0.3	0.318	0.263	0.472	0.375
Boron	mg/kg	11,000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vanadium	mg/kg	1,200	21.8	14.2	20.1	19.7	14.9	16.4	15.9	9.27	25	12
Copper	mg/kg	7,100	21.4	6.99	9.98	<14	11.8	9.79	13.5	11.3	29	14.6
Zinc	mg/kg	40,000	77.1	59.9	46.3	68.8	72.9	71.6	70.5	253	96.7	113
			---	---	---	---	---	---	---	---	---	---
GENERAL INORGANICS			---	---	---	---	---	---	---	---	---	---
Easily Liberatable Cyanide (free)	mg/kg	24	---	---	---	---	---	---	---	---	---	---
			---	---	---	---	---	---	---	---	---	---
US EPA PRIORITY PAHs			---	---	---	---	---	---	---	---	---	---
Acenaphthene	mg/kg	3,000 (57.0)sol	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
Acenaphthylene	mg/kg	2,900 (86.1)sol	<0.012	<0.012	<0.012	0.0239	<0.012	<0.012	<0.012	<0.012	0.0672	0.0177
Anthracene	mg/kg	31,000 (1.17)vap	<0.016	<0.016	<0.016	0.0342	<0.016	<0.016	<0.016	<0.016	0.0732	<0.016
Benzo(a)anthracene	mg/kg	11	0.0213	<0.014	<0.014	0.167	<0.014	<0.014	<0.014	0.0161	0.481	0.0909
Benzo(b)fluoranthene	mg/kg	3.9	0.0312	<0.015	0.0237	0.202	<0.015	<0.015	<0.015	0.0231	0.783	0.111
Benzo(k)fluoranthene	mg/kg	110	<0.014	<0.014	<0.014	0.0755	<0.014	<0.014	<0.014	<0.014	0.295	0.0621
Benzo(g,h,i)perylene	mg/kg	360	<0.024	<0.024	<0.024	0.147	<0.024	<0.024	<0.024	<0.024	0.337	0.0845
Benzo(a)pyrene	mg/kg	5.3	0.0211	<0.015	<0.015	0.19	<0.015	<0.015	<0.015	0.0188	0.561	0.104
Chrysene	mg/kg	30	0.0378	<0.01	0.0146	0.178	<0.01	<0.01	<0.01	0.0235	0.494	0.115
Di-benzo(a,h)anthracene	mg/kg	0.31	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	0.0662	<0.023
Fluoranthene	mg/kg	1,500	0.0506	<0.017	<0.017	0.311	<0.017	<0.017	<0.017	0.0265	0.804	0.239
Fluorene	mg/kg	2,800 (30.9)sol	<0.01	<0.01	<0.01	0.0119	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg	45	<0.018	<0.018	<0.018	0.137	<0.018	<0.018	<0.018	<0.018	0.324	0.0831
Naphthalene	mg/kg	2.3	0.0148	<0.009	<0.009	0.0537	<0.009	<0.009	<0.009	<0.009	0.0399	0.0206
Phenanthrene	mg/kg	1,300 (36.0)sol	0.0496	<0.015	<0.015	0.146	<0.015	<0.015	<0.015	0.0182	0.178	0.158
Pyrene	mg/kg	3,700	0.0399	<0.015	<0.015	0.271	<0.015	<0.015	<0.015	0.0236	0.699	0.202
			---	---	---	---	---	---	---	---	---	---
TPH			---	---	---	---	---	---	---	---	---	---
TPH Aliphatic >C5-6	mg/kg	42	<0.01	<0.01	<0.01	0.00342	<0.01	<0.01	<0.01	<0.01	0.0375	<0.01
TPH Aliphatic >C6-8	mg/kg	100	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0415	<0.01
TPH Aliphatic >C8-10	mg/kg	27	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.598	<0.01
TPH Aliphatic >C10-12	mg/kg	130 (48)vap	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.213	0

Sample Identity	England and Wales (mg/kg) where		SA01	WS01	BH02	HP02	TP02	WS02	WS03	TP04	WS04	WS06
Depth (m bgl)	Soil Organic Matter <1%		0.20-0.20	0.40-0.40	0.20-0.20	0.25-0.25	0.50-0.50	0.80-0.80	1.00-1.00	0.30-0.30	0.20-0.20	0.90-0.90
Reference		Screen Value	4	12	10	23	2	14	16	6	17	20
Sample Date	Units	Residential (without plant uptake)	3/25/2019	3/28/2019	3/28/2019	3/28/2019	3/25/2019	3/28/2019	3/28/2019	3/25/2019	3/28/2019	3/29/2019
TPH Aliphatic >C12-16	mg/kg	1,100 (24)sol	0.128	0.551	0.278	<0.1	0.366	<0.1	<0.1	<0.1	0.257	0.632
TPH Aliphatic >C16-35	mg/kg	65,000 (8.48)sol	---	---	---	---	---	---	---	---	---	---
TPH Aliphatic >C35-44	mg/kg	65,000 (8.48)sol	1.1	0.454	<0.1	0.975	0.125	0.106	<0.1	<0.1	0.389	0.847
TPH Aromatic >EC5-7 (Benzene)	mg/kg	0.89	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic >EC7-8	mg/kg	860	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH Aromatic >EC8-10	mg/kg	47	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.399	<0.01
TPH Aromatic >EC10-12	mg/kg	250	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.142	<0.01
TPH Aromatic >EC12-16	mg/kg	1,800	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.147	0.687
TPH Aromatic >EC16-21	mg/kg	1,900	0.234	<0.1	<0.1	0.795	<0.1	<0.1	<0.1	<0.1	12.8	3.92
TPH Aromatic >EC21-35	mg/kg	1,900	7.12	0.395	1.25	9.09	0.336	0.276	<0.1	4.25	43	14
TPH Aromatic >EC35-44	mg/kg	1,900	7.22	0.456	0.879	9.77	0.448	0.832	<0.1	5.56	14	4.47
TPH Aliphatic & Aromatic >EC44-70	mg/kg	1,900	---	---	---	---	---	---	---	---	---	---
Total TPH	mg/kg	No Sum	---	---	---	---	---	---	---	---	---	---
			---	---	---	---	---	---	---	---	---	---
<b>BTEX</b>			---	---	---	---	---	---	---	---	---	---
			---	---	---	---	---	---	---	---	---	---
Benzene	mg/kg	0.89	<0.18	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.18	<0.18
Toluene	mg/kg	880vap (869)	<0.14	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.14	<0.14
Ethylbenzene	mg/kg	83	<0.08	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.08	<0.08
m-Xylene	mg/kg	82	<0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.2
o-Xylene	mg/kg	88	<0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.2
p-Xylene	mg/kg	79	<0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.2
Xylenes (mixed isomers)	mg/kg	79	<0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.2	<0.2
			---	---	---	---	---	---	---	---	---	---

**Notes:**

---	Analyte not tested for
sol	Suitable 4 Use Level exceeds soil saturation limit which is given in brackets (note that if soil data exceeds the solubility limit, free product may be present). For screening consider applicability of both solubility limit and soil screening value.
vap	Suitable 4 Use Level exceeds vapour saturation limit which is given in brackets.

Groundwater Samples	Units	LOD	BH01	BH02	BH03A	WS02	WS03
Carbon, Organic	mg/l	<3	<3	<3	<3	<3	<3
Nitrite as NO2	mg/l	<0.05	<0.05	<0.05	0.051	<0.05	<0.05
pH	pH Units	<1	7.04	7.46	7.55	7.9	7.34
Sulphate	mg/l	<2	30.8	33	35.3	26.2	25.9
Chloride	mg/l	<2	35.2	37.2	14.2	42.7	40.4
Ammoniacal Nitrogen as NH3	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammoniacal Nitrogen as NH4	mg/l	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrate as NO3	mg/l	<0.3	6.05	6.44	5.06	8.85	8.07
Alkalinity, Total as CaCO3	mg/l	<2	95	100	195	100	100
Mercury	µg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Antimony	µg/l	<1	<1	<1	<1	<1	<1
Arsenic	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Barium	µg/l	<0.2	23.4	41.6	99.3	39.5	21.3
Beryllium	µg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	µg/l	<10	28.3	27.8	25.2	30.3	29
Cadmium	µg/l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium	µg/l	<1	<1	<1	<1	<1	<1
Copper	µg/l	<0.3	<0.3	0.661	0.519	0.424	<0.3
Lead	µg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Molybdenum	µg/l	<3	<3	<3	<3	<3	<3
Nickel	µg/l	<0.4	<0.4	0.715	1.42	0.708	<0.4
Selenium	µg/l	<1	2.39	1.17	2.9	1.6	1.84
Zinc	µg/l	<1	<1	<1	3.98	<1	<1
Phenol	mg/l	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
GRO Surrogate % recovery**	%		114	108	114	110	113
GRO >C5-C12	µg/l	<50	<50	<50	<50	<50	<50
Methyl tertiary butyl ether (MTBE)	µg/l	<3	<3	<3	<3	<3	<3
Benzene	µg/l	<7	<7	<7	<7	<7	<7
Toluene	µg/l	<4	<4	<4	<4	<4	<4
Ethylbenzene	µg/l	<5	<5	<5	<5	<5	<5
m,p-Xylene	µg/l	<8	<8	<8	<8	<8	<8
o-Xylene	µg/l	<3	<3	<3	<3	<3	<3
Sum of detected Xylenes	µg/l	<11	<11	<11	<11	<11	<11
Sum of detected BTEX	µg/l	<28	<28	<28	<28	<28	<28
Aliphatics >C5-C6	µg/l	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	µg/l	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	µg/l	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	µg/l	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Aliphatics >C21-C35 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Total Aliphatics >C12-C35 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Aromatics >EC5-EC7	µg/l	<10	<10	<10	<10	<10	<10

Groundwater Samples	Units	LOD	BH01	BH02	BH03A	WS02	WS03
Aromatics >EC7-EC8	µg/l	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	µg/l	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	µg/l	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Total Aromatics >EC12-EC35 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Total Aliphatics & Aromatics >C5-35 (aq)	µg/l	<10	<10	<10	<10	<10	<10
Naphthalene (aq)	µg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthylene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoranthene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Anthracene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Phenanthrene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chrysene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Pyrene (aq)	µg/l	<0.005	<0.005	<0.005	0.00746	<0.005	<0.005
Benzo(a)anthracene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(b)fluoranthene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(k)fluoranthene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(a)pyrene (aq)	µg/l	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Dibenzo(a,h)anthracene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo(g,h,i)perylene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Indeno(1,2,3-cd)pyrene (aq)	µg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PAH, Total Detected USEPA 16 (aq)	µg/l	<0.082	<0.082	<0.082	<0.082	<0.082	<0.082
Aliphatics >C16-C35 Aqueous	µg/l	<10	<10	<10	<10	<10	<10

Soil Derived Leachate Samples			SA01	TP04	WS03	WS06
			0.20-0.20	0.30-0.30	1.00-1.00	0.90-0.90
	Units	LOD				
Temperature	°C		18.4	18	18	18.4
pH	pH Units		8.29	7.76	7.76	8.46
Conductivity @ 20 deg.C	µS/cm		28.2	11.1	11.1	84.8
Nitrite as NO2	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05
pH	pH Units	<1	7.38	7.96	6.91	7.95
Sulphate	mg/l	<2	<2	5.5	<2	<2
Chloride	mg/l	<2	<2	<2	<2	<2
Ammoniacal Nitrogen as NH3	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05
Ammoniacal Nitrogen as NH4	mg/l	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrate as NO3	mg/l	<0.3	2.65	0.64	0.807	0.799
Alkalinity, Total as CaCO3	mg/l	<2	17	50	4.5	50
Mercury	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Antimony	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/l	<0.0005	<0.0005	0.00106	<0.0005	0.00557
Barium	mg/l	<0.0002	0.00603	0.283	0.00189	0.014
Beryllium	mg/l	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Boron	mg/l	<0.01	<0.01	<0.01	<0.01	0.0105
Cadmium	mg/l	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Chromium	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	mg/l	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Lead	mg/l	<0.0002	0.000605	<0.0002	0.000332	0.00032
Molybdenum	mg/l	<0.003	<0.003	<0.003	<0.003	0.00716
Nickel	mg/l	<0.0004	0.000668	0.000574	<0.0004	0.000509
Selenium	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/l	<0.001	0.00229	<0.001	0.0044	<0.001
Phenol	mg/l	<0.002	<0.002	<0.002	<0.002	<0.002
GRO >C5-C12	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05
Methyl tertiary butyl ether (MTBE)	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
Benzene	mg/l	<0.007	<0.007	<0.007	<0.007	<0.007
Toluene	mg/l	<0.004	0.021	<0.004	<0.004	<0.004
Ethylbenzene	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005
m,p-Xylene	mg/l	<0.008	<0.008	<0.008	<0.008	<0.008
o-Xylene	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003
Aliphatics >C5-C6	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C16-C21	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C21-C35	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Total Aliphatics >C12-C35	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC5-EC7	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01



Soil Derived Leachate Samples			SA01	TP04	WS03	WS06
			0.20-0.20	0.30-0.30	1.00-1.00	0.90-0.90
	Units	LOD				
Aromatics >EC7-EC8	mg/l	<0.01	0.021	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC16-EC21	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC21-EC35	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC16-EC35	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Total Aromatics >EC12-EC35	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Total Aliphatics & Aromatics >C5-35	mg/l	<0.01	0.023	<0.01	<0.01	<0.01
Naphthalene	mg/l	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Acenaphthene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Acenaphthylene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Fluoranthene	mg/l	<0.000005	0.0000764	0.0000229	0.0000418	0.0000358
Anthracene	mg/l	<0.000005	0.00000791	<0.000005	0.0000104	0.00000531
Phenanthrene	mg/l	<0.000005	0.0000404	0.0000195	0.0000476	0.0000229
Fluorene	mg/l	<0.000005	0.00000542	<0.000005	0.00000688	<0.000005
Chrysene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Pyrene	mg/l	<0.000005	0.000049	0.0000155	0.0000309	0.0000227
Benzo(a)anthracene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	0.0000071
Benzo(b)fluoranthene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Benzo(k)fluoranthene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Benzo(a)pyrene	mg/l	<0.000002	<0.000002	<0.000002	<0.000002	<0.000002
Dibenzo(a,h)anthracene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Benzo(g,h,i)perylene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005
Indeno(1,2,3-cd)pyrene	mg/l	<0.000005	<0.000005	<0.000005	<0.000005	<0.000005



## **APPENDIX G – GROUNDWATER AND GROUNDGAS MONITORING RESULTS**

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD



**Date Monitored:** 02/04/19  
**Monitoring Engineer:** KW  
**Weather:** Bright, mild, slight  
wind

[illegible]

## Notes

nt = not tested  
nd = not detected

Data Compiled by: KW  
Data Checked by: SR

# WYG Environmental Planning and Transport

## LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD



**Site Name:** Cwmcarn

**Job No.:** A110489-4

**Client:** Caerphilly County Borough Council

**Date Monitored:** 08/04/19

**Monitoring Engineer:** KW

**Weather:** Overcast, damp and mild

EQUIPMENT USED											
Type	Make		Serial		Last Calibrated						
Gas Analyser	Landtec GA5000		G502044		Nov-18						
Interface Meter	Solinst		122-004988-1		n/a						
LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS											
Exploratory Hole No	Peak		Steady								
	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	O <sub>2</sub> (% vol)	BAL (%)	PID (ppm)	H <sub>2</sub> S (ppm)	HCN (ppm)	CO (ppm)	Time
WS01	0.0	1.3	0.0	1.3	20.4	78.3	nt	0	nt	0	11:30:00
WS02	0.0	0.6	0.0	0.6	20.2	79.1	nt	0	nt	0	14:30:00
WS03	0.0	2.7	0.0	2.7	17.6	79.7	nt	0	nt	0	15:45:00
WS05	0.0	0.4	0.0	0.4	22.1	77.5	nt	0	nt	0	12:30:00
BH01	0.0	1.0	0.0	0.6	15.1	84.3	nt	0	nt	1	15:15:00
BH02	0.0	0.9	0.0	0.9	20.5	78.6	nt	0	nt	1	14:00:00
BH03A	0.0	0.4	0.0	0.4	16.4	83.2	nt	0	nt	0	11:00:00
LANDGAS - PHYSICAL PARAMETERS											
Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks				
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)					
WS01	1001	nt	-0.1	-0.1	0.6	0.6					
WS02	1002	nt	-0.2	-0.2	0.1	0.1					
WS03	1002	nt	0.1	0.1	-0.8	-0.8					
WS05	1002	nt	-0.2	-0.2	0.1	0.1					
BH01	1002	nt	0.1	0.1	0.0	0.0					
BH02	1002	nt	0.1	0.1	0.2	0.2					
BH03A	1001	nt	-0.1	-0.1	0.8	0.8					
AMBIENT ATMOSPHERIC CONDITIONS						ATMOSPHERIC PRESSURE CONDITIONS					
Parameter		Before Monitoring		After Monitoring							
CH <sub>4</sub> (% vol)		0.1		0.0		3 days prior (m bar)			999		
CO <sub>2</sub> (% vol)		0.3		0.1		2 days prior (m bar)			1005		
O <sub>2</sub> (% vol)		21.5		21.4		1 day prior (m bar)			1007		
PID (ppm)		nt		nt		during (m bar) am,midday,pm			1010		
Atmos Press. (m bar)		1001		1003		1 day post (m bar)			1014		
GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS											
Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Temp (°C)	
WS01	1.45	1.60	nd	nd	nt	nt	nt	nt	nt	nt	
WS02	0.94	1.25	nd	nd	296.7	403.8	nt	7.7	9.0	10.6	
WS03	1.17	1.55	nd	nd	324.9	391.8	nt	7.2	7.9	9.9	
WS05	DRY	2.30	nd	nd	nt	nt	nt	nt	nt	nt	
BH01	1.10	6.79	nd	nd	330.1	337.8	nt	7.1	5.9	10.1	
BH02	0.65	4.88	nd	nd	294.1	393.9	nt	7.5	4.4	10.2	
BH03A	1.22	6.51	nd	nd	264.4	497.7	nt	7.5	5.4	9.5	

### Notes

nt = not tested  
nd = not detected

Data Compiled by: KW  
Data Checked by: SR

# WYG Environmental Planning and Transport

## LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD



**Site Name:** Cwmcarn

**Job No.:** A110489-4

**Client:** Caerphilly County Borough Council

**Date Monitored:** 16/04/19

**Monitoring Engineer:** KW

**Weather:** Very overcast, rainy and mild

EQUIPMENT USED											
Type	Make		Serial		Last Calibrated						
Gas Analyser	Landtec GA5000		G502044		Nov-18						
Interface Meter	Solinst		122-004988-1		n/a						
LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS											
Exploratory Hole No	Peak		Steady								
	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	O <sub>2</sub> (% vol)	BAL (%)	PID (ppm)	H <sub>2</sub> S (ppm)	HCN (ppm)	CO (ppm)	Time
WS01	0.0	2.0	0.0	2.0	18.2	79.7	nt	0	nt	0	09:40:00
WS02	0.0	1.0	0.0	1.0	21.3	7.6	nt	0	nt	0	10:20:00
WS03	0.0	4.0	0.0	4.0	18.1	78	nt	0	nt	0	11:00:00
WS05	0.0	0.7	0.0	0.7	21.9	77.3	nt	0	nt	0	09:00:00
BH01	0.0	0.2	0.0	0.2	21.7	78.1	nt	0	nt	0	10:40:00
BH02	0.0	0.8	0.0	0.8	21.4	77.9	nt	0	nt	0	10:00:00
BH03A	0.0	2.1	0.0	2.1	18.2	79.7	nt	0	nt	0	09:20:00
LANDGAS - PHYSICAL PARAMETERS											
Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks				
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)					
WS01	1006	nt	0.4	0.4	0.0	0.0					
WS02	1006	nt	0.2	0.2	0.0	0.0					
WS03	1006	nt	0.2	0.2	0.9	0.9					
WS05	1006	nt	0.3	0.3	0.0	0.0					
BH01	1006	nt	0.1	0.1	0.1	0.1					
BH02	1006	nt	-1.2	-1.2	0.5	0.5					
BH03A	1006	nt	0.3	0.3	0.1	0.1					
AMBIENT ATMOSPHERIC CONDITIONS						ATMOSPHERIC PRESSURE CONDITIONS					
Parameter		Before Monitoring		After Monitoring							
CH <sub>4</sub> (% vol)		0.0		0.0		3 days prior (m bar)			1024		
CO <sub>2</sub> (% vol)		0.2		0.2		2 days prior (m bar)			1023		
O <sub>2</sub> (% vol)		22.3		22.3		1 day prior (m bar)			1017		
PID (ppm)		nt		nt		during (m bar) am,midday,pm			1016		
Atmos Press. (m bar)		1006		1007		1 day post (m bar)			1022		
GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS											
Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Temp (°C)	
WS01	1.53	1.60	nd	nd	nt	nt	nt	nt	nt	nt	
WS02	1.18	1.27	nd	nd	nt	nt	nt	nt	nt	nt	
WS03	1.45	1.57	nd	nd	nt	nt	nt	nt	nt	nt	
WS05	DRY	2.35	nd	nd	nt	nt	nt	nt	nt	nt	
BH01	1.33	6.70	nd	nd	nt	nt	nt	nt	nt	nt	
BH02	0.87	4.85	nd	nd	nt	nt	nt	nt	nt	nt	
BH03A	1.38	6.54	nd	nd	nt	nt	nt	nt	nt	nt	

### Notes

nt = not tested  
nd = not detected

Data Compiled by: KW  
Data Checked by: SR

# WYG Environmental Planning and Transport

## LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD



**Site Name:** Cwmcarn  
**Job No.:** A110489-4  
**Client:** CCBC

**Date Monitored:** 13/12/19  
**Monitoring Engineer:** DV  
**Weather:** Overcast

EQUIPMENT USED											
Type	Make		Serial		Last Calibrated						
Gas Analyser	Landtec GA5000		G502044		Oct-17						
Interface Meter	Solinst		122-004988-1		n/a						
LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS											
Exploratory Hole No	Peak		Steady								
	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	O <sub>2</sub> (% vol)	BAL (%)	PID (ppm)	H <sub>2</sub> S (ppm)	HCN (ppm)	CO (ppm)	Time
WS101	<0.1	0.6	<0.1	0.6	20.7	nt	nt	<1	nt	<1	nt
WS102	<0.1	1.5	<0.1	1.5	20.2	nt	nt	<1	nt	<1	nt
WS105	0.2	1.2	0.2	1.2	18.8	nt	nt	<1	nt	<1	nt
WS107	<0.1	2.2	<0.1	2.2	19.0	nt	nt	<1	nt	<1	nt
WS108	<0.1	1.8	<0.1	1.8	19.2	nt	nt	<1	nt	<1	nt
BH101A	<0.1	0.2	<0.1	<0.1	20.9	nt	nt	<1	nt	<1	nt
LANDGAS - PHYSICAL PARAMETERS											
Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks				
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)					
WS101	976	nt	0.0	0.0	nt	-0.03					
WS102	976	nt	0.2	0.2	nt	-0.05					
WS105	973	nt	0.0	0.0	nt	-0.10					
WS107	976	nt	0.1	0.1	nt	0.00					
WS108	975	nt	0.1	0.1	nt	0.09					
BH101A	976	nt	0.1	0.1	nt	-0.05					
AMBIENT ATMOSPHERIC CONDITIONS						ATMOSPHERIC PRESSURE CONDITIONS					
Parameter		Before Monitoring		After Monitoring							
CH <sub>4</sub> (% vol)		nt		<0.1		3 days prior (m bar)			nt		
CO <sub>2</sub> (% vol)		nt		<0.1		2 days prior (m bar)			nt		
O <sub>2</sub> (% vol)		nt		21.6		1 day prior (m bar)			nt		
PID (ppm)		nt		nt		during (m bar) am,midday,pm			nt		
Atmos Press. (m bar)		nt		976		1 day post (m bar)			nt		
GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS											
Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Temp (°C)	
WS101	1.78	1.90	nd	nd	nt	nt	nt	nt	nt	nt	
WS102	1.59	1.65	nd	nd	nt	nt	nt	nt	nt	nt	
WS105	1.67	1.75	nd	nd	nt	nt	nt	nt	nt	nt	
WS107	1.59	1.65	nd	nd	nt	nt	nt	nt	nt	nt	
WS108	DRY	1.80	nd	nd	nt	nt	nt	nt	nt	nt	
BH101A	1.97	6.50	nd	nd	nt	nt	nt	nt	nt	nt	

**Notes**  
 nt = not tested  
 nd = not detected

Data Compiled by: DV  
 Data Checked by: SR

# WYG Environmental Planning and Transport

## LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD



**Site Name:** Cwmcarn  
**Job No.:** A110489-4  
**Client:** CCBC

**Date Monitored:** 16/12/19  
**Monitoring Engineer:** SB  
**Weather:**

Clear

EQUIPMENT USED											
Type	Make				Serial			Last Calibrated			
Gas Analyser	Landtec GA5000				G502044			Oct-17			
Interface Meter	Solinst				122-004988-1			n/a			
LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS											
Exploratory Hole No	Peak		Steady								
	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	O <sub>2</sub> (% vol)	BAL (%)	PID (ppm)	H <sub>2</sub> S (ppm)	HCN (ppm)	CO (ppm)	Time
WS101	0.1	0.9	0.1	0.9	20.1	78.8	nt	<1	nt	<1	13:13:00
WS102	0.1	1.5	0.1	1.5	1.5	78.5	nt	<1	nt	<1	12:59:00
WS105	0.1	1.0	0.1	1.0	20.1	78.8	nt	<1	nt	<1	12:45:00
WS107	0.1	2.2	0.1	2.2	18.2	79.5	nt	<1	nt	<1	12:52:00
WS108	0.1	1.7	0.1	1.7	19.7	78.6	nt	<1	nt	<1	13:20:00
BH101A	0.1	0.1	0.1	0.1	20.7	79.1	nt	<1	nt	<1	13:07:00
LANDGAS - PHYSICAL PARAMETERS											
Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks				
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)					
WS101	989	nt	0.1	0.1	-0.14	0.00					
WS102	989	nt	0.1	0.1	-0.03	0.00					
WS105	987	nt	0.2	0.1	0.09	0.05					
WS107	989	nt	0.1	0.1	-0.05	-0.02					
WS108	988	nt	0.1	0.1	-0.26	-0.03					
BH101A	989	nt	0.1	0.1	0.65	0.09					
AMBIENT ATMOSPHERIC CONDITIONS						ATMOSPHERIC PRESSURE CONDITIONS					
Parameter		Before Monitoring		After Monitoring							
CH <sub>4</sub> (% vol)		0.1		0.1		3 days prior (m bar)			nt		
CO <sub>2</sub> (% vol)		0.2		0.1		2 days prior (m bar)			nt		
O <sub>2</sub> (% vol)		20.9		21.1		1 day prior (m bar)			nt		
PID (ppm)		nt		nt		during (m bar) am,midday,pm			nt		
Atmos Press. (m bar)		987		988		1 day post (m bar)			nt		
GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS											
Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Temp (°C)	
WS101	1.84	1.95	nd	nd	nt	nt	nt	nt	nt	nt	
WS102	1.85	2.08	nd	nd	nt	nt	nt	nt	nt	nt	
WS105	1.70	1.78	nd	nd	nt	nt	nt	nt	nt	nt	
WS107	1.61	1.64	nd	nd	nt	nt	nt	nt	nt	nt	
WS108	DRY	1.81	nd	nd	nt	nt	nt	nt	nt	nt	
BH101A	4.06	6.45	nd	nd	nt	nt	nt	nt	nt	nt	

### Notes

nt = not tested  
nd = not detected

Data Compiled by: SB  
Data Checked by: SR

# WYG Environmental Planning and Transport

## LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD



**Site Name:** Cwmcarn  
**Job No.:** A110489-4  
**Client:** CCBC

**Date Monitored:** 14/01/20  
**Monitoring Engineer:** GT  
**Weather:**

Raining

EQUIPMENT USED											
Type	Make				Serial			Last Calibrated			
Gas Analyser	Landtec GA5000				G502044			Oct-17			
Interface Meter	Solinst				122-004988-1			n/a			
LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS											
Exploratory Hole No	Peak		Steady								
	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	CH <sub>4</sub> (% vol)	CO <sub>2</sub> (% vol)	O <sub>2</sub> (% vol)	BAL (%)	PID (ppm)	H <sub>2</sub> S (ppm)	HCN (ppm)	CO (ppm)	Time
WS101	0.2	1.8	0.2	1.8	19.5	78.5	nt	<1	nt	<1	11:13:00
WS102	0.2	2.0	0.2	2.0	19.8	78.5	nt	<1	nt	<1	11:18:00
WS105	0.2	1.3	0.2	1.3	18.8	79.7	nt	<1	nt	<1	10:41:00
WS107	0.2	3.0	0.2	3.0	18.3	78.5	nt	<1	nt	<1	11:24:00
WS108	0.2	1.6	0.2	1.6	20.0	78.3	nt	<1	nt	<1	11:04:00
BH101A	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
BH104A	0.2	1.7	0.2	1.0	20.2	78.7	nt	<1	nt	<1	12:41:00
BH105	0.2	1.6	0.2	1.6	20.0	78.3	nt	<1	nt	<1	11:01:00
LANDGAS - PHYSICAL PARAMETERS											
Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks				
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)					
WS101	980	nt	0.1	0.1	-0.15	-0.14					
WS102	980	nt	0.1	0.2	0.00	0.03					
WS105	978	nt	0.1	0.2	2.40	1.64					
WS107	980	nt	0.1	0.2	-0.14	-0.10					
WS108	978	nt	0.1	0.2	-0.03	0.02					
BH101A	nt	nt	nt	nt	nt	nt	Borehole Flooded				
BH104A	975	nt	0.1	0.1	0.31	0.14					
BH105	978	nt	0.1	0.2	0.0	0.0					
AMBIENT ATMOSPHERIC CONDITIONS											
Parameter		Before Monitoring		After Monitoring		ATMOSPHERIC PRESSURE CONDITIONS					
CH <sub>4</sub> (% vol)		0.2		0.2		3 days prior (m bar)			1019		
CO <sub>2</sub> (% vol)		0.2		0.2		2 days prior (m bar)			1019		
O <sub>2</sub> (% vol)		20.8		21.0		1 day prior (m bar)			995		
PID (ppm)		nt		nt		during (m bar) am,midday,pm			993, 988, 993		
Atmos Press. (m bar)		978		975		1 day post (m bar)			1009		
GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS											
Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Temp (°C)	
WS101	1.8	1.9	nt	nt	nt	nt	nt	nt	nt	nt	
WS102	1.8	2.1	nt	nt	nt	nt	nt	nt	nt	nt	
WS105	1.7	1.8	nt	nt	nt	nt	nt	nt	nt	nt	
WS107	1.6	1.6	nt	nt	nt	nt	nt	nt	nt	nt	
WS108	DRY	0.8	nt	nt	nt	nt	nt	nt	nt	nt	
BH101A	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	
BH104A	1.9	4.8	nt	nt	113.4	236.9	nt	7.1	9.8	10.0	
BH105	0.5	4.5	nt	nt	47.2	569.4	nt	7.3	0.5	8.9	

### Notes

nt = not tested

nd = not detected

Data Compiled by: GT

Data Checked by: SR





## **APPENDIX H – CIRIA C552 RISK METHODOLOGY**

The following tables are derived from CIRIA C552 and have been used to define the risk rating presented in the Qualitative Risk Assessment matrix.

## Classification of consequence

Classification	Definition
<b>Severe</b>	Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short term risk of pollution (note; Water Resources Act contains no scope for considering significant pollution) of sensitive water resource. Catastrophic damage to building/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
<b>Medium</b>	Chronic damage to human health ('significant harm', as defined In DETR, 2000). Pollution of sensitive water resources (note; Water Resources Act contains no scope for considering significant pollution). A significant change in a particular ecosystem, or an organism forming part of such an ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
<b>Mild</b>	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm', as defined In DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
<b>Minor</b>	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

## Classification of probability

Classification	Definition
<b>High likelihood</b>	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
<b>Likely</b>	There is a pollutant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
<b>Low likelihood</b>	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period that such an event would take place, and is even less likely in the shorter term.
<b>Unlikely</b>	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

## Matrix of consequence against probability to gain a risk classification

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk