# GROUND INVESTIGATION REPORT

# ENVIROWALES LIMITED, TAFARNAUBACH INDUSTRIAL ESTATE, TREDEGAR

**Prepared for:**

## ENVIROWALES LIMITED

**June 2010**

**Prepared by:**

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# GROUND INVESTIGATION REPORT

# ENVIROWALES LIMITED,
# TAFARNAUBACH INDUSTRIAL ESTATE

| **Report Reference Number:** | | P640/R001 | |
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| **Report Issue:** | | Final | |
| **Report Prepared by:** | | **Report Reviewed & Approved by:** | |
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| ***Signature:*** | | ***Signature:*** | |
| ***Date:*** | June 2010 | ***Date:*** | June 2010 |

This report is not to be used for contractual or engineering purposes unless this approval sheet is signed where indicated by both the originator of the report and the approver and the report is designated "FINAL".

# GROUND INVESTIGATION REPORT

# ENVIROWALES LIMITED, TAFARNAUBACH, INDUSTRIAL ESTATE.

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# GROUND INVESTIGATION REPORT

# ENVIROWALES LIMITED, TAFARNAUBACH INDUSTRIAL ESTATE

## 1. SUMMARY

1.1 Further to instructions received from Mr Brian Kelly of EnviroWales, Environmental Compliance has undertaken a site appraisal for Unit 5, Tafarnaubach Industrial Estate, Ebbw Vale. EnviroWales propose to undertake works associated with their Lead Acid Battery Recycling activities at this site.

1.2 This report addresses geo-environmental issues associated with future site occupation, with Site Investigation Works being undertaken between 1st and 2nd June 2010.

1.3 The field work was undertaken by Quantum Geotechnical and was at all times supervised by their Engineering Geologist. The location of the window sample boreholes ("WS") were specified by Environmental Compliance's Principal Consultant and confirmed by Mr Brian Kelly.

1.4 Fourteen window sample boreholes were drilled, to a maximum depth of 3.50m below ground level ("bgl"). Most were no deeper than 1m due to the presence of Hard Strata.

1.5 All window sample logs have been recorded and can be found in Appendix II of the Factual Ground Investigation Report prepared by Quantum Geotechnical, which may be found as Appendix A of this report.

1.6 Of the thirty-three samples sent for chemical analysis, only three exceeded trigger levels. It is not considered that the former use of the site has caused any significant contamination.

1.7 It is however recommended that all storage vessels onsite should be checked to confirm that they are indeed empty and if possible, ascertain their previous contents.

# 2. INTRODUCTION

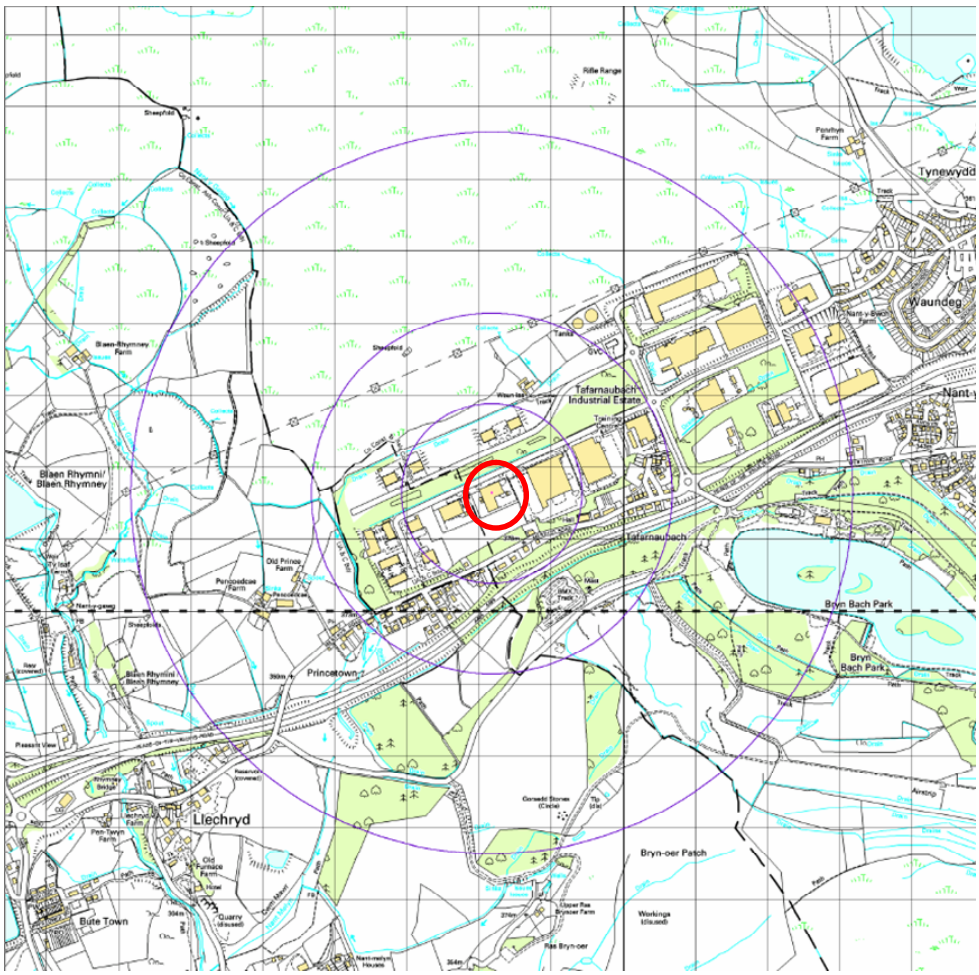
## 2.1. Site Location

2.1.1. The site is located at:

Unit 5
Tafarnaubach Industrial Estate
Tredegar
NP22 3AA

2.1.2. This location is shown on Figure 1 below with the site being circled in red.

**Figure 1: Site Location**



## 2.2. Proposed Site Use

2.2.1. EnviroWales has accumulated a large quantity of slag and other waste materials on the production site on Rassau Industrial Estate. This material requires re-processing/pre-treatment in preparation for permanent storage at an authorised site and/or for recycling at the existing processing plant. It is proposed that this processing/pre-treatment will take place at Unit 5, Tabarnaubach Industrial Estate.

2.2.2. It is intended to remove all remaining slag from the Rassau site and transport it to the Tafarnaubach site using skip lorries. The slag will then be crushed and decanted into 1.5tonne bags for disposal.

2.2.3. Drosses will also be accepted at the site where they will be segregated and prepared for recycling.

2.2.4. Plastics will also be stored on site for bulking up prior to being sent for recycling.

2.2.5. Domestic and portable batteries are also found in with the lead acid batteries that are accepted at the Rassau site. These are removed from the main treatment processes at Rassau and will then be sent to the Tafarnaubach site for separation and sorting prior to being disposed of by a suitably licensed contractor.

# 3. OBJECTIVES

3.1. The objectives of this report are:

- determine the baseline ground conditions at the site and look for evidence of any contamination from previous site uses; and
- on completion of the intrusive investigation, any potential pollution will be identified and characterised, and comment will also be made on the likelihood of any off site migration.

# 4. INVESTIGATION AND SAMPLING STRATEGY

## 4.1. General

4.1.1. The intrusive investigation commenced 1st June 2010 and lasted two days. The site investigation works were supervised by ECL and the physical works were undertaken by Quantum Geotechnical.

4.1.2. ECL's role was to direct and supervise the intrusive investigation. Duties included:

- determining the location of the window sample boreholes (which were confirmed with EnviroWales prior to being drilled);
- modifying the site investigation to take account of the ground conditions encountered;
- scheduling the samples to be sent for analysis; and
- liaison with Quantum's Geotechnical Engineer.

4.1.3. Fourteen window sample boreholes were drilled, the locations of which are shown on Figure 3, in Appendix I of the Factual Ground Investigation Report prepared by Quantum (See Appendix A of this report). It was the intention to drill each hole to a depth of 4m, however, due to refusal on Hard Strata, most did not reach more than 0.8m bgl. The depths achieved are provided in Table 1 below.

**Table 1: Window Sample Depths**

| WS | Depth (mbgl) | WS | Depth (mbgl) |
|---|---|---|---|
| 01 | 0.67 | 08 | 0.70 |
| 02 | 0.68 | 09 | 1.00 |
| 03 | 0.68 | 10 | 2.80 |
| 04 | 0.82 | 11 | 0.60 |
| 05 | 3.50 | 12 | 0.80 |
| 06 | 0.65 | 13 | 0.62 |
| 07 | 3.30 | 14 | 0.82 |

## 4.2. Constraints on Investigations

According to the Envirocheck report, there had only been one use of the site. Drainage runs were clearly identifiable and window sample locations were determined appropriately. CAT scans were undertaken of all sample locations prior to drilling. There were no constraints to the investigation sample locations.

## 4.3. Soil and Investigation and Sampling Techniques and Protocols

### 4.3.1. Window Sampling

4.3.1.1. Window sampling is essentially a percussive method of creating small diameter boreholes. A window sampler is a high tensile steel tube with a hardened cutting shoe to penetrate hard materials. Each sampler is usually 1m or 2m long with a series of "windows" or slots cut in the wall of the tube through which to view or extract soil samples. Samplers are driven down into the ground using a percussive hammer.

4.3.1.2. The depth limit tends to be around 8m to 10m, although the technique is usually used to a maximum depth of around 3 - 5m. In practice, the limiting factor tends not to be how deep the samplers can be driven in but rather whether the ground conditions are such that they may then be pulled back out.

4.3.1.3. A full sample will reveal a complete or partial ground profile although guidance from the Drill Supervisor will be needed on any compression that may have occurred and resulted in, for example, a 1.5m sample occupying a 1m space in the sampler.

4.3.1.4. With some window sampling systems, samples can be recovered in a thin walled transparent liner placed inside the steel tubes. The liner is removed for visual inspection or capped at each end for transporting to the laboratory.

4.3.1.5. Window sampling causes minimal disturbance to the ground surface (e.g. useful for investigations inside buildings, in a landscaped car park or between the sleepers of rail lines.) The method can be used where access is very restricted (e.g. small operational sites and in gardens). It can also achieve rapid coverage to shallow depth.

### 4.3.2. Sample Locations

4.3.2.1. Sample locations were chosen with reference to the locations where potentially polluting substances were thought to have been stored on site, together with an informal discussion EnviroWales and a site reconnaissance visit undertaken 27th May 2010.

4.3.2.2. The proposed investigation locations for the site are shown on Figure 3 in Appendix I of the Factual Ground Investigation Report prepared by Quantum (see Appendix A of this report).

### 4.3.3. Sample Collection Protocol

Window samples were all taken by Quantum's Engineering Geologist. Bulk and undisturbed samples were taken within the overlying superficial deposits for strata identification and chemical testing. The procedure for the logging and storage of samples is as follows:

1. each sample is given a unique sample identification number;
2. a note is made on the window sample logs of the number and description of samples taken;
3. the samples are stored in the appropriate containers and placed immediately in cool boxes to prevent any deterioration of the sample a the end of each working day the samples are collected by courier and sent to MCERTS accredited laboratories for analysis; and

4. all samples must be accompanied by a chain of custody form.

### 4.3.4. Justification of Analytical Suites

The analytical suite was a duplicate of the analysis required by the Environment Agency for the site investigation at EnviroWales existing facility in Rassau. This is shown in Table 2.

**Table 2: Analytical Suite**

| Determinand | Soils | Groundwater |
|---|---|---|
| Bicarbonate | | ✓ |
| Conductivity | | ✓ |
| Chloride | ✓ | ✓ |
| Cyanide | ✓ | ✓ |
| Dissolved oxygen | | ✓ |
| Nitrate | | ✓ |
| pH | ✓ | ✓ |
| Sulphate | ✓ | ✓ |
| Suspended solids | | ✓ |
| Extractable Petroleum Hydrocarbons (EPH) | ✓ | ✓ |
| Aluminium and its compounds | ✓ | ✓ |
| Arsenic and its compounds | ✓ | ✓ |
| Antimony and its compounds | ✓ | ✓ |
| Bismuth and its compounds | ✓ | ✓ |
| Boron and its compounds | ✓ | ✓ |
| Cadmium and its compounds | ✓ | ✓ |
| Calcium | | ✓ |
| Chromium and its compounds | ✓ | ✓ |
| Copper and its compounds | ✓ | ✓ |
| Iron and its compounds | ✓ | ✓ |
| Lead and its compounds | ✓ | ✓ |
| Manganese and its compounds | ✓ | ✓ |
| Magnesium and its compounds | | ✓ |
| Mercury and its compounds | ✓ | ✓ |
| Nickel and its compounds | ✓ | ✓ |
| Potassium | | ✓ |
| Selenium and its compounds | ✓ | ✓ |
| Sodium and its compounds | ✓ | ✓ |
| Silver and its compounds | ✓ | ✓ |
| Tin and its compounds | ✓ | ✓ |
| Zinc and its compounds | ✓ | ✓ |

## 4.4. Samples Analysed

4.4.1. A total of 33 soil samples were sent for chemical analysis as per the suite described in Section 4.3.4. No groundwater samples were taken as no groundwater was encountered.

4.4.2. The samples were all sent to DETS (Derwentside Environmental Testing Services), a UKAS and MCERTS accredited laboratory. Analysis commenced on 7th June 2010 and was completed by 15th June 2010. A copy of the Certificate of Analysis may be found in Appendix III of the Factual Ground Investigation Report prepared by Quantum. The results are discussed in Section 5.

# 5. DISCUSSION

## 5.1. Trigger Levels

5.1.1. It is understood that the site is to be used by EnviroWales for industrial use as described in Section 2.2. Therefore, results of the chemical analyses have been compared with Soil Guideline Values published by the Environment Agency for commercial use (values were checked June 2010 for accuracy). Where parameters have not yet been published criteria are based upon the 2005 CLEA levels, Dutch (2001) Action Levels, USEPA Levels or the now withdrawn ICRCL guidelines.

5.1.2. A copy of the results, showing comparisons with the trigger levels, may be found in Appendix B. Samples exceeding the trigger levels are highlighted in yellow.

## 5.2. Results

5.2.1. There was no visual or olfactory evidence of ground contamination encountered during the intrusive investigation.

5.2.2. Of the 33 samples sent for analysis only three exceeded the trigger levels, the exceptions are shown in Table 2. None of the trigger levels that were exceeded were current SGVs

**Table 3: Samples Exceeding Trigger Levels**

| Sample Identification | Depth (m) | Determinant | Measured Value (mg/kg) | Trigger Level (mg/kg) |
|---|---|---|---|---|
| WS03, ES2 | 0.54-0.68 | Sulphate | 380 | 250[1] |
| WS07, D1 | 0.00-0360 | Zinc | 200 | 140[2] |
| WS09, ES1 | 0.42-0.55 | EPH | 8200 | 1000[2] |

Notes 1 = Withdrawn ICRCL Level
2 = Dutch Intervention Value

5.2.3. WS03 is located within the existing buildings, specifically in an area that was occupied by the powder coating process. The sulphate level is not considered to be significant.

5.2.4. WS07 is located adjacent to a former storage tank. As the contents of this tank are unknown it is difficult to determine if the elevated zinc concentration is attributable to any potential spillages or not.

5.2.5. WS09 is located within the building formerly used as a tyre recycling facility. The location chosen was within a former drainage channel in order to maintain the integrity of the recently laid concrete floor. WS09, ES1 shows elevated levels of extractable petroleum hydrocarbons, however, sample WS09, D3 which was taken at a depth of 0.80m shows EPH levels of 45mg/kg. It is therefore considered that this elevated level of EPH is most likely to have been attributable to oil remaining in the

drainage pipe. As this drainage section is to be removed, no further action is considered necessary.

## 5.3. Recommendations

5.3.1. From the areas investigated the site does not appear to have been contaminated as a result of the previous site operations.

5.3.2. The tank adjacent to WS03 should be investigated to determine the former contents. It is also recommended that all storage vessels onsite should be checked to confirm that they are indeed empty and if possible, ascertain their previous contents.

# APPENDIX A

## *Factual Ground Investigation Report Prepared by Quantum Geotechnical – June 2010*

# ENVIROWALES LTD, UNIT 5, TAFARNAUBACH INDUSTRIAL ESTATE EBBW VALE

## FACTUAL GROUND INVESTIGATION REPORT

**Report No. X101422/FGI**

# EnviroWales Ltd

# Unit 5,

# Tafarnaubach Industrial Estate

# Ebbw Vale

## FACTUAL GROUND INVESTIGATION REPORT

Report No. X101422/FGI June 2010

**Prepared for :**

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# CONTENTS

## 0.0. FOREWORD

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

### 0.1. Ground Investigation

#### 0.1.1. General

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

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

#### 0.1.2. Investigation Procedures

Window sampling techniques for ground investigation have been employed within the project. All Exploratory Hole operations, sampling and logging of soils, rocks and in-situ testing complies with the recommendations of the British Code of Practice BS 5930 (1999), 'Site Investigations' as superseded in part by BS EN ISO 14688-1 (2002) and 14688-2 (2004) and BS 1377: 1990, 'Methods of Test for Soils for Engineering Purposes'. Whilst the Window Sampling techniques allow the maximum data to be obtained in soft ground/ superficial deposits, some disturbance and variation of soft and layered soils is unavoidable. Attention is drawn to this condition whenever it is suspected.

#### 0.1.3. Routine Sampling

Representative bulk and disturbed samples of the different strata are taken following completion of logging. These samples are sealed in clear plastic bags and 2kg plastic tubs, and labelled with a view to future laboratory testing.

### 0.1.4. In-Situ Testing

No in-situ testing was required as part of this project.

### 0.1.5. Groundwater

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

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

### 0.1.6. Retention of Samples

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded. Further to notifying the Engineer/ Client with one week's notice all soil and/or rock samples will be discarded 28 days after submission of the approved final report.

## 1.0. INTRODUCTION

### 1.1 General

Upon the instructions of Environmental Compliance Ltd (hereafter referred to as the Engineer) acting on behalf of their Client, EnviroWales Ltd, Quantum Geotechnical (QGL) has been commissioned to undertake a ground investigation on the site of a potential acquisition at Unit 5, Tafarnaubach Industrial Estate, Ebbw Vale.

This report presents a factual account of the fieldwork carried out, the strata encountered, groundwater observations and details subsequent laboratory testing of samples obtained from the investigation.

Other available sources of information that have been consulted include the published geological maps for the area, which include the British Geological Survey Sheets 232 'Abergavenny' at 1:63,360 scale solid and drift editions, in addition to Ordnance Survey Maps.

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

## 2.0. SITE DETAIL

### 2.1. Site Description

The area of investigation is located within the existing premises of EnviroWales Ltd at Unit 5 within Tafarnaubach Industrial Estate just north of Ebbw Vale. The ground investigation was undertaken within the existing premises both within the external concrete storage yard and soft landscaped areas and internal to the existing buildings.

Access to the site is directly off the A465 (Heads of the Valleys Road) and along a dedicated access track within Tafarnaubach Industrial Estate.

The National Grid reference of the site is SO 116 103, see Site Location Plan, Figure 1, Appendix I.

### 2.2. Topography

The investigation site is located on level land with no distinct variations in topography across site.

### 2.3. Statutory Service Information

All service information was held by the Client with the relevant plans and information made available to Quantum prior to commencement of the intrusive works. Standard Quantum procedures for breaking ground were followed including the undertaking of hand excavated inspection pits at exploratory hole locations prior to commencement of works and all areas scanned for services. No onsite services were deemed at risk during the investigation procedures.
The Utility Plans provided to QGL included the following;

- Western Power Distribution Records
- National Grid Transco Records
- Dwr Cymru Welsh Water Records
- British Telecom Records
- NTL Records

## 3.0. GEOLOGY & ENVIRONMENTAL SETTING

### 3.1. Published Geology

Details of the superficial and solid geology of the site is provided by the British Geological Survey sheets 232 'Abergavenny' Solid and Drift at 1:63,360 scale.

#### *3.1.1. Drift Deposits*

The site is indicated to be underlain by Glacial superficial deposits, typically comprising Clays and Gravels (Boulder Clay deposits). Immediately north of the site lies an isolated area of Peat deposits. The thicknesses of these deposits are not indicated on the maps.

#### *3.1.2. Solid Geology*

The solid geology beneath the site is indicated to be that of the Millstone Grit Series of Carboniferous age, namely Farewell Rock. Such rocks typically comprise interbedded siltstones and mudstones. This in turn is underlain by the Lower Coal Measures, also of Carboniferous age, shown to crop just south of the A465. No faults or geological structures are shown to impinge upon the site. An extract of British Geological Survey Sheet 232 'Drift' edition is presented as Figure 2 in Appendix I.

### 3.2. Mining & Quarrying

No evidence of non-metalliferous or mineral mining has been identified in the vicinity of the site.

### 3.3. Limestone Solution Features

The site is not underlain by potentially soluble limestone bedrock, and hence the risk from limestone solution features is considered null.

### 3.4. Hydrology

There are no main rivers within 250m of the site with no surface water features noted within 50m of the site. No waterways are deemed at risk from the ground investigations works.

### 3.5. Hydrogeology

Groundwater Vulnerability Maps Sheets 36 as published by the Environment Agency indicates the site to reside upon a Minor Aquifer with variable permeability. The soils are noted as having an undetermined leaching potential reflecting the site's industrial setting.

### *3.6.* Designated Environmentally Sensitive Sites

No environmentally or ecologically sensitive areas were identified to Qunatum on the study site, however peat bogs exist locally to the north, along with areas of moor land each of which may harbour protected species. No searches for this information have been made.

## 4.0. FIELDWORK

### 4.1. General

All fieldwork was undertaken between 1st & 2nd June 2010. Full time onsite supervision and attendance by an Engineering Geologist from Qunatum was undertaken on all aspects of the siteworks and subsequent reinstatement works of all accesses and exploratory hole locations.

All working areas were securely fenced off at all times ensuring the Health & Safety of both the workforce and any site visitors.

#### *4.1.1. Summary of Fieldworks*

The fieldworks comprised the forming of 14No. Window Sample Boreholes as located and specified by the Engineer, Environmental Compliance Ltd.

### 4.2. Exploratory Hole Locations

The exploratory hole locations were set out by the Engineer with a Quantum Engineering Geologist in attendance.

An Exploratory Hole Location Plan is presented as Figure 3 in Appendix I.

### 4.3. Window Sample Boreholes

Window Sampling was undertaken to obtain samples of the underlying superficial strata. A total of fourteen Window Samples were sunk both internal to the existing buildings and externally. Where required, concrete coring apparatus was utilised to allow window sampling through either the external concrete yard area or through the internal building floor slabs.

Window Sampling utilises dynamically driven sampling tubes, nominally 116mm in diameter to begin with then reduced diameters as depth increases. This technique allows a relatively undisturbed sample of soil to be taken in a plastic liner, or alternatively sub sampled as a disturbed jar sample. Within competent granular-cohesive soils the portable equipment used for Window Sampling is limited by the nature of the ground and robustness of the driving tool. It is also not possible, due to the size and power of the equipment, to case the borehole to prevent collapse from granular and/or wet material.

The following depths were achieved within the Window Sample Holes:

- WS01 – 0.67mbgl Refusal on Hard Strata
- WS02 – 0.68mbgl Refusal on Hard Strata
- WS03 – 0.68mbgl Refusal on Hard Strata
- WS04 – 0.82mbgl Refusal on Hard Strata
- WS05 – 3.50mbgl Refusal on Hard Strata
- WS06 – 0.65mbgl Refusal on Hard Strata
- WS07 – 3.30mbgl Refusal on Hard Strata
- WS08 – 0.70mbgl Refusal on Hard Strata
- WS09 – 1.00mbgl Refusal on Hard Strata
- WS10 – 2.80mbgl Refusal on Hard Strata
- WS11 – 0.60mbgl Refusal on Hard Strata
- WS12 – 0.80mbgl Refusal on Hard Strata
- WS13 – 0.62mbgl Refusal on Hard Strata
- WS14 – 0.82mbgl Refusal on Hard Strata

The recovered window sample liners were split and logged on site in accordance with BS5930: 1999; BS EN ISO 14688-1:2002 and BS EN ISO 14688-2:2005, by Quantum's Engineering Geologist and backfilled upon completion with Bentonite and Concrete.

A complete set of Engineering Geologist's logs for Window Sampling are presented in Appendix II.

### 4.4. Sampling

Sampling of soils were undertaken in accordance with the Specification for the Works as specified by the Project Engineer. Bulk, disturbed and undisturbed samples were taken within the overlying superficial deposits for strata identification and laboratory testing purposes in accordance with BS EN ISO 22475-1:2006. Sample type and sample depth are all recorded on the Engineering Geologist's Exploratory Hole Logs found within the appropriate Appendix.

## 5.0. LABORATORY TESTING

### 5.1. General

The laboratory testing was scheduled by the Engineer, Environmental Compliance Ltd and comprised a number of geo-environmental chemical tests on selected soil samples recovered from the investigation.

### 5.2. Geotechnical Testing

No geotechnical testing was required as part of this Contract.

### 5.3. Environmental Testing

Environmental testing was carried out on selected soil samples gained from the ground investigation.

The table below displays the environmental tests undertaken on selected soil samples.

***Table 1*:** Environmental soil tests undertaken

| | |
|---|---|
| Chloride | Chromium and its compounds |
| Cyanide | Copper and its compounds |
| pH | Iron and its compounds |
| Sulphate | Lead and its compounds |
| Total Petroleum Hydrocarbons (TPH) | Manganese and its compounds |
| Aluminium and its compounds | Mercury and its compounds |
| Arsenic and its compounds | Nickel and its compounds |
| Antimony and its compounds | Selenium and its compounds |
| Bismuth and its compounds | Sodium and its compounds |
| Boron and its compounds | Silver and its compounds |
| Cadmium and its compounds | Tin and its compounds |
| Zinc and its compounds | |

A full set of Environmental Laboratory Test Certificates are provided within Appendix III.

## 6.0. GROUND CONDITIONS ENCOUNTERED

### 6.1. Ground Conditions - General

An overview of the ground conditions encountered is presented below with more detailed descriptions in the following sub-sections;

- Made Ground – Concrete and Reworked Topsoil with man-made inclusions
- Glacial Deposits
- Bedrock

### 6.2. Detailed Ground Conditions

#### *6.2.1. Made Ground/ Reworked Topsoil*

Only four of the Window Samples were located within the external grassed areas of the premises and thereby encountered an initial layer of reworked Topsoil. These were WS07, WS08, WS10 and WS13. The Topsoil had been reworked and proved to be very gravelly ranging in thickness from 0.05m in WS08 to 0.30m in WS07. With the exception of WS13 each of the Window Samples located within the soft landscaped areas progressed into natural soils immediately underlying the Topsoil cover. WS13 encountered black Sand and fine Gravel Fill with coal debris between 0.07m and 0.12m before progressing into firm to stiff, reworked sandy clayey Silt with occasional timber to a depth of 0.60m below existing ground level.

The remaining ten Window Samples were located either within the existing buildings or on concrete hardstanding areas outside as detailed within the relevant Engineer's Logs in Appendix II. Underlying the initial Concrete cover, each of the Window Samples encountered Made Ground deposits ranging from Sub Base gravel fill primarily within the Window Samples undertaken inside the buildings to silty sandy Gravel Fill with plastic fragments within the external Loading Bay areas.

The following Made Ground depths were encountered within the Window Samples:

| | |
|---|---|
| WS01 – 0.50m | WS08 – 0.05m |
| WS02 – 0.54m | WS09 – 0.55m |
| WS03 – 0.54m | WS10 – 0.20m |
| WS04 – 0.36m | WS11 – 0.10m |
| WS05 – 0.55m | WS12 – 0.75m |
| WS06 – 0.44m | WS13 – 0.60m |
| WS07 – 0.30m | WS14 – 0.35m |

### *6.2.2. Glacial Deposits*

With the exception of WS04, WS06, WS07 and WS13, which encountered bedrock immediately underlying the Made Ground, each of the Window Samples encountered a layer of typically firm, grey, slightly sandy silty CLAY/ clayey SILT before encountering bedrock. This generally ranged in thickness from 0.14m in WS02 to 0.70m in WS10, however, WS05 located centrally inside the buildings revealed a firm to stiff, grey slightly sandy clayey SILT from 0.55m to 3.35m depth before encountering bedrock.

### *6.2.3. Bedrock*

Each of the Window Samples encountered highly weathered MUDSTONE bedrock at the base of the boreholes whereby Refusal was often encountered and no further progress could be achieved. The bedrock comprised very weak, grey, Mudstone Shale, highly weathered, often recovered as Gravel. However, WS07 achieved a final depth of 3.30m having encountered bedrock at 0.30m indicating the weak nature of the rock.

Rockhead was encountered at the following depths:

| | |
|---|---|
| WS01 – 0.67m | WS08 – 0.65m |
| WS02 – 0.68m | WS09 – 0.95m |
| WS03 – 0.68m | WS10 – 0.90m |
| WS04 – 0.36m | WS11 – 0.45m |
| WS05 – 3.35m | WS12 – 0.75m |
| WS06 – 0.44m | WS13 – 0.60m |
| WS07 – 0.30m | WS14 – 0.55m |

## 6.3. Groundwater Encountered

No groundwater was encountered during the ground investigation.

*Please note: The groundwater conditions observed in these exploratory holes are those appertaining to the period of the investigation. However, it should be noted that groundwater levels are subject to diurnal, seasonal and climatic conditions or may vary due to other causes.*

## 7.0. REFERENCES


British Geological Survey: -

- British Geological Survey, Sheet 232 '*Abergavenny*' (solid and drift) – 1:63,360 Scale

Environment Agency: -

- Groundwater Vulnerability Maps 36 – 1:100,000 Scale.

Specialist Publications;-

- British Code of Practice BS 5930: (1999) *'Code of Practice for Site Investigations'*
- British Code of Practice BS 1377: (1990) *'Methods of test for soils for civil engineering purposes'.*
- British Code of Practice BS 10175: (2001) *'Code of Practice for Investigation of Potentially Contaminated Sites'*
- British Code of Practice BS EN ISO 14688-1 (2002)
- British Code of Practice BS EN ISO 14688-2 (2004)
- Health and Safety Executive Guidance Note EH40/90
- Specification for Ground Investigation – Thomas Telford 1993 Reprinted 2005
- ICE Conditions of Contract – Ground Investigation Version, 2nd Edition, November 2003

For and on behalf of QUANTUM GEOTECHNICAL LIMITED

*Written by:*

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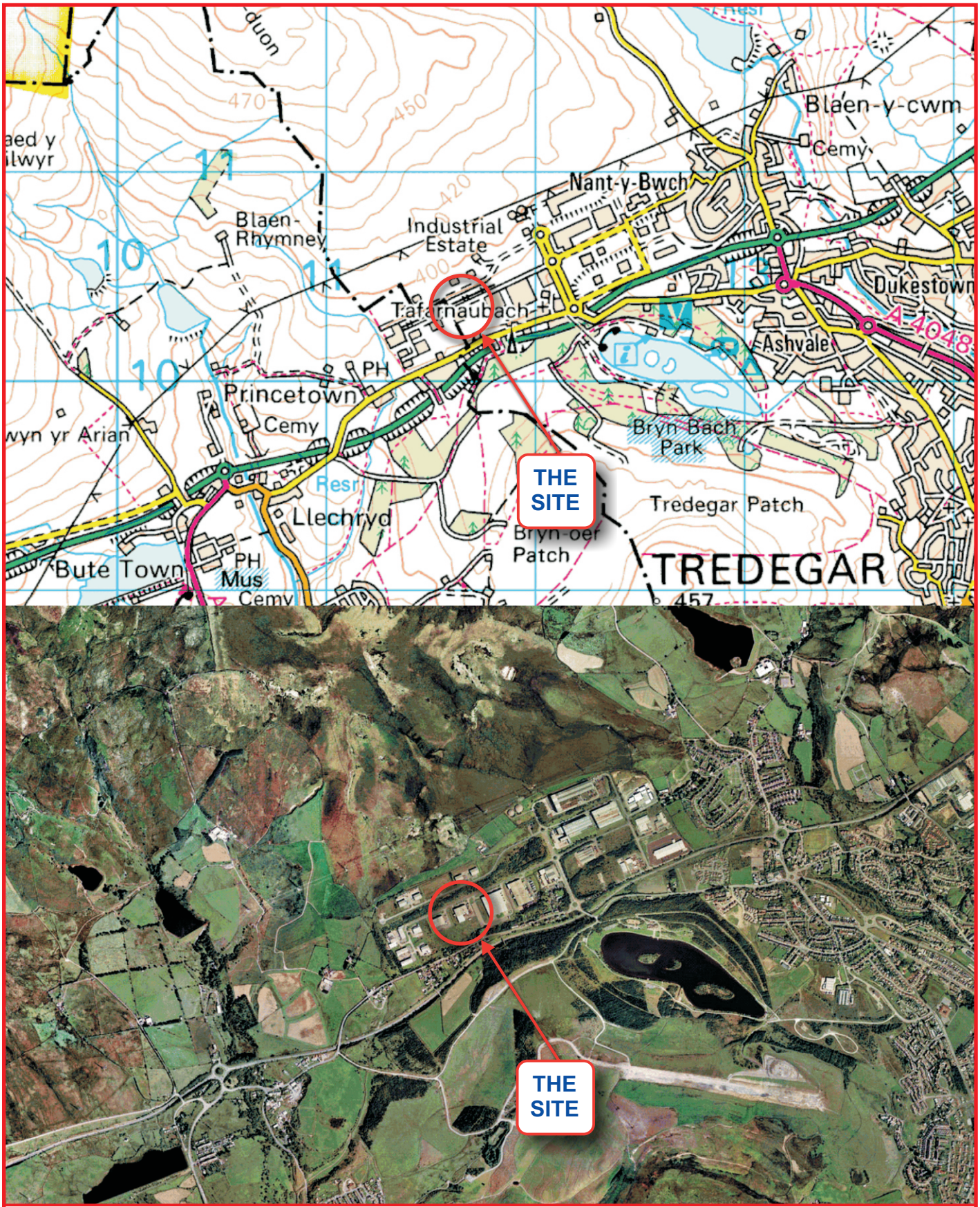
## APPENDIX I – SITE PLANS



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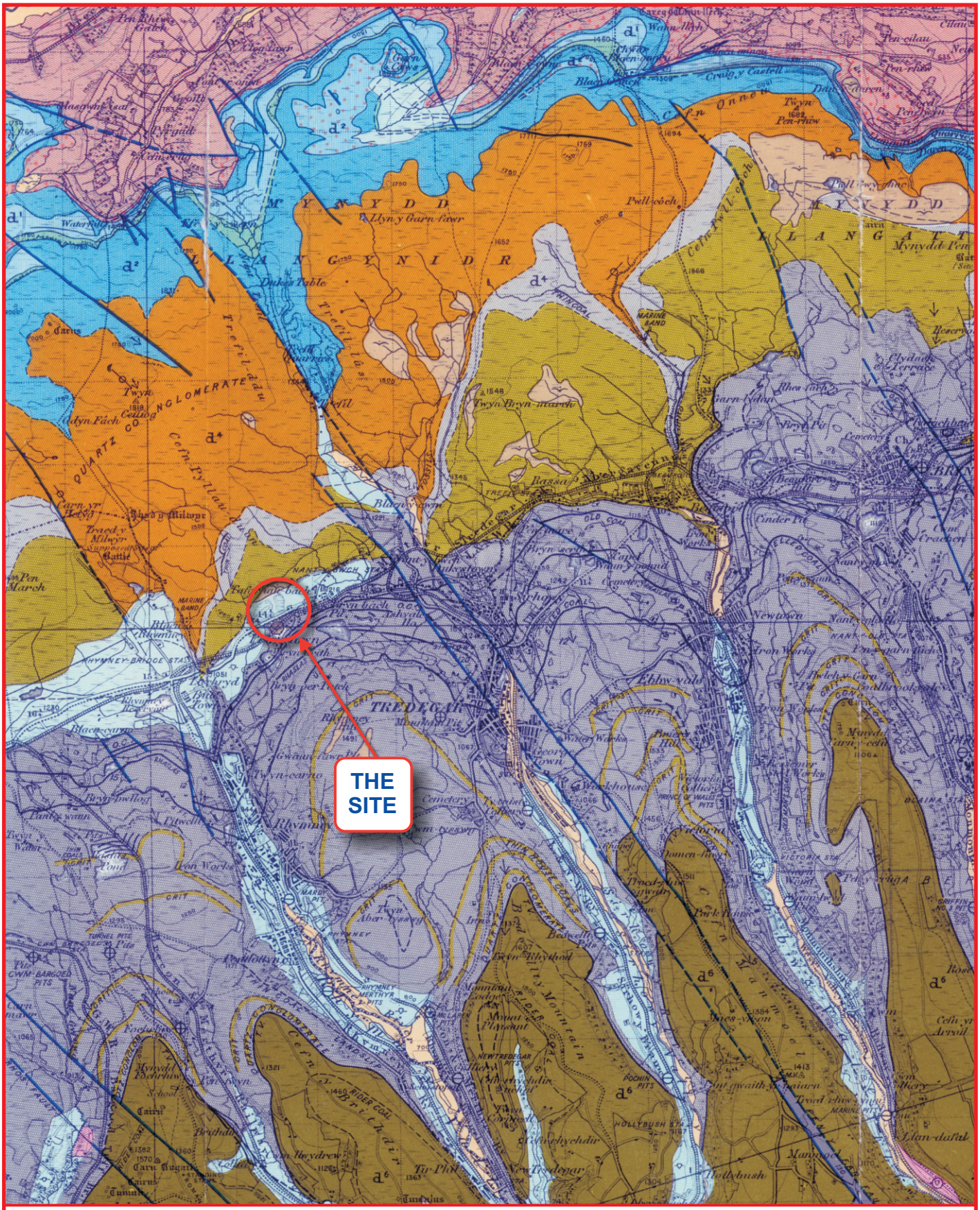
ENVIROWALES LTD, UNIT 5,
TAFARNAUBACH INDUSTRIAL ESTATE
EBBW VALE

SITE LOCATION PLAN

FIGURE 1

SCALE:
1 : 25000

JOB No.
X101422



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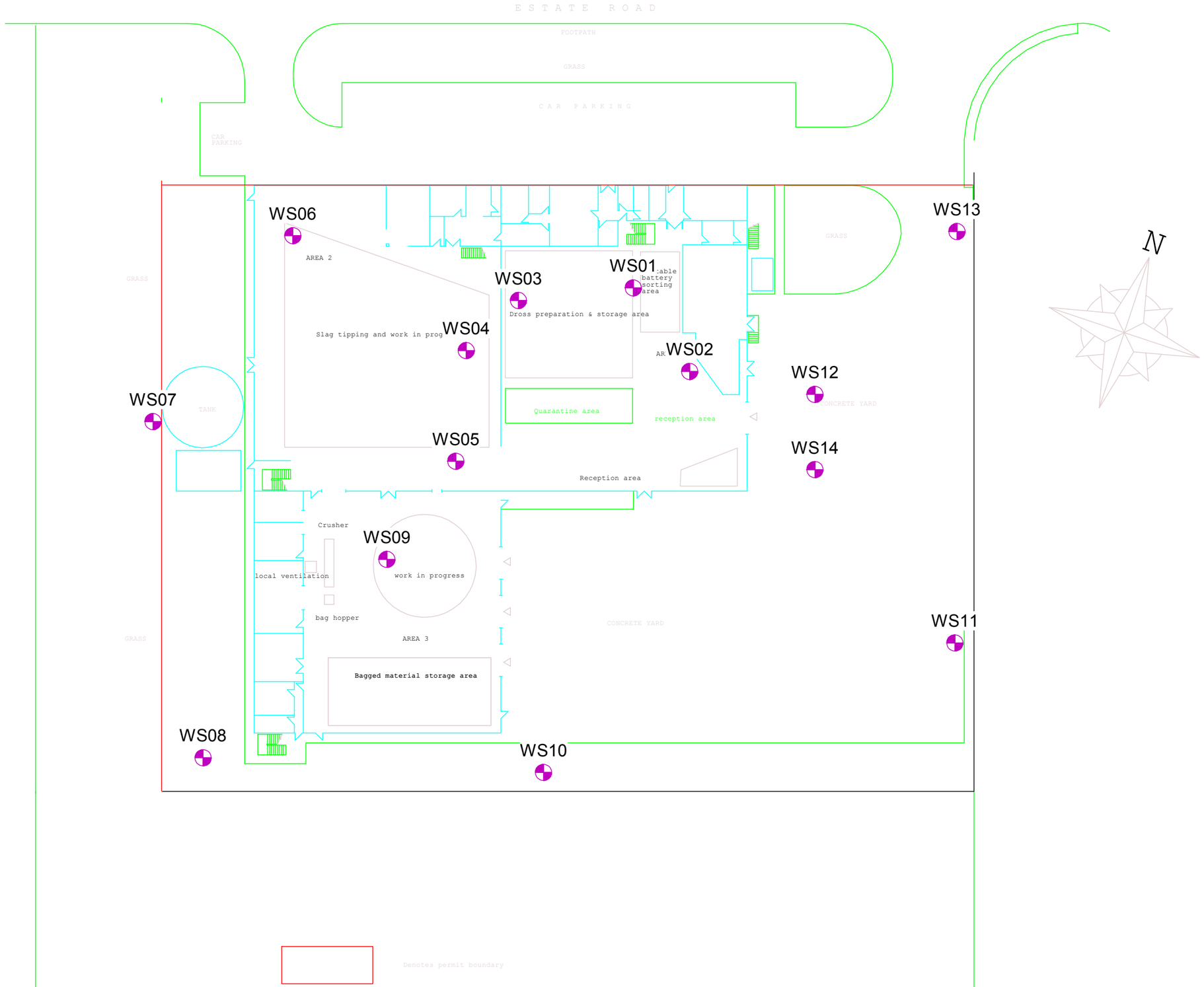
GEOLOGICAL MAP EXTRACT

FIGURE 2

SCALE:
1 : 63360

JOB No.
X101422

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KEY

- Borehole
- Trial Pit
- Monitoring / Test Point
- Window Sample
- Dynamic Probe
- Historical Hole

**PROJECT**
**UNIT 5, TAFARNAUBACH IND. EST.**

**DRAWING TITLE:**
**EXPLORATORY HOLE LOCATION PLAN**

| JOB NO. | FIGURE NO. |
|---|---|
| X101422 | 3 |
| DATE | SCALE |
| 17/06/10 | 1:500 |

## APPENDIX II – ENGINEERING GEOLOGIST'S WINDOW SAMPLE BOREHOLE LOGS

# KEY TO BOREHOLE AND TRIAL PIT LOGS

## SAMPLE AND TEST TYPES

| | |
|---|---|
| **U** | Undisturbed driven tube sample - 102mm diameter, 450mm long. |
| **P** | Undisturbed pushed piston sample - 102mm diameter, 1000mm long. |
| **TW** | Undisturbed thin walled push in sample - 100mm diameter, 750mm long. |
| **B** | Bulk disturbed sample. |
| **BLK** | Block Sample |
| **CBR** | Heavy duty undisturbed sample - 154 mm diameter (CBR mould). |
| **D** | Small disturbed sample. |
| **LB** | Large Bulk disturbed sample (for earthworks testing) |
| **C** | Core sample |
| **W** | Water sample |
| **G** | Gas sample |
| **j** | Jar sample |
| **t** | Tub sample |
| **p** | Pot sample |
| **s** | Small sample |
| **v** | Vial sample |

| | |
|---|---|
| **S** | Standard Penetration Test using split spoon sampler. (See Note). |
| **C** | Standard Penetration Test using a solid 60 degree cone. (See Note). |

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

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

## CORE RUN DETAILS

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

## WATER COLUMN SYMBOLS


First water strike, second water strike etc.


Standing water level after first strike, second strike etc.

Seepage.

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NOTE:
Legend symbols in accordance with BS 5930 (1999)

# KEY TO BOREHOLE AND TRIAL PIT LOGS

## MATERIAL LEGENDS

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

## INSTALLATION / BACKFILL DETAILS

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

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NOTE:
Legend symbols in accordance with BS 5930 (1999)

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS01**

Dates : 01/06/10 - 01/06/10

Location : Within factory building

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 216.46 E
*Approximate Co-ordinates Only* 190.17 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| | | | | (0.06) | MADE GROUND: Concrete | | (0.06) | |
| | | | | 0.06 (0.20) | MADE GROUND: Concrete | | 0.06 (0.20) | |
| 0.30 - 0.50 | ES 1 | | | 0.26 (0.04) | MADE GROUND: Concrete | | 0.26 (0.04) | |
| | | | | 0.30 (0.20) | MADE GROUND: Grey brown slightly clayey sand and fine to medium sub base gravel fill. | | 0.30 (0.20) | |
| 0.50 - 0.67 | D 2 | 87 | 100 | 0.50 (0.17) | Firm grey possibly reworked slightly sandy silty CLAY with fine to coarse subangular to angular gravel and possible cobbles. | | 0.50 (0.17) | |
| | | | | 0.67 | Weak grey weathered shaley silty MUDSTONE.<br>WS terminated at 0.67m bgl on sampler refusal. | | 0.67 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through floor slab. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

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| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No.**

**WS02**

Dates : 01/06/10 - 01/06/10

Location : Within factory building

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 230.15 E
*Approximate* 170.11 N
*Co-ordinates Only* *Co-ordinates to Local Grid*

| Samples | | Sample Run | | Depth (Thick-ness) | STRATA DESCRIPTION | Legend | Depth (Thick-ness) | Water |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | | | | | |
| | | | | (0.02) | MADE GROUND: Yellow clay tiles | | (0.02) | |
| | | | | 0.02 | MADE GROUND: Concrete | | 0.02 | |
| | | | | (0.26) | | | (0.26) | |
| | | | | 0.28 | MADE GROUND: Concrete. Plastic DPC at 0.33m bgl. | | 0.28 | |
| 0.33 - 0.54 | D 1 | | | (0.05) | MADE GROUND: Grey brown slightly clayey sand and fine to medium sub base gravel fill. | | (0.05) | |
| | | | | 0.33 | | | 0.33 | |
| 0.54 - 0.68 | ES 2 | 87 | 100 | (0.21) | | | (0.21) | |
| | | | | 0.54 | Firm grey possibly reworked slightly sandy silty CLAY with fine to coarse subangular to angular gravel and possible cobbles. | | 0.54 | |
| | | | | (0.14) | | | (0.14) | |
| | | | | 0.68 | Weak grey weathered shaley silty MUDSTONE. WS terminated at 0.68m on sampler refusal. | | 0.68 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through floor slab. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

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|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

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**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No.**

**WS03**

Dates : 01/06/10 - 01/06/10

Location : Within factory building

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 187.61 E
*Approximate Co-ordinates Only* 187.72 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| | | | | (0.02) | MADE GROUND: Yellow clay tiles | | (0.02) | |
| | | | | 0.02 | MADE GROUND: Concrete screed. | | 0.02 | |
| | | | | (0.03) | MADE GROUND: Concrete | | (0.03) | |
| | | | | 0.05 | | | 0.05 | |
| 0.29 - 0.54 | D 1 | | | (0.20) | MADE GROUND: Concrete. Plastic DPC at 0.25m bgl. | | (0.20) | |
| | | | | 0.25 | MADE GROUND: Grey brown slightly clayey sand and fine to medium sub base gravel fill. | | 0.25 | |
| | | 87 | 100 | (0.04) | | | (0.04) | |
| | | | | 0.29 | | | 0.29 | |
| 0.54 - 0.68 | ES 2 | | | (0.25) | Firm grey possibly reworked slightly sandy silty CLAY with fine to coarse subangular to angular gravel and possible cobbles. | | (0.25) | |
| | | | | 0.54 | | | 0.54 | |
| | | | | (0.14) | Weak grey weathered shaley silty MUDSTONE. | | (0.14) | |
| | | | | 0.68 | WS terminated at 0.68m on sampler refusal. | | 0.68 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through floor slab. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

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|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

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**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No.**

**WS04**

Dates : 01/06/10 - 01/06/10

Location : Within factory building

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 175.87 E
*Approximate Co-ordinates Only* 175.00 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| | | | | (0.02) | MADE GROUND: Yellow clay tiles | | (0.02) | |
| | | | | (0.02) | MADE GROUND: Concrete screed. | | 0.02 | |
| | | | | 0.02 | MADE GROUND: Concrete | | (0.02) | |
| | | | | 0.04 | | | 0.04 | |
| | | | | (0.21) | MADE GROUND: Concrete. Plastic DPC at 0.25m bgl. | | (0.21) | |
| 0.32 - 0.40 | ES 1 | | | 0.25 | MADE GROUND: Grey brown slightly clayey sand and fine to medium sub base gravel fill. | | 0.25 | |
| 0.40 - 0.60 | D 2 | | | (0.07) | | | (0.07) | |
| | | | | 0.32 | Very weak and weak grey weathered silty MUDSTONE. Recovered as silty sandy fine to medium angular gravel. | | 0.32 | |
| 0.60 - 0.82 | D 3 | 77 | 100 | (0.04) | | | (0.04) | |
| | | | | 0.36 | | | 0.36 | |
| | | | | (0.46) | | | (0.46) | |
| | | | | 0.82 | WS terminated at 0.82m on sampler refusal. | | 0.82 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through floor slab. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

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| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

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**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS05**

Dates : 01/06/10 - 01/06/10

Location : Within factory building

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 172.45 E
*Approximate Co-ordinates Only* 148.09 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | Depth (Thick-ness) | STRATA DESCRIPTION | Legend | Depth (Thick-ness) | Water |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | | | | | |
| | | | | (0.02) | MADE GROUND: Yellow clay tiles | | (0.02) | |
| | | | | 0.02 (0.22) | MADE GROUND: Concrete | | 0.02 (0.22) | |
| 0.30 - 0.55 | ES 1 | | | 0.24 (0.06) | MADE GROUND: Concrete. Plastic DPC at 0.24m bgl. MADE GROUND: Sandy fine to coarse gravelly sub base. | | 0.24 (0.06) | |
| | | | | 0.30 (0.25) | | | 0.30 (0.25) | |
| 0.55 - 1.00 | D 2 | 87 | 100 | 0.55 | Firm to stiff grey, brown and grey brown slightly sandy clayey SILT with fine to medium subrounded to subangular mudstone gravel. Possible residual soil. | | 0.55 | |
| 1.20 - 1.40 | ES 3 | 77 | 100 | | | | | |
| 1.60 - 1.80 | D 4 | | | | | | | |
| | | | | (2.80) | | | (2.80) | |
| 2.20 - 2.40 | ES 5 | 67 | 100 | | | | | |
| 2.60 - 2.80 | D 6 | | | | | | | |
| 3.10 - 3.30 | ES 7 | 57 | 200 | | | | | |
| 3.35 - 3.50 | D 8 | | | 3.35 (0.15) | Very weak and weak grey weathered silty MUDSTONE. | | 3.35 (0.15) | |
| | | | | 3.50 | WS terminated at 3.50m on sampler refusal. | | 3.50 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through floor slab. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

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| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

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**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS06**

Dates : 01/06/10 - 01/06/10

Location : Within factory building

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 132.34 E
*Approximate Co-ordinates Only*
203.38 N
*Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| | | | | (0.02) 0.02 | MADE GROUND: Yellow clay tiles | | (0.02) 0.02 | |
| | | | | (0.02) 0.04 | MADE GROUND: Concrete screed. | | (0.02) 0.04 | |
| | | | | 0.02 | MADE GROUND: Concrete | | | |
| 0.32 - 0.44 | D 1 | | | (0.20) 0.24 | MADE GROUND: Concrete. Plastic DPC at 0.24m bgl. | | (0.20) 0.24 | |
| 0.44 - 0.55 | D 2 | 77 | 100 | (0.08) 0.32 | MADE GROUND: Grey brown sand and fine to medium subangular to angular gravel sub base fill. | | (0.08) 0.32 | |
| | | | | (0.12) 0.44 | Very weak and weak grey weathered silty MUDSTONE. | | (0.12) 0.44 | |
| | | | | (0.21) 0.65 | WS terminated at 0.65m on sampler refusal. | | (0.21) 0.65 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through floor slab. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

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| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS07**

Dates : 01/06/10 - 01/06/10

Location : Adjacent to tank to rear of premises

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 97.62 E
*Approximate Co-ordinates Only*
157.39 N
*Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| 0.00 - 0.30 | D 1 | | | (0.30) | MADE GROUND: Brown reworked gravelly TOPSOIL with occasional fibrous organic rootlets. | | (0.30) | |
| | | | | 0.30 | | | 0.30 | |
| 0.40 - 0.60 | D 2 | 87 | 100 | | Very weak grey with very occasional grey brown staining fully weathered (residual soil) shaley MUDSTONE with occasionally clayey bands. Recovered as firm sandy clayey fine to medium subangular to angular gravel. | | | |
| 0.60 - 0.80 | ES 3 | | | | | | | |
| 1 | | | | | | | | |
| 1.20 - 1.40 | D 4 | 77 | 100 | | | | | |
| 1.60 - 1.80 | D 5 | | | (3.00) | | | (3.00) | |
| 2 | | | | | | | | |
| 2.20 - 2.40 | D 6 | 67 | 100 | | | | | |
| 2.60 - 2.80 | D 7 | | | | | | | |
| 3 | 3.00 - 3.30 | D 8 | | | | | | |
| | | 57 | 100 | | | | | |
| | | | | 3.30 | WS terminated at 3.3m bgl on sampler refusal. | | 3.30 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Densities and consistencies visually assessed.

Dry

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| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No.**

**WS08**

Dates : 01/06/10 - 01/06/10

Location : On grass to rear of premises

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 110.34 E
*Approximate Co-ordinates Only* 74.22 N
*Co-ordinates to Local Grid*

| Samples | | Sample Run | | Depth (Thick-ness) | STRATA DESCRIPTION | Legend | Depth (Thick-ness) | Water |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | | | | | |
| 0.00 - 0.05 | ES 1 | | | (0.05) | MADE GROUND: Brown reworked topsoil with occasional fibrous organic rootlets. | | (0.05) | |
| 0.10 - 0.30 | D 2 | | | 0.05 | Firm grey sandy fine to medium subangular to angular mudstone and quartzite gravelly CLAY. Possibly reworked/ made ground. | | 0.05 | |
| 0.40 - 0.60 | ES 3 | 87 | 100 | (0.60) | | | (0.60) | |
| | | | | 0.65 | Weak grey brown weathered MUDSTONE. | | 0.65 | |
| | | | | (0.05) | WS terminated at 0.70m bgl on sampler refusal. | | (0.05) | |
| | | | | 0.70 | | | 0.70 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Densities and consistencies visually assessed.

Dry

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| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS09**

Dates : 01/06/10 - 01/06/10

Location : Within factory building

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 155.33 E
*Approximate Co-ordinates Only* 123.14 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| | | | | (0.25) | MADE GROUND: Concrete drainage gully. | | (0.25) | |
| | | | | 0.25<br>(0.17) | MADE GROUND: Concrete. | | 0.25<br>(0.17) | |
| 0.42 - 0.55 | ES 1 | | | 0.42<br>(0.13) | MADE GROUND: Grey reworked fine gravelly clay with concrete debris. | | 0.42<br>(0.13) | |
| 0.60 - 0.80 | D 2 | 77 | 100 | 0.55<br>(0.40) | Firm grey brown slightly sandy CLAY with fine to medium subangular to angular mudstone gravel. | | 0.55<br>(0.40) | |
| 0.80 - 0.95 | D 3 | | | | | | | |
| 1 | | | | 0.95<br>(0.05)<br>1.00 | Weak to medium strong grey weathered SILTSTONE/ MUDSTONE.<br>WS terminated at 1.00m bgl on sampler refusal. | | 0.95<br>(0.05)<br>1.00 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through floor slab. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

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| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS10**

Dates : 02/06/10 - 02/06/10

Location : On grass adjacent to loading area

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 193.96 E
*Approximate Co-ordinates Only* 70.79 N
*Co-ordinates to Local Grid*

| | Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| | 0.00 - 0.20 | D 1 | | | (0.20) | MADE GROUND: Brown reworked gravelly TOPSOIL. | | (0.20) | |
| | 0.30 - 0.50 | D 2 | 87 | 100 | 0.20<br>(0.70) | Firm to stiff grey slightly sandy CLAY with fine angular mudstone gravel. | | 0.20<br>(0.70) | |
| | 0.70 - 0.90 | ES 3 | | | | | | | |
| 1 | | | | | 0.90 | Stiff sandy CLAY with much fine angular mudstone gravel. Possibly very weathered MUDSTONE/ residual soil. | | 0.90 | |
| | 1.20 - 1.40 | D 4 | 77 | 100 | (1.30) | | | (1.30) | |
| | 1.60 - 1.80 | ES 5 | | | | | | | |
| 2 | 2.00 - 2.20 | D 6 | | | | | | | |
| | | | 67 | 25 | 2.20<br>(0.60) | No recovery. | | 2.20<br>(0.60) | |
| | | | | | 2.80 | WS terminated at 2.80m bgl on sampler refusal. | | 2.80 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Densities and consistencies visually assessed.

Dry

QUANTUM
Bynea
Llanelli, Carmarthenshire SA14 9ST
Tel: 01554 744880
Fax: 01554 776150
email: enquiries@quantum-gb.co.uk

| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS11**

Dates : 02/06/10 - 02/06/10

Location : On hardstand adjacent to loading area

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 295.68 E
*Approximate Co-ordinates Only* 103.08 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| 0.00 - 0.10 | D 1 | | | (0.10) | MADE GROUND: Weak weathered concrete. | | (0.10) | |
| 0.10 - 0.45 | ES 2 | | | 0.10 | Firm grey slightly sandy silty CLAY with fine angular gravel. | | 0.10 | |
| | | 87 | 100 | (0.35) | | | (0.35) | |
| 0.45 - 0.60 | D 3 | | | 0.45 | Weak grey weathered shaley silty MUDSTONE. | | 0.45 | |
| | | | | (0.15) | | | (0.15) | |
| | | | | 0.60 | WS terminated at 0.60m bgl on sampler refusal. | | 0.60 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Densities and consistencies visually assessed.

Dry

QUANTUM
Bynea
Llanelli, Carmarthenshire SA14 9ST
Tel: 01554 744880
Fax: 01554 776150
email: enquiries@quantum-gb.co.uk

| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS12**

Dates : 02/06/10 - 02/06/10

Location : In loading area

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 261.45 E
*Approximate Co-ordinates Only* 164.24 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| | | | | (0.23) | MADE GROUND: Concrete. | | (0.23) | |
| 0.23 - 0.40 | ES 1 | | | 0.23 | MADE GROUND: Silty sand and gravel fill with concrete and plastic debris. | | 0.23 | |
| 0.40 - 0.75 | D 2 | 77 | 100 | (0.52) | | | (0.52) | |
| | | 67 | 100 | | | | | |
| | | | | 0.75 | Very weak grey weathered shaley MUDSTONE. | | 0.75 | |
| | | | | (0.05) | WS terminated at 0.80m bgl on sampler refusal. | | (0.05) | |
| | | | | 0.80 | | | 0.80 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through concrete roadway. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

QUANTUM
Bynea
Llanelli, Carmarthenshire SA14 9ST
Tel: 01554 744880
Fax: 01554 776150
email: enquiries@quantum-gb.co.uk

| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS13**

Dates : 02/06/10 - 02/06/10

Location : On grass adjacent to main gates

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 296.17 E
*Approximate Co-ordinates Only* 203.87 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| 0.00 - 0.07 | D 1 | | | (0.07) | MADE GROUND: Topsoil. | | (0.07) | |
| 0.12 - 0.40 | ES 2 | | | 0.07 | MADE GROUND: Black sand and fine gravel fill with occasional coal debris. | | 0.07 | |
| | | | | (0.05) | | | (0.05) | |
| | | | | 0.12 | MADE GROUND: Firm to stiff grey reworked slightly sandy clayey SILT with fine to medium subangular to angular mudstone and occasionally sandstone gravel. Occasional timber. | | 0.12 | |
| | | 87 | 100 | | | | | |
| 0.40 - 0.60 | D 3 | | | (0.48) | | | (0.48) | |
| | | | | (0.02) | Weak grey weathered shaley silty MUDSTONE. | | 0.60 | |
| | | | | 0.60 | WS terminated at 0.62m bgl on sampler refusal. | | (0.02) | |
| | | | | 0.62 | | | 0.62 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Densities and consistencies visually assessed.

Dry

QUANTUM
Bynea
Llanelli, Carmarthenshire SA14 9ST
Tel: 01554 744880
Fax: 01554 776150
email: enquiries@quantum-gb.co.uk

| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

**Contract : Unit 5, Tafarnaubach Ind. Est.**

**Client : Enviro Wales**

**Window Sample No. WS14**

Dates : 02/06/10 - 02/06/10

Location : In loading area

Job Number : X101422

Engineer : Environmental Compliance Ltd.

Ground Level :

Coordinates: 260.96 E
*Approximate Co-ordinates Only* 145.65 N *Co-ordinates to Local Grid*

| Samples | | Sample Run | | | STRATA | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No. | Diam. (mm) | Recovery (%) | Depth (Thick-ness) | DESCRIPTION | Legend | Depth (Thick-ness) | Water |
| | | | | (0.22) | MADE GROUND: Concrete. | | (0.22) | |
| 0.22 - 0.35 | ES 1 | | | 0.22 (0.13) | MADE GROUND: Grey brown sand and fine gravel sub base fill. | | 0.22 (0.13) | |
| 0.35 - 0.55 | D 2 | 77 | 100 | 0.35 (0.20) | Firm grey sandy fine angular gravelly silty CLAY. | | 0.35 (0.20) | |
| 0.55 - 0.82 | D 3 | | | 0.55 (0.27) | Very weak grey weathered shaley silty MUDSTONE becoming very hard at 0.82m bgl. | | 0.55 (0.27) | |
| | | | | 0.82 | WS terminated at 0.82m bgl on sampler refusal. | | 0.82 | |

**Remarks:** Terrier 2000 tracked window sample rig and coring attachment. Concrete coring through concrete roadway. Densities and consistencies visually assessed. Concrete core reinstated with fresh concrete plug.

Dry

QUANTUM
Bynea
Llanelli, Carmarthenshire SA14 9ST
Tel: 01554 744880
Fax: 01554 776150
email: enquiries@quantum-gb.co.uk

| Operator: | Logged By. | Sheet No. | Scale: | |
|---|---|---|---|---|
| SGT | FL | 1 Of 1 | 1:20.00 | All measurements in metres unless otherwise stated |

AGS

## APPENDIX III – ENVIRONMENTAL LABORATORY TEST CERTIFICATES

# Certificate of Analysis

2139

Certificate Number: 10-38796

Date: 15/06/2010

Client:

Quantum GB Ltd
Ty Berwig
Bynea
Llanelli
Carmarthenshire
SA14 9ST

| | |
|---|---|
| Our Reference: | 10-38796 |
| Client Reference: | T10122 |
| Contract Title: | Tafarnaubach |
| Description: | 33 soil samples |
| Date Received: | 07/06/2010 |
| Date Started: | 07/06/2010 |
| Date Completed: | 15/06/2010 |
| Test Procedures: | Identified by prefix DETSn, details available upon request. |

Notes:

Observations and interpretations are outside the scope of UKAS accreditation
* denotes test not included in laboratory scope of accreditation
# denotes test that holds MCERT accreditation
$ denotes tests completed by an approved subcontractor
I/S denotes insufficient sample to carry out test
N/S denotes that the sample is not suitable for testing
DETSM denotes tests carried out by DETS Midlands laboratory
Solid samples will be disposed 1 month and liquids 2 weeks
after the date of issue of this test certificate
Asbestos subsamples will be kept for 6 months

Approved By:

Authorised Signatories:

Rob Brown
Business Manager



Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • Fax 01207 582444 • email: info@dets.co.uk • www.dets.co.uk

Our Ref: 10-38796
Client Ref: T10122
Contract Title: Tafarnaubach

**Sample Details**

| Sample ID | Number | DETS Ref | Matrix Description | Date Sampled | Time Sampled | Preservation | Analysis Complete |
|---|---|---|---|---|---|---|---|
| WS01 | 1 | 263779 | brown clayey very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS01 | 2 | 263780 | dark grey very gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS02 | 1 | 263781 | dark grey gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS02 | 2 | 263782 | brown gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS03 | 1 | 263783 | brown clayey very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS03 | 2 | 263784 | brown very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS04 | 2 | 263785 | grey very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS04 | 3 | 263786 | grey very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS05 | 1 | 263787 | brown very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS05 | 2 | 263788 | brown very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS05 | 4 | 263789 | brown/grey gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS05 | 7 | 263790 | dark grey/orange gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS06 | 1 | 263791 | brown very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS06 | 2 | 263792 | grey/orange very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS07 | 1 | 263793 | dark brown gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS07 | 3 | 263794 | dark grey gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS07 | 5 | 263795 | dark grey very gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS07 | 7 | 263796 | dark grey very gravelly clayey SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS08 | 2 | 263797 | dark grey gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS08 | 3 | 263798 | brown gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS09 | 1 | 263799 | dark brown gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS09 | 3 | 263800 | dark grey gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS10 | 2 | 263801 | dark grey gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS10 | 4 | 263802 | brown gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS10 | 6 | 263803 | grey/orange gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS11 | 2 | 263804 | grey gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS11 | 3 | 263805 | grey very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS12 | 1 | 263806 | grey very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS12 | 2 | 263807 | dark brown gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS13 | 2 | 263808 | brown gravelly sandy CLAY | Not Provided | Not Provided | None | 15/06/2010 |
| WS13 | 3 | 263809 | grey clayey very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS14 | 1 | 263810 | brown clayey very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |
| WS14 | 3 | 263811 | grey/orange very gravelly SAND | Not Provided | Not Provided | None | 15/06/2010 |

# Summary of Chemical Analysis
# Soil Samples

Our Ref: 10-38796
Client Ref: T10122
Contract Title: Tafarnaubach

| | | Lab No. | 263779 | 263780 | 263781 | 263782 | 263783 |
|---|---|---|---|---|---|---|---|
| | | Sample Ref | WS01 | WS01 | WS02 | WS02 | WS03 |
| | | Depth | | | | | |
| | | Other Ref | 1 | 2 | 1 | 2 | 1 |
| | | Sample Type | ES | D | D | ES | D |
| **Test** | **Units** | **DETSxx** | | | | | |
| Aluminium | mg/kg | DETS 042* | 830 | 9200 | 9300 | 31000 | 7800 |
| Antimony | mg/kg | DETS 042* | < 1.0 | 1.8 | 2.7 | 5.2 | < 1.0 |
| Arsenic | mg/kg | DETS 042# | 3.9 | 6.1 | 3.9 | 6.9 | 2.5 |
| Bismuth | mg/kg | DETS 042* | < 5 | < 5 | < 5 | < 5 | < 5 |
| Cadmium | mg/kg | DETS 042# | 0.6 | 0.8 | 1.2 | 1.3 | 0.2 |
| Chromium | mg/kg | DETS 042# | 4 | 16 | 14 | 35 | 9 |
| Copper | mg/kg | DETS 042# | 8 | 23 | 26 | 33 | 4 |
| Iron | mg/kg | DETS 042 | 2900 | 32000 | 50000 | 55000 | 4400 |
| Lead | mg/kg | DETS 042# | 40 | 18 | 35 | 33 | 13 |
| Manganese | mg/kg | DETS 042# | 170 | 770 | 860 | 880 | 210 |
| Mercury | mg/kg | DETS 081# | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | DETS 042# | 3 | 24 | 28 | 57 | 6 |
| Selenium | mg/kg | DETS 042# | 0.6 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Silver | mg/kg | DETS 042* | 2 | < 1 | 1 | < 1 | < 1 |
| Sodium | mg/kg | DETS 042* | 170 | 280 | 220 | 490 | 270 |
| Tin | mg/kg | DETS 042* | 4 | 6 | 6 | 8 | 4 |
| Zinc | mg/kg | DETS 042# | 71 | 75 | 78 | 110 | 30 |
| Chloride | mg/kg | DETS 055 | 26 | 8 | 10 | 12 | 11 |
| Boron (water soluble) | mg/kg | DETS 020# | < 0.2 | 0.3 | < 0.2 | 0.2 | 0.7 |
| Cyanide total | mg/kg | DETS 067# | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | DETS 075# | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 |
| Sulphate Aqueous Extract as SO4 | mg/l | DETS 076# | 91 | 120 | 120 | 200 | 120 |
| pH | | DETS 008# | 10.3 | 9.3 | 9.2 | 8.8 | 10.0 |
| EPH (C10-C40) | mg/kg | DETS 051# | 30 | 59 | 12 | < 10 | < 10 |

# Summary of Chemical Analysis
# Soil Samples

Our Ref: 10-38796
Client Ref: T10122
Contract Title: Tafarnaubach

| | | Lab No. | 263784 | 263785 | 263786 | 263787 | 263788 |
|---|---|---|---|---|---|---|---|
| | | Sample Ref | WS03 | WS04 | WS04 | WS05 | WS05 |
| | | Depth | | | | | |
| | | Other Ref | 2 | 2 | 3 | 1 | 2 |
| | | Sample Type | ES | D | D | ES | D |
| **Test** | **Units** | **DETSxx** | | | | | |
| Aluminium | mg/kg | DETS 042* | 35000 | 26000 | 28000 | 2800 | 22000 |
| Antimony | mg/kg | DETS 042* | 4.4 | 3.1 | 2.9 | 1.3 | 3.2 |
| Arsenic | mg/kg | DETS 042# | 7.4 | 4.6 | 4.7 | 3.3 | 5.8 |
| Bismuth | mg/kg | DETS 042* | < 5 | < 5 | < 5 | < 5 | < 5 |
| Cadmium | mg/kg | DETS 042# | 0.7 | 0.4 | 0.6 | 0.3 | 0.7 |
| Chromium | mg/kg | DETS 042# | 37 | 26 | 31 | 8 | 27 |
| Copper | mg/kg | DETS 042# | 33 | 14 | 25 | 7 | 25 |
| Iron | mg/kg | DETS 042 | 30000 | 15000 | 25000 | 2300 | 30000 |
| Lead | mg/kg | DETS 042# | 20 | 18 | 18 | 22 | 18 |
| Manganese | mg/kg | DETS 042# | 750 | 310 | 560 | 240 | 560 |
| Mercury | mg/kg | DETS 081# | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | DETS 042# | 37 | 15 | 28 | 5 | 29 |
| Selenium | mg/kg | DETS 042# | < 0.5 | < 0.5 | < 0.5 | 0.7 | < 0.5 |
| Silver | mg/kg | DETS 042* | < 1 | < 1 | < 1 | 1 | < 1 |
| Sodium | mg/kg | DETS 042* | 500 | 480 | 490 | 290 | 410 |
| Tin | mg/kg | DETS 042* | 7 | 6 | 8 | 3 | 4 |
| Zinc | mg/kg | DETS 042# | 92 | 58 | 80 | 42 | 68 |
| Chloride | mg/kg | DETS 055 | 12 | 10 | 10 | 29 | 9 |
| Boron (water soluble) | mg/kg | DETS 020# | < 0.2 | 0.8 | 0.4 | 0.2 | 0.2 |
| Cyanide total | mg/kg | DETS 067# | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | DETS 075# | 0.07 | 0.03 | 0.02 | 0.03 | 0.01 |
| Sulphate Aqueous Extract as SO4 | mg/l | DETS 076# | 380 | 100 | 110 | 94 | 53 |
| pH | | DETS 008# | 9.7 | 9.3 | 9.0 | 9.8 | 8.6 |
| EPH (C10-C40) | mg/kg | DETS 051# | 63 | < 10 | < 10 | 120 | < 10 |

# Summary of Chemical Analysis
# Soil Samples

Our Ref: 10-38796
Client Ref: T10122
Contract Title: Tafarnaubach

| | | Lab No. | 263789 | 263790 | 263791 | 263792 | 263793 |
|---|---|---|---|---|---|---|---|
| | | Sample Ref | WS05 | WS05 | WS06 | WS06 | WS07 |
| | | Depth | | | | | |
| | | Other Ref | 4 | 7 | 1 | 2 | 1 |
| | | Sample Type | D | ES | D | D | D |
| **Test** | **Units** | **DETSxx** | | | | | |
| Aluminium | mg/kg | DETS 042* | 19000 | 19000 | 1300 | 15000 | 21000 |
| Antimony | mg/kg | DETS 042* | 6.6 | 6.9 | 1.2 | 3.7 | 5.0 |
| Arsenic | mg/kg | DETS 042# | 11 | 38 | 3.6 | 11 | 11 |
| Bismuth | mg/kg | DETS 042* | < 5 | < 5 | < 5 | < 5 | < 5 |
| Cadmium | mg/kg | DETS 042# | 0.9 | 0.8 | 0.4 | 1.0 | 1.0 |
| Chromium | mg/kg | DETS 042# | 27 | 28 | 5 | 24 | 32 |
| Copper | mg/kg | DETS 042# | 28 | 38 | 9 | 29 | 35 |
| Iron | mg/kg | DETS 042 | 44000 | 37000 | 3600 | 39000 | 29000 |
| Lead | mg/kg | DETS 042# | 18 | 20 | 34 | 16 | 37 |
| Manganese | mg/kg | DETS 042# | 530 | 450 | 280 | 1200 | 670 |
| Mercury | mg/kg | DETS 081# | 0.07 | 0.23 | < 0.05 | < 0.05 | 0.09 |
| Nickel | mg/kg | DETS 042# | 34 | 38 | 4 | 38 | 35 |
| Selenium | mg/kg | DETS 042# | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Silver | mg/kg | DETS 042* | < 1 | < 1 | < 1 | < 1 | < 1 |
| Sodium | mg/kg | DETS 042* | 310 | 420 | 250 | 320 | 420 |
| Tin | mg/kg | DETS 042* | 4 | 9 | 4 | 5 | 22 |
| Zinc | mg/kg | DETS 042# | 90 | 95 | 44 | 89 | 200 |
| Chloride | mg/kg | DETS 055 | 5 | 4 | 36 | 6 | 7 |
| Boron (water soluble) | mg/kg | DETS 020# | < 0.2 | 1.2 | 0.5 | 0.4 | 0.7 |
| Cyanide total | mg/kg | DETS 067# | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.3 |
| Total Sulphate as SO4 | % | DETS 075# | < 0.01 | 0.03 | 0.03 | 0.02 | 0.03 |
| Sulphate Aqueous Extract as SO4 | mg/l | DETS 076# | 19 | 24 | 74 | 78 | 35 |
| pH | | DETS 008# | 8.5 | 8.8 | 9.1 | 8.8 | 8.2 |
| EPH (C10-C40) | mg/kg | DETS 051# | < 10 | 21 | < 10 | 13 | 37 |

# Summary of Chemical Analysis
# Soil Samples

Our Ref: 10-38796
Client Ref: T10122
Contract Title: Tafarnaubach

| | | Lab No. | 263794 | 263795 | 263796 | 263797 | 263798 |
|---|---|---|---|---|---|---|---|
| | | Sample Ref | WS07 | WS07 | WS07 | WS08 | WS08 |
| | | Depth | | | | | |
| | | Other Ref | 3 | 5 | 7 | 2 | 3 |
| | | Sample Type | ES | D | D | D | ES |
| **Test** | **Units** | **DETSxx** | | | | | |
| Aluminium | mg/kg | DETS 042* | 16000 | 15000 | 19000 | 14000 | 15000 |
| Antimony | mg/kg | DETS 042* | 3.8 | < 1.0 | 3.7 | 2.7 | < 1.0 |
| Arsenic | mg/kg | DETS 042# | 12 | 5.7 | 4.1 | 6.8 | 6.9 |
| Bismuth | mg/kg | DETS 042* | < 5 | < 5 | < 5 | < 5 | < 5 |
| Cadmium | mg/kg | DETS 042# | 0.6 | 0.7 | 0.6 | 0.6 | 0.8 |
| Chromium | mg/kg | DETS 042# | 20 | 22 | 25 | 20 | 23 |
| Copper | mg/kg | DETS 042# | 50 | 40 | 37 | 22 | 33 |
| Iron | mg/kg | DETS 042 | 32000 | 30000 | 28000 | 25000 | 35000 |
| Lead | mg/kg | DETS 042# | 24 | 22 | 16 | 16 | 19 |
| Manganese | mg/kg | DETS 042# | 420 | 600 | 350 | 430 | 1000 |
| Mercury | mg/kg | DETS 081# | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | DETS 042# | 35 | 43 | 37 | 29 | 37 |
| Selenium | mg/kg | DETS 042# | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Silver | mg/kg | DETS 042* | < 1 | < 1 | < 1 | < 1 | < 1 |
| Sodium | mg/kg | DETS 042* | 270 | 280 | 250 | 410 | 320 |
| Tin | mg/kg | DETS 042* | 6 | 6 | 10 | 8 | 7 |
| Zinc | mg/kg | DETS 042# | 93 | 92 | 83 | 72 | 88 |
| Chloride | mg/kg | DETS 055 | 19 | 5 | 19 | 6 | 11 |
| Boron (water soluble) | mg/kg | DETS 020# | 0.4 | 0.5 | 0.5 | 0.7 | 0.7 |
| Cyanide total | mg/kg | DETS 067# | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | DETS 075# | 0.02 | 0.01 | < 0.01 | 0.02 | < 0.01 |
| Sulphate Aqueous Extract as SO4 | mg/l | DETS 076# | 67 | 38 | 40 | 49 | 14 |
| pH | | DETS 008# | 8.2 | 8.1 | 8.2 | 8.4 | 8.5 |
| EPH (C10-C40) | mg/kg | DETS 051# | < 10 | < 10 | < 10 | 31 | 75 |

# Summary of Chemical Analysis
# Soil Samples

Our Ref: 10-38796
Client Ref: T10122
Contract Title: Tafarnaubach

| | | Lab No. | 263799 | 263800 | 263801 | 263802 | 263803 |
|---|---|---|---|---|---|---|---|
| | | Sample Ref | WS09 | WS09 | WS10 | WS10 | WS10 |
| | | Depth | | | | | |
| | | Other Ref | 1 | 3 | 2 | 4 | 6 |
| | | Sample Type | ES | D | D | D | D |
| **Test** | **Units** | **DETSxx** | | | | | |
| Aluminium | mg/kg | DETS 042* | 12000 | 23000 | 14000 | 11000 | 14000 |
| Antimony | mg/kg | DETS 042* | 2.4 | 3.9 | 3.0 | 2.7 | 3.0 |
| Arsenic | mg/kg | DETS 042# | 4.7 | 7.5 | 7.5 | 5.8 | 9.5 |
| Bismuth | mg/kg | DETS 042* | < 5 | < 5 | < 5 | < 5 | < 5 |
| Cadmium | mg/kg | DETS 042# | 0.5 | 0.8 | 0.8 | 0.7 | 0.7 |
| Chromium | mg/kg | DETS 042# | 15 | 27 | 24 | 17 | 20 |
| Copper | mg/kg | DETS 042# | 28 | 36 | 28 | 23 | 23 |
| Iron | mg/kg | DETS 042 | 25000 | 35000 | 35000 | 30000 | 31000 |
| Lead | mg/kg | DETS 042# | 9 | 20 | 17 | 15 | 20 |
| Manganese | mg/kg | DETS 042# | 790 | 740 | 780 | 540 | 260 |
| Mercury | mg/kg | DETS 081# | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | DETS 042# | 25 | 35 | 39 | 31 | 29 |
| Selenium | mg/kg | DETS 042# | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Silver | mg/kg | DETS 042* | 4 | < 1 | < 1 | < 1 | 6 |
| Sodium | mg/kg | DETS 042* | 600 | 430 | 260 | 280 | 230 |
| Tin | mg/kg | DETS 042* | 15 | 5 | 6 | 3 | 4 |
| Zinc | mg/kg | DETS 042# | 34 | 83 | 89 | 81 | 60 |
| Chloride | mg/kg | DETS 055 | 35 | 25 | 5 | 19 | 7 |
| Boron (water soluble) | mg/kg | DETS 020# | 1.6 | 0.5 | 0.4 | 0.3 | < 0.2 |
| Cyanide total | mg/kg | DETS 067# | < 0.1 | < 0.1 | 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | DETS 075# | 0.03 | 0.03 | < 0.01 | < 0.01 | 0.01 |
| Sulphate Aqueous Extract as SO4 | mg/l | DETS 076# | 80 | 120 | 13 | 21 | 13 |
| pH | | DETS 008# | 8.7 | 8.3 | 8.4 | 8.0 | 7.8 |
| EPH (C10-C40) | mg/kg | DETS 051# | 8200 | 45 | 62 | 23 | < 10 |

# Summary of Chemical Analysis
# Soil Samples

Our Ref: 10-38796
Client Ref: T10122
Contract Title: Tafarnaubach

| | | Lab No. | 263804 | 263805 | 263806 | 263807 | 263808 |
|---|---|---|---|---|---|---|---|
| | | Sample Ref | WS11 | WS11 | WS12 | WS12 | WS13 |
| | | Depth | | | | | |
| | | Other Ref | 2 | 3 | 1 | 2 | 2 |
| | | Sample Type | ES | D | ES | D | ES |
| **Test** | **Units** | **DETSxx** | | | | | |
| Aluminium | mg/kg | DETS 042* | 19000 | 13000 | 23000 | 21000 | 15000 |
| Antimony | mg/kg | DETS 042* | 3.9 | 2.9 | 6.7 | 5.1 | 4.0 |
| Arsenic | mg/kg | DETS 042# | 6.6 | 7.4 | 7.1 | 6.9 | 6.5 |
| Bismuth | mg/kg | DETS 042* | < 5 | < 5 | < 5 | < 5 | < 5 |
| Cadmium | mg/kg | DETS 042# | 0.8 | 0.7 | 0.8 | 0.5 | 0.7 |
| Chromium | mg/kg | DETS 042# | 26 | 21 | 33 | 28 | 19 |
| Copper | mg/kg | DETS 042# | 30 | 31 | 31 | 34 | 27 |
| Iron | mg/kg | DETS 042 | 37000 | 31000 | 32000 | 23000 | 28000 |
| Lead | mg/kg | DETS 042# | 17 | 16 | 16 | 18 | 17 |
| Manganese | mg/kg | DETS 042# | 660 | 1000 | 1600 | 700 | 520 |
| Mercury | mg/kg | DETS 081# | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | DETS 042# | 33 | 39 | 30 | 30 | 28 |
| Selenium | mg/kg | DETS 042# | < 0.5 | < 0.5 | 0.6 | < 0.5 | < 0.5 |
| Silver | mg/kg | DETS 042* | < 1 | < 1 | < 1 | 1 | < 1 |
| Sodium | mg/kg | DETS 042* | 390 | 260 | 590 | 550 | 270 |
| Tin | mg/kg | DETS 042* | 7 | 5 | 7 | 19 | 7 |
| Zinc | mg/kg | DETS 042# | 84 | 89 | 81 | 81 | 72 |
| Chloride | mg/kg | DETS 055 | 48 | 13 | 9 | 83 | 10 |
| Boron (water soluble) | mg/kg | DETS 020# | < 0.2 | 0.4 | 0.8 | 0.6 | < 0.2 |
| Cyanide total | mg/kg | DETS 067# | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | DETS 075# | < 0.01 | < 0.01 | 0.03 | 0.04 | < 0.01 |
| Sulphate Aqueous Extract as SO4 | mg/l | DETS 076# | 18 | 14 | 58 | 150 | 11 |
| pH | | DETS 008# | 8.1 | 8.3 | 10.0 | 10.7 | 9.0 |
| EPH (C10-C40) | mg/kg | DETS 051# | 15 | < 10 | 79 | 560 | 18 |

# Summary of Chemical Analysis
# Soil Samples

Our Ref: 10-38796
Client Ref: T10122
Contract Title: Tafarnaubach

| | | Lab No. | 263809 | 263810 | 263811 |
|---|---|---|---|---|---|
| | | Sample Ref | WS13 | WS14 | WS14 |
| | | Depth | | | |
| | | Other Ref | 3 | 1 | 3 |
| | | Sample Type | D | ES | D |
| **Test** | **Units** | **DETSxx** | | | |
| Aluminium | mg/kg | DETS 042* | 10000 | 1800 | 16000 |
| Antimony | mg/kg | DETS 042* | 2.9 | 1.2 | 4.3 |
| Arsenic | mg/kg | DETS 042# | 5.0 | 2.9 | 2.6 |
| Bismuth | mg/kg | DETS 042* | < 5 | < 5 | < 5 |
| Cadmium | mg/kg | DETS 042# | 0.4 | 0.3 | 0.6 |
| Chromium | mg/kg | DETS 042# | 14 | 5 | 23 |
| Copper | mg/kg | DETS 042# | 15 | 6 | 36 |
| Iron | mg/kg | DETS 042 | 15000 | 2700 | 26000 |
| Lead | mg/kg | DETS 042# | 13 | 30 | 19 |
| Manganese | mg/kg | DETS 042# | 340 | 190 | 280 |
| Mercury | mg/kg | DETS 081# | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | DETS 042# | 15 | 4 | 43 |
| Selenium | mg/kg | DETS 042# | < 0.5 | 0.5 | < 0.5 |
| Silver | mg/kg | DETS 042* | < 1 | < 1 | < 1 |
| Sodium | mg/kg | DETS 042* | 300 | 240 | 300 |
| Tin | mg/kg | DETS 042* | 7 | < 1 | 4 |
| Zinc | mg/kg | DETS 042# | 48 | 49 | 100 |
| Chloride | mg/kg | DETS 055 | 11 | 42 | 14 |
| Boron (water soluble) | mg/kg | DETS 020# | 0.5 | < 0.2 | < 0.2 |
| Cyanide total | mg/kg | DETS 067# | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | DETS 075# | 0.03 | 0.02 | < 0.01 |
| Sulphate Aqueous Extract as SO4 | mg/l | DETS 076# | 61 | 23 | 16 |
| pH | | DETS 008# | 10.6 | 9.5 | 9.0 |
| EPH (C10-C40) | mg/kg | DETS 051# | 48 | < 10 | < 10 |

## Appendix A - Details of Analysis

Method details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS.
No Recovery Factors are used in the determination of results. Results reported assume 100% recovery
Full method statements are available on request.

| Method | Name of Parameter | Units | Limit of Detection | Sample Preparation | Sub-Contracted | UKAS | MCERTS |
|---|---|---|---|---|---|---|---|
| DETS 002 | Organic Matter | % | 0.01 | Air Dried | No | Yes | Yes |
| DETS 003 | Loss on Ignition | % | 0.01 | Air Dried | No | Yes | Yes |
| DETS 004 | Total Sulphate | % | 0.01 | Air Dried | No | Yes | Yes |
| DETS 075 | Total Sulphate | % | 0.01 | Air Dried | No | Yes | Yes |
| DETS 004 | Water Soluble Sulphate | mg/l | 10.00 | Air Dried | No | Yes | Yes |
| DETS 076 | Water Soluble Sulphate | mg/l | 10.00 | Air Dried | No | Yes | Yes |
| DETS 006 | Chloride | mg/kg | 0.01 | Air Dried | No | Yes | Yes |
| DETS 008 | pH | pH Units | 0.10 | Air Dried | No | Yes | Yes |
| DETS 042 | Selenium | mg/kg | 0.50 | Air Dried | No | Yes | Yes |
| DETS 019 | Ammonia | mg/kg | 0.02 | Air Dried | No | Yes | Yes |
| DETS 020 | Boron (Water Soluble) | mg/kg | 0.20 | Air Dried | No | Yes | Yes |
| DETS 024 | Sulphide | mg/kg | 10.00 | Air Dried | No | Yes | Yes |
| DETS 042 | Antimony | mg/kg | 1.00 | Air Dried | No | No | No |
| DETS 042 | Arsenic | mg/kg | 0.20 | Air Dried | No | Yes | Yes |
| DETS 042 | Barium | mg/kg | 1.50 | Air Dried | No | Yes | Yes |
| DET S 042 | Beryllium | mg/kg | 0.20 | Air Dried | No | Yes | Yes |
| DETS 042 | Cadmium | mg/kg | 0.10 | Air Dried | No | Yes | Yes |

## Appendix A - Details of Analysis

Method details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS.
No Recovery Factors are used in the determination of results. Results reported assume 100% recovery
Full method statements are available on request.

| Method | Name of Parameter | Units | Limit of Detection | Sample Preparation | Sub-Contracted | UKAS | MCERTS |
|---|---|---|---|---|---|---|---|
| DETS 042 | Cobalt | mg/kg | 0.70 | Air Dried | No | Yes | Yes |
| DETS 042 | Copper | mg/kg | 0.20 | Air Dried | No | Yes | Yes |
| DETS 042 | Chromium | mg/kg | 0.15 | Air Dried | No | Yes | Yes |
| DETS 042 | Iron | mg/kg | 1.00 | Air Dried | No | Yes | No |
| DETS 042 | Lead | mg/kg | 0.30 | Air Dried | No | Yes | Yes |
| DETS 042 | Manganese | mg/kg | 20.00 | Air Dried | No | Yes | Yes |
| DETS 081 | Mercury | mg/kg | 0.05 | Air Dried | No | Yes | Yes |
| DETS 042 | Molybdenum | mg/kg | 0.40 | Air Dried | No | Yes | Yes |
| DETS 042 | Nickel | mg/kg | 0.20 | Air Dried | No | Yes | Yes |
| DETS 042 | Thallium | mg/kg | 1.00 | Air Dried | No | No | No |
| DETS 042 | Vanadium | mg/kg | 0.80 | Air Dried | No | Yes | Yes |
| DETS 042 | Zinc | mg/kg | 1.00 | Air Dried | No | Yes | Yes |
| DETS 049 | Sulphur (Free) | mg/kg | 0.50 | As Received | No | Yes | Yes |
| DETS 050 | PAH | mg/kg | 0.10 | As Received | No | Yes | No |
| DETS 051 | TPH (C10 - C40) | mg/kg | 20.00 | As Received | No | Yes | Yes |
| DETS 052 | PCB | mg/kg | 0.01 | As Received | No | Yes | Yes |

## Appendix A - Details of Analysis

Method details are shown only for those determinants listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS.
No Recovery Factors are used in the determination of results. Results reported assume 100% recovery
Full method statements are available on request.

| Method | Name of Parameter | Units | Limit of Detection | Sample Preparation | Sub-Contracted | UKAS | MCERTS |
|---|---|---|---|---|---|---|---|
| DETS 062 | Benzene | mg/kg | 0.01 | As Received | No | Yes | Yes |
| DETS 062 | Toluene | mg/kg | 0.01 | As Received | No | Yes | Yes |
| DETS 062 | Ethylbenzne | mg/kg | 0.01 | As Received | No | Yes | Yes |
| DETS 062 | Xylene | mg/kg | 0.01 | As Received | No | Yes | Yes |
| DETS 067 | Phenol - Monohydric | mg/kg | 0.3 | Air Dried | No | Yes | Yes |
| DETS 067 | Easily Liberatable Cyanide | mg/kg | 0.1 | Air Dried | No | Yes | Yes |
| DETS 067 | Complex Cyanide | mg/kg | 0.30 | Air Dried | No | Yes | No |
| DETS 067 | Total Cyanide | mg/kg | 0.40 | Air Dried | No | Yes | Yes |
| DETS 067 | Thiocyanate | mg/kg | 0.6 | Air Dried | No | Yes | Yes |
| DETS 068 | VOC | mg/kg | 0.01 | As Received | No | No | No |


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# APPENDIX B

## *Analysis Results with Trigger Levels*

## Summary of Chemical Analysis
## Soil Samples

**Client Ref:P640**
**Contract Title: Tafarnaubach**

| Test | Units | Soil Guideline Value or Equivalent | Ref: | WS01, ES1 | WS01, D2 | WS02, D1 | WS02, ES2 | WS03, D2 | WS03, ES2 | WS04, D2 | WS04, D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminium | mg/kg | | | 830 | 9200 | 9300 | 31000 | 7800 | 35000 | 26000 | 28000 |
| Antimony | mg/kg | | | 1.0 | 1.8 | 2.7 | 5.2 | 1.0 | 4.4 | 3.1 | 2.9 |
| Arsenic | mg/kg | 640.0 | 1 | 3.9 | 6.1 | 3.9 | 6.9 | 2.5 | 7.4 | 4.6 | 4.7 |
| Bismuth | mg/kg | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Cadmium | mg/kg | 230 | 1 | 0.6 | 0.8 | 1.2 | 1.3 | 0.2 | 0.7 | 0.4 | 0.6 |
| Chromium | mg/kg | 5000 | 5 | 4 | 16 | 14 | 35 | 9 | 37 | 26 | 31 |
| Copper | mg/kg | 190 | 3 | 8 | 23 | 26 | 33 | 4 | 33 | 14 | 25 |
| Iron | mg/kg | | | 2900 | 32000 | 50000 | 55000 | 4400 | 30000 | 15000 | 25000 |
| Lead | mg/kg | 750 | 5 | 40 | 18 | 35 | 33 | 13 | 20 | 18 | 18 |
| Manganese | mg/kg | | | 170 | 770 | 860 | 880 | 210 | 750 | 310 | 560 |
| Mercury | mg/kg | 26 | 1 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | 1800 | 1 | 3 | 24 | 28 | 57 | 6 | 37 | 15 | 28 |
| Selenium | mg/kg | 13000 | 1 | 0.6 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Silver | mg/kg | | | 2 | < 1 | 1 | < 1 | < 1 | < 1 | < 1 | < 1 |
| Sodium | mg/kg | | | 170 | 280 | 220 | 490 | 270 | 500 | 480 | 490 |
| Tin | mg/kg | | | 4 | 6 | 6 | 8 | 4 | 7 | 6 | 8 |
| Zinc | mg/kg | 140 | 3 | 71 | 75 | 78 | 110 | 30 | 92 | 58 | 80 |
| Chloride | mg/kg | | | 26 | 8 | 10 | 12 | 11 | 12 | 10 | 10 |
| Boron (water soluble) | mg/kg | 3.0 | 4 | < 0.2 | 0.3 | < 0.2 | 0.2 | 0.7 | < 0.2 | 0.8 | 0.4 |
| Cyanide total | mg/kg | 1 | 3 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | | | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.07 | 0.03 | 0.02 |
| Sulphate Aqueous Extract as SO4 | mg/l | 250 | 4 | 91 | 120 | 120 | 200 | 120 | 380 | 100 | 110 |
| pH | | | | 10.3 | 9.3 | 9.2 | 8.8 | 10.0 | 9.7 | 9.3 | 9.0 |
| EPH (C10-C40) | mg/kg | 1000 | 3 | 30 | 59 | 12 | 10 | 10 | 63 | 10 | 10 |

References

| | |
|---|---|
| EA, SGV Mar 2010 - Commercial | 1 |
| CLEA, 2005 - Residential | 2 |
| Duch Intervention Value | 3 |
| ICRCL | 4 |
| CLEA, 2005 - Commercal | 5 |

## Summary of Chemical Analysis
## Soil Samples

**Client Ref:P640**
**Contract Title: Tafarnaubach**

| Test | Units | Soil Guideline Value or Equivalent | Ref: | WS05, ES1 | WS05, D2 | WS05, D4 | WS05, ES7 | WS06, D1 | WS06, D2 | WS07, D1 |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminium | mg/kg | | | 2800 | 22000 | 19000 | 19000 | 1300 | 15000 | 21000 |
| Antimony | mg/kg | | | 1.3 | 3.2 | 6.6 | 6.9 | 1.2 | 3.7 | 5.0 |
| Arsenic | mg/kg | 640.0 | 1 | 3.3 | 5.8 | 11.0 | 38.0 | 3.6 | 11.0 | 11.0 |
| Bismuth | mg/kg | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Cadmium | mg/kg | 230 | 1 | 0.3 | 0.7 | 0.9 | 0.8 | 0.4 | 1.0 | 1.0 |
| Chromium | mg/kg | 5000 | 5 | 8 | 27 | 27 | 28 | 5 | 24 | 32 |
| Copper | mg/kg | 190 | 3 | 7 | 25 | 28 | 38 | 9 | 29 | 35 |
| Iron | mg/kg | | | 2300 | 30000 | 44000 | 37000 | 3600 | 39000 | 29000 |
| Lead | mg/kg | 750 | 5 | 22 | 18 | 18 | 20 | 34 | 16 | 37 |
| Manganese | mg/kg | | | 240 | 560 | 530 | 450 | 280 | 1200 | 670 |
| Mercury | mg/kg | 26 | 1 | < 0.05 | < 0.05 | 0.07 | 0.23 | < 0.05 | < 0.05 | 0.09 |
| Nickel | mg/kg | 1800 | 1 | 5 | 29 | 34 | 38 | 4 | 38 | 35 |
| Selenium | mg/kg | 13000 | 1 | 0.7 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Silver | mg/kg | | | 1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 |
| Sodium | mg/kg | | | 290 | 410 | 310 | 420 | 250 | 320 | 420 |
| Tin | mg/kg | | | 3 | 4 | 4 | 9 | 4 | 5 | 22 |
| Zinc | mg/kg | 140 | 3 | 42 | 68 | 90 | 95 | 44 | 89 | 200 |
| Chloride | mg/kg | | | 29 | 9 | 5 | 4 | 36 | 6 | 7 |
| Boron (water soluble) | mg/kg | 3.0 | 4 | 0.2 | 0.2 | < 0.2 | 1.2 | 0.5 | 0.4 | 0.7 |
| Cyanide total | mg/kg | 1 | 3 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | 0.3 |
| Total Sulphate as SO4 | % | | | 0.03 | 0.01 | < 0.01 | 0.03 | 0.03 | 0.02 | 0.03 |
| Sulphate Aqueous Extract as SO4 | mg/l | 250 | 4 | 94 | 53 | 19 | 24 | 74 | 78 | 35 |
| pH | | | | 9.8 | 8.6 | 8.5 | 8.8 | 9.1 | 8.8 | 8.2 |
| EPH (C10-C40) | mg/kg | 1000 | 3 | 120 | 10 | 10 | 21 | 10 | 13 | 37 |

References

| | |
|---|---|
| EA, SGV Mar 2010 - Commercial | 1 |
| CLEA, 2005 - Residential | 2 |
| Duch Intervention Value | 3 |
| ICRCL | 4 |
| CLEA, 2005 - Commercal | 5 |

## Summary of Chemical Analysis
## Soil Samples

**Client Ref:P640**
**Contract Title: Tafarnaubach**

| Test | Units | Soil Guideline Value or Equivalent | Ref: | WS07, ES3 | WS07, D5 | WS07, D7 | WS08, D2 | WS08, ES3 | WS09, ES1 | WS09, D3 |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminium | mg/kg | | | 16000 | 15000 | 19000 | 14000 | 15000 | 12000 | 23000 |
| Antimony | mg/kg | | | 3.8 | 1.0 | 3.7 | 2.7 | 1.0 | 2.4 | 3.9 |
| Arsenic | mg/kg | 640.0 | 1 | 12.0 | 5.7 | 4.1 | 6.8 | 6.9 | 4.7 | 7.5 |
| Bismuth | mg/kg | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Cadmium | mg/kg | 230 | 1 | 0.6 | 0.7 | 0.6 | 0.6 | 0.8 | 0.5 | 0.8 |
| Chromium | mg/kg | 5000 | 5 | 20 | 22 | 25 | 20 | 23 | 15 | 27 |
| Copper | mg/kg | 190 | 3 | 50 | 40 | 37 | 22 | 33 | 28 | 36 |
| Iron | mg/kg | | | 32000 | 30000 | 28000 | 25000 | 35000 | 25000 | 35000 |
| Lead | mg/kg | 750 | 5 | 24 | 22 | 16 | 16 | 19 | 9 | 20 |
| Manganese | mg/kg | | | 420 | 600 | 350 | 430 | 1000 | 790 | 740 |
| Mercury | mg/kg | 26 | 1 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | 1800 | 1 | 35 | 43 | 37 | 29 | 37 | 25 | 35 |
| Selenium | mg/kg | 13000 | 1 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Silver | mg/kg | | | < 1 | < 1 | < 1 | < 1 | < 1 | 4 | < 1 |
| Sodium | mg/kg | | | 270 | 280 | 250 | 410 | 320 | 600 | 430 |
| Tin | mg/kg | | | 6 | 6 | 10 | 8 | 7 | 15 | 5 |
| Zinc | mg/kg | 140 | 3 | 93 | 92 | 83 | 72 | 88 | 34 | 83 |
| Chloride | mg/kg | | | 19 | 5 | 19 | 6 | 11 | 35 | 25 |
| Boron (water soluble) | mg/kg | 3.0 | 4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.7 | 1.6 | 0.5 |
| Cyanide total | mg/kg | 1 | 3 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | | | 0.02 | 0.01 | < 0.01 | 0.02 | < 0.01 | 0.03 | 0.03 |
| Sulphate Aqueous Extract as SO4 | mg/l | 250 | 4 | 67 | 38 | 40 | 49 | 14 | 80 | 120 |
| pH | | | | 8.2 | 8.1 | 8.2 | 8.4 | 8.5 | 8.7 | 8.3 |
| EPH (C10-C40) | mg/kg | 1000 | 3 | 10 | 10 | 10 | 31 | 75 | 8200 | 45 |

References

| | |
|---|---|
| EA, SGV Mar 2010 - Commercial | 1 |
| CLEA, 2005 - Residential | 2 |
| Duch Intervention Value | 3 |
| ICRCL | 4 |
| CLEA, 2005 - Commercal | 5 |

## Summary of Chemical Analysis
## Soil Samples

**Client Ref:P640**
**Contract Title: Tafarnaubach**

| Test | Units | Soil Guideline Value or Equivalent | Ref: | WS10, D2 | WS10, D4 | WS10, D6 | WS11, ES2 | WS11, D3 | WS12, ES1 | WS12, D2 | WS13, ES2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminium | mg/kg | | | 14000 | 11000 | 14000 | 19000 | 13000 | 23000 | 21000 | 15000 |
| Antimony | mg/kg | | | 3.0 | 2.7 | 3.0 | 3.9 | 2.9 | 6.7 | 5.1 | 4.0 |
| Arsenic | mg/kg | 640.0 | 1 | 7.5 | 5.8 | 9.5 | 6.6 | 7.4 | 7.1 | 6.9 | 6.5 |
| Bismuth | mg/kg | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| Cadmium | mg/kg | 230 | 1 | 0.8 | 0.7 | 0.7 | 0.8 | 0.7 | 0.8 | 0.5 | 0.7 |
| Chromium | mg/kg | 5000 | 5 | 24 | 17 | 20 | 26 | 21 | 33 | 28 | 19 |
| Copper | mg/kg | 190 | 3 | 28 | 23 | 23 | 30 | 31 | 31 | 34 | 27 |
| Iron | mg/kg | | | 35000 | 30000 | 31000 | 37000 | 31000 | 32000 | 23000 | 28000 |
| Lead | mg/kg | 750 | 5 | 17 | 15 | 20 | 17 | 16 | 16 | 18 | 17 |
| Manganese | mg/kg | | | 780 | 540 | 260 | 660 | 1000 | 1600 | 700 | 520 |
| Mercury | mg/kg | 26 | 1 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | 1800 | 1 | 39 | 31 | 29 | 33 | 39 | 30 | 30 | 28 |
| Selenium | mg/kg | 13000 | 1 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 0.6 | < 0.5 | < 0.5 |
| Silver | mg/kg | | | < 1 | < 1 | 6 | < 1 | < 1 | < 1 | 1 | < 1 |
| Sodium | mg/kg | | | 260 | 280 | 230 | 390 | 260 | 590 | 550 | 270 |
| Tin | mg/kg | | | 6 | 3 | 4 | 7 | 5 | 7 | 19 | 7 |
| Zinc | mg/kg | 140 | 3 | 89 | 81 | 60 | 84 | 89 | 81 | 81 | 72 |
| Chloride | mg/kg | | | 5 | 19 | 7 | 48 | 13 | 9 | 83 | 10 |
| Boron (water soluble) | mg/kg | 3.0 | 4 | 0.4 | 0.3 | < 0.2 | < 0.2 | 0.4 | 0.8 | 0.6 | < 0.2 |
| Cyanide total | mg/kg | 1 | 3 | 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | | | < 0.01 | < 0.01 | 0.01 | < 0.01 | < 0.01 | 0.03 | 0.04 | < 0.01 |
| Sulphate Aqueous Extract as SO4 | mg/l | 250 | 4 | 13 | 21 | 13 | 18 | 14 | 58 | 150 | 11 |
| pH | | | | 8.4 | 8.0 | 7.8 | 8.1 | 8.3 | 10.0 | 10.7 | 9.0 |
| EPH (C10-C40) | mg/kg | 1000 | 3 | 62 | 23 | 10 | 15 | 10 | 79 | 560 | 18 |

References

| | |
|---|---|
| EA, SGV Mar 2010 - Commercial | 1 |
| CLEA, 2005 - Residential | 2 |
| Duch Intervention Value | 3 |
| ICRCL | 4 |
| CLEA, 2005 - Commercal | 5 |

## Summary of Chemical Analysis
## Soil Samples

**Client Ref:P640**
**Contract Title: Tafarnaubach**

| Test | Units | Soil Guideline Value or Equivalent | Ref: | WS13, D3 | WS14, ES1 | WS14, D3 |
|---|---|---|---|---|---|---|
| Aluminium | mg/kg | | | 10000 | 1800 | 16000 |
| Antimony | mg/kg | | | 2.9 | 1.2 | 4.3 |
| Arsenic | mg/kg | 640.0 | 1 | 5.0 | 2.9 | 2.6 |
| Bismuth | mg/kg | | | < 5 | < 5 | < 5 |
| Cadmium | mg/kg | 230 | 1 | 0.4 | 0.3 | 0.6 |
| Chromium | mg/kg | 5000 | 5 | 14 | 5 | 23 |
| Copper | mg/kg | 190 | 3 | 15 | 6 | 36 |
| Iron | mg/kg | | | 15000 | 2700 | 26000 |
| Lead | mg/kg | 750 | 5 | 13 | 30 | 19 |
| Manganese | mg/kg | | | 340 | 190 | 280 |
| Mercury | mg/kg | 26 | 1 | < 0.05 | < 0.05 | < 0.05 |
| Nickel | mg/kg | 1800 | 1 | 15 | 4 | 43 |
| Selenium | mg/kg | 13000 | 1 | < 0.5 | 0.5 | < 0.5 |
| Silver | mg/kg | | | < 1 | < 1 | < 1 |
| Sodium | mg/kg | | | 300 | 240 | 300 |
| Tin | mg/kg | | | 7 | < 1 | 4 |
| Zinc | mg/kg | 140 | 3 | 48 | 49 | 100 |
| Chloride | mg/kg | | | 11 | 42 | 14 |
| Boron (water soluble) | mg/kg | 3.0 | 4 | 0.5 | < 0.2 | < 0.2 |
| Cyanide total | mg/kg | 1 | 3 | < 0.1 | < 0.1 | < 0.1 |
| Total Sulphate as SO4 | % | | | 0.03 | 0.02 | < 0.01 |
| Sulphate Aqueous Extract as SO4 | mg/l | 250 | 4 | 61 | 23 | 16 |
| pH | | | | 10.6 | 9.5 | 9.0 |
| EPH (C10-C40) | mg/kg | 1000 | 3 | 48 | 10 | 10 |

References

| | |
|---|---|
| EA, SGV Mar 2010 - Commercial | 1 |
| CLEA, 2005 - Residential | 2 |
| Duch Intervention Value | 3 |
| ICRCL | 4 |
| CLEA, 2005 - Commercal | 5 |