

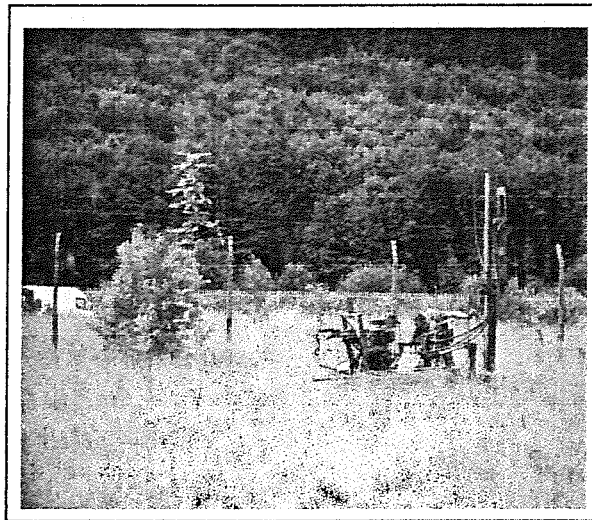


RHONDDA CYNON TAF

Environmental Services Group **Land Reclamation & Engineering**

TREHERBERT CIVIC AMENITY SITE

ENVIRONMENTAL & GEOTECHNICAL APPRAISAL



JULY 2005

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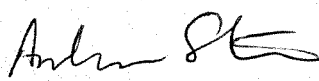
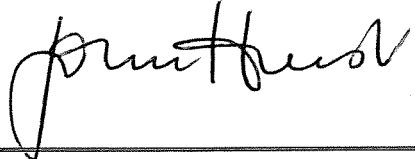
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REPORT VERIFICATION

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1.0 INTRODUCTION & SCOPE OF ASSESSMENT

- 1.1 On Wednesday 15th June 2005, the Land Reclamation and Engineering section (LR&E) was commissioned by Rhondda Cynon Taff County Borough Council's Special Projects Manager within the Chief Executive's Department (Client) to investigate and report on the ground conditions and environmental risks posed by a site designated for use as a civic amenity site (The Site).
- 1.2 The Client supplied an outline sketch of the proposed amenity site, topographical survey and some detail on usage but no further information on the site was available. The Client gave general loading requirements as a 20T recycling container covering an area of 15m² and a transport vehicle of 12T.
- 1.3 The scope of the work carried out by LR&E as part of the Client's brief is detailed below:
1. Carry out a desk study using the Envirocheck Report facility
 2. Carry out intrusive investigation of the proposed slab area (plan supplied by you) to establish bearing conditions (Dynamic probe, window sampling including SPTs) and groundwater levels (Small standpipes)
 3. Carry out chemical analysis (MCERTS) of an appropriate number of samples to enable a generic risk assessment to be carried out for human health (CLEA), ecological, aggressive ground and groundwater (R&D P20 Tier 1). Proceed to Tier 2 if required.
 4. Produce an interpretative report including assessments for generic human health, groundwater, aggressive ground (Concrete) and recommendations on slab composition and thickness etc. including any recommendations further work.

- 1.4 This report represents an assessment of the current understanding of the ground conditions and risks associated with the chemical composition and suitability of the ground materials and seeks to advise on the most applicable method of working.

2.0 THE SITE - Desk Study

The information within this section has been assembled from information presented in the Envirocheck Report and Historical Land Use Report (Appendix E) together with geological maps and visual inspection.

2.1 Location And Description

The site is located in the village of Treherbert 10 miles North of the town of Pontypridd. The site's national grid reference is 294170E 197990N.

The site consists of a marshy flat area with some hard surfacing adjacent to the Rhondda Fawr River.

It is proposed to build a civic amenity site consisting of recycling bins and drive through areas. The approximate area of the proposed site is 0.4 Ha.

2.2 History

In the 1870's the site mostly covered by marsh land with a watercourse running approximately West to East through the middle of the site. The Ynys-feio Colliery was active 0.3km to the South and a mineral railway ran adjacent to the Western Boundary of the site.

By 1900 the Lady Margaret Colliery and tip complex had been developed on the opposite side of the mineral railway to the site.

By 1945 a major sidings area had been established on the Western side of the mineral railway as part of the lady Margaret colliery. The site however had not been developed and contained the same features as in the 1870's.

By the 1960's the site had been in-filled and now bore the main shunt lines for a major sidings area directly to the North. The Ynys-feio Colliery and Lady Margaret Colliery had now closed but their tip complex's was still in existence.

By 1983 the north of the site had been re-developed for industry and a new road link established by 1993.

2.3 Surrounding Area

The Rhondda Fawr runs on the eastern boundary of the site in a north to south direction.

There is a mixture of light industry and educational establishments together with associated playing fields. Treherbert village is located to the East of the site on the opposite side of the Rhondda Fawr and comprises extensive residential housing.

2.4 Geology

The geology of this locality consists of recent alluvial deposits derived from the Rhondda Fawr River, this is underlain by Pleistocene glacial till type superficial deposits, which consists of stiff brown clay containing gravel sandstone and mudstone. The Pleistocene deposits are underlain by the by the Middle Coal Measures which consist mainly of mudstones, siltstones and occasional coal seams and associated seat earths, some thin sandstones may also exist within the sequence.

2.5 Hydrogeology

The site is not within a groundwater protection zone or are there any water abstraction points within 500m of the site.

The site is underlain by a minor aquifer (Variable Permeability). These can be fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although these aquifers will seldom produce large quantities of water for abstraction, they are important both for local supplies and in supplying base flow to rivers.

The drift deposits are classified as High Leaching Potential (U) – soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) assumed, until proved otherwise.

2.6 Hydrology

The site is very flat and there is no evidence of drainage other than infiltration through the surface.

The Rhondda Fawr River runs on the eastern boundary of the site in a north to south direction within a semi natural course.

There are no active trade effluent discharge consents within 150m of the site.

Most of the surface water from adjacent sites enters a storm sewer network and rubble drain system that runs down the Western side of the site North to South.

The Environment Agency General Quality Assessment (GQA) and Rivers Ecosystem (RE) Classification for the stretch of the Rhondda Fawr adjacent to the site are Class A and RE1 respectively. It is also classed as salmonid waters.

The site is within a zone 3 flood plain by the Environment Agency of Fluvial type.

The Environment Agency have a statutory sampling point downstream of the site and the convergence of the Nant Saerbren.

The following table lists the water quality recorded within the Rhondda Fawr River Taff at for the years 2000 to 2002.

	Average (1)	Percentile 95 (2)	Percentile 90 (3)	Percentile 10 (4)	No. of samples	GQA Standard
BOD (mg/l)	0.79	-	1.24		30	2.5 (3)
Ammonia (mgN/l)	0.033	-	0.061		30	0.25 (3)
Dissolved oxygen (% Saturation)	96.14	-	-	88.78	30	80 (4)
pH	7.7	-	-			6-9 (1)
Hardness (mg/l CaCO ₃)	82.53					
Dissolved Copper (ug/l)	1.08	1.17	-			112 (2)
Total Zinc (ug/l)	10.8	32.4				500 (2)

Source: EA web site

NB: The GQA standard is compared to the relevant column referred to by the number within the brackets after the standard.

2.7 Mining

No mining report was available from the Client and time scales have not allowed for a mining report to be obtained.

However, from the history of the site it can be surmised that the area has been extensively worked by the Ynys-feio Colliery and Lady Margaret Colliery. There is no evidence of any mine entries in the vicinity of the site but shallow mine workings may be present.

3.0 Site investigation

3.1 Design Rationale

The sampling has been restricted to the area of the slabled area of the proposed site as per Clients instruction.

The sampling grid has been derived from recommendations made in CLR4 assuming a targeted hotspot/softspot 10m radius (314m²). The window sampling points were set on a 20m grid with herringbone spacing given a 78% probability in hitting the target. This probability is considered reasonable based on the history of the site.

Each hole would also provide details of stratification and composition of the made ground

3.2 Field Works

9 number machine driven window samples were taken down to a maximum depth of 3m. A Standard Penetration test (SPT) was carried out at 1m depth.

3 number basic standpipes were inserted in 3 of the window sampling holes.

6 number machine driven dynamic probes were taken to 3m depth.

The fieldworks were carried out by CJ Associates Geotechnical Ltd under the supervision of Land Reclamation & Engineering. All detailed engineering logs in accordance with the requirements of BS 5930.

The position of all intrusive exploratory holes are shown on drawing 003.

3.2 Laboratory Testing

The analysis of samples consisted of Two different tests:

- Chemical Composition in the Solid. Relevant to contaminated land risk assessment. To MCERTS Standard.
- Leaching test carried out to the methods laid down by the former National Rivers Authority (NRA). Relevant to contaminated land risk assessment.

The in-filled material is of unknown origin but with the physical characteristics of colliery waste/spoil. This together with the proximity of spoil heaps prior to the infilling of the site would lead to the conclusion that it is colliery spoil derived with the possibility of hydrogen contamination from the mineral railway. The suite of inorganic and organic testing was established with reference to the Environment Agency Publication 'Potential Contaminants for the Assessment of Land' (CLR 8) (2002), Industry Profiles published by the DOE and BRE Special Digest 1 parts 1 to 4 (2001). Additional speciated analysis was carried out for Polycyclic Aromatic Hydrocarbons (PAH) to attempt to identify the risks associated with any hydrocarbon contamination and realise the relative pollution and/or health risk with the identified species.

The following is a list of the determinants:

Metals as total (arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, zinc), total organic carbon (mg/kg), sulphate (total) as SO₄, sulphate (water soluble) as SO₄, sulphur (total) as S%, pH, cyanide (free), phenols (total), total TPH, speciated PAH and calorific value

The results of the chemical analysis for the samples taken from the window samples are included in Appendix B and summarised in the Tables.

3.3 Materials Encountered

The ground conditions encountered by the exploratory holes beneath site can generally be summarised in the following table:

Summary of Ground Conditions		
Depth (m) From	Depth (m) To	Stratum
GL	0.05/0.2	Made Ground: Soft, grey-black-brown clay, with some fine to medium, sub-angular shale gravel
0.05/0.2	1.6/3.0	Made Ground: Loose to medium dense black, slightly clayey ash, with much fine to medium angular to sub-angular shale gravel
1.6	3.0	Firm to stiff, dark grey CLAY, with some fine to coarse, sub-angular to sub-rounded shale gravel.

The following is a summary of the corrected Standard Penetration Tests (Gibbs and Holtz (1957)) carried out at the site. Detailed analysis of the results can be found in Table 9

	Depth				
	0.5m	1.0m	1.5m	2.0m	2.5m
Number of Readings	6	15	6	6	6
Arithmetic Mean	30.60	37.13	35.78	39.00	35.42
Geometric Mean	29.02	35.26	34.69	38.23	33.26
10th Percentile	19.80	22.20	25.65	29.90	22.50
Minimum	18	18	24	26	18
Maximum	47	50	50	47	50

3.4 Ground Water Levels and Flows

The groundwater level in the three basic standpipes installed in the window sample holes was established on three occasions.

It should be noted that the 'smearing' of the sub grade as the window sample is taken may interfere with the water level within the hole.

The following table gives the water levels recorded below ground level.

	Groundwater level below ground level (m)		
Date	WS1	WS2	WS6
29/6/05	Vandalised	2.05m	Dry to 3.48m
6/7/05	Vandalised	1.85m	Vandalised
12/7/05	Vandalised	2.00m	Vandalised

From the table it can be seen that unfortunately there has been a significant amount of vandalism and therefore data is sparse. However, the results obtained from WS2 are generally what would be expected considering the proximity to the river. That is a shallow groundwater level rise from the base flow of the river, which is estimated at 3-3.5m below the elevation of WS2.

An estimated hydraulic gradient of 1 in 50 is assumed.

3.5 In-situ Gas Monitoring

The gas levels in the three basic standpipes installed in the window sample holes was established on three occasions. The atmosphere with each hole was analysed using a GA2000 gas analyser for Methane (CH₄), Carbon Dioxide (CO₂), Oxygen (O₂), Hydrogen Sulphide (H₂S) and Carbon Monoxide (CO). The Barometric Pressure was also taken.

It should be noted that the 'smearing' of the sub grade as the window sample is taken may interfere with the gas migration within the hole.

The following tables gives the gas levels recorded.

Gas levels recorded						
Date	CH ₄ (% v/v)	CO ₂ (%)	O ₂ (%)	H ₂ S (ppm)	CO (ppm)	Barometric Pressure (mb)
29/6/05	0	0	20.6	0	0	1004
6/7/05	0	0	20.7	0	0	995
12/7/05	0	0	20.6	0	0	1010

Gas levels recorded						
Date	CH ₄ (% v/v)	CO ₂ (%)	O ₂ (%)	H ₂ S (ppm)	CO (ppm)	Barometric Pressure (mb)
29/6/05	0	0	20.6	0	0	1004
6/7/05						
12/7/05						

WS1 could not be read due to vandalism and only one reading was obtained from WS6.

4.0 GEOTECHNICAL APPRAISAL

4.1 Site Preparation

Following topsoil strip, all reduced formations should be thoroughly proof rolled and compacted to reduce void space and hence potential for ignition of any combustible material. (See Section 5.2.1.3)

Allowances should be made for the removal of 'soft spots/areas' and their replacement with well compacted imported or site won granular materials. The materials should be compacted in layers, in accordance with the DTp Specification for Highway Works.

4.2 Stability of Sub Grade/formaton

The conservative loading requirement for the sub-grade is 50KN/m^2 assessed from information given from the Client.

Although, there are no founding levels available it has been assumed that the foundation slab will be shallow and excavation will be minimised.

The materials encountered shows a layer of soft material within the top 200mm followed by a layer of made ground comprising gravels derived from colliery spoil infill.

Analysis of the Standard Penetration Results, Table 9, gives an allowable bearing pressure of 90KN/m^2 at a depth of 0.5m and 95KN/m^2 at 1m. This is reasonably consistent and therefore a bearing pressure of 90KN/m^2 should be used assuming the foundation depth is between 0.5 and 1m. This is based on an allowable settlement of 25mm as prescribed in BS 8004.

Based on the aforementioned loading requirement it can be seen that the existing sub-grade has a factor of safety against adverse settlement of 1.8.

This factor of safety can be further improved by applying a vibratory roller to the exposed sub-grade. Four passes should be applied with a roller of Mass/metre width of roll of 3600kg.

4.3 Foundations and Floor Slabs

Based on the bearing capacity of the ground assessed in 4.2 the following is a preliminary assessment of the foundation slab required.

It is considered that a 175mm thick reinforced concrete slab on a 1200 gauge d.p.m. on a minimum thickness of 150mm well consolidated type 1 granular sub base will provide a design life of 20 years.

This design life is based on 100 passages of vehicles with four axles having a load of 12,700kg on each axle.

The reinforced concrete slab should be constructed with Design Class 3 sulphate resisting concrete (see section 5.4.1) and have a minimum compressive design strength of 35N/mm^2 . The reinforcement should be placed top and bottom of the concrete slab with 40 mm cover. A252 mesh reinforcement should be used within the base of the concrete slab with the top reinforcement being designed once the location of the joints has been determined. Location of the joints depends on the proposed finished levels and falls of the concrete slab, which are currently unavailable and therefore no site-specific comment can be given at this stage.

It is also strongly recommended that the concrete is mixed with microfilaments such as 'fibremesh' or similar. This will improve the durability, workability, impermeability and abrasion resistance.

All foundation formations should be inspected by a suitably qualified engineer before concreted.

Allowances should be made for the removal of 'soft spots/areas' and their replacement with well compacted imported or site won granular materials. The materials should be compacted in layers, in accordance with the DTp Specification for Highway Works.

4.4 Excavations and Disposal

Most of the excavations should be possible with normal soil excavating machinery. From the desk study it is very unlikely that buried structures exist at the site, however, allowances should be made for the use of pneumatic breaker attachments, or similar tools, if any buried obstructions are encountered.

The sides of excavations deeper than 1.0m should be supported by traditional methods or temporarily battered at gradients of typically 30°.

Exposed formations within the in-situ materials will be extremely susceptible to damage, softening and deterioration by wet weather and site traffic. They should therefore be protected by blinding concrete or 150mm thick layer of granular material immediately after exposure.

Due to the increasing costs of land fill due the Landfill Directive it is recommended that all excavations are minimised and all excavated materials are re-used on site within screening bunds etc. If it is a design requirement for material to be disposed off site further testing may be required under the Waste Acceptance Criteria for Inert landfill sites.

4.5 Drainage and Service Ducts

Due to the presence of a designated flood plain and the formation's elevation to the river it is recommended that the granular material placed to the base of the slab has a pathway to drain. This will minimise the length of time the sub-grade will be exposed to moisture and help prevent differential settlement. A peripheral drain should be designed to drain the sub-base for this purpose the position of which will be governed by the falls on the concrete slab. However, care should be taken not to affect the base flows to the river.

All the drainage runs are likely to be within the loose fill materials. They should therefore be designed using steep gradients and flexible joints to prevent backfalls occurring and the possibility of misalignment and breakage of the system.

Special care should be taken at the entry of drainage and services into proposed structures such as manholes where a considerable degree of flexibility should also be allowed to deal with likely differential movements.

5.0 ENVIRONMENTAL APPRAISAL

5.1 POTENTIAL CONTAMINATIVE SOURCE CHARACTERISATION

5.1.1 Potential Contaminants of Concern

The potential contaminants of concern (COC) for the site are based on the historical use of the site.

The history of the site is briefly outlined in section 2 but generally consists made ground and a railway sidings area.

The following is a generalised list of the potential COCs at the site

Heavy Metals – Mercury, Cadmium etc.

Phytotoxic Metals – Copper, zinc etc.

Other metals & semi-metals – arsenic, selenium, etc.

Inorganic Chemicals – Cyanides, sulphates, ammonia etc.

Organic – Phenols, petroleum and aromatic hydrocarbons etc.

5.1.2 Conceptual Site Model of Potential Pollutant Linkages

The risk of pollution or environmental harm occurring as a result of ground contamination is influenced by three main factors:

- The presence of a contamination source;
- The presence of a sensitive target, i.e. groundwater, human health;
- The existence of migration pathways by which contaminants can reach the target.

Some contaminants, while representing a hazard, are only a risk if there is a pathway for them to be taken up by the receptor.

Human exposure to soil contaminants can occur via many pathways. Direct pathways of importance include dermal absorption, inhalation of soil/dust, inhalation of volatilised compounds and inadvertent soil ingestion (or in the case of some children, deliberate soil ingestion). Indirect pathways, plant uptake of contaminants followed by human ingestion, contaminant presence in groundwater/surface water followed by human ingestion, and pathways involving transfers through the food chain.

The principal pathway by which contaminants reach the water environment is through slow seepage or leaching to either groundwater or surface waters. The potential for various chemicals to migrate by such pathways is dependent on many factors, including their physiochemical characteristics and the local hydrogeology. Substances that are water soluble, and thus liable to leaching, would appear to be the primary candidates for reaching controlled waters. However, hydrophobic substances can reach the aquatic environment if they themselves are liquids such as solvents and fuel oils. In addition, processes such as erosion can deliver some substances associated with soil to surface watercourses where they may accumulate in sediments.

The principal receptors that may potentially be impacted upon by the potential contaminants of concern are illustrated in Table 1 .

5.1.3 Conceptual Exposure Model

From details given by the client, the site's land use can be classified as Waste Management Facilities (Open to Public). The area will have an 75% hard covering with the critical receptor being a child. There is no data available on the number of likely visits per year for the critical receptor. However, once or twice a week would be a reasonable estimate.

5.1.4 Statistical Treatment of Analysis Data.

All statistical analyses have been carried out in accordance with the Environment Agency Publication 'Assessment of Risks to Human Health from Contaminated Land' (CLR 7) (2002).

Results of analysis below detection limit have been assumed as detection limit for statistical calculations. (CLR7)

The chemical composition data has been used to determine the upper 95% confidence limit (UCL) of the arithmetic mean of the total population of data for the chosen averaging area. This is sometimes known as the mean value test. The maximum value test has been carried out where sample populations are less than 20. The maximum value test gives an indication whether the maximum value of a given population of data is an outlier or hotspot. However, the determination of the UCL assumes that the distribution is normal. The coefficient of variation (CV) of the population of samples has therefore also been determined in order to establish whether the data distribution is generally normal or lognormal. The NSW EPA (1995) indicates that if the CV is greater than 1.2 the distribution is likely to be lognormal. Log-normal distributions exhibit a large skew away from the arithmetic mean and may provide evidence of outliers or hotspots when the number of samples within the population is greater than 20 or the population pass the maximum value test.

Where outliers are identified they have been removed from the sample population and the statistical tests repeated until there is no outlier identified.

The following outliers have been identified and removed from the sample population and treated as outliers/hotspots.

Averaging Area	Sample Ref.	Determinant	Concentration
Whole site	WS2	Acenaphthylene	0.53 mg/kg
	WS4	Acenaphthylene	0.53 mg/kg
	WS4	Anthracene	0.61 mg/kg
	WS7	Benzo(a)anthracene	0.88 mg/kg
	WS9	Mercury (Total)	0.3 Mg/kg

5.2 GENERIC QUANTATIVE RISK ASSESSMENT AND EVALUATION

Each potential Source-Pathway-Receptor relationship indicated in Section 5.1 and Table 1 has been assessed based on appropriate generic screening criteria in order to establish actual contaminants of concern (COCs) and significant pollutant linkages.

A generic quantitative risk estimation and evaluation has been carried out on the potential COCs with regard the potential pollutant linkages indicated in the conceptual model to identify significant pollutant linkage and unacceptable risks.

The risk-based assessment has been carried out using best practice methodology, CIRIA (2001) & DEFRA CLR11 (2004), and is summarised in Table 8 and expanded upon within the following sections. The risk index or classified risk is described in Table 7.

5.2.1 Source: Ground Materials

5.2.1.1 Human Health Risk Assessment (HHRA) & Evaluation

No contaminants were found that could exert an acute toxicity i.e. no cyanide present. Therefore, the evaluation of the data has been based on chronic (Long-term) and not Acute (Short-term) effects.

The site's land use can be classified as Waste Management Facilities (Open to Public). The area will have an 75% hard covering with the critical receptor being a child. Unfortunately, the current UK guidelines (CLEA 2002) do not include this conceptual exposure model within its standard land uses.

The industrial/commercial standard land use exposure model is inapplicable to the site due to the age and exposure duration of the receptor. Although the assumed extent of 'hard covering' included in the model is similar. The other exposure models will generally be conservative in nature, due to increased exposure time, but comparisons may be drawn between the residential without plant uptake standard land use due to the age of the critical receptor. This assumes that no vegetables are grown and consumed at the site.

The UCL of each determinant with its averaging area has therefore been compared to generic screening criteria from the following sources in order to establish actual contaminants of concern:

- Soil Guideline Values (SGV) for residential use without plant uptake (DEFRA, EA March 2002). This will be more conservative than the conceptual model, see previous comments.
- Site Specific Level (SSL). Calculated using CLEA model where toxicological information available from DEFRA.
- The Dutch Intervention Values 2000 (Dutch IV 2000). The intervention level is defined as a threshold value above which a specific identified pollutant should be treated provided there is more than 25m³ of soil contamination. These are multi-functional guidelines but are generally based on "residential with garden" and are for lifetime exposure and are not critical receptor derived as the UK are. They also are based on both human toxicity and ecotoxicity whereas the UK is only based on human toxicity. However, as with most generic guidelines, they are conservative in nature and all exposure pathways have been assumed in their derivation. Therefore, their use in screening for contaminants of concern within the UK for a building development, where human exposure and consumption of vegetables is limited, is considered appropriate for this initial generic assessment.

- The Dutch proposed "Serious Risk Concentrations" (Dutch SRC). They constitute revised Intervention Values similar to Dutch 2000 but with the Human Health and the Ecotoxicity elements broken down.
- Australian guideline on the investigation levels for soil and groundwater (Health investigation levels, E, Public open space/Secondary schools). These have been included in the selection process as these are the only known published generic values for open space.

The UK derived SGV's will always take precedence over other countries intervention values. This conservative approach is acceptable within the UK framework. The CLR10 CLEA model: *Technical Basis and Algorithms* states "if applying a generic assessment criterion with limiting conservative assumptions provides an acceptable answer to the question, then there is no need to initiate a more detailed site-specific risk assessment (DETR, Environment Agency and IEH, 2000)".

Benzo(a)pyrene has been selected as the indicator compound for the toxicity of the polycyclic aromatic hydrocarbons. This is because that toxicology information is readily available and it is widely accepted as one of the most toxic of the PAHs.

Table 2 compares the various screening criteria and identifies the ones selected for this assessment.

The selected screening criterion has been compared to the statistical data for each averaging area and outlier/hotspot. A summary is included as Table 3.

In evaluating the results the following observations are made:

- Results of analysis below detection limit have been assumed as detection limit for statistical calculations. (CLR7)
- The geometric means are all equal to or lower than the arithmetic means.
- The maximum percentage variation of the UCL from the arithmetic mean was 25%. For a small sample population this signifies very consistent results.
- No potential COCs were detected above their respective screening value. Nickel was the closest but still was 42% lower than its screening value.
- No Cadmium was detected above the detection limit of 0.5 mg/kg
- No Benzo(a)pyrene was detected above the detection limit of 0.5mg/kg.
- All hotspots/outliers identified in 5.1.3 were below their respective screening values.

The actual contaminants of concern (COC) identified are generally where $UCL > \text{screening value}$ or individual exceedance of screening value. Therefore, based on the available data the risk from ground contamination in terms of human health is **LOW**.

5.2.1.2 Ecological Risk Assessment (ERA) & Evaluation

The site's land use can be classified as Waste Management Facilities (Open to Public). The area will have an 75% hard covering with the critical receptor being a child.. Unfortunately, the current UK guidelines (CLEA 2002) do not include ecotoxicity. There are no currently published soil guideline values for ecotoxicity for the UK; the Environment Agency has published consultation on risk frameworks and soil guideline values but are as yet unpublished.

The UCL of each determinant with its averaging area has therefore been compared to generic screening criteria from the following source in order to establish actual contaminants of concern:

- The Dutch proposed "Serious Risk Concentrations" (Dutch SRC) RIVM (2001). They constitute revised Intervention Values similar to Dutch 2000 but with the Human Health and the Ecotoxicity elements broken down.

Table 2 compares the various screening criteria and identifies the ones selected for this assessment.

The selected screening criteria have been compared to the statistical data for each averaging area and outlier/hotspot. A summary is included as Table 4.

In evaluating the results the following observations are made:

- Results of analysis below detection limit have been assumed as detection limit for statistical calculations. (CLR7)
- The geometric means are all lower than the arithmetic means.
- The maximum percentage variation of the UCL from the arithmetic mean was 25%. For a small sample population this signifies very consistent results.
- No potential COCs were detected above their respective screening value. Naphthalene was the closest but still was 44% lower than its screening value.
- No Cadmium was detected above the detection limit of 0.5 mg/kg
- No Benzo(a)pyrene was detected above the detection limit of 0.5mg/kg.
- All hotspots/outliers identified in 5.1.3 were below their respective screening values.
- No screening value exists for total PAH. The speciated determinants showed no exceedances.

The actual contaminants of concern (COC) identified are generally where $UCL > \text{screening value}$ or individual exceedance of screening value. Therefore, based on the available data the risk from ground contamination in terms of ecotoxicity is **VERY LOW**.

5.2.1.3 Groundwater Risk Assessment (GWRA)

Conceptual Groundwater Flow Model

Two groundwater bodies are considered to exist beneath the site:

- The shallow unconfined and confined groundwater units within the made ground and Superficial Deposits (a minor aquifer); and
- The deep confined groundwater unit within the Coal Measures Strata.

Groundwater flow within the Made Ground and Superficial is in an West – East direction towards the River Rhondda. Hydraulic connection between these two units is minimal in the vicinity of the site and hence the Coal Measures Strata is not considered further in the assessment.

Shallow groundwater flow is considered to be principally by intergranular flow. A representative hydraulic conductivity for the shallow groundwater unit is considered to be 5m/day (BS 8004)

Source

The source of potential contamination has been identified as the made ground underlying the site.

The unsaturated zone dimensions for the site are:

- length (L) = 80m, Width (w) = 80m

The unsaturated zone dimensions are based upon the total area of the site. In reality, this is a conservative assumption the source concentrations are variable, and within this source zone lower concentrations will be present.

The soil 'pore water' quality has been established from leaching tests carried out using the methodology prescribed within the former National Rivers Authority publication "Leaching Tests for the Assessment of Contaminated Land", NRA R&D 301.

Pathways

Infiltrating rainfall recharge is likely to leach contamination within the unsaturated soil downwards towards the shallow groundwater unit within the Made Ground and Superficial Deposits.

Contaminants within the groundwater will migrate in a generally easterly direction towards the River Rhondda Fawr. It is likely that the shallow groundwater nit is in continuity with the River Rhondda Fawr approximately 25m distance from the site.

From flood studies reports the annual rainfall for the area has been approximated to 2000mm per year.

It has been assumed that Approximately 75% of the site is covered by hard standing, with all runoff routed to foul/storm drains. The proposed drainage of these hard areas is assumed to be 90% efficient.

The infiltration rates (Inf) have been calculated from this data as follows:

- 0.00183m per day

Receptors

The principal receptors in the vicinity of the site are:

- Groundwater within the Made Ground and Superficial Deposits beneath the site,
- The rubble drains leading to the Rhondda Fawr, and
- The River Rhondda Fawr

Groundwater within the Made Ground and Superficial Deposits form a minor aquifer. This could potentially support small-scale local abstraction. However, considering the former industrial land uses in the wider area, the vulnerability to infiltration and the lack of existing abstraction within a 0.5km radius of the site, it is unlikely that this resource would ever be used for potable supply purposes in the locality. Therefore, comparison of source concentrations in the first instance to drinking water standards is not considered relevant.

The rubble drain lies up gradient of the site. The hydraulic gradient and topography is such that any leaching of contaminants would travel away from the rubble drain. This watercourse is therefore not considered to be the principal receptor.

There is however a potential linkage in a down gradient direction between the minor aquifer and the River Rhondda Fawr.

Therefore, the principal receptor is considered to be the River Rhondda Fawr. Thus, it is important that relevant freshwater quality standards are not exceeded in the aquifer at the point at which it potentially provides base flow to this receptor.

Quantitative Risk Assessment

The principal receptor has been established as the River Taff, therefore the water quality standards used in this assessment are from the Environmental Quality Standard for freshwater (EQS Freshwater) and. . Where no standards exist for potential COCs reference has been made to the following standards in their preferred order:

- The surface Waters (River ecosystem)(Classification) Regulations 1994
- UK Drinking Water Standards (UK DWS)
- Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996
- Dutch intervention values for groundwater (New Dutch SRC GW).

Where selected standards are hardness dependent, the hardness range 100 – 150 has been used. This is in line with the hardness within the River Rhondda.

A quantitative risk assessment has been carried out for the Site using the tiered framework laid down in the Environment Agency publication *“Methodology for the derivation of remedial targets for soil and groundwater to protect water resources”* (R&D 20).

R&D 20 prescribes a tiered approach to assessment. The approach relies on the assessment of the contaminant concentration of water (pore water) in contact with the contaminated soil. The ‘pore water’ quality is then compared to the remedial target to establish the need for remediation to protect the identified receptor.

Tier 1 Assessment

For the first tier of assessment (Tier 1), the compliance point is taken as the soil zone and the remedial target is set as equivalent to the target concentration. No allowance is made for processes (such as dilution and attenuation) that may effect contaminant concentrations along the pathway between the soil (source) and the identified receptor.

The 'pore water remedial target concentration' has been established from the aforementioned published water quality standards.

Statistical analysis has been carried out on the data in accordance with CLR7 in order to establish the UCL. The Tier 1 assessment summary of the data for the Site is presented in Table 5.

This Tier 1 assessment has indicated that the following COCs require further assessment:

- Copper
- Benzo(a)pyrene

Tier 2 Assessment

This tier of assessment considers both soil and groundwater contamination. With regard to soil contamination the assessment includes the effects of dilution on the contaminant concentrations as well as the features included in the Tier 1 process. The dilution may be from either groundwater flowing directly beneath the site, or from an abstraction borehole or river. Distance to receptor is irrelevant under this tier of assessment but the type is important to ascertain the appropriate water quality standard.

A dilution factor (DF) was calculated for both sites using the site-specific data indicated in the previous section. The calculation was carried out using the methodology laid down in the Environment Agency publication (R&D 20) using the 'remedial targets worksheet R2.2a. The completed worksheets are included in Appendix C.

The following dilution factor was calculated:

- Dilution Factor = 2.39

The UCLs calculation for each of the COCs were diluted by the relevant factor and compared to the selected water quality standard under the Tier 1 assessment. The result of this dilution and comparison is shown in Table 6.

It can be seen from Table 6 that no diluted UCL exceeds its selected water quality standard.

Therefore, a Tier 3 assessment is not required and the risk of pollution of the principal receptor, the River Rhondda Fawr, from the ground materials has been assessed as **LOW**.

5.2.1.4 Buildings and Services Risk Assessment

Aggressive Ground

In the UK, sulphates in soil and groundwater are chemical agents most likely to attack concrete. The effects can be serious resulting in expansion and softening of the concrete to a mush.

Another common cause of concrete deterioration is groundwater acidity and this is sometimes linked with the presence of sulphates.

BRE Special Digest 1 "Concrete in aggressive ground" (2001) deals with both the classification of aggressive ground and the specification of concrete to resist chemical attack. The following assessment is in accordance with Part 1: Assessing the aggressive chemical environment and seeks to identify the appropriate Design Sulphate (DS) Class and the Aggressive Chemical Environment for Concrete (ACEC) class of the ground.

The source of potential aggressive ground is colliery spoil. Colliery Spoil may contain pyrite. Pyrites are sulphides that may oxidise to sulphate when the ground is disturbed. BRE SD1 gives a conservative procedure for detecting whether pyrite may be present.

The following is a summary of testing results and calculated levels from both sites relevant to the assessment of aggressive ground.

Determinant	Maximum Recorded Value	Source
pH	8.2	From Test results
Sulphate (Water Soluble) g/l	0.06	From Test results
Sulphate (Total) as %SO ₄	0.01	From Test results
Sulphur (Total) as %S	0.24	From Test results
Total Potential Sulphate %SO ₄	0.72	BRE SD1
Oxidisable Sulphates %SO ₄	0.71	BRE SD1

BRE SD1 states, "If the amount of Oxidisable Sulphates is greater than 0.3% SO₄ in a significant number of samples, pyrite is probably present."

It can be seen that the maximum recorded oxidisable sulphates is greater than the 0.3% specified in BRE SD1. Analysis of the individual results shows that 100% of the individual samples may be pyritic. This is assessed as being "significant" and therefore the assessment and classification of site has been carried out for the possibility of pyritic ground, the total potential sulphate as the classification driver.

The risk to concrete from chemical attack has therefore been assessed as **MODERATE**

Combustibility of Sub Grade

The risk of combustion is a function of the potential combustibility of the materials concerned, together with other factors such as their porosity (and hence exposure to oxygen), moisture content and ambient temperature.

The potential risk for combustion can be measured by assessing the calorific value (measured in MJ/kg) of the material concerned. ICRCCL Guidance Note 84/61 notes that materials with calorific values above 10 MJ/kg are almost certainly combustible and that smouldering can occur in materials with calorific values of 7 MJ/kg. Whilst combustion could potentially occur in materials with calorific values below these values, they provide a reasonable basis on which to assess the relative combustibility of materials encountered at the site.

The calorific values of 9 No. samples of made ground was determined in the laboratory. The measured range was 0.68MJ/kg to 1.00MJ/kg.

Therefore, it can be concluded that the materials tested may not be particularly prone to combustion.

It should also be noted that for combustion to occur the materials need to be ignited and this can occur by either self-ignition within the material mass or by ignition from an external source, such as a bonfire. At this site the risk of self-ignition is small due to the made ground being relatively thin, 2-3m that will assist with the dissipation of temperature increases associated with oxidation. Fully consolidated materials or mechanically compacted materials will also minimise the risk of self-ignition due to the reduction in porosity and hence oxygen starvation.

The risk for the site has been assessed as **VERY LOW** for combustion of sub-grade.

5.2.2 SOURCE: GROUND GAS

According to the relevant guidance (BRE Digest 211, 1999) the site is not located within an area where there is potential for the generation of radon gas.

The risk has therefore been assessed as LOW for radon gas.

A ground gas survey was carried out by LRE within the window sample holes including for Methane (CH₄), Carbon Dioxide (CO₂), Oxygen (O₂), Hydrogen Sulphide (H₂S) and Carbon Monoxide (CO). The Barometric Pressure was also taken.

The results of the monitoring are included in Section 3 and are summarised below:

Hole	Gas levels recorded					
	CH ₄ (% v/v)	CO ₂ (%)	O ₂ (%)	H ₂ S (ppm)	CO (ppm)	Barometric Pressure (mb)
WS1						
WS2	0	0	20.6-20.7	0	0	995-1010
WS6	0	0	20.6	0	0	1004

The following points have been noted:

- The holes were only sampled on three occasions
- Sampling was restricted due to vandalism, no readings from WS1, three from WS2 and one from WS6
- The barometric pressure was high at the time of readings.

The results have been assessed against criteria laid down in CIRIA 149 (1999) for the classification of gas characteristics of the site.

The results show no gas migration to the exploratory holes. This would give the site a general site characteristic situation 1. This situation allows for <0.1% by volume of methane and <1.5% of carbon dioxide. Therefore, although the gas monitoring has its limitations and has been restricted it can be seen that the gas levels on the site can rise and still be within characteristic situation 1. Characteristic situation 1 requires no special precautions and therefore the risk from ground gas has been assessed as **LOW**.

5.3 SIGNIFICANT POLLUTANT LINKAGES.

The significant pollutant linkages as defined within Part IIA of the Environmental Protection Act 1990 have been ascertained from the risk based assessment detailed in Section 5.2. It has been assumed that any potential pollutant linkage having an assessed risk as MODERATE or above is significant.

The following table summarises the significant pollutant linkages for then Site identified:

Source	Pathway	Receptor	Risk Classification
Sulphates/Sulphides	Leaching/oxidising	Buildings (Concrete)	MODERATE

Each of the above significant pollution linkage represents an unacceptable risk to the receptor and therefore will require remediation to reduce the risk classification.

5.4 REMEDIATION STRATEGY

The remediation strategy seeks to identify an appropriate strategy to reduce the risks posed by the contaminant at the receptor.

Sulphates and sulphides pose a significant risk to buildings and therefore precautions within the design of any concrete placed within the ground will be necessary.

A risk-based assessment of the possible mitigation measures has been carried out in accordance with published guidance CIRIA C552 (2001) and is shown in Tables 10 & 11. It can be seen that the risks and the residual risk varies between LOW and VERY LOW after implementation of the remediation strategy.

5.4.1 Design Requirements for Concrete

The risk based assessment detailed in section 5.1.3 and has identified the site as having a potential for the oxidisation of sulphide therefore creating an aggressive environment for concrete.

The following site classification has been obtained from Table 2 of BRE SD1 using the data in 5.2.1.4.

Design Sulphate Class (DS) = DS-3

Aggressive Chemical Environment for Concrete (ACEC) = AC-3

All concrete used below or in contact with the ground shall be specified and designed in accordance with BRE Special Digest 1 parts 1 to 4 (2001) using the above classification.

6 LIMITATIONS OF ASSESSMENT

The site is a product of continuing natural and artificial processes, and as a result, may exhibit a variety of characteristics that may vary from place to place, and with time. The risks associated with these variations may be mitigated by appropriate investigations, but cannot be eliminated.

The generic screening values selected for the environmental assessment are conservative and not necessarily an indication of the action level to which the contaminants will be detrimental to human health; they are mainly an indicator of a potential problem. However, this tiered approach is acceptable. The CLR10 CLEA model: *Technical Basis and Algorithms* states "if applying a generic assessment criterion with limiting conservative assumptions provides an acceptable answer to the question, then there is no need to initiate a more detailed site-specific risk assessment (DETR, Environment Agency and IEH, 2000)".

The assessment on the material's potential to produce ground gas has been undertaken from very limited data during times of high atmospheric pressure.

7 CONCLUSIONS

7.1 CONCLUSIONS FROM THE INVESTIGATION OF THE SITE

- The construction of a civic amenity is proposed at the site, which from historical plans consists of railway sidings on made ground.

- A series of desk studies and site investigations has been undertaken at the site to give an indication of the types, concentrations and extent of contamination and its environmental setting together with the geotechnical properties of the formation.

The chemical data has been used to carry out quantitative risk-based assessments using generic screening criteria and environmental quality standards, develop a conceptual model of pollutant linkages that exist in the context of the proposed after-use.

In terms of human health, the UCL of Nickel was closest to its respective screening value but was still 42% lower.

In terms of ecological impact, the UCL of Naphthalene was closest to its respective screening value but was still 44% lower.

There is no evidence to suggest that the site is currently impacting adversely on the prominent water body, the River Rhondda Fawr.

The evaluation of the chemical data has shown that there is only one actual contaminants of concern, sulphur, and one significant pollutant linkage, ground materials to buildings, as defined within Part IIA of the Environmental Protection Act 1990. The remediation of this linkage is the use of sulphate resisting concrete. However, there are limitations to any assessment, see section 6, and therefore provision should be made within any construction contract for the possibility of discovering small isolated pockets of contamination.

The geotechnical data has been used to carry out a geotechnical assessment of the site. This assessment has shown that the materials that will be encountered are fairly typical and are of a reasonable founding material for low bearing pressure foundations.

Based on the current understanding of the site, the site represents a potential short-term **LOW** risk to construction operatives, general public and controlled waters and a potentially **VERY LOW** long-term risk after construction.

8 RECOMMENDATIONS

The following is a summary of the recommendations made within the detailed assessment together with the relevant section reference:

- The formation shall be proof rolled to reduce void space and potential for ignition of combustible materials. (4.1)
- The founding layer is at least 0.5m lower than the current ground level. (4.2)
- All concrete used below or in contact with the ground shall be specified and designed in accordance with BRE Special Digest 1 parts 1 to 4 (2001) using the classification DS-3 and AC-3 (5.4.1).
- Preliminary assessment has shown that a 175mm thick reinforced concrete slab on a 1200 gauge d.p.m. on a minimum thickness of 150mm well consolidated type 1 granular sub base will provide a design life of 20 years. (4.3)
- 'Soft' Spots in the formation shall be removed and material replaced with suitable. (4.3).
- All exposed formations should be protected from deterioration immediately (4.4)
- Due to increasing costs of landfill all material should be utilised on site. (4.4)

- A peripheral drain should be installed to drain the sub-base to the slab and all designed pipe-work should have steep gradients. Flexibility should be designed into the pipe-work connections to structures (4.5)
- Risk based assessments should be carried out for site operations and relevant precautions taken. Restrictions on the consumption of food on site should be considered together with minimising the exposure of skin to soils. The generation of dust should be minimised and where necessary the inhalation of dust by site workers prevented.
- Any surface water falling or running into disturbed areas of the site should be prevented from entering controlled surface waters in an uncontrolled manner.

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10 ABBREVIATIONS

BaP	Benzo(a)pyrene
BRE	Building Research Establishment
BTEX	Benzene, Toluene, ethylbenzene, mp-xylene & o-xylene
CIRIA	Construction Industry Research and Information Association
CLEA	Contaminated Land Exposure Assessment
CLR	Contaminated Land Report
COC	Contaminant of Concern
CV	Coefficient of Variation
DEFRA	Department of Environment, Food and Rural Affairs
EA	Environment Agency
EWG	European Waste Catalogue
GQA	General Quality Assessment
HHRA	Human Health Risk Assessment
ICRCL	Interdepartmental Committee for the Redevelopment of Contaminated Land
NIWAC	National Interim Waste Acceptance Criteria
PAH	Polycyclic Aromatic Hydrocarbon
SGV	Soil Guideline Value
SSL	Site Specific Level
TPH	Total Petroleum Hydrocarbons
UCL	Upper Confidence Limit (95 th percentile)

11 Glossary of Risk Assessment Terminology

Acute exposure	Short term exposure to, or contact with, a chemical.
ADRD	Acronym for Advection-Dispersion-Retardation-Decay, processes that may be simulated in contaminant transport modelling.
Adsorption	The attraction and adhesion of a layer of ions from an aqueous solution to the solid mineral surfaces with which it is in contact.
Advection	Mass transport caused by the bulk movement of flowing water.
ALARP	Acronym for As Low As Reasonably Practical.
Aquifer	A permeable geological stratum or formation that is capable of both storing and transmitting water in significant amounts.
Assumption	An estimated value or input to a spreadsheet. These are the uncertain independent variables used in Monte Carlo analysis.
ASTM	American Society for Testing & Materials
Attenuation	Reduction in contaminant concentration through biological, chemical and physical processes as it passes through a medium.
Average Daily Exposure (ADE)	The average daily amount of a contaminant to which a critical human receptor is exposed over the duration of exposure.
Average linear velocity	The rate of movement of fluid through porous media from one point to another (units m.s ⁻¹)
Averaging time	Time period over which exposure to a chemical is aggregated & averaged. This varies according to the conceptual model used and the toxicological end-point of the chemical assessed.
Base flow	The contribution of groundwater to surface water flow.
Biodegradation	The breakdown of a substance or chemical by living organisms, usually bacteria.
Borehole	Drilled hole made in soil or rock.
Bulk density (PB)	The mass of rock per unit volume: this specifically includes the porosity of the rock (ie. bulk density = mineral density x porosity).
Catchment area	The area of land needed to sustain an identified groundwater abstraction by natural recharge.
Cation exchange capacity (CEC)	The ability of a particular rock or soil to adsorb cations by cation exchange (units eq.kg ⁻¹).
Chronic exposure	Long-term exposure to, or contact with, a chemical.
CLEA	Contaminated Land Exposure Assessment Model
CLR	Contaminated Land Report
Compliance point exceeded	Point along pathway where target concentration should not be exceeded

Concentration (C)	Amount (mass/moles) of chemical per amount (volume/mass) of medium in which it exists.
Confidence level confidence interval	The percentage of values within a range compared to the total number of values.
Confined	Where permeable strata are covered by a substantial depth of impermeable strata and the potentiometric surface lies above the boundary.
Conservative pollutants	Pollutants which can move through the aquifer with little reaction with the rock matrix and which are unaffected by biodegradation (eg. chloride).
Controlled Waters	Defined by the Water Resources Act 1991 Part 111 Section 104. These include all groundwaters, inland waters (including canals), estuaries and coastal waters three nautical miles from shore.
Darcy velocity	More correctly termed specific discharge. An apparent velocity calculated from Darcy's law; represents the flow rate at which water would flow in an aquifer if it were to have 100% porosity, given by Darcy velocity $q = Ki$
Darcy's Law	The equation by which the quantity of water flowing through an aquifer may be computed . Darcy's law is usually written $Q = K A i$, where Q = flux through aquifer, K = hydraulic conductivity, A = cross-sectional area of the aquifer, i = hydraulic gradient
Decay	Reduction in contaminant mass due to processes including biodegradation, non reversible reactions, radio-active decay.
Declining source	A source term which describes decreasing concentrations. For example, where the soil source of contamination is gradually flushed by recharge. This results in a decrease in the contaminant load within the soil through time.
Density (p)	The mass or quantity of a substance per unit volume.
Deterministic modelling	The traditional approach to modelling where in any calculation a single value is assigned to each variable.
Diffuse source	Pollution from widespread activities with no one discrete source.
Diffusion	The process by which both ionic and molecular species dissolved in water move from areas of higher concentration to areas of lower concentration.
Diffusivity (D)	The diffusion coefficient, related to the velocity of diffusing particles within a medium.
Dilution Discharge (Q)	Reduction in concentration brought about by the addition of water . The volume of water flowing in a stream or through an aquifer past a specific point in a given period of time Flux is a more generalised term.

Dispersion	The phenomenon by which a solute in flowing groundwater is mixed with uncontaminated water and becomes spread out along (longitudinal dispersion) and perpendicular to (transverse dispersion) the flow path. Dispersion is caused by both differences in the velocity that the water travels at the pore level and differences in the rate at which water flows through different strata in the flow path .
Dispersion coefficient	Defined as dispersion length multiplied by linear groundwater Velocity
Dispersion length (x), also referred to as dispersivity	The characteristic length of a dispersion process, which is sometimes thought of as a property of the medium. Unfortunately this is scale dependent, and as the scale of interest increases, the value also increases. A common estimate of longitudinal dispersion length is 1/10 the scale of interest. For a transverse dispersion length, 1150 may be used.
Effective porosity	That portion of the porosity that allows transmission of water .
Field capacity	The maximum amount of water which a porous medium can hold against gravity.
Flux	The amount of a substance (eg. volume of water, mass of contaminant) passing through a specific cross-sectional area in a given period of time.
Forecast	A statistical summary of the simulation results in a spreadsheet model, displayed graphically or numerically.
Forecast value	A value calculated by the spreadsheet model during one iteration. These values are kept in a list for each forecast, and are summarised in the forecast chart and the statistics.
Fraction of organic carbon (foc)	The mass fraction of organic carbon in a rock or soil.
Groundwater	The mass of water in the ground below the unsaturated zone occupying the total pore space in the rock and moving slowly down The hydraulic gradient in accordance with the permeability' . The water contained in interconnected pores located below the water table in an unconfined aquifer, or located in a confined aquifer.
Groundwater Source Protection Zone	An area designated around a groundwater source, the maximum extent of which is the catchment area for the source and within which there are limits to the processes and activities that can occur.
Heterogeneity	A property arising from non-uniform distribution of flow within an aquifer. This may arise from hydrodynamic processes at the scale of a pore throat (i.e. water flows faster through the centre of an opening) or at a sedimentary scale (e.g. Variations in permeability due to the presence of layers of different grain size) or larger scale (e.g. fractures act as fast pathways, or layering).
Hydraulic conductivity (K)	The coefficient of proportionality describing the rate at which water can move through a permeable medium. (Units ms ⁻¹)
Hydraulic gradient (i)	The gradient of the hydraulic head at a point. It may be defined as

the change in total head over distance in the direction of maximum slope vertically or horizontally. This may be estimated by interpolating values of head at known points, eg. from a contour map or cross section.

The sum of the elevation head, pressure head and velocity head at a given point in an aquifer. This is the elevation to which water would rise in a tube with one open end at the point in the aquifer and the other end open to the atmosphere.

The dose that can be considered to present a minimal human health risk from exposure to soil contaminants. However, and in addition, efforts are still needed to reduce exposure from all routes to as low as reasonably practicable (ALARP), so that even this minimal risk is further diminished.

A powerful mathematical method that allows the solution of non linear equations.

The concentrations of contaminants that are dissolved from a soil into an inert solution when they are mixed.

The liquid that has percolated through solid waste or contaminated soil and dissolved soluble components.

Background intake of a chemical from ambient levels in food, water, air and other sources.

A system that uses random or pseudo-random numbers from a range of specified values to measure the effects of uncertainty on a model.

A substance for which a threshold for adverse health effects cannot be presumed. These substances carry some level of risk at any given exposure, although the risk may be minimal at low levels of exposure. Non-threshold substances are usually genotoxic carcinogens or mutagens.

Polycyclic Aromatic Hydrocarbon.

The ratio of the amount of substance sorbed to a medium, to the concentration in solution under equilibrium conditions (also called distribution coefficient) (Kd, units $m^3.kg^{-1}$).

The route taken by a substance through the environment.

Probability density function

A quantity (often a concentration) below which the specified percentage of samples occur (ie. 95% of values in a set do not exceed the 95th percentile).

An isolated, saturated groundwater body supported by a low permeability layer above the main water table.

A measure of the ability of a medium to transmit a fluid.

A non-pumping well, usually of small diameter, that is used to measure the elevation of the water table or piezometric surface

Piezometric surface	The imaginary surface with elevations equal to the hydraulic head at all points in an aquifer. This represents the level to which water will rise in a piezometer. If the head varies significantly with depth in the aquifer, there may be more than one piezometric surface. The water table is a particular piezometric surface.
Plume (contaminant)	The resultant region of groundwater contamination arising from a source of contamination having been influenced by groundwater flow.
Point source	Pollution arising from a discrete source, eg. a petrol station.
Pollutant linkage Pollution	The relationship between a contaminant, a pathway and a receptor As defined by the Environment Protection Act 1990: pollution of the environment due to the release (into any environmental medium) from any process of substances which are capable of causing harm to man or any other living organism supported by the environment.
Pollution (groundwater)	Of groundwater, as defined by the Groundwater Directive: the discharge by man, directly or indirectly, of substances or energy into groundwater, the results of which are such as to endanger human health or water supplies, harm living resources and the aquatic ecosystem or interfere with other legitimate uses of groundwater.
Pore water	Any free water (that is, not adsorbed within the matrix of a soil or rock and incapable of participating in contaminant movement) contained within the pore space or within fissures in either the unsaturated or saturated zone .
Porosity (n)	Ratio of the volume of void space to the total rock volume.
Porous	Having microscopic pores between the rock grains (not necessarily interconnected)'. Water of suitable quality for drinking water'.
Potable water	
Probability distribution function (PDF)	Describes the probability of a number of events occurring. For example, a linear PDF assigns an equal probability to all events within specified maximum and minimum limits, and a zero probability to those outside. A triangular PDF uses maximum, minimum and most-likely values to cluster the results around the most-likely value.
RBCA	Risk-Based Corrective Action
Realisation (trial)	A three-step process, in which Crystal Ball generates random numbers for assumptions, recalculates the spreadsheet model and records the forecast values.
Receptor (target)	An entity on the land, or on other land, which is being or could be harmed by a potential pollutant, or controlled waters which are being or are likely to be polluted
Recharge	Water that percolates downward from the surface into groundwater'.
Remedial target	The goal of remedial activity set at the compliance point, in the form of a desired concentration in the soil or groundwater.

Remediation	Doing anything for the purpose of assessing the condition of contaminated land, surface water or groundwater; doing anything for the purpose of preventing or remedying or mitigating the effects - this involves breaking the pollutant linkage by dealing with source or pathway or receptor. Remediation also includes the activity associated with subsequent monitoring.
Retardation	A general term for the processes that act to remove (permanently or temporarily) the solutes in groundwater. The combined effect of these processes is that the solute front migrates slower than the advecting groundwater.
Retardation factor (R)	A measure of the reduction in solute velocity relative to the velocity of the advecting groundwater.
Risk	The combination of a) the probability of occurrence of a hazard, and b) the magnitude of the consequences.
Risk assessment	The process of identifying source, pathway and receptor, and assessing the degree of risk to the receptor associated with contaminant migration from the source.
Saturated zone	The zone in which the voids in an aquifer are filled with water at a pressure greater than atmospheric. The water table is at the top of the saturated zone in an unconfined aquifer.
Seed value	Crystal Ball: The first value in a sequence of random numbers. A given seed value produces the same sequence of random numbers every time a simulation is run. CLEA: A soil contaminant concentration used to calculate an ADE for comparison with the TDSI in a modelling run.
Source term	A description of the contaminant source: this may include the concentrations and rate of release.
Source-pathway-receptor model	A conceptual model of contaminant transport. All three components are required for a risk to be present. Risk assessment requires analysis of each of those components.
Target Concentration	The concentration at the compliance point that should not be exceeded (normally water quality standard or background)
Threshold contaminant	A chemical for which it is assumed that there is a threshold level of toxicant that needs to be present to produce an effect (for example, inhibition of an enzyme) leading to adverse effects on health.
Tiers	Environment Agency R&D Publication 20 defines four tiers of increasing complexity which may be applied to a risk assessment: • Tier 1: direct comparison of groundwater concentrations or leachable concentrations with water quality standards. • Tier 2: addition dilution by groundwater or surface water. • Tier 3: use of attenuation factors such as decay or retardation, may be appropriate to use simple 1 D transport models. • Tier 4: like Tier 3 but with refinements which may include 2D or 3D contaminant transport modelling, or treatment of heterogeneity.
Tolerable Daily Intake	An estimate of the amount of contaminant, expressed on a body

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(TDI)	weight basis that can be ingested over a lifetime without appreciable health risks.	
Tolerable Daily Soil Intake (TDSI)	That fraction of the TDI that is allocated to tolerable exposure from contaminants in soil that takes account of the general level of background exposure (the MDI).	
Tortuosity (τ)	The ratio of the actual length of a groundwater flow path (accounting for the water flowing around grains, through small fractures etc.) to the straight-line distance between two points in an aquifer.	
Transmissivity (T)	The capacity of an aquifer to transmit water through its entire thickness. In a vertically homogeneous aquifer it is derived from the hydraulic conductivity using: Transmissivity = hydraulic conductivity x thickness	
Unconfined	Where permeable strata are not confined, so there is no low permeability barrier between the zone of saturation and the surface. There will be a water table in an unconfined aquifer.	
Unsaturated zone	The zone between the land surface and the water table. The pore spaces, although they may be saturated, contain water at pressures less than atmospheric as well as air and other gases. Also called the vadose zone .	
Velocity	Linear average groundwater velocity in direction of travel.	
Water table	The surface in an unconfined aquifer at which the pore water pressure is atmospheric. It represents the piezometric surface of an unconfined aquifer.	

TABLES

Table 1 – Summary of Potential Pollutant Linkages (Conceptual Model)

Source	Contaminant	Pathway	Receptor
Ground Materials	Heavy Metals	Windblown Dust (Migration)	Human Health
	Leachability	Controlled Waters –Rhondda Fawr River	Controlled Waters –Rhondda Fawr River
		Plant uptake	Ecology
		Leachability	Controlled Waters –Rhondda Fawr River
	Other Metals	Leachability	Controlled Waters –Rhondda Fawr River
	Inorganic Chemicals	Direct contact, inhalation and ingestion	Human Health
		Windblown Dust (Migration)	Buildings & Services
		Leachability	Controlled Waters –Rhondda Fawr River
	Organic	Direct contact, inhalation and ingestion	Human Health
		Windblown Dust (Migration)	Buildings & Services
		Combustion	Ecology
	All	Plant uptake	Ecology
		Solids in surface water	Controlled Waters –Rhondda Fawr River
Ground Gas	Methane, carbon dioxide, radon	Migration through ground and conduits	Buildings & Services Ecology Human Health, River

Table 2 – Selection of Generic Screening Criteria – HHRA & ERA

Country of Origin	UK Clea 2002	Dutch 2000	Dutch 2001	Dutch 2001	Australian
Generic Term	SGV	IV	SRC	SRC	HIL
Exposure Senario	Residential without Plant up take	Residential	Residential	Unknown	Parks and Schools
Receptor	Human Health	Human & Ecotoxicity	Human Health	Ecotoxicity	Human Health
Arsenic (Total)	mg/kg 20	55	576	85	200
Boron (Soluble)	mg/kg				3
Cadmium (Total)	mg/kg 30	12	28	13	40
Chromium (Total)	mg/kg 200	380	2756	220	200
Copper (Total)	mg/kg	190	8600	96	200
Lead (Total)	mg/kg 450	530	622	580	600
Manganese (Total)	mg/kg				3000
Mercury (Total)	mg/kg 15	10	210	4	30
Nickel (Total)	mg/kg 75	210	1470	100	600
Selenium (Total)	mg/kg 260				
Zinc (Total)	mg/kg	720	46100	350	14000
Ammonia as N	mg/kg				
Cyanide (Free)	mg/kg	20		N/a	500
Cyanide (Total)	mg/kg	50		N/a	1000
Sulphate (Total) as SO4	%				
Sulphate as SO4 (Soluble)	g/l				
Sulphide as S	mg/kg				
Sulphur (Total) as SO4*	%				
Phenols (Total)	mg/kg	40	390	14	17000
Mineral Oil (C10-C40)	mg/kg	5000			11200
>> PAH SUITE <<					
naphthalene	mg/kg 1468*		870	17	
acenaphthylene	mg/kg		26000		
acenaphthene	mg/kg		315000		
fluorene	mg/kg		23000		
phenanthrene	mg/kg		23000	31	
anthracene	mg/kg		25500	1.6	
fluoranthene	mg/kg		30300	260	
pyrene	mg/kg		320000		
benzo(a)anthracene	mg/kg		3000	2.5	
chrysene	mg/kg		32000	35	
benzo(b)fluoranthene	mg/kg		2800		
benzo(k)fluoranthene	mg/kg		3200	38	
benzo(a)pyrene	mg/kg 1.313*		280	7	2
dibenzo(ah)anthracene	mg/kg		70		
benzo(ghi)perylene	mg/kg		19200	33	
indeno(123cd)pyrene	mg/kg		3200	1.9	
PAH (Total)	mg/kg	40	Toxic Unit App	No Sum	40

* SSL Calculated using CLEA Model

	Selected for HHRA
	Selection for ERA

Table 3a – HHRA - Summary Chemical Composition - Solid Samples

Determinant	Units	Number Of Samples	Arithmetic Mean	Geometric Mean	Min Value	Max Value	Mean Value (Upper 95% Confidence)	Screening Values (HHRA)	Source	SV Exceeded by Mean Test?	Frequency Detected Above SV
Arsenic (Total)	mg/kg	9	8.0	8.0	6.2	9.2	8.7	20	SGV	NO	0.00%
Cadmium (Total)	mg/kg	9	0.5	0.5	0.5	0.5	0.5	30	SGV	NO	0.00%
Chromium (Total)	mg/kg	9	6.0	5.9	5.0	7.6	6.7	200	SGV	NO	0.00%
Copper (Total)	mg/kg	9	39.9	39.8	35.0	44.0	41.8	200	Aust	NO	0.00%
Iron (Total)	mg/kg	9	19222.2	18346.1	10000.0	33000.0	23417.3				
Lead (Total)	mg/kg	9	29.6	28.6	22.0	43.0	34.9	450	SGV	NO	0.00%
Mercury (Total)	mg/kg	8	0.2	0.2	0.2	0.2	0.2	15	SGV	NO	0.00%
Nickel (Total)	mg/kg	9	38.3	37.6	29.0	54.0	43.6	75	SGV	NO	0.00%
Selenium (Total)	mg/kg	9	0.8	0.8	0.5	1.0	0.8	260	SGV	NO	0.00%
Zinc (Total)	mg/kg	9	76.4	75.9	62.0	92.0	82.8	14000	SRC Dutch	NO	0.00%
Cyanide (Free)	mg/kg	9	0.5	0.5	0.5	0.5	0.5	20	Dutch 2000	NO	0.00%
Phenols (Total)	mg/kg	9	1.3	1.3	0.6	2.1	1.6	40	Dutch 2000	NO	0.00%
Sulphate (Total) as SO4	%	9	0.01	0.01	0.01	0.01	0.01	0.24	BRE	NO	0.00%
Sulphate as SO4 (2:1 Water Extract)	g/l	9	0.1	0.1	0.1	0.1	0.1				
Total Sulphur as S (Ignition in Oxygen)*	%	9	0.21	0.21	0.15	0.24	0.23				
Total Organic Carbon	mg/kg	9	17422.2	15598.9	3800.0	25000.0	21831.4	50000	WAC	NO	0.00%
Calorific Value	kJ/kg	9	8511.1	8410.1	6800.0	10000.0	9424.4				
pH	pH units	9	7.8	7.8	7.6	8.2	8.0				
TPH (Total)	mg/kg	9	55.2	54.7	50.0	70.0	60.5	500	WAC Inert	NO	0.00%

Analys below detection limit has been assumed as detection limit for calculations
SGV = Soil Guideline Value (DEFRA, EA March 2002) - Land-use (Residential without plant uptake)
Dutch 2000 - Dutch integrated intervention value (IV)
Aust- Australian guideline on the investigation levels for soil and groundwater (Health investigation levels, E, Secondary schools
SRC Dutch – Serious Risk Concentration
Exceedances of screening concentrations are indicated as bold

Table 3b –HHRA - Summary Chemical Composition - Solid Samples (PAH Speciation)

Determinant	Units	Number Of Samples	Arithmetic Mean	Geometric Mean	Min Value	Max Value	Mean Value (Upper 95% Confidence)	Screening Values (HHRA)	Source	SV Exceeded by Mean Test?	Frequency Detected Above SV
>> PAH SUITE <<											
naphthalene	mg/kg	9	8.4	8.2	6.0	11.0	9.6	1468	SSL (CLEA)	NO	0.00%
acenaphthylene	mg/kg	7	0.5	0.5	0.5	0.5	0.5				
acenaphthene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
fluorene	mg/kg	9	0.8	0.8	0.6	1.0	0.9				
phenanthrene	mg/kg	9	3.4	3.4	2.8	4.3	3.8				
anthracene	mg/kg	8	0.5	0.5	0.5	0.6	0.5				
fluoranthene	mg/kg	9	1.2	1.1	0.5	1.7	1.4				
pyrene	mg/kg	9	1.1	1.1	0.5	1.6	1.4				
benzo(a)anthracene	mg/kg	8	0.6	0.6	0.5	0.7	0.6				
chrysene	mg/kg	9	1.0	0.9	0.6	1.3	1.1				
benzo(b)fluoranthene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
benzo(k)fluoranthene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
benzo(a)pyrene	mg/kg	9	0.5	0.5	0.5	0.5	0.5	1.313	SSL (CLEA)	NO	0.00%
dibenzo(ah)anthracene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
benzo(ghi)perylene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
indeno(123cd)pyrene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
PAH (Total)	mg/kg	9	19.0	18.7	13.0	24.0	21.2	40	Dutch 2000	NO	0.00%

Notes

Analysis below detection limit has been assumed as detection limit for calculations
SGV = Soil Guideline Value (DEFRA, EA March 2002) - Land-use (Residential without plant uptake)
Dutch 2000 - Dutch integrated intervention value (IV)
SRC Dutch – new consultation values to replace Dutch 2000
Aust- Australian guideline on the investigation levels for soil and groundwater (Health investigation levels, E, Secondary schools
Exceedances of screening concentrations are indicated as bold
ND = Not Detected
N/S = Not sampled

Table 4a –ERA - Summary Chemical Composition - Solid Samples

Determinant	Units	Number Of Samples	Arithmetic Mean	Geometric Mean	Min Value	Max Value	Mean Value (Upper 95% Confidence)	Screening Values (ERA)	Source	SV Exceeded by Mean Test?	Frequency Detected Above SV
Arsenic (Total)	mg/kg	9	8.0	8.0	6.2	9.2	8.7	85	SRC Dutch	NO	0.00%
Cadmium (Total)	mg/kg	9	0.5	0.5	0.5	0.5	0.5	13	SRC Dutch	NO	0.00%
Chromium (Total)	mg/kg	9	6.0	5.9	5.0	7.6	6.7	220	SRC Dutch	NO	0.00%
Copper (Total)	mg/kg	9	39.9	39.8	35.0	44.0	41.8	96	SRC Dutch	NO	0.00%
Iron (Total)	mg/kg	9	19222.2	18346.1	10000.0	33000.0	23417.3				
Lead (Total)	mg/kg	9	29.6	28.6	22.0	43.0	34.9	580	SRC Dutch	NO	0.00%
Mercury (Total)	mg/kg	8	0.2	0.2	0.2	0.2	0.2	4	SRC Dutch	NO	0.00%
Nickel (Total)	mg/kg	9	38.3	37.6	29.0	54.0	43.6	100	SRC Dutch	NO	0.00%
Selenium (Total)	mg/kg	9	0.8	0.8	0.5	1.0	0.8				
Zinc (Total)	mg/kg	9	76.4	75.9	62.0	92.0	82.8	350	SRC Dutch	NO	0.00%
Cyanide (Free)	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
Phenols (Total)	mg/kg	9	1.3	1.3	0.6	2.1	1.6	14	SRC Dutch	NO	0.00%
Sulphate (Total) as SO4	%	9	0.01	0.01	0.01	0.01	0.01	0.24	BRE	NO	0.00%
Sulphate as SO4 (2:1 Water Extract)	g/l	9	0.1	0.1	0.1	0.1	0.1				
Total Sulphur as S (ignition in Oxygen)*	%	9	0.21	0.21	0.15	0.24	0.23				
Total Organic Carbon	mg/kg	9	17422.2	15598.9	3800.0	25000.0	21831.4				
Calorific Value	kJ/kg	9	8511.1	8410.1	6800.0	10000.0	9424.4				
pH	pH units	9	7.8	7.8	7.6	8.2	8.0				
TPH (Total)	mg/kg	9	55.2	54.7	50.0	70.0	60.5				

Notes
Analys is below detection limit has been assumed as detection limit for calculations
SGV = Soil Guideline Value (DEFRA, EA March 2002) - Land-use (Residential without plant uptake)
Dutch 2000 - Dutch integrated intervention value (IV)
Aust- Australian guideline on the investigation levels for soil and groundwater (Health investigation levels, E, Secondary schools
SRC Dutch – Serious Risk Concentration
Exceedances of screening concentrations are indicated as bold

Table 4b – ERA - Summary Chemical Composition - Solid Samples (PAH Speciation)

Determinant	Units	Number Of Samples	Arithmetic Mean	Geometric Mean	Min Value	Max Value	Mean Value (Upper 95% Confidence)	Screening Values (ERA)	Source	SV Exceeded by Mean Test?	Frequency Detected Above SV
>> PAH SUITE <<											
naphthalene	mg/kg	9	8.4	8.2	6.0	11.0	9.6	17	SRC Dutch	NO	0.00%
acenaphthylene	mg/kg	7	0.5	0.5	0.5	0.5	0.5				
acenaphthene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
fluorene	mg/kg	9	0.8	0.8	0.6	1.0	0.9				
phenanthrene	mg/kg	9	3.4	3.4	2.8	4.3	3.8	31	SRC Dutch	NO	0.00%
anthracene	mg/kg	8	0.5	0.5	0.5	0.6	0.5	1.6	SRC Dutch	NO	0.00%
fluoranthene	mg/kg	9	1.2	1.1	0.5	1.7	1.4	260	SRC Dutch	NO	0.00%
pyrene	mg/kg	9	1.1	1.1	0.5	1.6	1.4				
benzo(a)anthracene	mg/kg	8	0.6	0.6	0.5	0.7	0.6	2.5	SRC Dutch	NO	0.00%
chrysene	mg/kg	9	1.0	0.9	0.6	1.3	1.1	35	SRC Dutch	NO	0.00%
benzo(b)fluoranthene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
benzo(k)fluoranthene	mg/kg	9	0.5	0.5	0.5	0.5	0.5	38	SRC Dutch	NO	0.00%
benzo(a)pyrene	mg/kg	9	0.5	0.5	0.5	0.5	0.5	7	SRC Dutch	NO	0.00%
dibenzo(ah)anthracene	mg/kg	9	0.5	0.5	0.5	0.5	0.5				
benzo(ghi)perylene	mg/kg	9	0.5	0.5	0.5	0.5	0.5	33	SRC Dutch	NO	0.00%
indeno(123cd)pyrene	mg/kg	9	0.5	0.5	0.5	0.5	0.5	1.9	SRC Dutch	NO	0.00%
PAH (Total)	mg/kg	9	19.0	18.7	13.0	24.0	21.2				

Notes

Analysis below detection limit has been assumed as detection limit for calculations
SGV = Soil Guildline Value (DEFRA, EA March 2002) - Land-use (Residential without plant uptake)
Dutch 2000 - Dutch integrated intervention value (IV)
SRC Dutch – new consultation values to replace Dutch 2000
Aust- Australian guideline on the investigation levels for soil and groundwater (Health investigation levels, E, Secondary schools
Exceedances of screening concentrations are indicated as bold
ND = Not Detected
N/S = Not sampled

Table 5a –GWRA - Summary Leachate Analysis & Tier 1 Assessment

Determinant	Units	Number Of Samples	Arithmetic Mean	Geometric Mean	Min Value	Max Value	Mean Value (Upper 95% Confidence)	Screening Values (GWRA)	Source	Exceeded by Mean Test?	SV	Frequency Detected Above SV
Arsenic (Soluble)*	µg/l	3	10.00	10.00	10.00	10.00	10.00	50	EQS Freshwater	NO	0.00%	
Cadmium (Soluble)	µg/l	3	0.50	0.50	0.50	0.50	0.50	5	EQS Freshwater	NO	0.00%	
Chromium (Soluble)	µg/l	3	10.00	10.00	10.00	10.00	10.00	20	EQS Freshwater > 100-150	NO	0.00%	
Copper (Soluble)	µg/l	3	11.33	11.19	10.00	14.00	13.72	10	EQS Freshwater > 100-150	YES	33.33%	
Iron (Soluble)	mg/l	3	0.34	0.05	0.01	1.00	0.93	1	EQS Freshwater	NO	0.00%	
Lead (Soluble)	µg/l	3	1.00	1.00	1.00	1.00	1.00	10	EQS Freshwater > 100-150	NO	0.00%	
Mercury (Soluble)	µg/l	3	0.20	0.20	0.20	0.20	0.20	1	EQS Freshwater	NO	0.00%	
Nickel (Soluble)	µg/l	3	20.00	20.00	20.00	20.00	20.00	150	EQS Freshwater > 100-150	NO	0.00%	
Selenium (Soluble)*	µg/l	3	2.00	2.00	2.00	2.00	2.00	10	UK DWS	NO	0.00%	
Zinc (Soluble)	µg/l	3	10.00	10.00	10.00	10.00	10.00	75	EQS Freshwater > 100-150	NO	0.00%	
Sulphate as SO4	g/l	3	0.02	0.02	0.02	0.02	0.02	0.4	EQS Freshwater	NO	0.00%	
Ammonia as N	mg/l	3	0.10	0.10	0.10	0.10	0.10	0.25	River GQA grade A	NO	0.00%	
COD (filtered) as O2	mg/l	3	13.67	12.81	10.00	21.00	20.22					
Chloride as Cl-	mg/l	3	2.00	2.00	2.00	2.00	2.00	250	UK DWS	NO	0.00%	
Dissolved Solids	mg/l	3	63.33	62.31	54.00	80.00	78.27					
Fluoride as F-	mg/l	3	0.23	0.22	0.20	0.28	0.27	1.5	UK DWS	NO	0.00%	
Total Org.Carbon (Filt)	mg/l	3	0.1	0.1	0.1	0.1	0.1					
pH	PH Units	3	7.20	7.18	6.6	7.9	7.88					

Notes:
Analysis below detection limit has been assumed as detection limit for calculations
Figures in bold are above their respective screening values
UK DWS = UK Drinking Water Standards (2001)
EQS Freshwater = Environmental Quality Standards
New Dutch SRC GW – new consultation values to replace Dutch IV GW
Abstraction Regs = Surface Waters (Abstraction for Drinking Water) Regs 1996

Table 5b – GWRA - Summary Leaching Analysis (PAH Speciation) & Tier 1 Assessment

Determinant	Units	Number Of Samples	Arithmetic Mean	Geometric Mean	Min Value	Max Value	Mean Value (Upper 95% Confidence)	Screening Values (GWRA)	Source	SV Exceeded by Mean Test?	Frequency Detected Above SV
>> PAH SUITE <<*											
naphthalene	µg/l	3	0.05	0.04	0.02	0.10	0.09	10	EQS Freshwater	NO	0.00%
acenaphthene	µg/l	3	0.02	0.02	0.02	0.02	0.02	2570	New Dutch SRC GW	NO	0.00%
fluorene	µg/l	3	0.02	0.02	0.02	0.02	0.02	1320	New Dutch SRC GW	NO	0.00%
phenanthrene	µg/l	3	0.02	0.02	0.02	0.03	0.03	30	New Dutch SRC GW	NO	0.00%
anthracene	µg/l	3	0.02	0.02	0.02	0.03	0.03	1.4	New Dutch SRC GW	NO	0.00%
fluoranthene	µg/l	3	0.20	0.13	0.03	0.33	0.36	30	New Dutch SRC GW	NO	0.00%
pyrene	µg/l	3	0.08	0.06	0.02	0.16	0.15	106	New Dutch SRC GW	NO	0.00%
benzo(a)anthracene	µg/l	3	0.04	0.03	0.02	0.06	0.06	1	New Dutch SRC GW	NO	0.00%
chrysene	µg/l	3	0.05	0.04	0.02	0.07	0.08	1.2	New Dutch SRC GW	NO	0.00%
benzo(b)fluoranthene	µg/l	3	0.02	0.02	0.02	0.03	0.03	0.1	UK DWS	NO	0.00%
benzo(k)fluoranthene	µg/l	3	0.02	0.02	0.02	0.02	0.02	0.1	UK DWS	NO	0.00%
benzo(a)pyrene	µg/l	3	0.02	0.02	0.02	0.02	0.02	0.01	UK DWS	YES	100.00%
dibenzo(ah)anthracene	µg/l	3	0.02	0.02	0.02	0.02	0.02	0.83	New Dutch SRC GW	NO	0.00%
benzo(ghi)perylene	µg/l	3	0.02	0.02	0.02	0.02	0.02	0.1	UK DWS	NO	0.00%
indeno(123cd)pyrene	µg/l	3	0.02	0.02	0.02	0.02	0.02	0.1	UK DWS	NO	0.00%
PAH (Total)	µg/l	3	0.49	0.43	0.20	0.67	0.76				

Notes:

Analysis below detection limit has been assumed as detection limit for calculations
Figures in bold are above their respective screening values
UK DWS = UK Drinking Water Standards (2001)
EQS Freshwater = Environmental Quality Standards
New Dutch SRC GW – new consultation values to replace Dutch IV GW
Abstraction Regs = Surface Waters (Abstraction for Drinking Water) Regs 1996

Table 6 – GWRA - Tier 2 Assessment for the Site

Determinant (COC)	Units	95% UCL (from leachate analysis)	Dilution Factor (DF) (Calculated)	Diluted UCL (UCL ÷ DF)	Screening Values	Source	Screening Value Exceeded?
Site							
Copper	ug/l	13.72	2.39	5.74	10	EQS Freshwater >100-150	NO
Benzo(a)pyrene	ug/l	<0.02	2.39	0.008	0.01	UK DWS	NO

Notes:

Analysis below detection limit has been assumed as detection limit for calculations
Figures in bold are above their respective screening values
UK DWS = UK Drinking Water Standards (2001)
EQS Freshwater = Environmental Quality Standards
New Dutch SRC GW – new consultation values to replace Dutch IV GW
Abstraction Regs = Surface Waters (Abstraction for Drinking Water) Regs 1996

TABLE 7 – Description of the Classified Risks and Likely Action Required.

Classified Risk	Description
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard or contaminant of concern, OR, there is evidence that severe harm to a designated receptor is currently happening.
	Urgent investigation (if not undertaken already) and remediation is likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard or contaminant of concern.
	Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the long term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard or contaminant of concern. However, it is either unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild.
	Investigation (if not undertaken already) is normally required to clarify the risk. Some remedial works may be required in the longer term.
Low	It is possible that harm could arise to a designated receptor from an identified hazard or contaminant of concern, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Table 8a – Detailed Summary of Risk Estimation, Evaluation & Remediation for Potential Contaminants of Concern

Source	Contaminant	Pathway	Receptor	Risk Level Before Mitigation			Present Risk Estimation, Evaluation & Possible Remediation Measures	Risk Level After Remediation			
				Likelihood	Severity	Risk Index		Likelihood	Severity	Risk Index	Residual Risk
Ground Materials	Heavy Metals, and other inorganic chemicals	Dermal contact, inhalation and ingestion	Human Health	1	3	3	All UCLs < Screening Value No exceedance recorded. Risk assessed as LOW No remediation Required				
		Plant uptake	Ecology	1	2	2	All UCLs < Screening Value No exceedance recorded Risk assessed as for soft landscaped areas. No remediation Required				
	Sulphate & sulphide	Leaching	Buildings (Concrete)	4	2	8	BRE SD1 Consulted Risk assessed as MODERATE Remediation: Use concrete designed for DS-3 and AC-3	1	2	2	VERY LOW
	Organics	Combustion	Building/occupants	1	2	2	Calorific Values <1MJ/kg Risk Assessed as VERY LOW No remediation Required				

Likelihood/probability	Severity/consequence:	Risk Index: Likelihood x Severity
4 – High Likelihood	4 – Severe – Short-term (Acute) risk to human health, water resource or catastrophic damage to property.	16 Very High Risk
3 – Likely	3 – Medium – Long term (Chronic) risk to human health or water resource	12 High Risk
2 – Low Likelihood	2 – Mild – Pollution of non-sensitive water resource. Significant damage to crops or property	7 - 11 Moderate Risk
1 – Unlikely	1 – Minor – Non-permanent human health risks, repairable effects on property	3 - 6 Low Risk
		1 - 2 Very Low Risk

Table 8b – Detailed Summary of Risk Estimation, Evaluation & Remediation for Potential Contaminants of Concern

Source	Contaminant	Pathway	Receptor	Risk Level Before Mitigation			Present Risk Estimation, Evaluation & Possible Remediation Measures	Risk Level After Remediation		
				Likelihood	Severity	Risk Index		Likelihood	Severity	Risk Index
Ground Materials (Continued)	Organic (PAH & Phenols)	Dermal contact, inhalation and ingestion	Human Health	1	3	3	No exceedance recorded	Risk assessed as LOW	No Remediation Required	All UCLs < Screening Value
		Dust Windblown								
		(Migration)								
		Plant uptake					Ecology	1	2	
ALL		Leaching	River Rhondda Fawr	1	3	3	Tier 2 Diluted UCL < Screening Values	Risk Assessed as LOW	No Remediation Required	Tier 2 Diluted UCL < Screening Values
			Via Groundwater							
		Migration	Buildings/occupants	1	3	3	Characteristic Situation 1 (CIRIA 149)	Risk Assessed as LOW	No Remediation Required	
Ground Gas	Methane									

Likelihood/probability	Severity/consequence:	Risk Index: Likelihood x Severity			
		16 Very High Risk	12 High Risk	7 - 11 Moderate Risk	3 - 6 Low Risk
4 – High Likelihood 3 – Likely 2 – Low Likelihood 1 – Unlikely	4 – Severe – Short-term (Acute) risk to human health, water resource or catastrophic damage to property. 3 – Medium – Long term (Chronic) risk to human health or water resource 2 – Mild – Pollution of non-sensitive water resource. Significant damage to crops or property 1 – Minor – Non-permanent human health risks, repairable effects on property				

Table 9 – Summary of Standard Penetration Testing & Potential Bearing Pressures

Assumed Density =	20 kN/m ³				
	Depth				
	0.5m	1.0m	1.5m	2.0m	2.5m
	Overburden Pressure (kN/m ²)	10	20	30	40
	Correction Factor*	3.6	3	2.7	2.6
Corrected SPT N-Values					
Exploratory Hole					
WS1		50			
WS2		48			
WS3		36			
WS4		50			
WS5		50			
WS6		39			
WS7		50			
WS8		18			
WS9		27			
DP1	28.8	33	32	33.8	50
DP2	21.6	21	41	46.8	17.5
DP3	46.8	42	50	26	30
DP4	39.6	42	41	39	27.5
DP5	28.8	27	24	41.6	37.5
DP6	18	24	27	46.8	50

Statistics

Number of Readings	6	15	6	6	6
Arithmetic Mean	30.60	37.13	35.78	39.00	35.42
Geometric Mean	29.02	35.26	34.69	38.23	33.26
10th Percentile	19.80	22.20	25.65	29.90	22.50
Minimum	18	18	24	26	18
Maximum	47	50	50	47	50
Range	29	32	26	21	33
Standard Deviation	10.86	11.51	9.67	8.06	12.98
Coefficient of Variation	0.35	0.31	0.27	0.21	0.37
Distribution Type	Normal	Normal	Normal	Normal	Normal

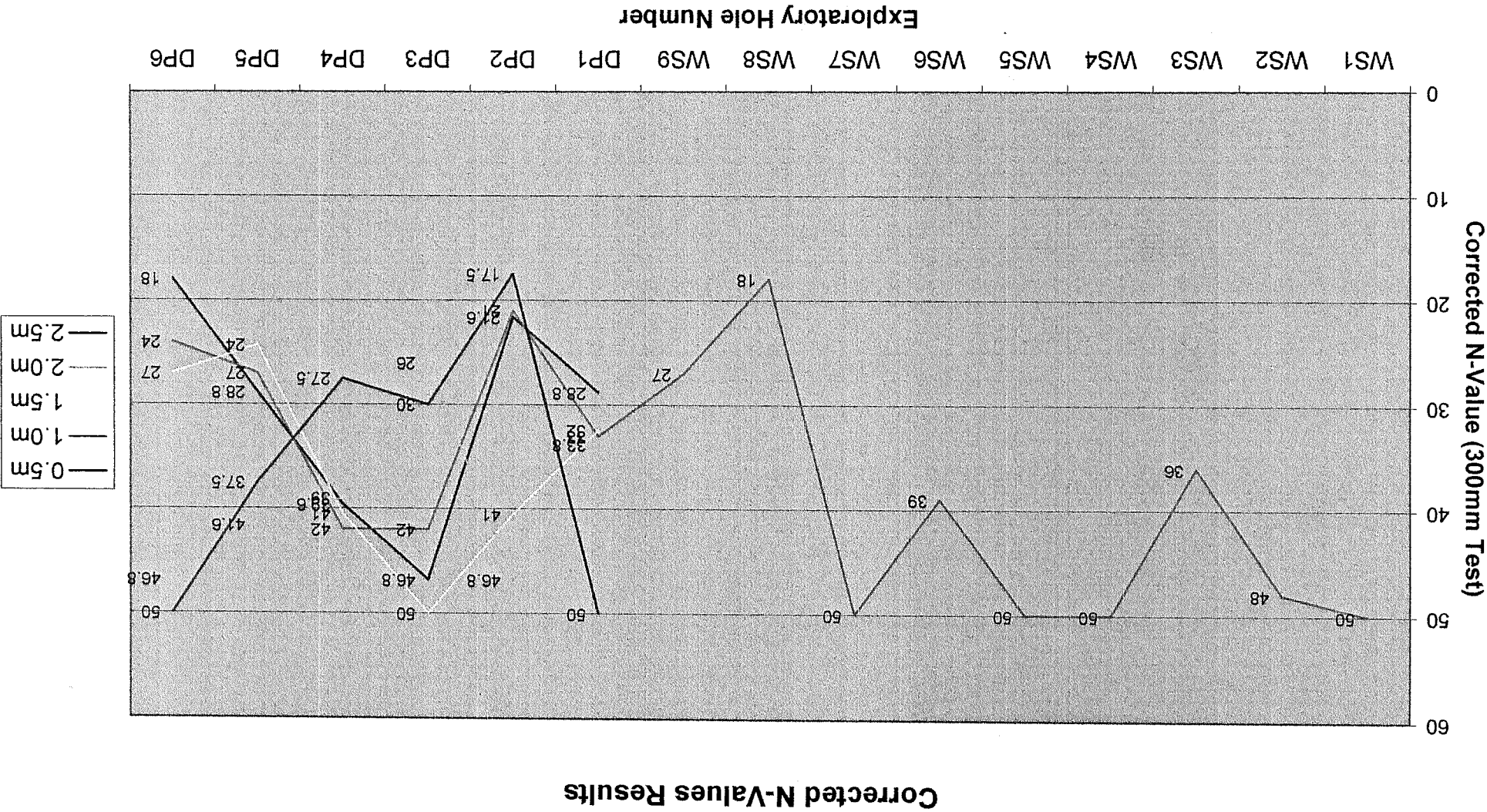
Allowable Bearing Pressure (25mm settlement criterion BS 8004)

Assuming that 10% of readings are erroneous therefore use 10th percentile figure
Assuming that groundwater is within 1m of foundation, Correction Factor 0.5

Allowable Bearing Pressure (kN/m ²)**	90	95	105	135	95
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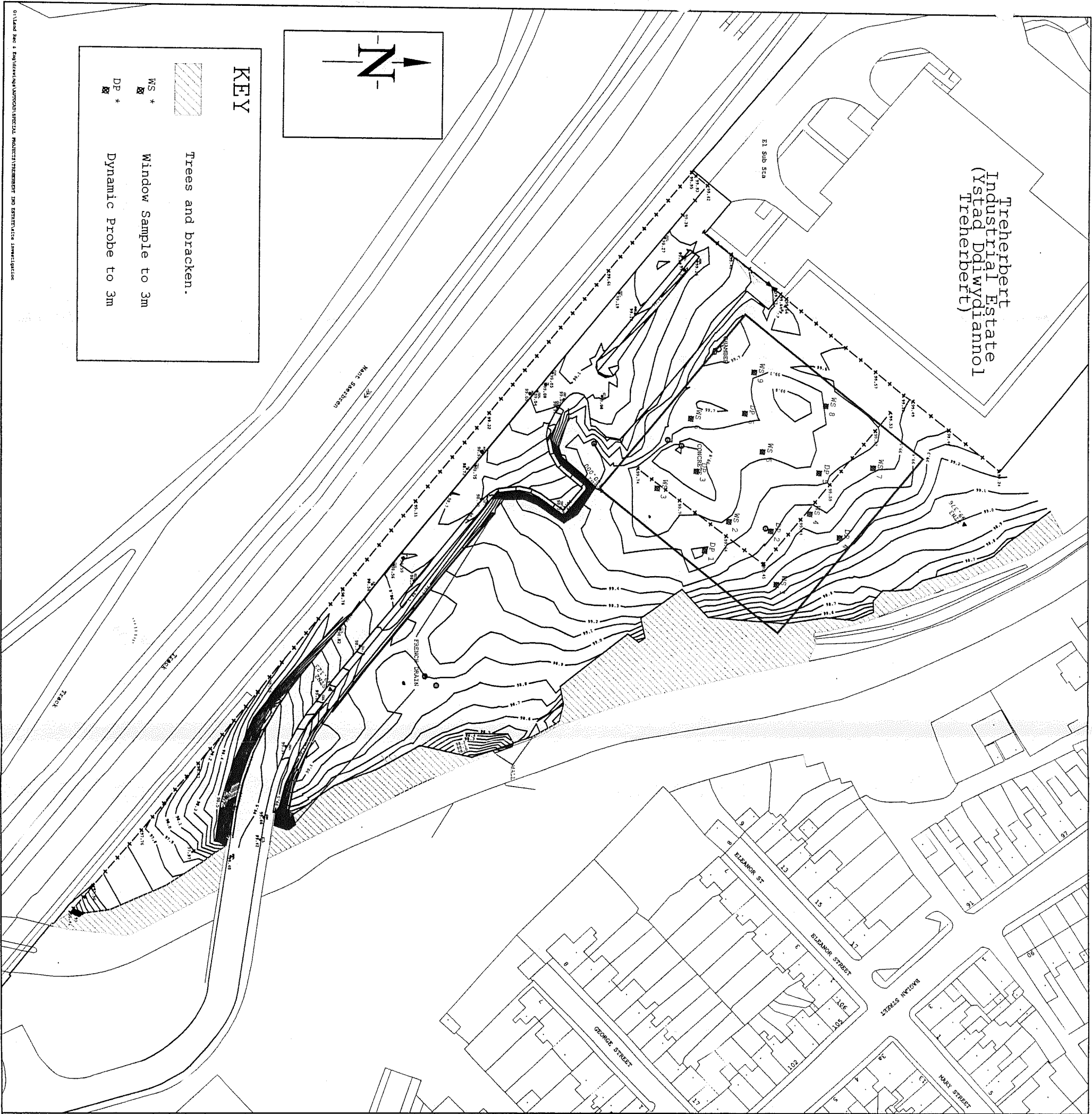
Notes:
* Correction Factor from Gibbs and Holtz (1957)
** Taken from Terzaghi and Peck (1968)

Chart For Table 9



Drawings

Treherbert Industrial Estate
(Ystiad Ddiwydiannol Treherbert)

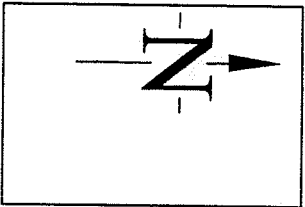


KEY

Trees and bracken.

WS * Window Sample to 3m

DP * Dynamic Probe to 3m



Site Location Plan

Setting Out for Exploratory Holes

Idle Ref.	Existing (Local Grid)	Nothing (Local Grid)	Level
WS1	933.3	978.2	99.227
WS2	973.3	978.2	99.885
WS3	992.0	988.0	99.747
WS4	963.0	960.0	99.467
WS5	983.7	960.0	99.731
WS6	1001.8	966.8	99.671
WS7	963.1	939.4	99.530
WS8	983.7	939.4	99.886
WS9	1001.9	949.2	99.669
DP1	971.4	981.9	99.703
DP2	965.4	978.9	99.517
DP3	989.7	977.0	99.816
DP4	933.4	957.5	99.313
DP5	970.3	951.5	99.652
DP6	994.6	957.7	99.696

Notes

Window Sampling - window sampling shall be to a depth of 3m or until refusal. An SPT shall be carried out at a depth of 0.75m 1.00m. A representative soil sample shall be taken over the first 1m depth. Minimum amount of soil sample shall be 5kg. At least half the quantity of sample shall be kept and not analysed to enable re-analysis or testing tests to be performed. All window samples are to be completed

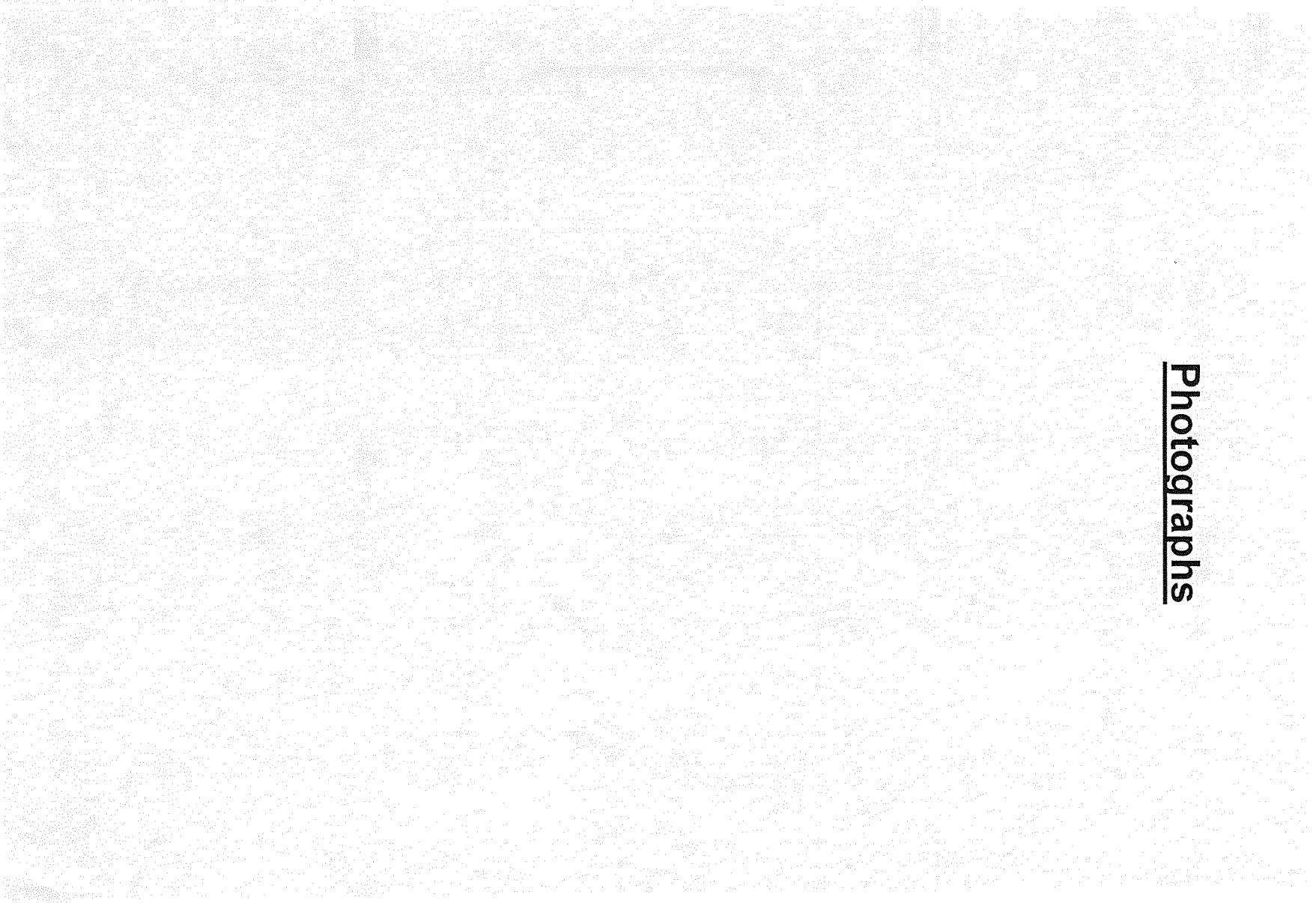
Dynamic Probing - dynamic probing shall be carried out to a depth of 3m. After completion of the window samples, should there be time available, the dynamic probing shall commence starting at DP1 and will progress through the scheduled holes until the end of the second day.

Standpipes - standpipes of 100mm shall be installed in WS1, WS2 and WS6 to their full depth. The filter section shall be terra filter or similar. Plain pipe is to extend 150mm above and 350mm below the ground level. The standpipe shall be simply pushed into the window sample hole without packing, grout or headworks. A cap shall be fitted to the extended tube above ground level.

Chemical Analysis - each sample collected from the top 1m of window sampling shall be analysed for the following and reported to M&CETS: metals as total: Arsenic, Cadmium, chromium, Copper, iron, lead, mercury, nickel, selenium and zinc. Total Organic Carbon (mg/kg), Sulphate (total) as SO4, Sulphate as SO4 (Water soluble), Sulphur (total) as S%, pH, cyanide(free), phenols (total), Total TPH and Speciated PAH.

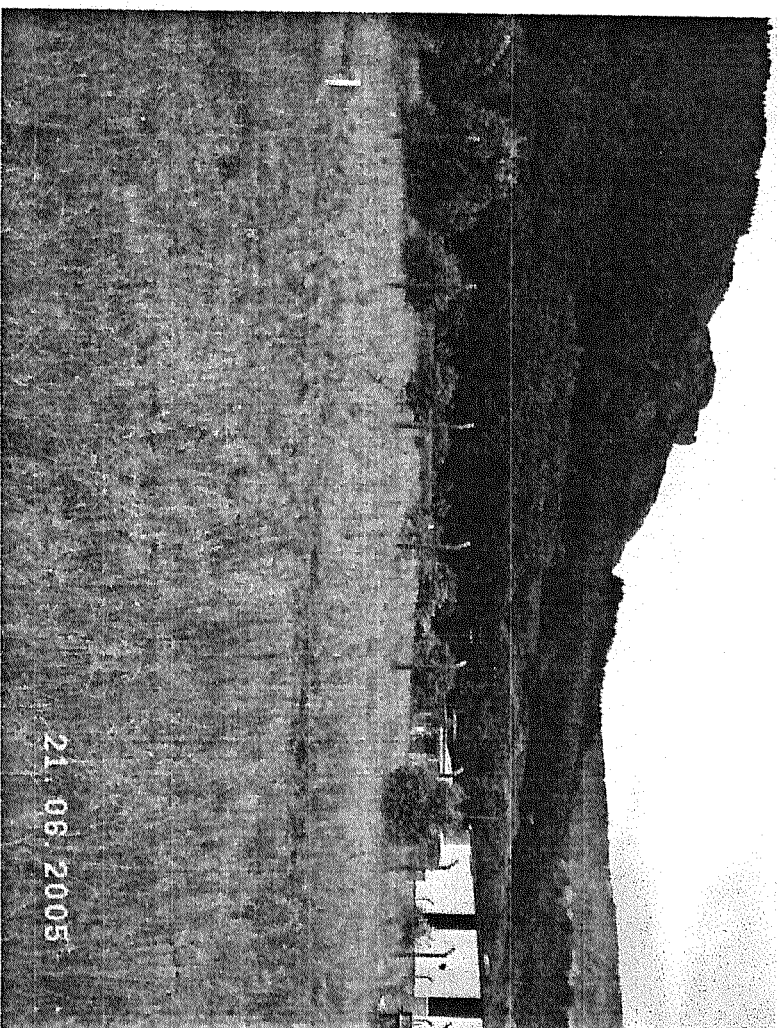
Revised	By	Checked	Date
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COUNTY BOROUGH COUNCIL			
CYNGOR BWYDEISTREF SIROL			
RHONDDA CYNON TAF			
ENVIRONMENTAL SERVICES			
LAND RECLAMATION & ENGINEERING			
Llanrhondd, Llanrhondd Road, Pen-y-bont, CF37 2YA			
Tel: 01443 486063 Fax: 01443 486184			
TREHERBERT INDUSTRIAL ESTATE			
Site Investigation			
Prepared by	AS	Scale	1:500
Drawn by	AS		
Checked by	PRB	Dwg No	E436/005/003
Date	JUNE 2005		

Photographs

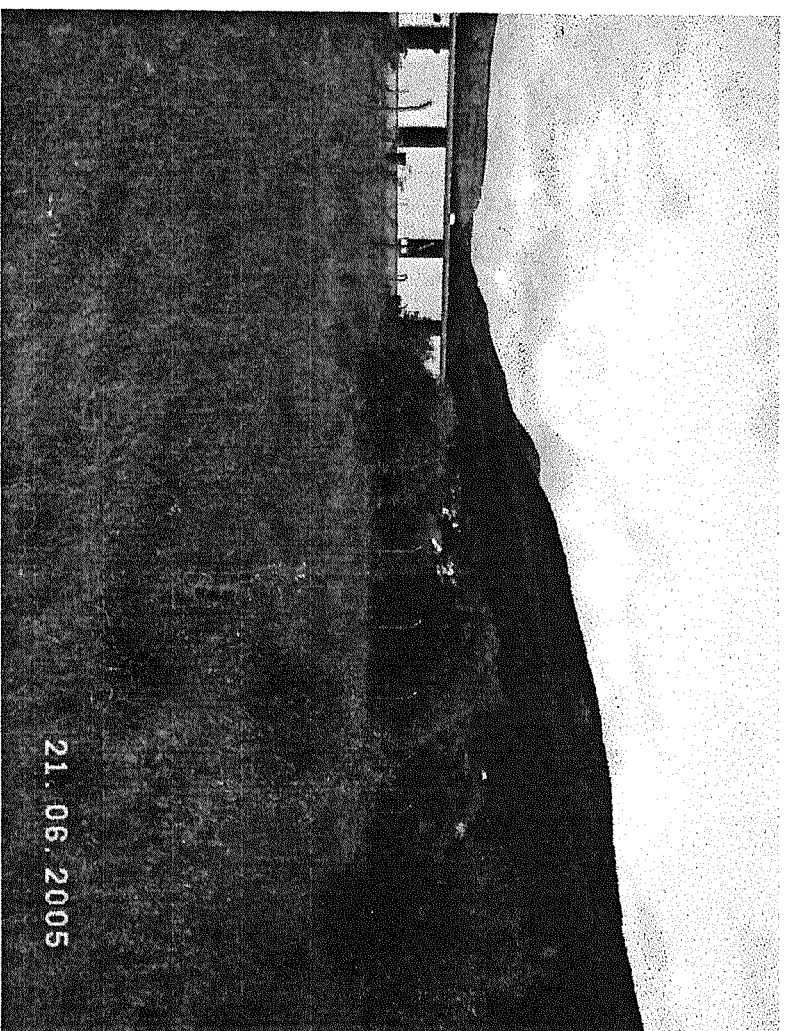


Aerial View Showing General Features





General View West



General View North East

Appendix A

Site Investigation Data

Window Sampler Borehole Log Sheet

WS No: 1

Site: Treherbert

Start Date: 20/06/2005

Job Number: S0639

Finish Date: 20/06/2005

Client: RCT

Vertical Scale: 1:25

Rig Type: Competitor 130

Sheet 1 of 1

C J Associates



Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's)				Windowless Sample (L) Blows / % rec. (sample dia)	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.)
		Test type	Seal	Blow Counts	Test Drive						
0.00 - 1.00	L1							0.10	(0.10)	MADE GROUND (Soft, grey-black-brown clay, with some fine to medium, subangular shale gravel). MADE GROUND (Loose to medium dense, black, slightly clayey ash, with much fine to medium, angular to subangular shale gravel).	
1.00 - 2.00	L2	C	3.2	3.5,5,6	N=19	150	300	(77mm)	(1.60)		
2.00 - 3.00	L3							(67mm)	(1.30)	Firm to stiff, dark grey CLAY, with some fine to coarse, subangular to subrounded shale gravel.	
								3.00		END OF BOREHOLE	

Water Remarks:

-

Casing:

Drilled By: K

Logged By: JH

Checked By:

General Remarks:

Window Sampler Borehole Log Sheet

WS No: 3

Site: Treherbert

Start Date: 20/06/2005

Job Number: S0639

Finish Date: 20/06/2005

Ant: RCT

Vertical Scale: 1:25

Rig Type: Competitor 130

Sheet 1 of 1

C J Associates



Depth (m)	Sample Ref	Standard Penetration Tests (SPT's)				Windowless Sample (L) Blows / % rec. (sample dia)	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
		Test type	Seal	Blow Counts	Pen (mm)						
				Test Drive	N-value	Seal					
0.00	L1							0.10	(0.10)	MADE GROUND (Soft, grey-black-brown clay, with some fine to medium, subangular shale gravel).	
-1.00								0.50	(0.40)	MADE GROUND (Loose, black, slightly clayey ash, with occasional fine to medium, angular to subangular shale gravel).	
-2.00	L2	C	3.2	3.3,2,4	N=12	150 300				MADE GROUND (Medium dense, black, slightly clayey ash, with much fine to coarse, angular to subangular shale gravel, occasional coal fragments).	
-3.00	L3								(2.50)		
								3.00		END OF BOREHOLE	
Water Remarks:											
General Remarks:											
Casing:									Drilled By: K		
									Logged By: JH		
									Checked By:		

Window Sampler Borehole Log Sheet

Site: Treherbert

Job Number: S0639

ant: RCT

WS No: 4

Start Date: 21/06/2005

Finish Date: 21/06/2005

Vertical Scale: 1:25

Sheet 1 of 1

C J Associates

Rig Type: Competitor 130

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's)				Windowless Sample (L) Blows / % rec. (sample dia.)	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
		Test type	Seal.	Test Drive	N-value	Seal					
0.00 - 0.65	L1						0.20	(0.20)		MADE GROUND (Soft, grey-black-brown clay, with some fine to medium subangular shale gravel).	
0.65		.C	5,4	5,6,7,6	N=24	150 300		(1.75)		MADE GROUND (Loose to medium dense, black, slightly clayey ash, with much fine to medium, angular to subangular shale gravel).	
							1.95			END OF BOREHOLE	
										Casing:	Drilled By: K Logged By: IH
Water Remarks:											
General Remarks: Refusal at 1.95m.										Checked By:	

Window Sampler Borehole Log Sheet

WS No: 6

6

Site: Treherbert

Start Date: 21/06/2005

Start Date: 21/06/2005

Job Number: S0639

Finish Date: 21/06/2005

Finish Date: 21/06/2005

int: RCT

Vertical Scale: 1:25

Rig Type: Competitor 130

Sheet 1 of 1

C J Associates

Sheet 1 of 1

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's)				Windowless Sample (L) Blows / % rec. (sample dia.)	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduce Level (m O.D.)		
		Test type Seal	Blow Counts Test Drive	N-value	Pen. (mm) Seal Test								
0.00 - 1.00	L1					(87mm)	0.15	(0.15)		MADE GROUND (Soft, grey-black-brown clay, with some fine to medium, subangular shale gravel) MADE GROUND (Loose to medium dense, black, slightly clayey ash, with some fine to medium, occasionally coarse, angular to subangular shale gravel).			
1.00 - 2.00	L2	C	3,3	3,4,3,3	N=13 150 300	(77mm)		(2.85)					
2.00 - 3.00	L3					(67mm)							
							3.00			END OF BOREHOLE			
Water Remarks:												Casing:	Drilled By: K Logged By: IH
General Remarks:													Checked By:

Window Sampler Borehole Log Sheet

WS No: 7

Site: Treherbert

Start Date: 21/06/2005

Job Number: S0639

Finish Date: 21/06/2005

Ant: RCT

Vertical Scale: 1:25

Rig Type: Competitor 130

Sheet 1 of 1

C J Associates



Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's)				Windowless Sample (L) Blows / % rec. (sample dia)	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m, O.D.)
		Test Type	Seal	Blow Counts Test Drive	N-value	Seal					
0.00 - 1.00	L1						0.10	(0.10)		MADE GROUND (Soft, grey-black-brown clay, with some fine to medium, subangular shale gravel)	
										MADE GROUND (Loose to medium dense, black, slightly clayey ash, with some fine to medium, occasionally coarse, angular to subangular shale gravel).	
1.00 - 1.95	L2	C	5,4	4,4,4,5	N=17	150 300		(1.85)			
						(77mm)	1.95			END OF BOREHOLE	
Water Remarks:											
General Remarks: Refusal at 1.95m.											
Casing:								Drilled By: K		Logged By: JH	
								Checked By:			

Window Sampler Borehole Log Sheet

WS No: 8

Site: Treherbert

Job Number: S0639

Start Date: 21/06/2005

Finish Date: 21/06/2005

Vertical Scale: 1:25

Sheet 1 of 1



C J Associates

Ant: RCT

Rig Type: Competitor 130

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's)				Windowless Sample (L) Blows / % rec. (sample dia.)	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.)
		Test type	Seal.	Test Drive	N-value	Seal					
0.00 - 1.00	L1						0.05	(0.05)		MADE GROUND (Soft, grey-black-brown clay, with some fine to medium, subangular shale gravel)	
1.00 - 2.00	L2	C	3.2	1,1,2,2	N=6	150 300		(2.95)		MADE GROUND (Loose to medium dense, black, slightly clayey ash, with some fine to coarse, angular to subangular shale gravel, occasional coal fragments).	
2.00 - 3.00	L3										
							3.00			END OF BOREHOLE	
Water Remarks:										Casing:	Drilled By: K Logged By: IH
General Remarks:										Checked By:	

Window Sampler Borehole Log Sheet

WS No.: 9

Site: Treherbert

Start Date: 21/06/2005

Job Number: **S0639**

Finish Date: 21/06/2005

ant: RCT

Vertical Scale: 1:25

Rig Type: Competitor 130

Sheet 1 of 1

C J Associates

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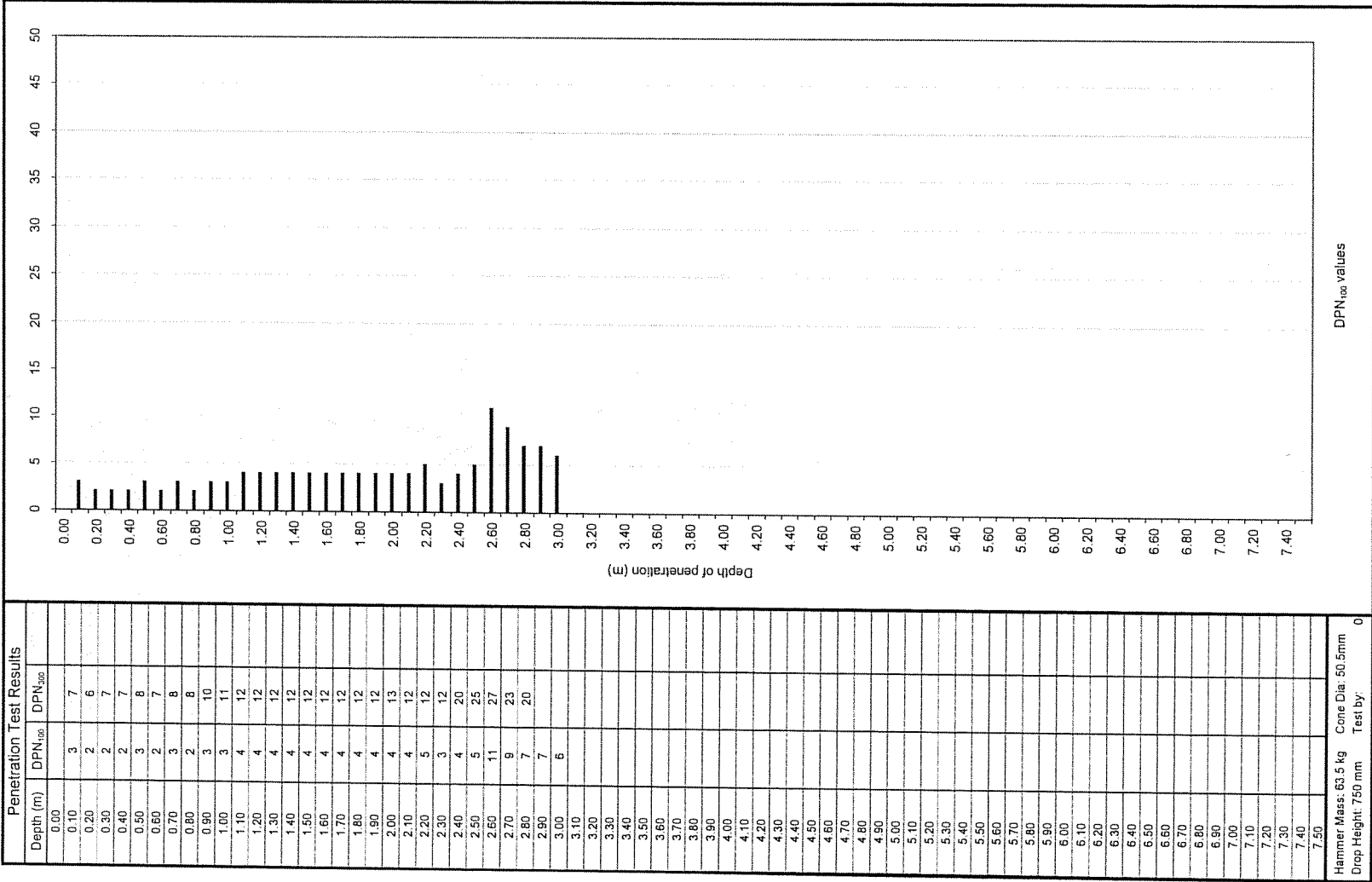
Dynamic Probe Test Results Sheet

DP No: 1



Site: TREHERBERT
Date: 20-Jun-05
Job Number: S0639
Test Type: DPSH
Client: RCT
Final Depth: 3m

Rig Type: Competitor 130



General Remarks:
DPN₁₀₀ = Dynamic penetration resistance for 100mm penetration.
DPN₃₀₀ = Dynamic penetration resistance for 300mm penetration (ie: sum of 3 consecutive DPN₁₀₀ values), starting at the depth given.

Dynamic Probe Test Results Sheet

DP No: 2

Site: TREHERBERT

Date: 21-Jun-05

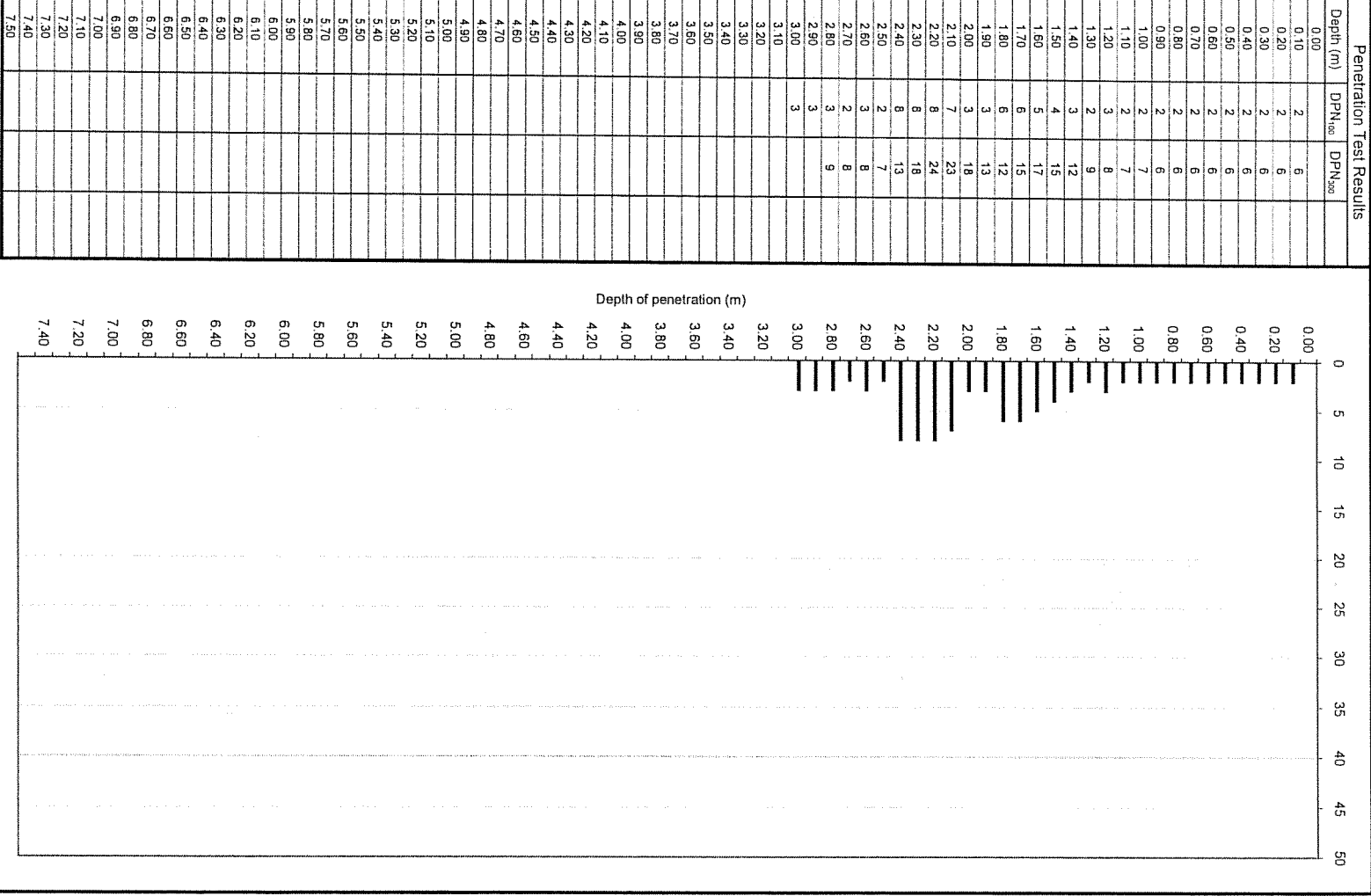
Job Number: S0639

Test Type: DPSH

Client: RCT

Final Depth: 3m

Rig Type: Competitor 130



Hammer Mass: 63.5 kg Cone Dia: 50.5mm
Drop Height: 750 mm Test by: 0

General Remarks:
DPN₁₀₀ = Dynamic penetration resistance for 100mm penetration.
DPN₃₀₀ = Dynamic penetration resistance for 300mm penetration (ie. sum of 3 consecutive DPN₁₀₀ values), starting at the depth given.

Dynamic Probe Test Results Sheet

DP No: 3



Site: TREHERBERT

Date: 20-Jun-05

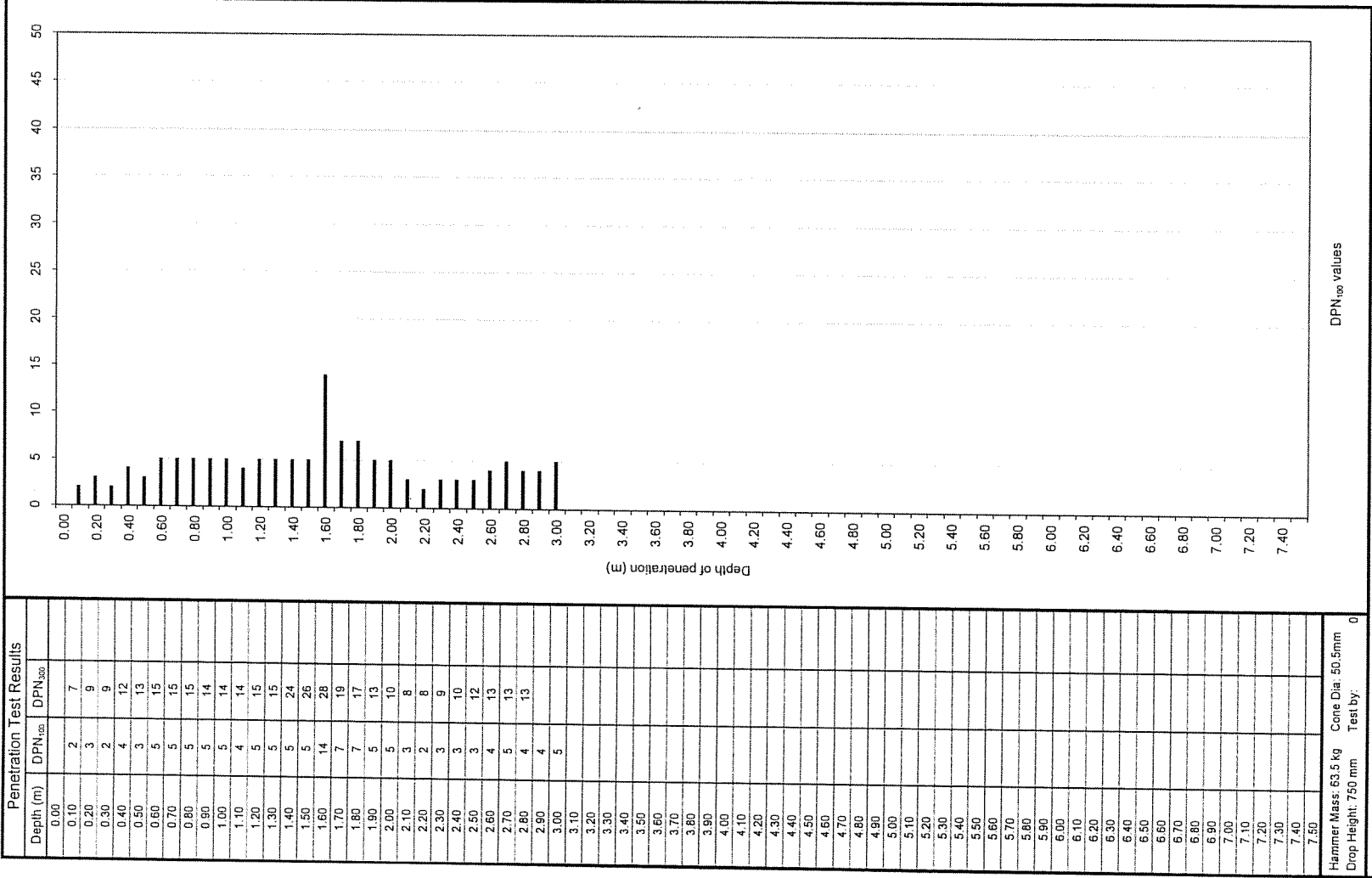
Job Number: S0639

Test Type: DPSH

Client: RCT

Final Depth: 3m

Rig Type: Competitor 130



General Remarks:
DPN₁₀₀ = Dynamic penetration resistance for 100mm penetration.
DPN₃₀₀ = Dynamic penetration resistance for 300mm penetration (ie: sum of 3 consecutive DPN₁₀₀ values), starting at the depth given.

Dynamic Probe Test Results Sheet

DP No: 4

Site: TREHERBERT

Date: 20-Jun-05

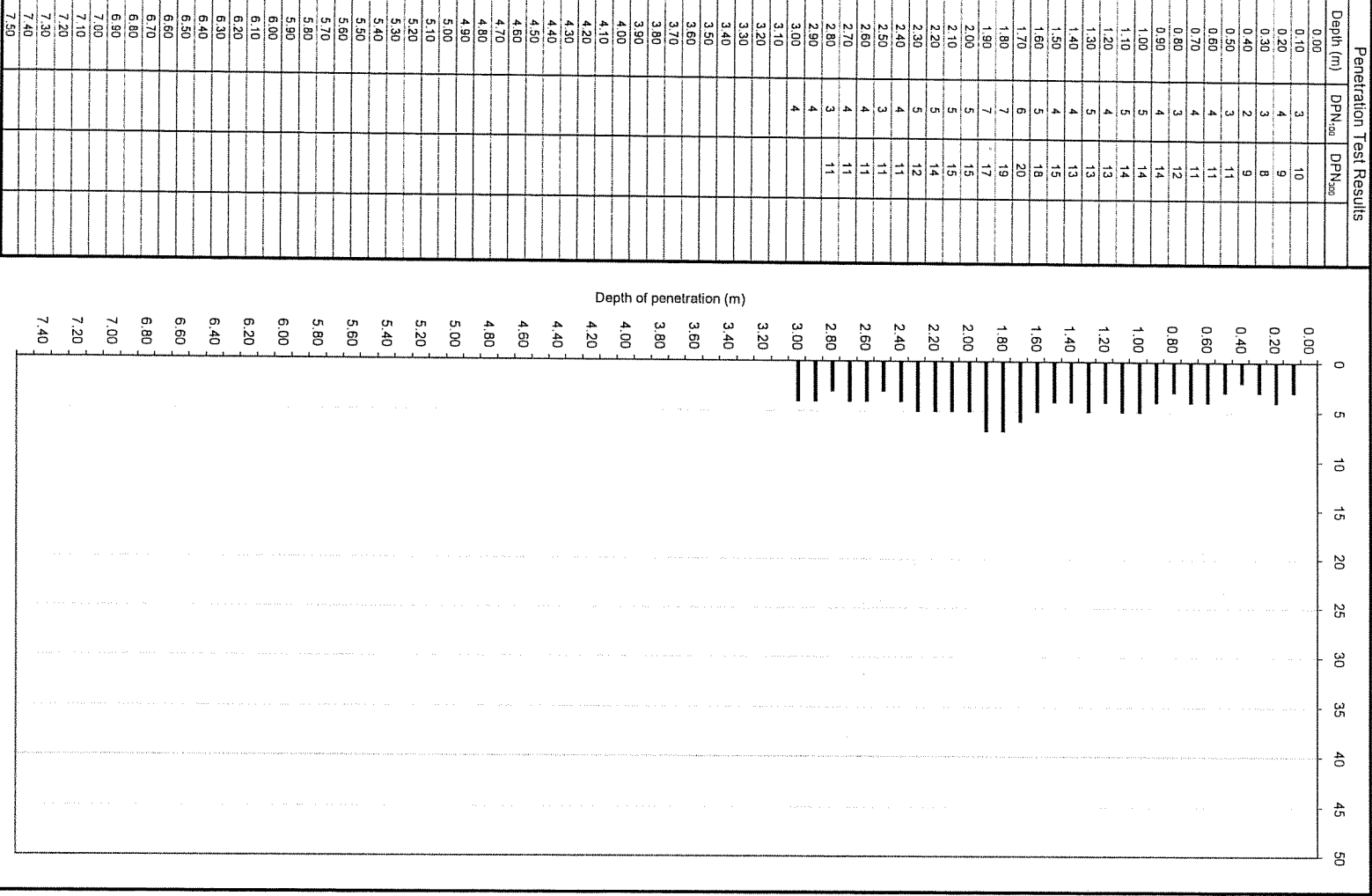
Job Number: S0639

Test Type: DPSH

Client: RCT

Final Depth: 3m

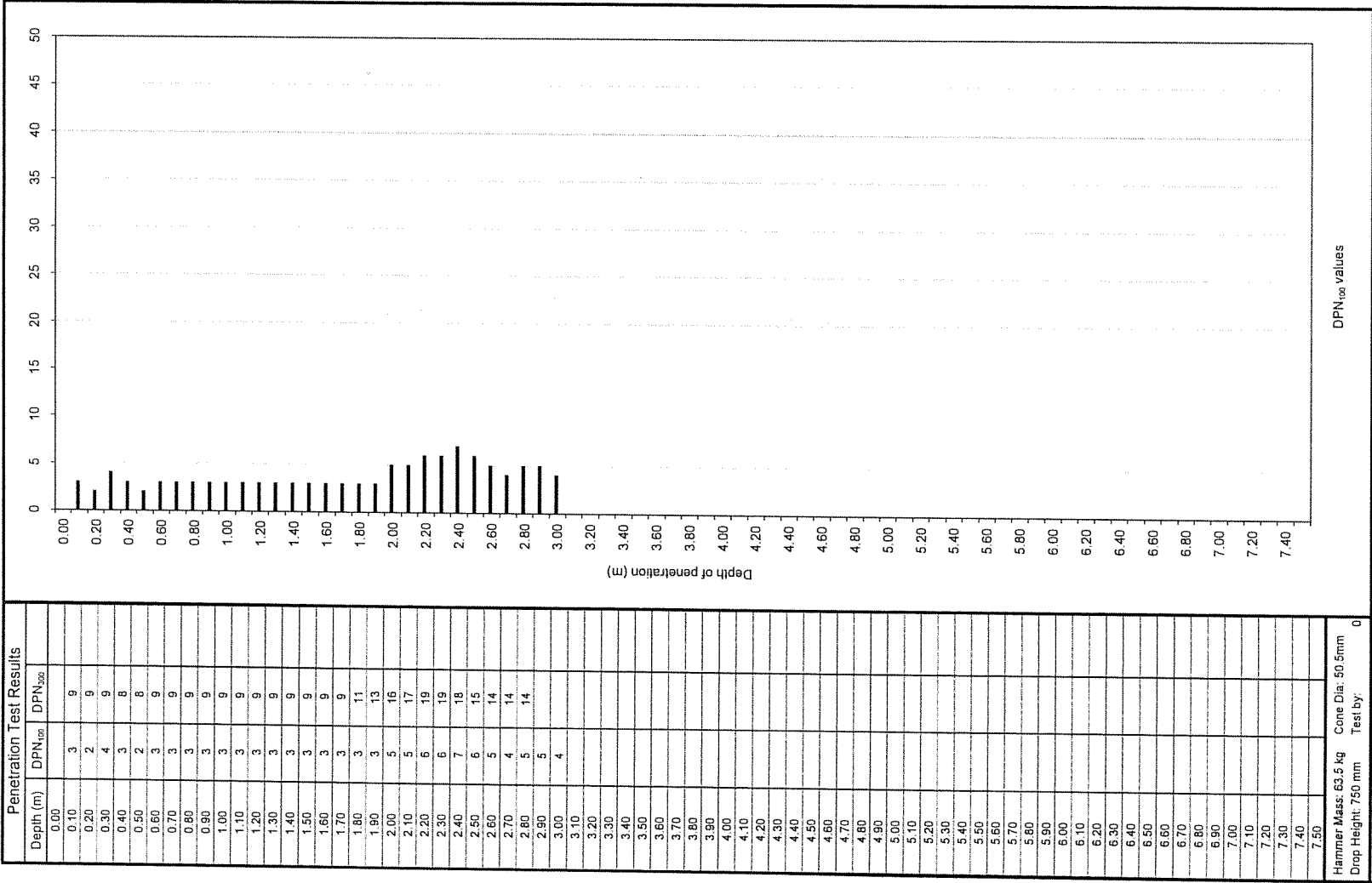
Rig Type: Competitor 130



Hammer Mass: 63.5 Kg Cone Dia: 50.5mm
Drop Height: 750 mm Test by: 0

General Remarks:

DPN₁₀₀ = Dynamic penetration resistance for 100mm penetration.
DPN₃₀₀ = Dynamic penetration resistance for 300mm penetration (ie: sum of 3 consecutive DPN₁₀₀ values), starting at the depth given.



General Remarks:
DPN₁₀₀ = Dynamic penetration resistance for 100mm penetration.
DPN₃₀₀ = Dynamic penetration resistance for 300mm penetration (ie: sum of 3 consecutive DPN₁₀₀ values), starting at the depth given.

Dynamic Probe Test Results Sheet

DP No: 6

Site: TREHERBERT

Date: 21-Jun-05

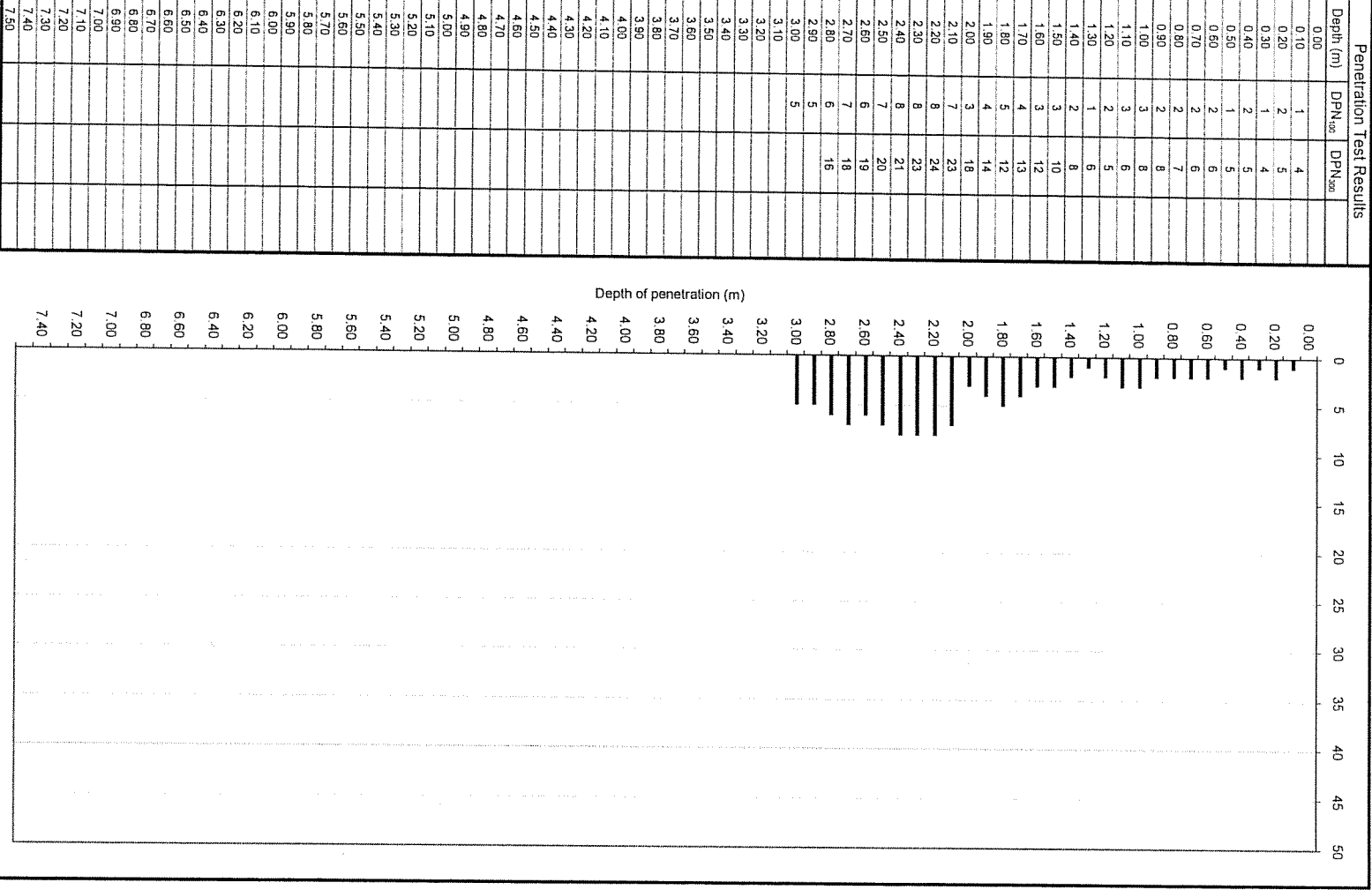
Job Number: S0639

Test Type: DPSH

Client: RCT

Final Depth: 3m

Rig Type: Competitor 130



Hammer Mass: 63.5 kg Cone Dia: 50.5mm
Drop Height: 750 mm Test by: 0

General Remarks:

DPN₁₀₀ = Dynamic penetration resistance for 100mm penetration.
DPN₃₀₀ = Dynamic penetration resistance for 300mm penetration. (ie. sum of 3 consecutive DPN₁₀₀ values), starting at the depth given.

Appendix B

Results of Chemical Analysis & MCERTS Certificates

01/08/2005

Ms Lorna Logan

C.J. Associates Geotechnical Limited

King Road Avenue

Avonmouth

Bristol

BS11 9HF

Test Report : C/JG /C0356

Dear Ms Logan

Please find enclosed the results of the analysis carried out on the samples submitted from Treherbert on 28/06/2005.

I trust you will find these satisfactory but should you have any queries please contact customer services.

Yours sincerely

Katy Kennedy

LOGISTICS MANAGER

Determinations marked * in this certificate are not included in the UKAS accreditation schedule for our laboratory. Determinations marked M have met the requirements of the MCERTS performance standard. Opinions and interpretations expressed herein, and marked R, are outside the scope of UKAS accreditation. Determinations marked S were subcontracted. Unless otherwise stated, Severn Trent - Midlands was not responsible for sampling. Information about methods and performance characteristics of the determinations are available on request. Unless otherwise agreed, as received soils will be disposed of after 30 days and waters/leachates after 10 days from the issue of the final report.

Analysis carried out on air-dried and ground test portion of the sample, unless otherwise stated in the synopses of analytical methods. Air drying is carried out at not greater than 30°C. All results are reported on an air-dried basis.

Samples are not preserved on site, unless otherwise stated in the synopses of analytical methods.

Site	Treherbert	Sample Type	SOIL
Sample ID:	WS1	Job:	CJG/C0356
Other ID:	0.00m	Sample No:	688085
Your Ref:	S0639/L6747	Your Order:	
Received:	30/06/2005		
Description	Black loam with occasional gravel and roots		

Method	Determination	Result	Units	Date of analysis	UoM %
30/30C	M Arsenic (Total)	8.7	mg/kg	04/07/2005	10.3/10.7
30	M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	M Chromium (Total)	7.5	mg/kg	02/07/2005	15.01
30	M Copper (Total)	42	mg/kg	02/07/2005	13.10
30	M Iron (Total)	23000	mg/kg	02/07/2005	8.44
30	M Lead (Total)	30	mg/kg	02/07/2005	13.28
30C	M Mercury (Total)	< 0.20	mg/kg	04/07/2005	19.53
30	M Nickel (Total)	41	mg/kg	02/07/2005	14.41
30C	M Selenium (Total)	0.70	mg/kg	04/07/2005	16.78
30	M Zinc (Total)	81	mg/kg	02/07/2005	11.14
14	M Cyanide (Free)	< 0.50	mg/kg	04/07/2005	42.71
40A	M Phenols (Total)	0.60	mg/kg	04/07/2005	27.94
45	M Sulphate (Total) as SO4	< 0.01	%	04/07/2005	32.64
46	M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	
36	Total Organic Carbon	25000	mg/kg	05/07/2005	
39	pH	7.7	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	M TPH (Total)	< 50	mg/kg	02/07/2005	30.0
	M >> PAH SUITE <<	.		01/07/2005	
307	M naphthalene	9.1	mg/kg	05/07/2005	
307	M acenaphthylene	0.50	mg/kg	05/07/2005	
307	M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	M fluorene	0.81	mg/kg	05/07/2005	
307	M phenanthrene	3.2	mg/kg	05/07/2005	14.44
307	M anthracene	< 0.50	mg/kg	05/07/2005	
307	M fluoranthene	1.2	mg/kg	05/07/2005	
307	M pyrene	1.2	mg/kg	05/07/2005	29.51
307	M benzo(a)anthracene	0.56	mg/kg	05/07/2005	
307	M chrysene	0.99	mg/kg	05/07/2005	
307	M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Treherbert

Sample ID:

WS1

Other ID:

0.00m

Your Ref:

S0639/L6747

Received:

30/06/2005

Description

Black loam with occasional gravel and roots

Sample Type

Job:
Sample No:
Your Order:

SOIL

CJG/C0356
688085

Method	Determination	Result	Units	Date of analysis	UoM %
307	^M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	^M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	^M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	^M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	^M indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	^M PAH (Total)	19	mg/kg	05/07/2005	18.40
Moisture	Moisture*	13	%	01/07/2005	
Stones	Stones %*	17	%	01/07/2005	
	Chemical Testing \$	Ext		27/07/2005	

Comments

Site	Treherbert	Sample Type	SOIL
Sample ID:	WS2	Job:	CJG/C0356
Other ID:	0.00m	Sample No:	688086
Your Ref:	S0639/L6747	Your Order:	
Received:	30/06/2005		
Description	Black loam with occasional roots and gravel		

Method	Determination	Result	Units	Date of analysis	UoM %
30/30C	^M Arsenic (Total)	8.8	mg/kg	04/07/2005	10.3/10.7
30	^M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	^M Chromium (Total)	6.2	mg/kg	02/07/2005	15.01
30	^M Copper (Total)	43	mg/kg	02/07/2005	13.10
30	^M Iron (Total)	18000	mg/kg	02/07/2005	8.44
30	^M Lead (Total)	42	mg/kg	02/07/2005	13.28
30C	^M Mercury (Total)	< 0.20	mg/kg	04/07/2005	19.53
30	^M Nickel (Total)	36	mg/kg	02/07/2005	14.41
30C	^M Selenium (Total)	0.81	mg/kg	04/07/2005	16.78
30	^M Zinc (Total)	73	mg/kg	02/07/2005	11.14
14	^M Cyanide (Free)	< 0.50	mg/kg	04/07/2005	
40A	^M Phenols (Total)	1.3	mg/kg	04/07/2005	42.71
45	^M Sulphate (Total) as SO4	< 0.01	%	04/07/2005	27.94
46	^M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	32.64
36	Total Organic Carbon	17000	mg/kg	05/07/2005	
39	pH	7.8	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	^M TPH (Total)	65	mg/kg	02/07/2005	30.0
	^M >> PAH SUITE <<	.		01/07/2005	
307	^M naphthalene	9.8	mg/kg	05/07/2005	
307	^M acenaphthylene	0.53	mg/kg	05/07/2005	
307	^M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	^M fluorene	0.87	mg/kg	05/07/2005	
307	^M phenanthrene	3.4	mg/kg	05/07/2005	14.44
307	^M anthracene	< 0.50	mg/kg	05/07/2005	
307	^M fluoranthene	1.0	mg/kg	05/07/2005	
307	^M pyrene	0.99	mg/kg	05/07/2005	29.51
307	^M benzo(a)anthracene	0.56	mg/kg	05/07/2005	
307	^M chrysene	0.88	mg/kg	05/07/2005	
307	^M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Treherbert

Sample ID:

WS2

Other ID:

0.00m

Your Ref:

S0639/L6747

Received:

30/06/2005

Description

Black loam with occasional roots and gravel

Sample Type

Job:

SOIL

CJG/C0356

Sample No:

688086

Your Order:

Method	Determination	Result	Units	Date of analysis	UoM %
307	M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	M indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	M PAH (Total)	20	mg/kg	05/07/2005	18.40
Moisture	Moisture*	14	%	01/07/2005	
Stones	Stones %*	17	%	01/07/2005	
	Chemical Testing \$	Ext		27/07/2005	

Comments

Site	Treherbert	Sample Type	SOIL
Sample ID:	WS3	Job:	CJG/C0356
Other ID:	0.00m	Sample No:	688087
Your Ref:	S0639/L6747	Your Order:	
Received:	30/06/2005		
Description	Black loam with occasional gravel and roots		

Method	Determination	Result	Units	Date of analysis	UoM %
30/30C	^M Arsenic (Total)	6.4	mg/kg	04/07/2005	10.3/10.7
30	^M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	^M Chromium (Total)	5.3	mg/kg	02/07/2005	15.01
30	^M Copper (Total)	35	mg/kg	02/07/2005	13.10
30	^M Iron (Total)	33000	mg/kg	02/07/2005	8.44
30	^M Lead (Total)	23	mg/kg	02/07/2005	13.28
30C	^M Mercury (Total)	< 0.20	mg/kg	04/07/2005	19.53
30	^M Nickel (Total)	48	mg/kg	02/07/2005	14.41
30C	^M Selenium (Total)	0.74	mg/kg	04/07/2005	16.78
30	^M Zinc (Total)	86	mg/kg	02/07/2005	11.14
14	^M Cyanide (Free)	< 0.50	mg/kg	04/07/2005	
40A	^M Phenols (Total)	1.2	mg/kg	04/07/2005	42.71
45	^M Sulphate (Total) as SO4	< 0.01	%	04/07/2005	27.94
46	^M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	32.64
36	Total Organic Carbon	15000	mg/kg	05/07/2005	
39	pH	7.6	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	^M TPH (Total)	< 50	mg/kg	02/07/2005	30.0
	^M >> PAH SUITE <<	.		01/07/2005	
307	^M naphthalene	11	mg/kg	05/07/2005	
307	^M acenaphthylene	< 0.50	mg/kg	05/07/2005	
307	^M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	^M fluorene	0.85	mg/kg	05/07/2005	
307	^M phenanthrene	4.2	mg/kg	05/07/2005	14.44
307	^M anthracene	0.56	mg/kg	05/07/2005	
307	^M fluoranthene	1.7	mg/kg	05/07/2005	
307	^M pyrene	1.6	mg/kg	05/07/2005	29.51
307	^M benzo(a)anthracene	0.73	mg/kg	05/07/2005	
307	^M chrysene	1.3	mg/kg	05/07/2005	
307	^M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Treherbert

Sample ID:

WS3

Other ID:

0.00m

Your Ref:

S0639/L6747

Received:

30/06/2005

Description

Black loam with occasional gravel and roots

Sample Type

Job:

Sample No:

688087

Your Order:

SOIL

CJG/C0356

Method	Determination	Result	Units	Date of analysis	UoM %
307	^M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	^M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	^M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	^M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	^M indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	^M PAH (Total)	24	mg/kg	05/07/2005	18.40
Moisture	Moisture*	8.1	%	01/07/2005	
Stones	Stones %*	23	%	01/07/2005	
	Chemical Testing \$	Ext		27/07/2005	

Comments

Site	Treherbert	Sample Type	SOIL
Sample ID:	WS4	Job:	CJG/C0356
Other ID:	0.00m	Sample No:	688088
Your Ref:	S0639/L6747	Your Order:	
Received:	30/06/2005		
Description	Black loam with occasional gravel		

Method	Determination	Result	Units	Date of analysis	UoM %
30/30C	M Arsenic (Total)	8.4	mg/kg	04/07/2005	10.3/10.7
30	M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	M Chromium (Total)	5.1	mg/kg	02/07/2005	15.01
30	M Copper (Total)	41	mg/kg	02/07/2005	13.10
30	M Iron (Total)	16000	mg/kg	02/07/2005	8.44
30	M Lead (Total)	26	mg/kg	02/07/2005	13.28
30C	M Mercury (Total)	< 0.20	mg/kg	04/07/2005	19.53
30	M Nickel (Total)	35	mg/kg	02/07/2005	14.41
30C	M Selenium (Total)	0.76	mg/kg	04/07/2005	16.78
30	M Zinc (Total)	68	mg/kg	02/07/2005	11.14
14	M Cyanide (Free)	< 0.50	mg/kg	04/07/2005	42.71
40A	M Phenols (Total)	1.6	mg/kg	04/07/2005	27.94
45	M Sulphate (Total) as SO4	< 0.01	%	04/07/2005	32.64
46	M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	
36	Total Organic Carbon	19000	mg/kg	05/07/2005	
39	pH	8.0	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	M TPH (Total)	62	mg/kg	02/07/2005	30.0
	M >> PAH SUITE <<	.		01/07/2005	
307	M naphthalene	10	mg/kg	05/07/2005	
307	M acenaphthylene	0.58	mg/kg	05/07/2005	
307	M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	M fluorene	0.97	mg/kg	05/07/2005	
307	M phenanthrene	4.3	mg/kg	05/07/2005	14.44
307	M anthracene	0.61	mg/kg	05/07/2005	
307	M fluoranthene	1.2	mg/kg	05/07/2005	
307	M pyrene	1.3	mg/kg	05/07/2005	29.51
307	M benzo(a)anthracene	0.67	mg/kg	05/07/2005	
307	M chrysene	1.0	mg/kg	05/07/2005	
307	M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Sample ID:

Other ID:

Your Ref:

Received:

Description

Treherbert

WS4

0.00m

S0639/L6747

30/06/2005

Black loam with occasional gravel

Sample Type

Job:

Sample No:

Your Order:

SOIL

CJG/C0356

688088

Method	Determination	Result	Units	Date of analysis	UoM %
307	^M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	^M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	^M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	^M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	^M indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	^M PAH (Total)	23	mg/kg	05/07/2005	18.40
Moisture	Moisture*	12	%	01/07/2005	
Stones	Stones %*	19	%	01/07/2005	
Comments	Chemical Testing \$	Ext		27/07/2005	

Site	Treherbert			Sample Type	SOIL
Sample ID:	WS5	Job:	CJG/C0356		
Other ID:	0.00m	Sample No:	688089		
Your Ref:	S0639/L6747	Your Order:			
Received:	30/06/2005				
Description	Black loam with occasional gravel				

Method	Determination	Result	Units	Date of analysis	UoM %
30/30C	M Arsenic (Total)	8.3	mg/kg	04/07/2005	10.3/10.7
30	M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	M Chromium (Total)	6.9	mg/kg	02/07/2005	15.01
30	M Copper (Total)	44	mg/kg	02/07/2005	13.10
30	M Iron (Total)	22000	mg/kg	02/07/2005	8.44
30	M Lead (Total)	43	mg/kg	02/07/2005	13.28
30C	M Mercury (Total)	< 0.20	mg/kg	04/07/2005	19.53
30	M Nickel (Total)	35	mg/kg	02/07/2005	14.41
30C	M Selenium (Total)	0.74	mg/kg	04/07/2005	16.78
30	M Zinc (Total)	83	mg/kg	02/07/2005	11.14
14	M Cyanide (Free)	< 0.50	mg/kg	04/07/2005	42.71
40A	M Phenols (Total)	1.8	mg/kg	04/07/2005	27.94
45	M Sulphate (Total) as SO4	< 0.01	%	04/07/2005	32.64
46	M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	
36	Total Organic Carbon	22000	mg/kg	05/07/2005	
39	pH	7.9	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	M TPH (Total)	< 50	mg/kg	02/07/2005	30.0
	M >> PAH SUITE <<	.		01/07/2005	
307	M naphthalene	6.9	mg/kg	05/07/2005	
307	M acenaphthylene	< 0.50	mg/kg	05/07/2005	
307	M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	M fluorene	0.77	mg/kg	05/07/2005	
307	M phenanthrene	3.0	mg/kg	05/07/2005	14.44
307	M anthracene	< 0.50	mg/kg	05/07/2005	
307	M fluoranthene	1.2	mg/kg	05/07/2005	
307	M pyrene	1.2	mg/kg	05/07/2005	29.51
307	M benzo(a)anthracene	0.59	mg/kg	05/07/2005	
307	M chrysene	1.0	mg/kg	05/07/2005	
307	M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Treherbert

Sample ID:

WS5

Other ID:

0.00m

Your Ref:

S0639/L6747

Received:

30/06/2005

Description

Black loam with occasional gravel

Sample Type

Job:

SOIL

CJG/C0356

Sample No:

688089

Your Order:

Method	Determination	Result	Units	Date of analysis	UoM %
307	M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	M indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	M PAH (Total)	17	mg/kg	05/07/2005	18.40
Moisture	Moisture*	9.8	%	01/07/2005	
Stones	Stones %*	25	%	01/07/2005	
	Chemical Testing \$	Ext		27/07/2005	
Comments					

Site	Treherbert	Sample Type	SOIL
Sample ID:	WS6	Job:	CJG/C0356
Other ID:	0.00m	Sample No:	688090
Your Ref:	S0639/L67/47	Your Order:	
Received:	30/06/2005		
Description	Black loam with occasional gravel and roots		

Method	Determination	Result	Units	Date of analysis	UoM %
30/30C	M Arsenic (Total)	8.8	mg/kg	04/07/2005	10.3/10.7
30	M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	M Chromium (Total)	< 5.0	mg/kg	02/07/2005	15.01
30	M Copper (Total)	38	mg/kg	02/07/2005	13.10
30	M Iron (Total)	10000	mg/kg	02/07/2005	8.44
30	M Lead (Total)	25	mg/kg	02/07/2005	13.28
30C	M Mercury (Total)	< 0.20	mg/kg	04/07/2005	19.53
30	M Nickel (Total)	29	mg/kg	02/07/2005	14.41
30C	M Selenium (Total)	0.98	mg/kg	04/07/2005	16.78
30	M Zinc (Total)	62	mg/kg	02/07/2005	11.14
14	M Cyanide (Free)	< 0.50	mg/kg	04/07/2005	
40A	M Phenols (Total)	0.83	mg/kg	04/07/2005	42.71
45	M Sulphate (Total) as SO4	0.01	%	04/07/2005	27.94
46	M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	32.64
36	Total Organic Carbon	25000	mg/kg	05/07/2005	
39	pH	7.6	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	M TPH (Total)	< 50	mg/kg	02/07/2005	30.0
	M->> PAH SUITE <<	.		01/07/2005	
307	M naphthalene	9.0	mg/kg	05/07/2005	
307	M acenaphthylene	< 0.50	mg/kg	05/07/2005	
307	M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	M fluorene	0.72	mg/kg	05/07/2005	
307	M phenanthrene	2.8	mg/kg	05/07/2005	14.44
307	M anthracene	< 0.50	mg/kg	05/07/2005	
307	M fluoranthene	0.86	mg/kg	05/07/2005	
307	M pyrene	0.80	mg/kg	05/07/2005	29.51
307	M benzo(a)anthracene	0.51	mg/kg	05/07/2005	
307	M chrysene	0.85	mg/kg	05/07/2005	
307	M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Treherbert

Sample ID:

WS6

Other ID:

0.00m

Your Ref:

S0639/L6747

Received:

30/06/2005

Description

Black loam with occasional gravel and roots

Sample Type

Job:

SOIL

CJG/C0356

Sample No:

688090

Your Order:

Method	Determination	Result	Units	Date of analysis	UoM %
307	M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	M indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	M PAH (Total)	18	mg/kg	05/07/2005	18.40
Moisture	Moisture*	9.8	%	01/07/2005	
Stones	Stones %*	20	%	01/07/2005	
	Chemical Testing \$	Ext		27/07/2005	
Comments					

Site	Treherbert			Sample Type	SOIL
Sample ID:	WS7			Job:	CJG/C0356
Other ID:	0.00m			Sample No:	688091
Your Ref:	S0639/L6747			Your Order:	
Received:	30/06/2005				
Description	Black loam with occasional gravel				

Method	Determination	Result	Units	Date of analysis	UoM %
30/30C	M Arsenic (Total)	9.2	mg/kg	04/07/2005	10.3/10.7
30	M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	M Chromium (Total)	7.6	mg/kg	02/07/2005	15.01
30	M Copper (Total)	39	mg/kg	02/07/2005	13.10
30	M Iron (Total)	16000	mg/kg	02/07/2005	8.44
30	M Lead (Total)	33	mg/kg	02/07/2005	13.28
30C	M Mercury (Total)	< 0.20	mg/kg	04/07/2005	19.53
30	M Nickel (Total)	31	mg/kg	02/07/2005	14.41
30C	M Selenium (Total)	0.80	mg/kg	04/07/2005	16.78
30	M Zinc (Total)	72	mg/kg	02/07/2005	11.14
14	Cyanide (Free)	< 0.50	mg/kg	04/07/2005	
40A	M Phenols (Total)	1.1	mg/kg	04/07/2005	42.71
45	M Sulphate (Total) as SO4	0.01	%	04/07/2005	27.94
46	M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	32.64
36	Total Organic Carbon	18000	mg/kg	05/07/2005	
39	pH	8.0	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	M TPH (Total)	70	mg/kg	02/07/2005	30.0
	M >> PAH SUITE <<	.		01/07/2005	
307	M naphthalene	7.6	mg/kg	05/07/2005	
307	M acenaphthylene	< 0.50	mg/kg	05/07/2005	
307	M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	M fluorene	0.78	mg/kg	05/07/2005	
307	M phenanthrene	3.5	mg/kg	05/07/2005	14.44
307	M anthracene	0.53	mg/kg	05/07/2005	
307	M fluoranthene	1.5	mg/kg	05/07/2005	
307	M pyrene	1.4	mg/kg	05/07/2005	29.51
307	M benzo(a)anthracene	0.88	mg/kg	05/07/2005	
307	M chrysene	1.3	mg/kg	05/07/2005	
307	M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Treherbert

Sample ID:

WS7

Other ID:

0.00m

Your Ref:

S0639/L6747

Received:

30/06/2005

Description

Black loam with occasional gravel

Sample Type

Job:

SOIL

CJG/C0356

Sample No:

688091

Your Order:

Method	Determination	Result	Units	Date of analysis	UoM %
307	^M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	^M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	^M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	^M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	^M Indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	^M PAH (Total)	20	mg/kg	05/07/2005	18.40
Moisture	Moisture*	12	%	01/07/2005	
Stones	Stones %*	23	%	01/07/2005	
Comments	Chemical Testing \$	Ext		27/07/2005	

Site	Treherbert	Sample Type	SOIL
Sample ID:	WS8	Job:	CJG/C0356
Other ID:	0.00m	Sample No:	688092
Your Ref:	S0639/L6747	Your Order:	
Received:	30/06/2005		
Description	Black loam with occasional gravel		

Method	Determination	Result	Units	Date of analysis	Uom %
30/30C	^M Arsenic (Total)	7.5	mg/kg	04/07/2005	10.3/10.7
30	^M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	^M Chromium (Total)	< 5.0	mg/kg	02/07/2005	15.01
30	^M Copper (Total)	37	mg/kg	02/07/2005	13.10
30	^M Iron (Total)	18000	mg/kg	02/07/2005	8.44
30	^M Lead (Total)	22	mg/kg	02/07/2005	13.28
30C	^M Mercury (Total)	< 0.20	mg/kg	04/07/2005	19.53
30	^M Nickel (Total)	36	mg/kg	02/07/2005	14.41
30C	^M Selenium (Total)	0.80	mg/kg	04/07/2005	16.78
30	^M Zinc (Total)	71	mg/kg	02/07/2005	11.14
14	Cyanide (Free)	< 0.50	mg/kg	14/07/2005	
40A	^M Phenols (Total)	1.5	mg/kg	04/07/2005	42.71
45	^M Sulphate (Total) as SO4	0.01	%	04/07/2005	27.94
46	^M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	32.64
36	Total Organic Carbon	3800	mg/kg	05/07/2005	
39	pH	8.2	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	^M TPH (Total)	< 50	mg/kg	02/07/2005	30.0
	^M >> PAH SUITE <<	.		01/07/2005	
307	^M naphthalene	6.0	mg/kg	05/07/2005	
307	^M acenaphthylene	< 0.50	mg/kg	05/07/2005	
307	^M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	^M fluorene	0.95	mg/kg	05/07/2005	
307	^M phenanthrene	3.5	mg/kg	05/07/2005	14.44
307	^M anthracene	0.54	mg/kg	05/07/2005	
307	^M fluoranthene	1.4	mg/kg	05/07/2005	
307	^M pyrene	1.3	mg/kg	05/07/2005	29.51
307	^M Benzo(a)anthracene	0.52	mg/kg	05/07/2005	
307	^M chrysene	0.81	mg/kg	05/07/2005	
307	^M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Treherbert

Sample ID:

WS8

Other ID:

0.00m

Your Ref:

S0639/L6747

Received:

30/06/2005

Description

Black loam with occasional gravel

Sample Type

SOIL

Job:

CJG/C0356

Sample No:

688092

Your Order:

Method	Determination	Result	Units	Date of analysis	UoM %
307	M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	M indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	M PAH (Total)	17	mg/kg	05/07/2005	18.40
Moisture	Moisture*	8.2	%	01/07/2005	
Stones	Stones %*	23	%	01/07/2005	
	Chemical Testing \$	Ext		27/07/2005	
Comments					

SiteTreherbert

Sample ID:WS9

Other ID:0.00m

Your Ref:S0639/L6747

Received:30/06/2005

DescriptionBlack loam with occasional gravel

Sample TypeSOIL

Job:CJG/C0356

Sample No:688093

Your Order:

Method	Determination	Result	Units	Date of analysis	UoM %
30/30C	M Arsenic (Total)	6.2	mg/kg	04/07/2005	10.3/10.7
30	M Cadmium (Total)	< 0.50	mg/kg	02/07/2005	9.08
30	M Chromium (Total)	5.1	mg/kg	02/07/2005	15.01
30	M Copper (Total)	40	mg/kg	02/07/2005	13.10
30	M Iron (Total)	17000	mg/kg	02/07/2005	8.44
30	M Lead (Total)	22	mg/kg	02/07/2005	13.28
30C	M Mercury (Total)	0.30	mg/kg	04/07/2005	19.53
30	M Nickel (Total)	54	mg/kg	02/07/2005	14.41
30C	M Selenium (Total)	0.51	mg/kg	04/07/2005	16.78
30	M Zinc (Total)	92	mg/kg	02/07/2005	11.14
14	Cyanide (Free)	< 0.50	mg/kg	14/07/2005	
40A	M Phenols (Total)	2.1	mg/kg	04/07/2005	42.71
45	M Sulphate (Total) as SO4	< 0.01	%	04/07/2005	27.94
46	M Sulphate as SO4 (2:1 Water	< 0.06	g/l	05/07/2005	32.64
36	Total Organic Carbon	12000	mg/kg	05/07/2005	
39	pH	7.7	pH units	05/07/2005	
	>> TPH SUITE <<	.		30/06/2005	
317	M TPH (Total)	< 50	mg/kg	02/07/2005	30.0
	M >> PAH SUITE <<	.		01/07/2005	
307	M naphthalene	6.2	mg/kg	05/07/2005	
307	M acenaphthylene	< 0.50	mg/kg	05/07/2005	
307	M acenaphthene	< 0.50	mg/kg	05/07/2005	
307	M fluorene	0.55	mg/kg	05/07/2005	
307	M phenanthrene	2.9	mg/kg	05/07/2005	14.44
307	M anthracene	< 0.50	mg/kg	05/07/2005	
307	M fluoranthene	< 0.50	mg/kg	05/07/2005	
307	M pyrene	< 0.50	mg/kg	05/07/2005	29.51
307	M benzo(a)anthracene	< 0.50	mg/kg	05/07/2005	
307	M chrysene	0.59	mg/kg	05/07/2005	
307	M benzo(b)fluoranthene	< 0.50	mg/kg	05/07/2005	

Site

Treherbert

Sample ID:

WS9

Other ID:

0.00m

Your Ref:

S0639/L6747

Received:

30/06/2005

Description

Black loam with occasional gravel

Sample Type

Job:

SOIL

CJG/C0356

Sample No:

688093

Your Order:

Method	Determination	Result	Units	Date of analysis	UoM %
307	M benzo(k)fluoranthene	< 0.50	mg/kg	05/07/2005	
307	M benzo(a)pyrene	< 0.50	mg/kg	05/07/2005	37.46
307	M dibenzo(ah)anthracene	< 0.50	mg/kg	05/07/2005	
307	M benzo(ghi)perylene	< 0.50	mg/kg	05/07/2005	
307	M indeno(123cd)pyrene	< 0.50	mg/kg	05/07/2005	
307	M PAH (Total)	13	mg/kg	05/07/2005	18.40
Moisture	Moisture*	5.4	%	01/07/2005	
Stones	Stones %*	30	%	01/07/2005	
Comments	Chemical Testing \$	Ext		27/07/2005	

Synopses of Analytical Methods

Reference	Method Text
30	Metals are extracted from land samples by boiling with hydrochloric/nitric acids (3:1 ratio). The measurement of metal concentrations is determined directly on an ICP-OES at defined wavelengths.
30/30C	Metals are extracted from land samples by boiling with hydrochloric/nitric acids (3:1 ratio). For the measurement of metal concentrations is determined on an ICP-OES at defined wavelengths. Where a result is 25mg/kg or above results are obtained directly. Otherwise results are obtained via hydride generation.
307	PAH's are extracted from land samples using acetone. The samples are shaken mechanically and then centrifuged. An aliquot of the supernatant liquid is then transferred to a separate vial and analysed by HPLC using a variable wavelength programme.
30C	Metals are extracted from land samples by boiling with hydrochloric/nitric acid (3:1 ratio). The measurement of metal concentrations is determined by means of hydride generation / atomic vapour on an ICP-OES at defined wavelengths
317	Hydrocarbons are extracted from land samples using pentane. The samples are shaken mechanically, sonicated, before being centrifuged. After separation an aliquot of the pentane layer is transferred to a separate vial and spiked with internal standard. Hydrocarbon content of this extract is then determined by GC- Flame ionisation (FID). This analysis is carried out on an as received portion of sample.
40A	This method determines steam distillable phenolic compounds in landmaterials. Phenol is extracted from air dried soil using steam distillation. The pH adjusted distillate is measured colorimetrically at a defined wavelength.
45	The sulphates are extracted from land samples using boiling hydrochloric acid solution. After cooling and filtration the determination of sulphate is obtained from an aliquot of solution, via a turbidimetric measurement.
46	The water soluble sulphate content of land samples is extracted by shaking with deionised water. The resultant solution is filtered and the determination of sulphate is obtained turbidimetrically from this filtrate via a reaction with barium chloride.

ANALYSIS RESULTS PAGE 1 OF 1 PAGES

29 July 2005

Ms L Logan
C.J. Associates Geotechnical Limited
King Road Avenue
Avonmouth
Bristol
BS11 9HF

Test Report : CJG /C0356

Dear Ms Logan

Please find enclosed the results of the analysis carried out on the samples submitted from Treherbert on 28 June 2005.

I trust you will find these satisfactory but should you have any queries please contact customer services.

Yours sincerely

J Selbie
SECTION MANAGER INORGANICS

Determinations marked * In this certificate are not included in the UKAS accreditation schedule for our laboratory. Opinions and interpretations expressed herein, and marked #, are outside the scope of UKAS accreditation. Determinations marked \$ were subcontracted. Unless otherwise stated, Severn Trent was not responsible for sampling. Information about methods and performance characteristics of the determinations are available on request. Unless otherwise agreed, as received soils will be disposed of after 30 days, dried soils after 30 days and waters/leachates after 10 days from the issue of the final report. Soil analysis is carried out on air-dried and ground test portion of the sample.

Soil Analysis

CJG /C0356
Treherbert
Your Reference:- S0639/L6747
Your Order:-

CAS Number:	688085	688086	688087
Sample Ref	WS1	WS2	WS3
Detname	0.00m	0.00m	0.00m
Method	Units		
%	0.2	0.22	0.24
Total Sulphur \$			

Key
N/S - Not Scheduled
I/S - Insufficient Sample

Soil Analysis

CJG /C0356
Treherbert
Your Reference:- S0639/L6747
Your Order:-

CAS Number:	688088	688089	688090
Sample Ref	WS4	WS5	WS6
Detname	0.00m	0.00m	0.00m
Method	Units	0.2	0.23
Total Sulphur \$	%		

Key
N/S - Not Scheduled
I/S - Insufficient Sample

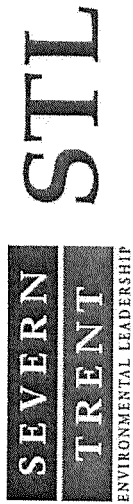
Soil Analysis

PAGE 3 OF 3

CIG /C0356
Treherbert
Your Reference:- S0639/L6747
Your Order:-

CAS Number:	688091	688092	688093
Sample Ref	WS7	WS8	WS9
Detname	0.00m	0.00m	0.00m
Total Sulphur \$	%	0.23	0.15
			0.21

Key
N/S - Not Scheduled
I/S - Insufficient Sample



01/08/2005

Ms Lorna Logan

C.J. Associates Geotechnical Limited
King Road Avenue
Avonmouth
Bristol
BS11 9HF

Test Report : CJG /C1472

Dear Ms Logan

Please find enclosed the results of the analysis carried out on the samples submitted from Treherbert on 15/07/2005.

I trust you will find those satisfactory but should you have any queries please contact me.

Yours sincerely

Katy Kennedy
LOGISTICS MANAGER

Determinations marked * in this certificate are not included in the UKAS accreditation schedule for our laboratory. Opinions and interpretations expressed herein, and marked #, are outside the scope of UKAS accreditation. Determinations marked \$ were subcontracted. Unless otherwise stated, STL Midlands was not responsible for sampling. Information about methods and performance characteristics of the determinations are available on request. Unless otherwise agreed, as received soils will be disposed of after 30 days and waters/leachates after 10 days from the issue of the final report. Soil analysis is carried out on air-dried and ground test portion of the sample

1510

Sample 1 Laboratory Number 696977
of 9 Report Number : CJG /C1472
Sample Source Treherbert
Sample I.D. WS1
Sample I.D. 0.00m
Sample Date 14/07/2005 Sample Received 18/07/2005 Analysis Complete 20/07/2005

Test Description	Result	Units	Method
Calorific Value*	6800	kJ/kg	09

1510

Sample of

29

Laboratory Number
Report Number :

696978
CJG /C1472

Sample Source

Treherbert

Sample I.D.

WS2

Sample I.D.

0.00m

Sample Date

14/07/2005

Sample Received

18/07/2005

Analysis Complete

20/07/2005

Test Description	Result	Units	Method
Calorific Value*	10000	kJ/kg	09

1510

Sample 3 Laboratory Number 696979
of 9 Report Number : CJG /C1472
Sample Source Treherbert
Sample I.D. WS3
Sample I.D. 0.00m
Sample Date 14/07/2005 Sample Received 18/07/2005 Analysis Complete 20/07/2005

Test Description	Result	Units	Method
Calorific Value*	9700	kJ/kg	09

1510

Sample of

49

Laboratory Number
Report Number :

696980
CJG /C1472

Sample Source

Treherbert

Sample I.D.

WS4

Sample I.D.

0.00m

Sample Date

14/07/2005

Sample Received

18/07/2005

Analysis Complete

20/07/2005

Test Description	Result	Units	Method
Calorific Value*	7400	kJ/kg	09

1510

Sample 5 Laboratory Number 696981
of 9 Report Number : CJG /C1472
Sample Source Treherbert
Sample I.D. WS5
Sample I.D. 0.00m
Sample Date 14/07/2005 Sample Received 18/07/2005 Analysis Complete 20/07/2005

Test Description	Result	Units	Method
Calorific Value*	10000	kJ/kg	09

1510

Sample of

69

6 Laboratory Number
Report Number :
Sample Source
Sample I.D.
Sample I.D.
Sample Date

696982
CJG /C1472
Treherbert
WS6
0.00m
14/07/2005

Sample Received
Analysis Complete

18/07/2005
20/07/2005

Test Description	Result	Units	Method
Calorific Value*	8000	kJ/kg	09

1510

Sample 7 Laboratory Number 696983
of 9 Report Number : CJG /C1472
Sample Source Treherbert
Sample I.D. WS7
Sample I.D. 0.00m
Sample Date 14/07/2005 Sample Received 18/07/2005 Analysis Complete 20/07/2005

Test Description	Result	Units	Method
Calorific Value*	7700	kJ/kg	09

1510

Sample of8 Laboratory Number696984
9 Report Number :CJG /C1472
Sample SourceTreherbert
Sample I.D.WS8
Sample I.D.0.00m
Sample Date14/07/2005 Sample Received18/07/2005 Analysis Complete20/07/2005

Test Description	Result	Units	Method
Calorific Value*	7000	kJ/kg	09

1510

Sample of 9 Laboratory Number 696985

Report Number : CJG /C1472

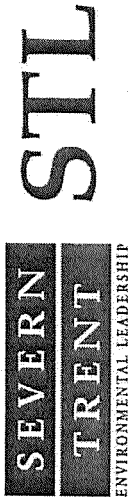
Sample Source Treherbert

Sample I.D. WS9

Sample I.D. 0.00m

Sample Date 14/07/2005 Sample Received 18/07/2005 Analysis Complete 20/07/2005

Test Description	Result	Units	Method
Calorific Value*	10000	kJ/kg	09



01/08/2005

Ms Lorna Logan

C.J. Associates Geotechnical Limited
King Road Avenue
Avonmouth
Bristol
BS11 9HF

Test Report : CJG /C1100

Dear Ms Logan

Please find enclosed the results of the analysis carried out on the samples submitted from Treherbert on 11/07/2005.

I trust you will find those satisfactory but should you have any queries please contact me.

Yours sincerely

Katy Kennedy
LOGISTICS MANAGER

Determinations marked * in this certificate are not included in the UKAS accreditation schedule for our laboratory. Opinions and interpretations expressed herein, and marked #, are outside the scope of UKAS accreditation. Determinations marked \$ were subcontracted. Unless otherwise stated, STL Midlands was not responsible for sampling. Information about methods and performance characteristics of the determinations are available on request. Unless otherwise agreed, as received soils will be disposed of after 30 days and water/sludgates after 10 days from the issue of the final report. Soil analysis is carried out on air-dried and ground test portion of the sample

1510

Sample 1
of 3

Sample Source
Sample I.D.
Sample I.D.

Laboratory Number
Report Number :
Treherbert
WS2
0.00m

10/07/2005
Sample Received

12/07/2005
Analysis Complete

28/07/2005

Test Description	Result	Units	Method
Leachate Prep (10:1 Std NRA)*			
Arsenic (Soluble)*	< 10	µg/l	25C
Cadmium (Soluble)	< 0.500	µg/l	56
Chromium (Soluble)	< 10	µg/l	53F
Copper (Soluble)	14	µg/l	53F
Iron (Soluble)	< 0.01	mg/l	53F
Lead (Soluble)	< 1.0	µg/l	56
Mercury (Soluble)	< 0.20	µg/l	56
Mercury in filtrate as Hg \$	<0.1	µg/l	WAS013
Nickel (Soluble)	< 20	µg/l	53F
Selenium (Soluble)*	< 2.0	µg/l	25C
Zinc (Soluble)	< 10	µg/l	53F
Sulphate as SO4	< 0.02	g/l	60
Ammonia as N	< 0.10	mg/l	60
COD (filtered) as O2	< 10	mg/l	11
Chloride as Cl-	< 2.0	mg/l	60
Dissolved Solids	80	mg/l	18
Fluoride as F-	0.28	mg/l	20
Total Org. Carbon (Filt)	< 1.0	mg/l	41
pH	7.9	pH units	31
>> PAH SUITE <<			
naphthalene	0.023	µg/l	331
acenaphthene	< 0.020	µg/l	331
fluorene	< 0.020	µg/l	331
phenanthrene	< 0.020	µg/l	331
anthracene	< 0.020	µg/l	331
fluoranthene	0.23	µg/l	331
pyrene	0.16	µg/l	331
benzo(a)anthracene	0.056	µg/l	331
chrysene	0.056	µg/l	331
benzo(b)fluoranthene	0.029	µg/l	331
benzo(k)fluoranthene	< 0.020	µg/l	331

1510

Sample of

13

Laboratory Number
Report Number :

694276
CJG /C1100

Sample Source

Treherbert

Sample I.D.

WS2

Sample I.D.

0.00m

Sample Date

10/07/2005

Sample Received

12/07/2005

Analysis Complete

28/07/2005

Test Description	Result	Units	Method
benzo(a)pyrene	< 0.020	µg/l	331
dibenzo(ah)anthracene	< 0.020	µg/l	331
benzo(ghi)perylene	< 0.020	µg/l	331
indeno(123cd)pyrene	< 0.020	µg/l	331
PAH (Total)	0.61	µg/l	331

1510

Sample 2 Laboratory Number 694277
of 3 Report Number : C/JG/C1100
Sample Source Treherbert
Sample I.D. WS3
Sample I.D. 0.00m
Sample Date 10/07/2005 Sample Received 12/07/2005 Analysis Complete 28/07/2005

Test Description	Result	Units	Method
Leachate Prep (10:1 Std NRA)*			
Arsenic (Soluble)*	< 10	µg/l	25C
Cadmium (Soluble)	< 0.500	µg/l	56
Chromium (Soluble)	< 10	µg/l	53F
Copper (Soluble)	< 10	µg/l	53F
Iron (Soluble)	< 0.01	mg/l	53F
Lead (Soluble)	< 1.0	µg/l	56
Mercury (Soluble)	< 0.20	µg/l	56
Mercury in filtrate as Hg \$	<0.1	µg/l	WAS013
Nickel (Soluble)	< 20	µg/l	53F
Selenium (Soluble)*	< 2.0	µg/l	25C
Zinc (Soluble)	< 10	µg/l	53F
Sulphate as SO4	< 0.02	g/l	60
Ammonia as N	< 0.10	mg/l	60
COD (filtered) as O2	< 10	mg/l	11
Chloride as Cl-	< 2.0	mg/l	60
Dissolved Solids	56	mg/l	18
Fluoride as F-	< 0.20	mg/l	20
Total Org. Carbon (Fil)	< 1.0	mg/l	41
pH	6.6	pH units	31
>> PAH SUITE <<			
naphthalene	0.10	µg/l	331
acenaphthene	< 0.020	µg/l	331
fluorene	< 0.020	µg/l	331
phenanthrene	0.028	µg/l	331
anthracene	0.030	µg/l	331
fluoranthene	0.33	µg/l	331
pyrene	0.056	µg/l	331
benzo(a)anthracene	0.034	µg/l	331
chrysene	0.073	µg/l	331
benzo(b)fluoranthene	< 0.020	µg/l	331
benzo(k)fluoranthene	< 0.020	µg/l	331

Sample of

23

Laboratory Number
Report Number :

694277
CJG /C1100

Sample Source

Treherbert

Sample I.D.

WS3

Sample I.D.

0.00m

Sample Date

10/07/2005

Sample Received

12/07/2005

Analysis Complete

28/07/2005

Test Description	Result	Units	Method
benzo(a)pyrene	< 0.020	µg/l	331
dibenzo(ah)anthracene	< 0.020	µg/l	331
benzo(ghi)perylene	< 0.020	µg/l	331
indeno(123cd)pyrene	< 0.020	µg/l	331
PAH (Total)	0.67	µg/l	331

1510

Sample 3

of 3

Sample Source

Sample I.D.

Sample I.D.

Sample Date

Laboratory Number

Report Number : C J G /C1100

Treherbert

WS4

0.00m

10/07/2005

694278

Sample Received

12/07/2005

Analysis Complete

28/07/2005

Test Description	Result	Units	Method
Leachate Prep (10:1 Std NRA)*			
Extracted			
Arsenic (Soluble)*	< 10	µg/l	25C
Cadmium (Soluble)	< 0.500	µg/l	56
Chromium (Soluble)	< 10	µg/l	53F
Copper (Soluble)	< 10	µg/l	53F
Iron (Soluble)	0.01	mg/l	53F
Lead (Soluble)	< 1.0	µg/l	56
Mercury (Soluble)	< 0.20	µg/l	56
Mercury in filtrate as Hg \$	<0.1	µg/l	WAS013
Nickel (Soluble)	< 20	µg/l	53F
Selenium (Soluble)*	< 2.0	µg/l	25C
Zinc (Soluble)	< 10	µg/l	53F
Sulphate as SO4	< 0.02	g/l	60
Ammonia as N	< 0.10	mg/l	60
COD (filtered) as O2	21	mg/l	11
Chloride as Cl-	< 2.0	mg/l	60
Dissolved Solids	54	mg/l	18
Fluoride as F-	< 0.20	mg/l	20
Total Org.Carbon (Filt)	< 1.0	mg/l	41
pH	7.1	pH units	31
>> PAH SUITE <<			
naphthalene	< 0.020	µg/l	331
acenaphthene	< 0.020	µg/l	331
fluorene	< 0.020	µg/l	331
phenanthrene	< 0.020	µg/l	331
anthracene	< 0.020	µg/l	331
fluoranthene	0.026	µg/l	331
pyrene	< 0.020	µg/l	331
benzo(a)anthracene	< 0.020	µg/l	331
chrysene	< 0.020	µg/l	331
benzo(b)fluoranthene	< 0.020	µg/l	331
benzo(k)fluoranthene	< 0.020	µg/l	331

1510

Sample of

33

Laboratory Number
Report Number :

694278
CJG /C1100

Sample Source

Treherbert

Sample I.D.

WS4

Sample I.D.

0.00m

Sample Date

10/07/2005

Sample Received

12/07/2005

Analysis Complete

28/07/2005

Test Description	Result	Units	Method
benzo(a)pyrene	< 0.020	µg/l	331
dibenzo(ah)anthracene	< 0.020	µg/l	331
benzo(ghi)perylene	< 0.020	µg/l	331
indeno(123cd)pyrene	< 0.020	µg/l	331
PAH (Total)	< 0.200	µg/l	331

Appendix C

Dilution Factor Calculations For Tier 2 Groundwater Risk Assessment

Appendix D

SSL Reports for Naphthelene and Benzo(a)pyrene From the CLEA model

CONTAMINATED LAND EXPOSURE ASSESSMENT MODEL 2002

Prepared by the Centre for Research into the Built Environment, for the Environment Agency (1993 - 2002)

Summary of Results

User Name: Andrew StoneReport Date: 27/07/2005

Contaminant: BENZO(A)PYRENESimulation Date: 27/07/2005

Soil Concentration (mg/Kg): 1.313Chemical Type: Organic / Non-Threshold

Health Criteria Value: Index Dose: Residential without plant uptake

(mg/Kg bw / day): 2E-5

Background (mg/day): Not Applicable

Model Parameters

Entry Route: Oral

Applied Dose Data To: All Routes

No. of Iterations: 5000

Scenario Type: Residential

Receptor Used: Female height / weight database

Averaging Method: Elapsed exposure time

Dermal Uptake Routine: US EPA Model (1992)

Plant Uptake Routine: Briggs-Ryan

Building Type: Ground Bearing Slab

Flow Type: Pressure Driven Flow In Winter

Age Class: 1 To 6

Soil Type: Sandy

Soil PH: 7

Soil Organic Matter (%): 6

Molecular Weight (g): 252.3

Air Diffusivity (m2 /s): 5E-6

Exposure Routes Analysis

Route 1 : Soil ingestion pathway
Route 2 : Ingestion of indoor dust
Route 5 : Outdoor exposure to soil through skin contact pathway
Route 7 : Outdoor inhalation of fugitive dust pathway
Route 9 : Outdoor inhalation of soil vapour pathway

Average Contribution of Each Exposure Route to ADE

Exposure route	Contributions for each exposure route			
	Mean (%)	Standard Dev (%)	Minimum (%)	Maximum (%)
1	75.0	9.0	30.3	96.1
5	25.0	9.1	3.9	69.7
7	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0

CONTAMINATED LAND EXPOSURE ASSESSMENT MODEL 2002

Prepared by the Centre for Research into the Built Environment, for the Environment Agency (1993 - 2002)

Summary of Results

Contaminant: BENZO(A)PYRENE

Report Date: 27/07/2005

Simulation Date: 27/07/2005

Total Average Daily Exposure (mg/Kg bodyweight / day) Ratio of ADE/TDI at 95th percentile: 1.014

Age/class	Percentiles			
	99 th	95 th	90 th	50 th
1	8.55E-6	4.87E-6	3.45E-6	1.23E-6
2	1.66E-5	1.00E-5	7.86E-6	3.50E-6
3	2.08E-5	1.35E-5	1.11E-5	5.50E-6
4	2.40E-5	1.61E-5	1.35E-5	7.34E-6
5	2.71E-5	1.82E-5	1.54E-5	9.06E-6
6	2.97E-5	2.03E-5	1.74E-5	1.07E-5

CONTAMINATED LAND EXPOSURE ASSESSMENT MODEL 2002

Prepared by the Centre for Research into the Built Environment, for the Environment Agency (1993 - 2002)

Contaminant BENZO(A)PYRENE

Report Date: 27/07/2005
Simulation Date: 27/07/2005

Oral Settings

Tolerable Daily Intake (mg.kg-1.bw.day-1) N/A
Index Dose (mg.kg-1.bw.day-1) 2E-5
Adult Background Value (mg.day-1) N/A

Inhalation Settings

Tolerable Daily Intake (mg.kg-1.bw.day-1) N/A
Index Dose (mg.kg-1.bw.day-1) N/A
Adult Background Value (mg.day-1) N/A

Dermal Settings

Tolerable Daily Intake (mg.kg-1.bw.day-1) N/A
Index Dose (mg.kg-1.bw.day-1) N/A
Adult Background Value (mg.day-1) N/A

Miscellaneous Settings

Skin Permeability (cm.hr-1) 0.108
Air Diffusion Coefficient (m2.s-1) 5E-6
Water Diffusion Coefficient (m2.s-1) 5E-10
Water Solubility (mg.l-1) 0.0038
Experimental Organic Carbon Distribution Coefficient (l.kg-1) 1140000
Experimental Octanol-Water Partition Coefficient (log, dimensionless) 6.06
Relative Molecular Weight (g.mol-1) 252.3
Vapour Pressure at 20°C (Pa) 7E-7
Henry's Constant (Pa.m3.mol-1) 0.157
Henry's Constant (Dimensionless) 6.46E-5
Experimental Soil Water Distribution Coefficient (l.kg-1) N/A

CONTAMINATED LAND EXPOSURE ASSESSMENT MODEL 2002

Prepared by the Centre for Research into the Built Environment, for the Environment Agency (1993 - 2002)

Summary of Results

Contaminant: Naphthalene User Name: Andrew Stone Report Date: 13/07/2005
 Soil Concentration (mg/Kg): 1468.056 Chemical Type: Organic / Threshold Simulation Date: 13/07/2005
 Health Criteria Value: TDI Details: Residential without plant uptake
 (mg/Kg bw / day): 0.02
 Background (mg/day): 0.0098

Model Parameters

Entry Route: Oral Mean Daily Intakes:
 Applied Dose Data To: All Routes Oral: 0.007
 No. of Iterations: 5000 Dermal: N/A
 Scenario Type: Residential Inhalation: 0.0028
 Receptor Used: Female height / weight database
 Averaging Method: Elapsed exposure time Age Class: 1 To 6
 Dermal Uptake Routine: US EPA Model (1992) Soil Type: Sandy
 Plant Uptake Routine: Briggs-Ryan Soil PH: 7
 Building Type: Ground Bearing Slab Soil Organic Matter (%): 5
 Flow Type: Pressure Driven Flow In Winter Molecular Weight (g) : 128.2
 Air Diffusivity (m²/s) : 5.9E-6

Exposure Routes Analysis

Route 1 : Soil ingestion pathway
 Route 2 : Ingestion of indoor dust
 Route 5 : Outdoor exposure to soil through skin contact pathway
 Route 7 : Outdoor inhalation of fugitive dust pathway
 Route 9 : Outdoor inhalation of soil vapour pathway

Average Contribution of Each Exposure Route to ADE

Exposure route	Mean (%)	Standard Dev (%)	Contributions for each exposure route	Minimum (%)	Maximum (%)
1	93.3	2.5		77.3	99.1
5	1.4	0.7		0.2	6.3
7	0.0	0.0		-0.0	0.0
9	5.2	2.2		-0.7	20.6

Summary of Results

Contaminant : Naphthalene

Report Date: 13/07/2005

Simulation Date: 13/07/2005

Total Average Daily Exposure (mg/Kg bodyweight / day)

Ratio of ADE/TDI at 95th percentile : 0.997

Age/class	Percentiles				
	99 th	95 th	90 th	50 th	
1	1.01E-2	5.42E-3	3.90E-3	1.19E-3	
2	1.84E-2	1.05E-2	8.15E-3	3.28E-3	
3	2.12E-2	1.37E-2	1.09E-2	5.16E-3	
4	2.49E-2	1.64E-2	1.32E-2	6.84E-3	
5	2.69E-2	1.83E-2	1.52E-2	8.29E-3	
6	2.88E-2	1.99E-2	1.70E-2	9.59E-3	

CONTAMINATED LAND EXPOSURE ASSESSMENT MODEL 2002

Prepared by the Centre for Research into the Built Environment for the Environment Agency (1993 - 2002)

Contaminant Naphthalene
Oral Settings

Report Date: 13/07/2005
Simulation Date: 13/07/2005

Tolerable Daily Intake (mg.kg-1.bw.day-1) 0.02
Index Dose (mg.kg-1.bw.day-1) N/A
Adult Background Value (mg.day-1) 0.007

Inhalation Settings

Tolerable Daily Intake (mg.kg-1.bw.day-1) 0.00086
Index Dose (mg.kg-1.bw.day-1) N/A
Adult Background Value (mg.day-1) 0.0028

Dermal Settings

Tolerable Daily Intake (mg.kg-1.bw.day-1) N/A
Index Dose (mg.kg-1.bw.day-1) N/A
Adult Background Value (mg.day-1) N/A

Miscellaneous Settings

Skin Permeability (cm.hr-1) 1.39
Air Diffusion Coefficient (m2.s-1) 9E-6
Water Diffusion Coefficient (m2.s-1) 5E-10
Water Solubility (mg.l-1) 1
Experimental Organic Carbon Distribution Coefficient (l.kg-1) 244
Experimental Octanol-Water Partition Coefficient (log, dimensionless) 3.37
Relative Molecular Weight (g.mol-1) 128.2
Vapour Pressure at 20°C (Pa) 0.3
Henry's Constant (Pa.m3.mol-1) 198
Henry's Constant (Dimensionless) 1
Experimental Soil Water Distribution Coefficient (l.kg-1) 198

Appendix E
Envirocheck Report
Including
Historical Land Use

Envirocheck[®] Report

Datashheet

Report on:

Proposed Civic Amenity Site
Treharbert
Rhondda Cynon Taff

National Grid Reference :

294170, 197990

Prepared For :

Rhondda Cynon Taff C B C
Llwyn Caslan
Library Road
PONTYPRIDD
Rhondda Cynon Taff
CF37 2YA

Client Details:

Special Projects, Church
Street, Pontypriidd,

Your Reference:

Mr A Stone, E436

Summary
Agency & Hydrological
Waste
Hazardous Substances
Geological
Industrial Land Use
Sensitive Land Use
Data Currency
Data Suppliers & Copyright Statements
Useful Contacts
BGS Borehole Order Form

Introduction

The Environment Act 1985 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity Datasheet places great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from English Nature (and the Scottish and Welsh equivalents), the Environment Agency (and the Scottish equivalent) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the legend database to 1km from a single point or a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers

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Data Type	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological				
Air Pollution Controls				
Air Pollution Control Enforcements				
Contaminated Land Register Entries and Notices				
Discharge Consents		4	5	5
Enforcement and Prohibition Notices				
Integrated Pollution Controls				
Integrated Pollution Prevention And Control				
Nearest Surface Water Feature		Yes		
Pollution Incidents to Controlled Waters		1	3	4
Substantiated Pollution Incident Register				
Prosecutions Relating to Authorised Processes				
Prosecutions Relating to Controlled Waters				
Water Industry Act Referrals				
Registered Radioactive Substances				
River Quality		2		
River Quality Biology Sampling Points		1		
River Quality Chemistry Sampling Points				
Water Abstractions				(2)
Groundwater Vulnerability	Yes			
Source Protection Zones				
Extreme Flooding from Rivers or Sea without Defences	Yes			
Flooding from Rivers or Sea without Defences	Yes	Yes		
Areas Benefiting from Flood Defences				
Flood Water Storage Areas				
Flood Defences				
River Flood Data (Scotland)				
Waste				
BGS Recorded Landfill Sites				
Integrated Pollution Control Registered Waste Sites				
Licensed Waste Management Facilities (Landfill Boundaries)				
Licensed Waste Management Facilities (Locations)				
Local Authority Recorded Landfill Sites				
Registered Landfill Sites				
Registered Waste Transfer Sites				
Registered Waste Treatment or Disposal Sites				

Summary

Data Type	On Site	0 to 250m	251 to 500m	501 to 1000m ("up to 2000m)
Hazardous Substances				
Control of Major Accident Hazards Sites (COMAH)				
Explosive Sites				
Notification of Installations Handling Hazardous Substances (NIHS)				
Planning Hazardous Substance Consents				1
Planning Hazardous Substance Enforcements				
Geological				
BGS Boreholes		1	1	4
BGS Recorded Mineral Sites				
BGS 1:625 000 Solid Geology	Yes			
Brine Compensation Areas				
Coal Mining Affected Areas	Yes			
Shallow Mining Hazards	Yes			
Compressible Ground Subsidence Hazards	Yes			
Ground Dissolution Subsidence Hazards				
Gulls And Cambering Subsidence Hazards				
Landslip Subsidence Hazards	Yes	Yes		
Swelling Clay Subsidence Hazards				
Mining Instability	Yes			
Natural and Mining Cavities				3
Radon Affected Areas	Yes			
Radon Protection Measures	Yes			
Industrial Land Use				
Contemporary Trade Directory Entries		1	3	5
Fuel Station Entries		1		1

Data Type	On Site	0 to 250m	251 to 500m	501 to 1000m (up to 2000m)
Sensitive Land Uses				
Areas of Adopted Green Belt				
Areas of Unadopted Green Belt				
Areas of Outstanding Natural Beauty				
Environmentally Sensitive Areas				
Forest Parks				
Local Nature Reserves				
Marine Nature Reserves				
National Nature Reserves				
National Parks				
National Scenic Areas				
Nitrates Sensitive Areas				
Nitrates Vulnerable Zones				
Ramsar Sites				
Sites of Special Scientific Interest			1	
Special Areas of Conservation				
Special Protection Areas				

Map ID	Details		Compass Direction	Estimated Distance From Site	Contact NGR
Discharge Consents					
1	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Dwr Cymru Cyfyngedig Sewerage Network - Sewers - Water Company Treherbert - George Street Environment Agency, Welsh Region River Taff An0123801 1 20th October 1989 20th October 1989 4th March 1994 Unspecified Not Specified Rhondda Fawr Consent expired Located by supplier to within 10m	E	158	1 294320 197930
Discharge Consents					
2	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Dwr Cymru Cyfyngedig Sewerage Network - Sewers - Water Company Treherbert - Rear Of George St Environment Agency, Welsh Region River Taff AN0123801 1 20th October 1989 20th October 1989 Not Supplied Unspecified Freshwater Stream/River Rhondda Fawr New Consent, by Application (Water Resources Act 1991, Section 88) Located by supplier to within 100m	SE	189	1 294340 197900
Discharge Consents					
3	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Dwr Cymru Cyfyngedig Sewerage Network - Sewers - Water Company Treherbert - Junction Buile St/ Environment Agency, Welsh Region River Taff AE2018402 1 14th November 1963 14th November 1963 Not Supplied Unspecified Freshwater Stream/River Rhondda Fawr New Consent, by Application (Water Resources Act 1991, Section 88) Located by supplier to within 100m	N	192	1 294200 198180
Discharge Consents					
4	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Caradon Everest Ltd Undefined Or Other Cwmnaethen Street Treorchy Trehe Treorchy Treherbert Rhondda Cynon Taff Environment Agency, Welsh Region Not Supplied Ag0007001 1 22nd September 1981 22nd September 1981 Not Supplied Unspecified Freshwater Stream/River River Rhondda Fawr New Consent, by Application (Water Resources Act 1991, Section 88) Located by supplier to within 10m	NW	250	1 293970 198140

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Discharge Consents					
5	Operator: Dwr Cymru Cyfngedig Property Type: Sewerage Network - Sewers - Water Company Location: Treherbert Ind Estate Authority: Environment Agency, Welsh Region Catchment Area: River Taff Reference: AN0123701 Permit Version: 1 Effective Date: 20th October 1989 Issued Date: 20th October 1989 Revocation Date: 31st March 2003 Discharge Type: Unspecified Discharge: Freshwater Stream/River Environment: Freshwater Stream/River Receiving Water: Rhonda Fawr Status: Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 100m	NW	273	1	294000 198200
Discharge Consents					
5	Operator: Dwr Cymru Cyfngedig Property Type: Sewerage Network - Pumping Station - Water Company Location: Treherbert Ind Est Cso Treherbert Cso Treherbert Industrial Estate, Treherbert, Rhonda Cynon Taff Authority: Environment Agency, Welsh Region Catchment Area: Not Supplied Reference: AN0331801 Permit Version: 1 Effective Date: 31st March 2003 Issued Date: 4th March 2003 Revocation Date: Not Supplied Discharge Type: Public Sewage: Storm Sewage Overflow Discharge: Freshwater Stream/River Environment: Freshwater Stream/River Receiving Water: Afon Rhonda Fawr Status: New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 10m	NW	285	1	294010 198220
Discharge Consents					
6	Operator: Dwr Cymru Cyfngedig Property Type: Sewerage Network - Pumping Station - Water Company Location: Treherbert Pumping Station Park C/Park Close, Treherbert, Rhonda Cynon Taff Authority: Environment Agency, Welsh Region Catchment Area: River Taff Reference: AN0123601 Permit Version: 3 Effective Date: 25th March 2004 Issued Date: 24th March 2004 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Pumping Station - Water Company Discharge: Freshwater Stream/River Environment: Freshwater Stream/River Receiving Water: Rhonda Fawr Status: Varied by Application - (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 10m	NW	458	1	293900 198360

Map ID	Details		Compass Direction	Estimated Distance From Site	Contact	NGR
Discharge Consents						
6	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Dwr Cymru Cyfyngedig Sewerage Network - Pumping Station - Water Company Treherbert Pumping Station Park Cl Park Close, Treherbert, Rhondda Cynon Taff Environment Agency, Welsh Region River Taff AN0123601 3 25th March 2004 24th March 2004 Not Supplied Sewage Discharges - Sw Storm Overflow/Storm Tank - Water Company Freshwater Stream/River Rhondda Fawr Varied by Application - (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Located by supplier to within 10m	NW	458	1	293900 198360
Discharge Consents						
7	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Dwr Cymru Cyfyngedig Water Supply Grid Mount Libanus Environment Agency, Welsh Region Not Supplied AN0006901 1 2nd October 1989 2nd October 1989 14th March 1994 Unspecified Land/Soakaway Environment: Soakaway Consent expired Located by supplier to within 100m	NE	469	1	294400 198400
Discharge Consents						
8	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Dwr Cymru Cyfyngedig Sewerage Network - Sewers - Water Company Treherbert P's Cso Pk Close Treherbert Park Close, Treherbert, Rhondda Environment Agency, Welsh Region River Taff AN0123601 1 20th October 1989 20th October 1989 30th March 2000 Unspecified Freshwater Stream/River Rhondda Fawr Varied by Application - (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Located by supplier to within 10m	NW	544	1	293900 198480

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Discharge Consents					
8	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Sewers - Water Company Location: Treherbert Pw Cso Pk Close Treherbert Park Close Treherbert Rhondda Authority: Environment Agency, Welsh Region Catchment Area: River Taff Reference: AN0123601 Permit Version: 2 Effective Date: 31st March 2000 Issued Date: 20th October 1989 Revocation Date: 24th March 2004 Discharge Type: Sewage Discharges - Pumping Station - Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Rhondda Fawr Status: Varied by Application - (Water Resources Act 1991, Schedule 10 as amended by Environment Act 1995) Positional: Located by supplier to within 10m Accuracy:	NW	544	1	293300 198460
Discharge Consents					
9	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Sewers - Water Company Location: Treherbert - Opposite Railway Authority: Environment Agency, Welsh Region Catchment Area: River Taff Reference: AN0124001 Permit Version: 1 Effective Date: 20th October 1989 Issued Date: 20th October 1989 Revocation Date: Not Supplied Discharge Type: Unspecified Discharge: Freshwater Stream/River Environment: Receiving Water: Rhondda Fawr Status: New Consent, by Application (Water Resources Act 1991, Section 86) Positional: Located by supplier to within 100m Accuracy:	SE	647	1	294560 197470
Discharge Consents					
10	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network - Sewers - Water Company Location: Treherbert - Rear Ynyswen Rd N Authority: Environment Agency, Welsh Region Catchment Area: River Taff Reference: AE2018403 Permit Version: 1 Effective Date: 14th November 1963 Issued Date: 14th November 1963 Revocation Date: Not Supplied Discharge Type: Unspecified Discharge: Freshwater Stream/River Environment: Receiving Water: Rhondda Fawr Status: New Consent, by Application (Water Resources Act 1991, Section 86) Positional: Located by supplier to within 100m Accuracy:	SE	719	1	294750 197560
Discharge Consents					
11	Operator: Griffin Windows Property Type: Undefined Or Other Location: Ynyswen Industrial Site Treherty Authority: Environment Agency, Welsh Region Catchment Area: River Taff Reference: AN0244601 Permit Version: 1 Effective Date: 22nd October 1993 Issued Date: 22nd October 1993 Revocation Date: Not Supplied Discharge Type: Trade Effluent Discharge: Freshwater Stream/River Environment: Receiving Water: River Rhondda Via Surface Water Status: New Consent, by Application (Water Resources Act 1991, Section 86) Positional: Located by supplier to within 100m Accuracy:	SE	876	1	294900 197500

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Pollution Incidents to Controlled Waters					
12	Property Type: Not Given Location: Blaen Rhondda School & New Inn, TREHERBERT Authority: Environment Agency, Welsh Region Pollutant: Miscellaneous - Vehicles Note: River Rhondda Fawr Incident Date: 13th March 1998 Incident Reference: 35110 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Severity of Incident: Category 3 - Minor Incident Positional Accuracy: Unknown	S	93	1	294200 197900
Pollution Incidents to Controlled Waters					
13	Property Type: Not Given Location: Off Station Street, Treherbet Authority: Environment Agency, Welsh Region Pollutant: Rubble/Litter Or Solids Note: Deliberate; River Rhondda Incident Date: 18th November 1998 Incident Reference: 37255 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Spillage Severity of Incident: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	NW	343	1	293950 198250
Pollution Incidents to Controlled Waters					
14	Property Type: Not Given Location: Bridge At Ty Isaf Road, GELLU Authority: Environment Agency, Welsh Region Pollutant: Oils - Diesel (Including Agricultural) Note: Not Supplied Incident Date: 17th May 1997 Incident Reference: 32870 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Severity of Incident: Category 3 - Minor Incident Positional Accuracy: Unknown	NW	414	1	293900 198300
Pollution Incidents to Controlled Waters					
15	Property Type: Not Given Location: Behind Meals On Wheels Building, Baglan Field Authority: Environment Agency, Welsh Region Pollutant: Rubble/Litter Or Solids Note: River Rhondda Fawr; Direct Introduction Incident Date: 18th February 1998 Incident Reference: 34763 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Vandalism Severity of Incident: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	SE	450	1	294400 197600
Pollution Incidents to Controlled Waters					
16	Property Type: Warehouses Location: Ynyswen Str/Clinic Authority: Environment Agency, Welsh Region Pollutant: Light Oil Note: Vandalism Incident Date: 18th March 1992 Incident Reference: 3355 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Leakage Severity of Incident: Category 2 - Significant Incident Positional Accuracy: Located by supplier to within 100m	SE	892	1	294950 197550

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Pollution Incidents to Controlled Waters					
17	Property Type: Not Given Location: Brynhyfryd Street, YNYSWEN Authority: Environment Agency, Welsh Region Pollutant: Oil - Diesel (including Agricultural Accident) Note: 28th March 1997 Incident Date: 31908 Incident Reference: Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Leakage Severity of Incident: Category 3 - Minor Incident Positional: Located by supplier to within 100m Accuracy:	SE	914	1	295000 197600
Pollution Incidents to Controlled Waters					
18	Property Type: Waste Handling Facilities Location: Factories, Ynyswen, Treorchy Road Authority: Environment Agency, Welsh Region Pollutant: Crude Sewage Note: Inadequate Design/Capacity Incident Date: 24th July 1995 Incident Reference: 25201 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Leakage Severity of Incident: Category 3 - Minor Incident Positional: Located by supplier to within 100m Accuracy:	SE	961	1	295000 197500
Pollution Incidents to Controlled Waters					
18	Property Type: Waste Handling Facilities Location: Ynyswen, TREORCHY Authority: Environment Agency, Welsh Region Pollutant: Light Oil Note: Inadequate Design/Capacity Incident Date: 24th July 1995 Incident Reference: 25201 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Leakage Severity of Incident: Category 3 - Minor Incident Positional: Located by supplier to within 100m Accuracy:	SE	963	1	295000 197500
River Quality					
Name: Rhonda Fawr GOA Grade: River Quality A Reach: Conf Nant Saerren-Conf Afon Selsig Estimated Distance of Reach (km): 1.8 Flow Rate: Flow less than 1.25 cumecs Flow Type: River Year: 2000	NE	105	1	294250 198050	
River Quality					
Name: Rhonda Fawr GOA Grade: River Quality A Reach: Conf Nant Lan - Conf Nant Saerren Estimated Distance of Reach (km): 4.5 Flow Rate: Flow less than 2.5 cumecs Flow Type: River Year: 2000	E	144	1	294320 197990	

Cymraeg27 June 2005



Environment Agency

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River quality

See also...		River quality (chemistry)									
Water		Site details:									
What is the WFD?		River name									
We are not responsible for the content of other web sites		River stretch									
		Years									
		Upstream grid ref.									
		Downstream grid ref.									
		Length									
		Sampling results:									
			Average	Standard deviation	Percentile 90	Percentile 10				Number of samples	
		Biochemical oxygen demand (mg/l)	.79	.35	1.24					30	
		Ammonia (mgN/l)	.033	.022	.061					30	
		Dissolved oxygen (percentage saturation)	96.14	5.74		88.78				30	
		View map of this location									
		Download this data									

Map ID	Details		Compass Direction	Estimated Distance From Site	Contact	NGR
River Quality Biology Sampling Points						
19	Name: Rhydola Fawr		E	28	1	294200
	Reach: Confluence Nant Ian - Confluence Nant Saelwren					198000
	Estimated Distance: 4.50					
	Positional: Located by supplier to within 100m					
	Accuracy: Year: 1990					
	GQA Grade: River Quality Biology GQA Grade B - Good					
	Year: 1995					
	GQA Grade: River Quality Biology GQA Grade C - Fairly Good					
	Year: 2000					
	GQA Grade: River Quality Biology GQA Grade B - Good					
	Year: 2002					
	GQA Grade: River Quality Biology GQA Grade B - Good					
	Year: 2003					
	GQA Grade: River Quality Biology GQA Grade B - Good					
Water Abstractions						
	Operator: Dwr Cymru Cyf		NW	1622	1	293510
	Licence Number: 21/57/24/0007					199470
	Permit Version: 100					
	Location: Nant Ystrad Ffienol At Treherbert					
	Authority: Environment Agency, Welsh Region					
	Abstraction: Public Water Supply, Potable Water Supply - Direct					
	Abstraction Type: Water may be abstracted from a single point					
	Source: Surface					
	Daily Rate (m3): Not Supplied					
	Yearly Rate (m3): Not Supplied					
	Details: Nant Ystrad Ffienol					
	Authorised Start: 01 January					
	Authorised End: 31 December					
	Permit Start Date: 7th February 2003					
	Permit End Date: Not Supplied					
	Positional: Located by supplier to within 100m					
	Accuracy:					
Water Abstractions						
	Operator: Dwr Cymru Cyf		S	1830	1	294150
	Licence Number: 21/57/24/0009					196160
	Permit Version: 100					
	Location: Spring At Cwmparc					
	Authority: Environment Agency, Welsh Region					
	Abstraction: Public Water Supply, Potable Water Supply - Direct					
	Abstraction Type: Water may be abstracted from a single point					
	Source: Surface					
	Daily Rate (m3): Not Supplied					
	Yearly Rate (m3): Not Supplied					
	Details: Spring At Cwmparc					
	Authorised Start: 01 January					
	Authorised End: 31 December					
	Permit Start Date: 16th April 1990					
	Permit End Date: Not Supplied					
	Positional: Located by supplier to within 100m					
	Accuracy:					
Groundwater Vulnerability						
	Geological Classification: Minor Aquifer (Variably permeable) - These can be fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and in supplying base flow to rivers		-	0	1	294170
	Soil Classification: Soils of High Leaching Potential (U) - Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) assumed, until proved otherwise					197990
	Map Sheet: Sheet 36 Mid Glamorgan					
	Scale: 1:100,000					
Drift Deposits						
	Description: None		-	-	-	-
Extreme Flooding from Rivers or Sea without Defences						
	Flood Plain Type: Fluvial		-	0	1	294170
	Source: Environment Agency, Head Office					197990
	Boundary Accuracy: As Supplied					

A Landmark Information Group Service

Report Reference: 11746031-1-1

Date: 15-Jun-2005

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Flooding from Rivers or Sea without Defences					
Flood Plain Type:	Fluvial	-	0	1	294170
Source:	Environment Agency, Head Office				197990
Boundary Accuracy:	As Supplied				
Flooding from Rivers or Sea without Defences					
Flood Plain Type:	Fluvial	E	68	1	294340
Source:	Environment Agency, Head Office				198000
Boundary Accuracy:	As Supplied				
Flooding from Rivers or Sea without Defences					
Flood Plain Type:	Fluvial	SE	167	1	294290
Source:	Environment Agency, Head Office				197850
Boundary Accuracy:	As Supplied				
Flooding from Rivers or Sea without Defences					
Flood Plain Type:	Fluvial	SE	234	1	294300
Source:	Environment Agency, Head Office				197790
Boundary Accuracy:	As Supplied				
Flooding from Rivers or Sea without Defences					
Flood Plain Type:	Fluvial	SE	248	1	294300
Source:	Environment Agency, Head Office				197780
Boundary Accuracy:	As Supplied				
Areas Benefiting from Flood Defences					
Description	None	-	-	-	-
Flood Water Storage Areas					
Description	None	-	-	-	-
Flood Defences					
Description	None	-	-	-	-
River Flood Data (Scotland)					
Description	None	-	-	-	-

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Local Authority Landfill Coverage					
Name:	Rhondda Cynon Taff County Borough Council - Has supplied landfill data	-	0	2	294170 197990

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Planning Hazardous Substance Consents					
20	Name: C W Rees	SE	704	3	294690
	Location: Units 1-5 Ynyswen Industrial Estate, TREORCHY West Glamorgan CF42 6EP				197510
	Authority: Rhondda Cynon Taff County Borough Council, Planning Department				
	Application Ref: 54/9/20987				
	Hazardous Substance: Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15 tonnes				
	Maximum Quantity: 24 Part C, Flammable Substance (Not in Parts A&B), Gas or gases flammable in air, when held as a gas, where amount held is >= 15 tonnes				
	Application date: 26th July 1993				
	Decision: Deemed consent granted between June 1992 and November 1992				
	Positional: Automatically positioned to the address				
	Accuracy:				

Map ID	Details		Compass Direction	Estimated Distance From Site	Contact	NGR
BGS Boreholes						
21	BGS Reference: Ss99nw10 Drilled Length (m): 193.67 Borehole Name: Lady Margaret Pit		W	180	4	294000 197840
BGS Boreholes						
22	BGS Reference: Ss99nw48 Drilled Length (m): Not Supplied Borehole Name: Cwmaberbron, Trial Pit		SW	419	4	293800 197800
BGS Boreholes						
23	BGS Reference: Ss99nw24 Drilled Length (m): 302.25 Borehole Name: Yaysfaie Colliery, No.3 Pit		E	579	4	294740 197870
BGS Boreholes						
23	BGS Reference: Ss99nw25 Drilled Length (m): 298.7 Borehole Name: Yaysfaie Colliery, No.4 Pit		E	609	4	294770 197850
BGS Boreholes						
24	BGS Reference: Ss99nw11 Drilled Length (m): 152.6 Borehole Name: Bute Colliery		NW	799	4	293500 198420
BGS Boreholes						
24	BGS Reference: Ss99nw76 Drilled Length (m): 160.05 Borehole Name: Bute Colliery		NW	808	4	293490 198420
BGS 1:825,000 Solid Geology						
Description:	Lower Westphalian (mainly Productive Coal Measures)		-	0	4	294170 197990
Coal Mining Affected Areas						
Description:	In an area which may be affected by coal mining activity. It is recommended that a coal mining report is obtained from the Coal Authority. Contact details are included in the Useful Contacts section of this report.		-	0	5	294170 197890
Shallow Mining Hazards						
Risk:	Low-Moderate		-	0	4	294170
Source:	British Geological Survey, National Geoscience Information Service					197890
Compressible Ground Subsidence Hazards						
Risk:	Moderate-High		-	0	4	294170
Source:	British Geological Survey, National Geoscience Information Service					197990
Ground Dissolution Subsidence Hazards						
Description	No Hazard		-	-	-	-
Gullies And Cambering Subsidence Hazards						
Description	No Hazard		-	-	-	-
Landslip Subsidence Hazards						
Risk:	Moderate		-	0	4	294170
Source:	British Geological Survey, National Geoscience Information Service					197990
Landslip Subsidence Hazards						
Risk:	Moderate		SW	214	4	294020
Source:	British Geological Survey, National Geoscience Information Service					197840
Swelling Clay Subsidence Hazards						
Description	No Hazard		-	-	-	-
Mining Instability						
Mining Evidence:	Inconclusive Coal Mining		-	0	-	294170
Source:	Ove Arup & Partners					197890
Boundary Quality:	As Supplied					

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Natural and Mining Cavities					
Cavity Type:	Gulls fissures due to canbering - fissure formed by land slipping along valley sides	SW	540	6	293800
Origin:	Natural				197600
Cavity Number:	1				
Commodity:	Not Supplied				
Postional:	Located by supplier to within 100m				
Accuracy:					
Natural and Mining Cavities					
Cavity Type:	Gulls fissures due to canbering - fissure formed by land slipping along valley sides	SW	540	6	293800
Origin:	Natural				197600
Cavity Number:	1				
Commodity:	Not Supplied				
Postional:	Located by supplier to within 100m				
Accuracy:					
Natural and Mining Cavities					
Cavity Type:	Cavities within fault zones	S	821	6	294400
Origin:	Natural				197200
Cavity Number:	1				
Commodity:	Not Supplied				
Postional:	Located by supplier to within 100m				
Accuracy:					
Radon Affected Areas					
Description:	Less than 1% of homes are above the Action Level	-	0	7	294170
Source:	National Radiological Protection Board				197990
Radon Protection Measures					
Type:	No radon protective measures are necessary	-	0	4	294170
Source:	British Geological Survey, National Geoscience Information Service				197990

Map ID	Details		Compass Direction	Estimated Distance From Site	Contact	NGR
Contemporary Trade Directory Entries						
25	Name: Location: Classification: Status: Positional Accuracy:	Treherbert Motors Bute Street,Treherbert,Treorchy,Mid Glamorgan,CF42 5NY Garage Services Active Automatically positioned to the address	N	178	-	294190 198170
Contemporary Trade Directory Entries						
26	Name: Location: Classification: Status: Positional Accuracy:	R & D Thomas 47,Bute Street,Treherbert,Treorchy,Mid Glamorgan,CF42 5NR Coal & Smokeless Fuel Merchants & Distributors Active Automatically positioned to the address	N	309	-	294100 198290
Contemporary Trade Directory Entries						
27	Name: Location: Classification: Status: Positional Accuracy:	P Thomas & Son 138,Bute Street,Treherbert,Treorchy,Mid Glamorgan,CF42 5PD Car Body Repairs Inactive Automatically positioned to the address	NW	354	-	294020 198310
Contemporary Trade Directory Entries						
28	Name: Location: Classification: Status: Positional Accuracy:	Rhonda Damp Proofing Ltd Forest View,Bagian Street,Treherbert,Treorchy,Mid Glamorgan,CF42 5AW Damp & Dry Rot Control Active Automatically positioned to the address	SE	397	-	294540 197820
Contemporary Trade Directory Entries						
29	Name: Location: Classification: Status: Positional Accuracy:	Celtic Coffins Unit 9,Ynyawen Ind Est,Treorchy,Mid Glamorgan,CF42 6EP Coffin Manufacturers Active Manually positioned to the address or location	SE	647	-	294650 197550
Contemporary Trade Directory Entries						
30	Name: Location: Classification: Status: Positional Accuracy:	Baker & Sons Abertoniwyd St,Treherbert,Treorchy,Mid Glamorgan,CF42 5PF Garage Services Active Manually positioned to the road within the address or location	NW	686	-	293750 198530
Contemporary Trade Directory Entries						
31	Name: Location: Classification: Status: Positional Accuracy:	Mike'S Cleaning Services 32,Dunraven Street,Treherbert,Treorchy,Mid Glamorgan,CF42 5BG Commercial Cleaning Services Active Automatically positioned to the address	NW	696	-	293670 198470
Contemporary Trade Directory Entries						
32	Name: Location: Classification: Status: Positional Accuracy:	G M Gas Supplies Ltd Unit 5,Ynyawen Ind Est,Treorchy,Mid Glamorgan,CF42 6EP Gas Suppliers Active Manually positioned to the address or location	SE	747	-	294730 197490
Contemporary Trade Directory Entries						
33	Name: Location: Classification: Status: Positional Accuracy:	New Road Garage Abertoniwyd Street,Treherbert,Treorchy,Mid Glamorgan,CF42 5PF Garage Services Active Automatically positioned to the address	NW	778	-	293690 198600

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
Fuel Station Entries					
34	Name: Trehernbert Motors Location: Bula Street, Trehernbert, TREGORCHY, Mid Glamorgan, CF42 5NY Brand: Out Of Industry Premises Type: Petrol Station Status: Out Of Industry Positional: Automatically positioned to the address Accuracy:	N	172	-	284190 198160
Fuel Station Entries					
35	Name: New Road Garage Location: Abernethiwyd Street, Trehernbert, TREGORCHY, Mid Glamorgan, CF42 5PF Brand: Unbranded Premises Type: Petrol Station Status: Open Positional: Automatically positioned to the address Accuracy:	NW	778	-	293690 198600

Map ID	Details	Compass Direction	Estimated Distance From Site	Contact	NGR
	Sites of Special Scientific Interest Name: Mynydd Ty-lsaf, Rhondda Multiple Area: N Area (m2): 3285379.75 Source: Countryside Council for Wales Reference: 538/33WJ Designation Details: Biological Designation Date: 1st January 1972 Date Type: Renitified	W	375	B	293800 197980

Data Type	Version	Update Cycle
Agency & Hydrological		
Air Pollution Controls		
Rhondda Cynon Taff County Borough Council Public Health and Protection Division	April-2005	Annual Rolling Update
Air Pollution Control Enforcements		
Rhondda Cynon Taff County Borough Council Public Health and Protection Division	April-2005	Annual Rolling Update
Discharge Consents		
Environment Agency Welsh Region	April-2005	Bi-Annually
Integrated Pollution Controls		
Environment Agency Welsh Region	April-2005	Quarterly
Integrated Pollution Prevention And Control		
Environment Agency Welsh Region	April-2005	Quarterly
Pollution Incidents to Controlled Waters		
Environment Agency Welsh Region	December-1998	Not Applicable
Substantiated Pollution Incident Register		
Environment Agency - Welsh Region South East Area	April-2005	Quarterly
Water Industry Act Referrals		
Environment Agency Welsh Region	April-2005	Quarterly
Registered Radioactive Substances		
Environment Agency Welsh Region	January-2005	Quarterly
River Quality		
Environment Agency Head Office	November-2001	Not Applicable
River Quality Biology Sampling Points		
Environment Agency Head Office	October-2004	Annually
River Quality Chemistry Sampling Points		
Environment Agency Head Office	December-2004	Annually
Water Abstractions		
Environment Agency Welsh Region	April-2005	Bi-Annually
Groundwater Vulnerability		
Environment Agency Head Office	January-1999	Not Applicable
Drift Deposits		
Environment Agency Head Office	January-1999	Not Applicable
Source Protection Zones		
Environment Agency Head Office	April-2005	Variable
Extreme Flooding from Rivers or Sea without Defences		
Environment Agency Head Office	February-2005	Quarterly
Flooding from Rivers or Sea without Defences		
Environment Agency Head Office	February-2005	Quarterly

Data Type	Version	Update Cycle
Agency & Hydrological		
Areas Benefiting from Flood Defences		
Environment Agency Head Office	February 2005	Quarterly
Flood Water Storage Areas		
Environment Agency Head Office	February 2005	Quarterly
Flood Defences		
Environment Agency Head Office	February 2005	Quarterly
River Flood Data (Scotland)		
Centre for Ecology and Hydrology	September 1999	Not Applicable

Data Type	Version	Update Cycle
Waste		
BGIS Recorded Landfill Sites		
British Geological Survey National Geoscience Information Service	June-1996	Not Applicable
Integrated Pollution Control Registered Waste Sites		
Environment Agency Welsh Region	April-2005	Quarterly
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - Welsh Region South East Area	April-2005	Bi-Annually
Licensed Waste Management Facilities (Locations)		
Environment Agency - Welsh Region South East Area	April-2005	Bi-Annually
Local Authority Landfill Coverage		
Rhondda Cynon Taff County Borough Council	May-2000	Not Applicable
Local Authority Recorded Landfill Sites		
Rhondda Cynon Taff County Borough Council	May-2000	Not Applicable
Registered Landfill Sites		
Environment Agency - Welsh Region South East Area	March-2003	Variable
Registered Waste Transfer Sites		
Environment Agency - Welsh Region South East Area	March-2003	Variable
Registered Waste Treatment or Disposal Sites		
Environment Agency - Welsh Region South East Area	March-2003	Variable

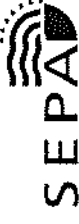
Data Type	Version	Update Cycle
Hazardous Substances		
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	May-2001	Variable
Explosive Sites		
Health and Safety Executive	April-2005	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November-2000	Not Applicable
Planning Hazardous Substance Consents		
Rhondda Cynon Taff County Borough Council Planning Department	March-2004	Annual Rolling Update
Planning Hazardous Substance Enforcements		
Rhondda Cynon Taff County Borough Council Planning Department	March-2004	Annual Rolling Update

Data Type	Version	Update Cycle
Geological		
BGS Boreholes		
British Geological Survey National Geoscience Information Service	March-2005	Quarterly
BGS Recorded Mineral Sites		
British Geological Survey National Geoscience Information Service	April-2005	Bi-Annually
BGS 1:625,000 Solid Geology		
British Geological Survey National Geoscience Information Service	August-1998	Not Applicable
Coal Mining Affected Areas		
The Coal Authority Mining Report Service	December-2003	As notified
Shallow Mining Hazards		
British Geological Survey National Geoscience Information Service	August-2002	Variable
Compressible Ground Subsidence Hazards		
British Geological Survey National Geoscience Information Service	August-2002	Variable
Ground Dissolution Subsidence Hazards		
British Geological Survey National Geoscience Information Service	August-2002	Variable
Gulls And Cambering Subsidence Hazards		
British Geological Survey National Geoscience Information Service	August-2002	Variable
Landslip Subsidence Hazards		
British Geological Survey National Geoscience Information Service	August-2002	Variable
Swelling Clay Subsidence Hazards		
British Geological Survey National Geoscience Information Service	August-2002	Variable
Mining Instability		
Ove Amap & Partners	October-2009	Not Applicable
Natural and Mining Cavities		
Peter Brett Associates Consulting Engineers	October-2001	Variable
Radon Affected Areas		
National Radiological Protection Board	January-2003	Not Applicable
Radon Protection Measures		
British Geological Survey National Geoscience Information Service	August-2002	Variable

Data Type	Version	Update Cycle
Industrial Land Use		
Contemporary Trade Directory Entries		
Thomson Directories	March-2005	Bi-Annually
Fuel Station Entries		
Catalist Ltd (Fuel Station Data)	February-2005	Quarterly

Data Type	Version	Update Cycle
Sensitive Land Uses		
Areas of Outstanding Natural Beauty		
Countryside Council for Wales	February-2005	Bi-Annually
Environmentally Sensitive Areas		
The National Assembly for Wales GI Services (Department of Planning & Countryside)	January-2005	Annually
Forest Parks		
Forestry Commission	April-1997	Not Applicable
Local Nature Reserves		
Bridgend County Borough Council	February-2005	Bi-Annually
Neath Port Talbot County Borough Council	February-2005	Bi-Annually
Rhondda Cynon Taff County Borough Council	February-2005	Bi-Annually
Marine Nature Reserves		
Countryside Council for Wales	February-2005	Bi-Annually
National Nature Reserves		
Countryside Council for Wales	February-2005	Bi-Annually
National Parks		
The National Assembly for Wales GI Services (Department of Planning & Countryside)	December-2004	Annually
Nitrate Sensitive Areas		
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	December-2003	Not Applicable
Nitrate Vulnerable Zones		
The National Assembly for Wales GI Services (Department of Planning & Countryside)	January-2004	Annually
Ramsar Sites		
Countryside Council for Wales	February-2005	Bi-Annually
Sites of Special Scientific Interest		
Countryside Council for Wales	February-2005	Bi-Annually
Special Areas of Conservation		
Countryside Council for Wales	February-2005	Bi-Annually
Special Protection Areas		
Countryside Council for Wales	February-2005	Bi-Annually

Some of the organisations who provide data which is used within the report

Ordnance Survey	 Licensed Partner
Environment Agency	 ENVIRONMENT AGENCY
Scottish Environment Protection Agency	 SEPA Scottish Environment Protection Agency
The Coal Authority	 THE COAL AUTHORITY
British Geological Survey	 British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
Centre for Ecology and Hydrology	 Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL
Countryside Council for Wales	 CYNGOR CEFN GWLAD CYMRU COUNTRYSIDE COUNCIL FOR WALES
Scottish Natural Heritage	 SCOTTISH NATURAL HERITAGE
English Nature	 ENGLISH NATURE
National Radiological Protection Board	 nrpb National Radiological Protection Board
Ove Arup	 ARUP

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Contact	Name and Address	
1	Environment Agency National Customer Contact Centre (NCCC) PO Box 544 Templeborough Rotherham S60 1BY enquiries@environment-agency.gov.uk	Telephone 08708 506 506
2	Rhondda Cynon Taff County Borough Council Headquarters - The Pavilions Cambrian Park Clydach Vale Rhondda CF40 2XX www.rhondda-cynon-taff.gov.uk	Telephone 01443 424000 Fax 01443 424024
3	Rhondda Cynon Taff County Borough Council Planning Department The Pavilions Cambrian Park Clydach Vale CF40 2XX www.rhondda-cynon-taff.gov.uk	Telephone 01443 494700 Fax 01443 424024
4	British Geological Survey Enquiry Service British Geological Survey Kingsley Dunham Centre Keyworth Nottingham Nottinghamshire NG12 5GG enquiries@bgs.ac.uk	Telephone 0115 936 3143 Fax 0115 936 3276
5	The Coal Authority Mining Report Service 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG thecoalauthority@coal.gov.uk	Telephone 0845 7626848 DX 716176 Mansfield 5

Contact	Name and Address	
6	Peter Brett Associates Consulting Engineers 16 Westcote Road Reading Berkshire RG30 2DE snook@pba.co.uk www.pba.co.uk	Telephone 0118 950 8777 Fax 0118 950 8198
7	National Radiological Protection Board Chilton Didcot Oxfordshire OX11 0RQ	Telephone 01235 831600 Fax 01235 833891
8	Countryside Council for Wales Plas Penrhos Fford Penrhos Bangor Gwynedd LL57 2LQ	Telephone 01248 385500 Fax 01248 355782
	Catalist Ltd (Fuel Station Data) Richmond House 22 Richmond Hill Clifton Bristol Avon BS8 1BA Mark@catalist-uk.com	Telephone 0117 923 7113 Fax 0117 923 7166
	Landmark Information Group Limited 5 - 7 Abbey Court Eagle Way Sowton Exeter Devon EX2 7HY mailbox@landmark-information.co.uk www.landmark-information.co.uk	Telephone 01392 441702 Fax 01392 441709

Please note that the Environment Agency/SEPA have a charging policy in place for enquiries



**British
Geological Survey**
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ref no: 156R/.....J.....

Your ref/order no. (if required):

BOREHOLE RECORDS ORDER FORM

Please note this order form is only to be used for the supply of borehole records from the National Geological Records Centre (NGRC) identified from Landmark Reports

Name:-	Company:-
Address:-	

Telephone Number:-

Fax Number:-

Date:-

With respect to the following boreholes I would like to: ~

Enquire about the costs ☐ Purchase copies ☐ New Leaflet ☐

BGS registration number:

For

[illegible]

Note: More than 10 records can be ordered, but it is advisable to discuss your requirements first with NGRC staff

Unit price £13(+VAT) per borehole. Minimum charge £26(+VAT)

Method of delivery, please indicate preferred option.

1st class post ☐ Special delivery (guaranteed next day before 12.30pm.) ☐ Fax ☐
(Nide 1st. class postage is included in the unit charge. Additional charges are made for fax or special delivery)

Please return this form to: - The Records Officer, National Geological Records Centre, British Geological Survey, Keyworth, Nottingham, NG12 5GG.
Tel: 0115936 3109 Fax: 0115936 3276

Tel: 0115936 3109 Fax: 0115936 3276
E-mail: ngis@bgs.ac.uk

LANDMARK TERMS AND CONDITIONS

Definitions

"Account" means the credit account established by a Member with Landmark.
"Agreement" means the agreement between Ourselves created by Your acceptance of these Terms.
"Authorized Reseller" means an agent or reseller of Landmark whom Landmark has duly appointed to resell its Reports and Services.
"Client" means the individual or organization to whom You provide professional services and/or Your professional advisors where applicable.
"Content" means any data, computing and information services and software, and other content and documentation or support materials and updates included in and/or supplied by or through the Websites, in Reports or Services or in any other way by Landmark and shall include Landmark developed and Third Party Content.
"Designated Users" means individuals appointed by Members to transact across the Member's Account.
"Intellectual Property Rights" means all forms of intellectual property or protective rights recognised in law.
"Member" means the person, firm or organisation who establishes and/or uses the Account.
"Order" means the request for Services from Landmark by You.

"Property Site" means a land site on which a Member requests Landmark provide either a Report or any other Service.
References to "We", "Us" and "Our" are references to Landmark Information Group Limited ("Landmark"), whose registered office is 7 Abbey Court, Eagle Way, Esher, EX2 7NY. Where You are not ordering the Services directly from Landmark, but from an Authorised Reseller, references to "Landmark" or "We" "Us" and "Our" shall be construed so as to mean either Landmark and/or the Authorised Reseller as the context shall indicate.
References to **"You/Your/Yourself"** refer to the contracting party who places an Order with Landmark and for whom the Services are to be provided by Landmark.

"Report" includes any information that Landmark supplies to You including all reports, services, datasets, software or information contained in them.
"Services" means the provision of any service by Landmark pursuant to these Terms which at the sole discretion of Landmark, may be time limited, for the purposes of evaluation only, offer reduced functionality, offer limited access to the Content, or be free of charge including but not limited to the report(s), data, information or other services undertaken by Landmark.

"Landmark Fees" means any charges levied by Landmark for Services provided to You.
"Suppliers" means any organisation who provides data or information of any form to Landmark.

"Third Party Content" means the services, software, information and other content or functionality provided by third parties and linked to or contained in the Services.
"Websites" means websites hosted by Landmark and includes the Content and any report, service, document, data-set, software or information contained therein, derived there from or thereby.

1. Terms and Conditions

a. These Terms govern the relationship between You and Landmark whether You are an unregistered visitor to the Website or a registered Member purchasing Landmark products or Services from Landmark.

b. Where these Terms are not expressly accepted by You they will be deemed to have been accepted by You, and You agree to be bound by these Terms when You place any Order, or pay for any Services provided or Reports ordered.

c. If the person communicating with Landmark is an Authorised Reseller, they must ensure that You agree to these Terms.

d. The headings in these Terms are for convenience only and shall not affect the meaning or interpretation of any part of these Terms.

e. We may modify these Terms, and may discontinue or revise any or all other aspects of the Services at our sole discretion, with immediate effect and without prior notice. Any amendment or variation to these Terms shall be posted on our Websites. Continued use of the Services by You shall be deemed an acceptance by You to be bound by any such amendments to the Terms.

f. Landmark reserves the right to refuse to supply Services to You or any other potential client without notice or reason.

2. Reports

Whilst Landmark will use reasonable care and skill in providing the Services to You the Services are provided on the express basis that You acknowledge and agree to the following:-

a. The Information and data supplied in the Services are derived from publicly available records and other third party sources and Landmark does not warrant the accuracy or completeness of such information or data; and

b. The Information and data supplied in the Services are derived solely from those sources specifically cited in the Report. Landmark does not claim that these sources represent an exhaustive or comprehensive list of all sources that might be consulted; and

c. Landmark does not guarantee that all past or current land uses or features will be identified in the Report; and the Services provided by Landmark are professional business to business services and not intended for use or interpretation by persons other than professional persons skilled in the use of property and environmental information; and

e. Landmark shall not be responsible for error or corruption in the Report resulting from inaccuracy or omission in primary or secondary information and data, inaccurate processing of information and data by third parties, computer malfunction or corruption of data whilst in the course of conversion, geo-coding, processing by computer or electronic means, or in the course of transmission by telephone or other communication link, or printing.

f. Landmark reserves the right, without limitation, to change the Reports or Services on offer at any time.

3. Intellectual Property

a. You acknowledge that all Intellectual Property Rights in the Report and Services are and shall remain owned by either Landmark or our Suppliers and nothing in these Terms purports to transfer, assign or grant any rights to You in respect of the Intellectual Property Rights.

b. Subject to clause 6.f, You are entitled to make the following use of the Services and Reports subject always to these Terms and You may, without further charge, make the Report or Services available to:
i. any person who purchases the whole of the Property Site;
ii. any person who provides funding secured on the whole of the Property Site;

iii. any person for whom You act in a professional or commercial capacity, and
iv. any person who acts for You in a professional or commercial capacity.

Accordingly Landmark shall have the same duties and obligations to those persons in respect of the Services as it has to You.

c. Each of those persons referred to in Clause 3.b. shall have the benefit and the burden of Your rights and obligations under these Terms. The limitations of Clause 3.b., and Landmark excludes all liability to all other persons unless Landmark has expressly agreed in writing to the assignment of the benefit of the Report and has been paid Landmark's reasonable fees for so doing.

d. All Parties given access to the Services agree that they will treat as strictly private and confidential the Services and all information which they obtain from the Services and shall restrict any disclosure to employees or professional advisors to enable the relevant party to conduct its internal business. The requirement in this clause to treat the Services as confidential shall include a requirement to maintain adequate security measures to safeguard the Services from unauthorised access, use or copying.

e. Each recipient of the Services agrees (and agrees it will cause its employees, agents or contractors who may from time to time have access to the Services to agree) it will not, except as permitted herein or by separate agreement with Landmark:-

i. effect or attempt to effect any modification, merger or change to the Service, nor permit any other person to do so, or
ii. copy, use, market, re-sell, distribute, merge, alter, add to or carry on any redistribution, reproduction, translation, publication, reduction to any electronic medium or machine readable form or commercially exploit or in any other way deal with or utilise or (except as expressly permitted by applicable law) reverse engineer, decompile or disassemble the Services, Reports, Content or Website; or
iii. remove, alter or in any way change any trademark or proprietary marking in any element of the Services and You acknowledge the ownership of the Content is as per this Clause, where such Content is incorporated or used into Your own documents, reports, systems or services whether or not these are supplied to any third party.

iv. create any product which is derived directly or indirectly from the data contained in the Services where such is incorporated into Your own documents, reports, systems or services whether or not these are supplied to any third party.

h. You are permitted to make five hard copies of any Report, but are not authorised to re-sell the Report, any part thereof or any copy thereof unless you are an Authorised Reseller. Further copies may not be made in whole or in part without the prior written permission of Landmark who shall be entitled to make a charge for each additional copy.

i. You hereby agree to fully indemnify Landmark against any claim losses or other damages suffered by Landmark as a result any breach by any recipient of the Services of these Terms.

j. You agree that You will comply with any reasonable instructions that We may give from time to time with regard to the use of the Intellectual Property Rights, including but not limited to acknowledging that the Services and Reports are confidential to You, Your Client or the persons set out in Clause 3.b.

k. The mapping contained in any Services is protected by Crown Copyright and must not be used for any purpose outside the context of the Services or as specifically provided by these Terms.

4. Charges

a. Landmark may grant You a credit limit in order to allow You to transact with it or setup an Account and reserves the right to withdraw any such credit limit at any time without prior notice.

b. You are fully responsible for all charges that accumulate on Your Account.

c. VAT at the prevailing rate shall be payable in addition to the Landmark Fees. You shall pay any other applicable indirect taxes related to Your use of the Services.

d. An individual or a monthly invoice showing all Orders created will be generated subject to these Terms. You will pay the Landmark Fees at the rates set out in Landmark's or its Authorised Reseller's invoice. The Landmark Fees are payable in full within 28 days without deduction, discount or set off. You acknowledge that time is of the essence with respect to the payment of such invoices. Non-payment of Landmark Fees may, at Our sole discretion result in Landmark terminating or limiting the use of Your Account and its provision of Services to You. Landmark reserve the right to amend the Landmark Fees from time to time and the Services will be charged at the Landmark Fee applicable at the date on which the Service is ordered.

e. We may charge interest on late payment at a rate equal to 8% per annum above the base lending rate of National Westminster Bank plc.
f. Landmark or its Authorised Reseller shall not be obliged to invoice any party other than You for the provision of Services, but where Landmark or its Authorised Reseller does so invoice any third party at Your request, and such invoice is not accepted or remains unpaid, Landmark or its Authorised Reseller shall have the option at any time to cancel such invoice and invoice You direct for such Services. Where Your order comprises a number of Services or severable elements within any one or more Services, any failure by Landmark or its Authorised Reseller to provide an element or elements of the Services shall not prejudice Landmark's or its Authorised Reseller's ability to require payment in respect of the Services delivered to You.

g. Termination
Landmark may suspend or terminate Your rights under these Terms without any liability to You with immediate effect if at any time:-

i. You fail to make any payment due in accordance with Clause 4;

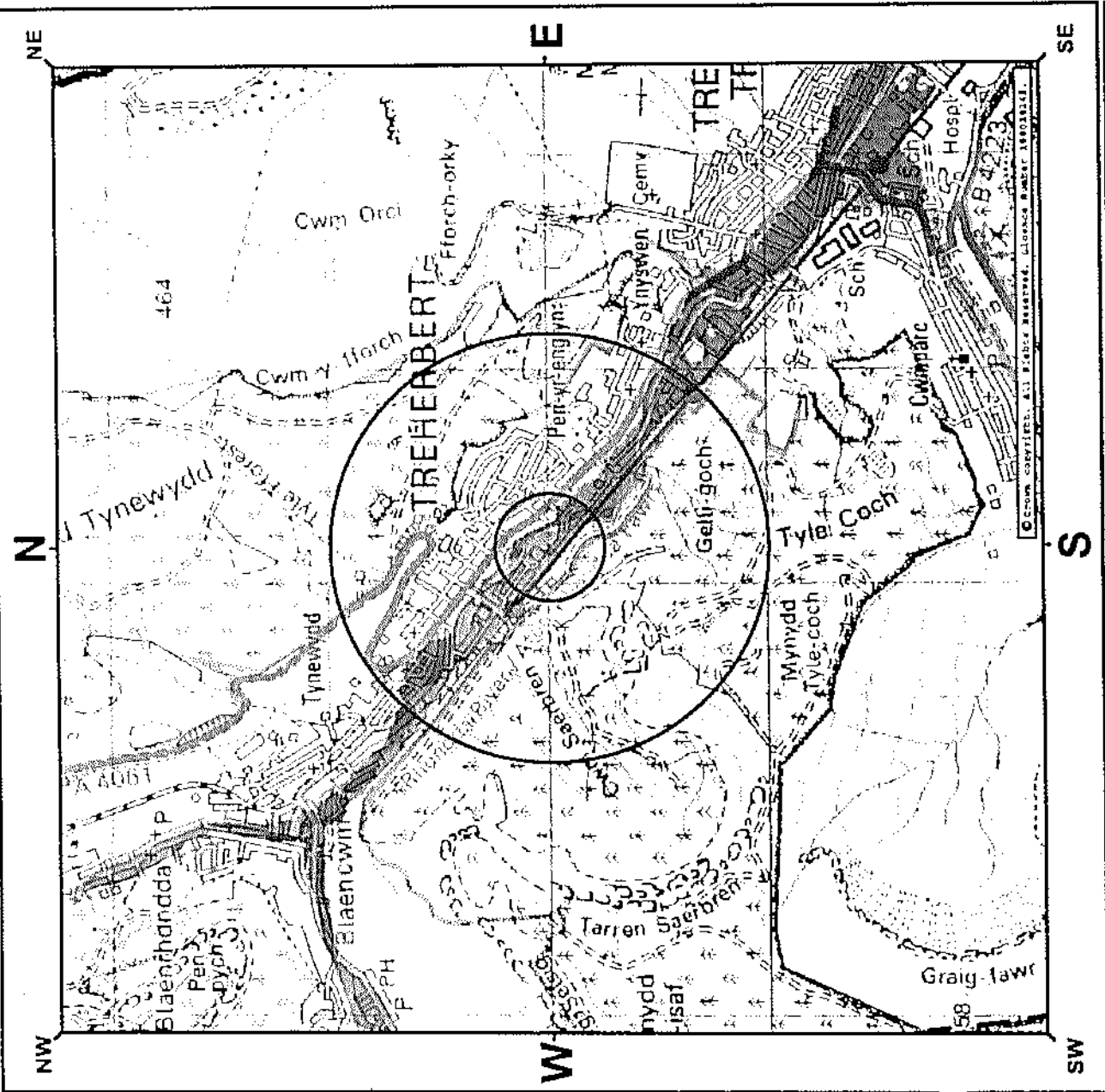
ii. You repeatedly breach or commit or cause to be committed any material breach of these Terms; or
iii. You commit a breach and You fail to remedy the breach within 7 days of receipt of a written notice to do so. Landmark may remedy the breach and recover the costs thereof from You, or

iv. You commit an act of bankruptcy or insolvency, are unable to pay Your debts as or when they fall due or make any composition or arrangement with Your creditors, or go into liquidation whether voluntary or compulsory, or if any order is made or a resolution is passed for Your winding up (except for the purpose of a solvent amalgamation or reconstruction), or if You cease or prepare to cease trading, or if You suffer the appointment of a receiver, administrative receiver, administrator or similar officer over the whole or part of any of Your assets.

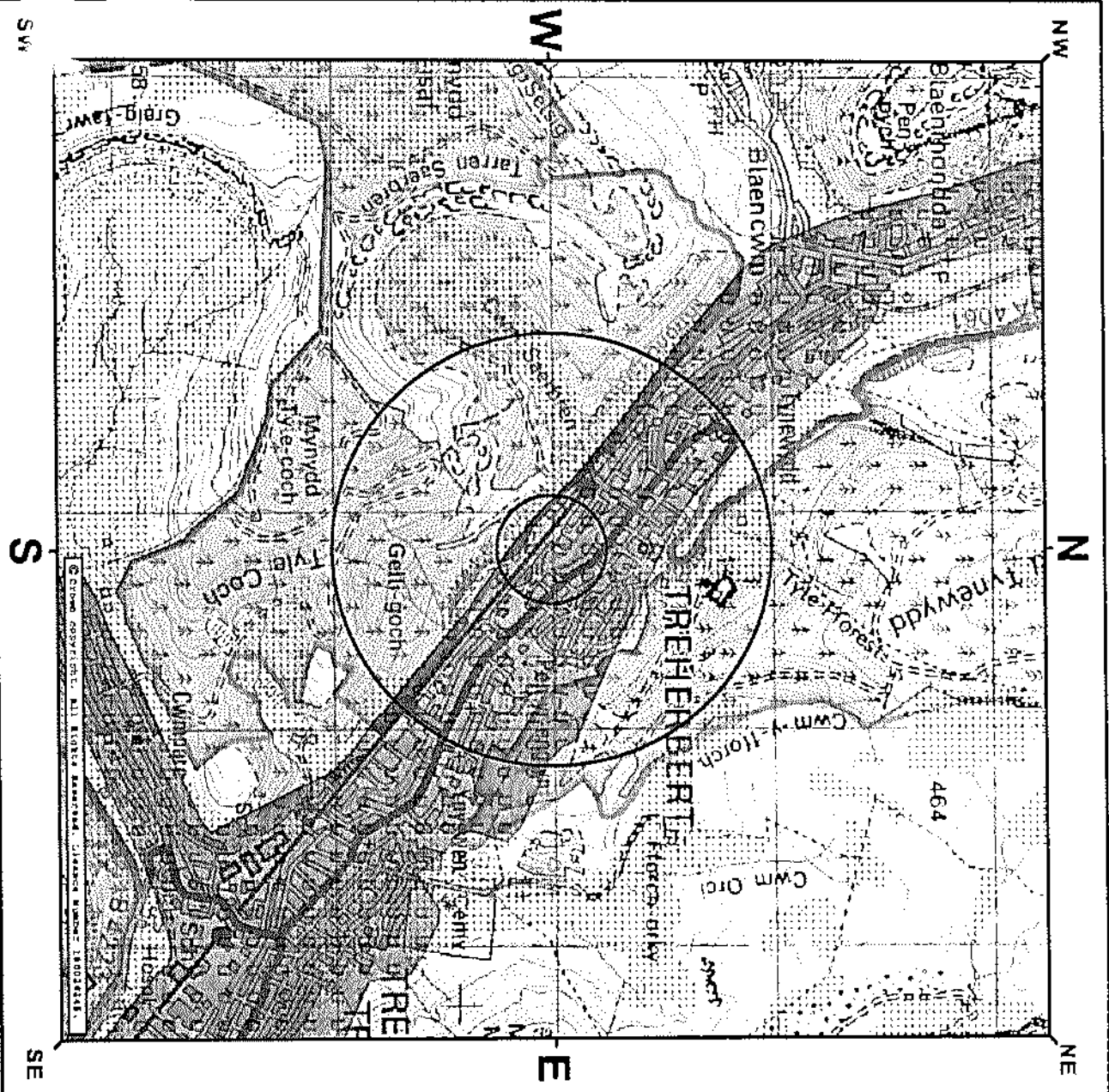
h. If Your rights are terminated under this Clause and You have made an advance payment We will refund You a reasonable proportion of the balance as determined by Us in relation to the value of Services previously purchased.

i. We may suspend the Agreement between You and Landmark for an indefinite period without notice and at any time if in Our opinion You are in breach of any of the provisions of these Terms.

- 6. Liability**
- a. We provide warranties and accept liability only to the extent stated in this Clause 6.
- b. Nothing in these Terms excludes either party's liability for death or personal injury caused by that party's negligence or willful default.
- c. As most of the information contained in the Services is provided to Landmark by others, Landmark cannot control its accuracy or completeness, nor is it within the scope of Landmark's Services to check the information on the ground. Accordingly, subject to clause 6b, Landmark will only be liable to You for any loss or damage caused by its negligence or willful default and neither Landmark nor any person providing information contained in any Services shall in any other circumstances be liable for any inaccuracies, faults or omissions in the Services nor shall Landmark have any liability if the Services are used otherwise than in accordance with these Terms.
- d. Save as precluded by law, Landmark shall not be liable for any indirect or consequential loss, damage or expenses (including loss of profits, loss of contracts, business or goodwill) however arising out of any problem, event, action or default by Landmark or any indirect or consequential loss of any nature whatsoever or for any physical damage to or loss of Your tangible property, any other direct loss, damage, cost or expense of any kind or any indirect or consequential loss, damage, cost or expense of any kind, whether any of the above arise under contract, tort (including negligence), indemnity or contribution or otherwise, in any event, and notwithstanding anything contained in these Terms, Landmark's liability in contract, tort (including negligence or breach of statutory duty) or otherwise howsoever arising by reason or in connection with this Contract (except in relation to death or personal injury) shall be limited to an aggregate amount not exceeding £1 million if the complaint is in relation to a Report on residential property and an amount not exceeding £10 million in respect of any other Report or Service purchased from Landmark except in so far as Landmark will not be liable for any defect, failure or omission relating to Services that is not notified to Landmark within six months of the date of the issue becoming apparent and in any event, within twelve months of the date of the Report. Where any claim relates to either a part of the Services that is not chargeable or if You have been in breach of any part of these Terms Landmark's liability shall be limited to £1,000.
- i. No person may rely on the Report more than 12 months after its original date.
- g. You acknowledge that:-
- i. You shall have no claim or recourse against any Third Party Content supplier nor any of our other Suppliers. You will not in any way hold us responsible for any selection or retention of, or the acts or omissions of Third Party Content suppliers or other Suppliers (including those with whom We have contracted to operate various aspects or parts of the Service) in connection with the Services (for the avoidance of doubt Landmark is not a Third Party Content supplier). Landmark does not promise that the supply of the Services will be uninterrupted or error free or provide any particular facilities or functions, or that the Content will always be complete, accurate, precise, free from defects of any other kind, computer viruses, software bugs or other similar code although Landmark will use reasonable efforts to correct any inaccuracies within a reasonable period of them becoming known to us;
- ii. Landmark's only obligation is to exercise the reasonable skill and care in providing environmental property risk information to persons acting in a professional or commercial capacity and You thereby acknowledge that You are such a person;
- iii. no physical inspection of the Property Site reported on is carried out as part of any Services offered by Landmark and as such We do not warrant that all land uses or features whether past or current will be identified in the Services and the Services do not include any information relating to the actual state or condition of any Property Site nor should they be used or taken to indicate or exclude actual fitness or unfitness of a Property Site for any particular purpose nor should it be relied upon for determining suitability or value or used as a substitute for any physical investigation or inspection.
- iv. You should carefully inspect the Property Site, and take any other advice that would be reasonably prudent to do prior to making any decision about the Property Site to which any Report or Service relates and not rely exclusively on the Report or any other Landmark Services in terms of valuing the Property Site.
- k. Time shall not be of the essence with respect to the provision of the Services.
- v. Landmark will not be held liable in any way if a Report on residential property is used for commercial property or more than the one residential property for which it was created.
- w. The Services have not been prepared to meet Your or anyone else's individual requirements; that You assume the entire risk as to the suitability of the Services and waive any claim of detrimental reliance upon the same; and You confirm You are solely responsible for the selection or omission of any specific part of the Content.
- xvii. You shall be solely responsible for maintaining the confidentiality of Your passwords (including Your Designated User's password(s)) and You will notify us immediately that You become aware of any unauthorised access to, use or copying of any part of Services or document or report derived or downloaded therefrom by anyone;
- xviii. You must observe and comply with all applicable regulations and legislation;
- ix. We offer no warranty for the performance of any linked internet service not operated by Us;
- x. You will on using the Services make a reasonable inspection of any results to satisfy Yourself that there are no defects or failures. In the event that there is a material defect You will notify us in writing of such defect within seven days of its discovery;
- xi. without prejudice to any remedies set out in these Terms, if in the course of Your business or otherwise You use for the benefit of or convey to any third party any part of the Website, Content, or Services You must make such third parties aware of the limitations, obligations and acknowledgements contained herein;
- xii. any support or assistance provided to You in connection with these Terms is at Your risk;
- xiii. the information contained in the Services has been extracted from various Crown Copyright and other published sources, and accordingly, Landmark does not accept any responsibility, and expressly disclaims all liability, for any errors, omissions or misstatements, or for any loss occasioned to any person acting, or refraining from action, as a result of, or in reliance upon, the information contained in these Services;
- h. All liability for any insurance products purchased by You rests solely with the insurer. Landmark does not endorse any particular product or insurer and no information contained within the Services should be deemed to imply otherwise. You acknowledge that if You Order any such insurance Landmark will deem such as Your consent to forward a copy of the Report to the insurers. Where such policy is purchased, all liability remains with the insurers and You are entirely responsible for ensuring that the insurance policy offered is suitable for Your needs and should seek independent advice. Landmark does not guarantee that an insurance policy will be available on a Property Site. All decisions with regard to the offer of insurance policies for any premises will be made solely at the discretion of the insurers and Landmark accepts no liability in this regard. The provision of a Report does not constitute any indication by Landmark that insurance will be available on the property.
- i. If Landmark provides You with any additional service obtained from a third party, including but not limited to any professional opinion, interpretation or conclusion, risk assessment or environmental report or search carried out in relation to a Report on Your Property Site, Landmark will not be liable in any way for any information contained therein or any issues arising out of the provision of those additional services to You or Your Client. Landmark will be deemed to have acted as an agent in these circumstances and the supply of these additional services will be governed by the terms and conditions of those Third Parties.
- j. Landmark has undertaken the Services for use only by the persons referred to at clause 3b and for no other purpose whatsoever and the Services should not be relied upon by any other third party. Landmark can accept no responsibility and will not be liable to any third party for any loss caused as a result of reliance upon the Services. Any third party relying on the Services does so entirely at its own risk, including without limitation any insurers referred to in this clause 6. Replacements of the Services are to rely on their own skill and judgment in determining the suitability of the Services for their own purpose and use and are advised to use the Services with caution and not base important business decisions solely on the same. Landmark Services are merely one of the tools available for the assessment of environmental, geological or other property or land-related risks and should be used in conjunction with other recognised methods of evaluation.
- k. Time shall not be of the essence with respect to the provision of the Services.
- 7. Events Beyond Our Control**
- You acknowledge that Landmark shall not be liable for any delay, interruption or failure in the provision of the Services which are caused or contributed to by any circumstance which is outside our reasonable control including but not limited to: lack of power, telecommunications failure or overload, computer malfunction, inaccurate processing of data, or delays in receiving, loading or checking data, corruption of data whilst in the course of conversion, geo-coding, processing by computer in the course of electronic communication, or printing.
- 8. Severability**
- If any provision of these Terms are found by either a court or other competent authority to be void, invalid, illegal or unenforceable, that provision shall be deemed to be deleted from these Terms and never to have formed part of these Terms and the remaining provisions shall continue in full force and effect.
- 9. Governing Law**
- This Agreement shall be governed by and construed in accordance with English law and each party agrees irrevocably submit to the exclusive jurisdiction of the English courts as regards any claim or matter arising under this Agreement. If any dispute arises out of or in connection with this agreement (a "Dispute") the parties undertake that, prior to the commencement of Court proceedings, they will seek to have the Dispute resolved amicably by use of an alternative dispute resolution procedure acceptable to both parties with the assistance of the Centre for Dispute Resolution (CEDR) if required by written notice initiating that procedure. If the Dispute has not been resolved to the satisfaction of either party within 60 days of initiation of the procedure or if either party fails or refuses to participate in or withdraws from participating in the procedure then either party may refer the Dispute to the Court.
- 10. Entire Agreement**
- a. These Terms, together with the prices and delivery details set out on our Websites and Your Order comprise the whole of our agreement relating to the supply of Services to You by Landmark. No prior negotiation, agreement, promotional material or statement whether written or oral made by any sales or other person or representative on our behalf should be understood as a variation of these Terms or as an authorised representation about the nature or quality of any Services offered for sale by us. Save for fraud or misrepresentation, Landmark shall have no liability for any such representation being untrue or misleading.
- b. These Terms shall prevail at all times to the exclusion of all other terms and conditions including any terms and conditions which You may purport to apply even if such other provisions are submitted in a later document or purport to exclude or override these Terms and neither the course of conduct between parties nor trade practice shall act to modify these Terms.
- 11. General**
- a. You shall not without our prior written consent assign, or transfer in any way the benefit of these Terms in whole or in part or any of Your obligations under these Terms save as provided by Clause 3.b. Your right to use the Services, operate Your Account or to designate users is not transferable.
- b. Landmark may assign its rights and obligations under these Terms without prior notice or any limitation.
- c. We may authorise or allow our contractors and other third parties to provide to Us and/or to You services necessary or related to the Services and to perform Our obligations and exercise Our rights under these Terms, which may include collecting payment on Our behalf. No waiver on our part to exercise, and no delay in exercising, any right, power or provision hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or provision hereunder preclude the exercise of that or any other right, power or provision.
- d. References in these Terms to any legislation shall be construed as references to the same as amended or re-enacted from time to time and shall include subordinate legislation or regulations.
- e. Unless otherwise stated in these Terms, all notices from You to Landmark must be in writing and sent to the Landmark registered office (or in the case of an Authorised Reseller, to its registered office address) and all notices from Us to You will be displayed on our Websites from time to time.
- f. A person who is not a party to any contract made pursuant to these Terms shall have no right under the Contract (Right of Third Parties) Act 1999 to enforce any terms of such contract and Landmark shall not be liable to any such third party in respect of any Services supplied.
- h. Landmark reserves the right to monitor or record telephone calls for training purposes.



KEY	
General	Agency & Hydrological Environment Agency
○ Specified Site	■ Extreme Flooding from Rivers or Sea without Defences (Zone 2)
✕ Bearing Reference Point	■ Flooding from Rivers or Sea without Defences (Zone 3)
○ Buffer	□ Area Benefiting from Flood Defences
	□ Flood Water Storage Areas
	— Flood Defences



KEY

General

-  Specified Site
-  Bearing Reference Point
-  Buffer

Groundwater Vulnerability

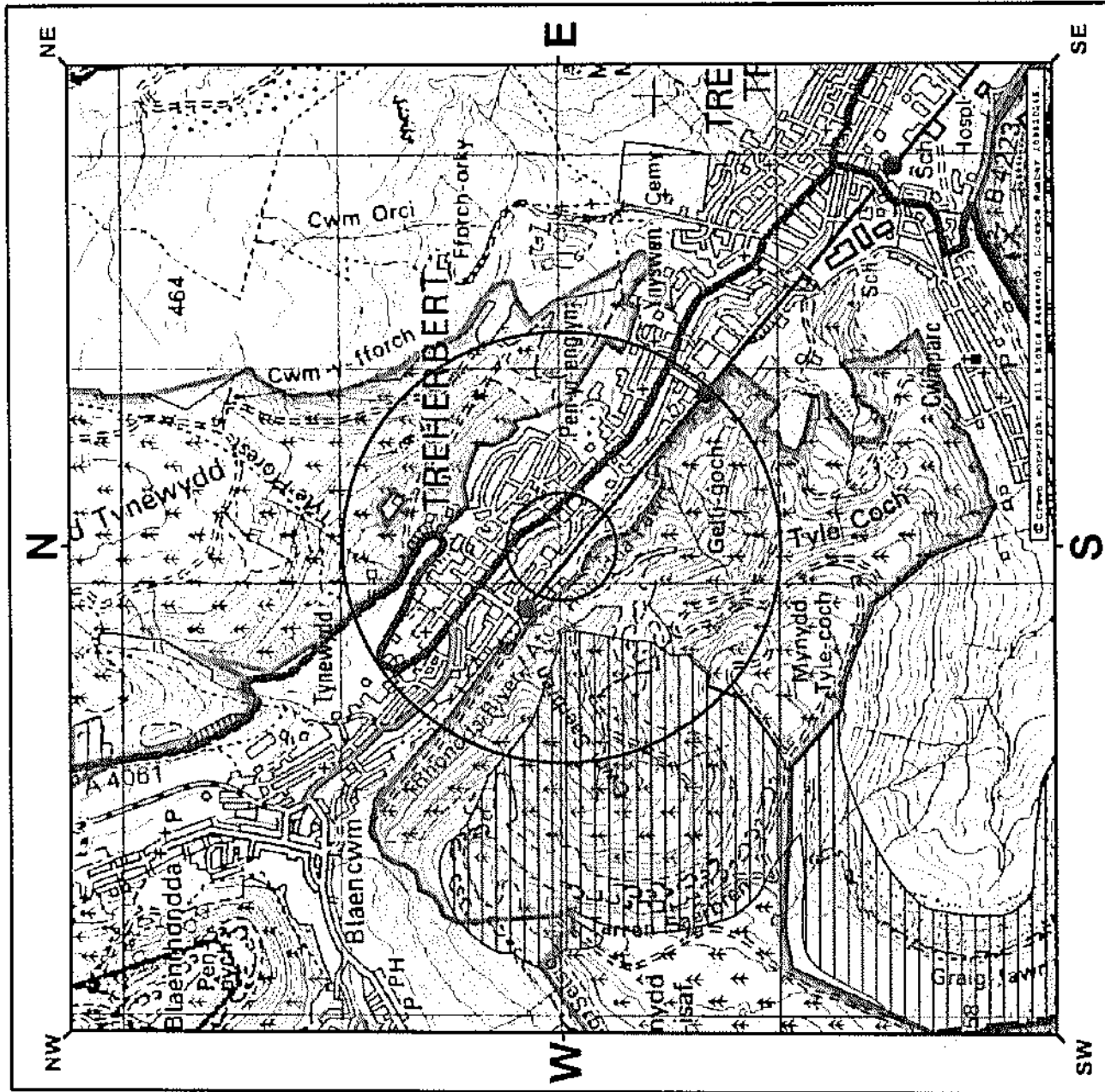
Geological Classes

-  Major Aquifer (High Permeable)
-  Minor Aquifer (Variable Permeable)
-  Non Aquifer (Negligibly Permeable)

Soil Classes

-  High (H) 1, 2, 3, U
-  Intermediate (I) 1, 2
-  Low
-  High (H) 1, 2, 3, U
-  Intermediate (I) 1, 2
-  Low

 Drift Deposit



KEY

General		☐ Environmentally Sensitive Area	☐ Nitrate Sensitive Area
☐ Specified Site		☐ Forest Park	☐ Nitrate Vulnerable Zone
☐ Bearing Reference Point		☐ Local Nature Reserve	☒ Ramsar Site
☐ Buffer		☒ Marine Nature Reserve	☒ Site of Special Scientific Interest
Sensitive Land Uses		☐ National Nature Reserve	☒ Special Area of Conservation
☒ Area of Adopted Green Belt		☒ National Park	☒ Special Protection Area
☒ Area of Unadopted Green Belt		☐ National Scenic Area	
☐ Area of Outstanding Natural Beauty			

CLIENT DETAILS Envirocheck Order No. EC11746031_1_1

Customer Ref: Mr A Stone Esq
Rhonda Green Tern C & C
Llyn Caeon Llanwrtyd
PO BOX 100
Rhonda Green Tern C & C

SITE DETAILS Grid Reference 294170 187980

Proposed Civic Amenity Site

Treherbert
Rhonda Green Tern

KEY TO THE LEGEND DATABASE

General

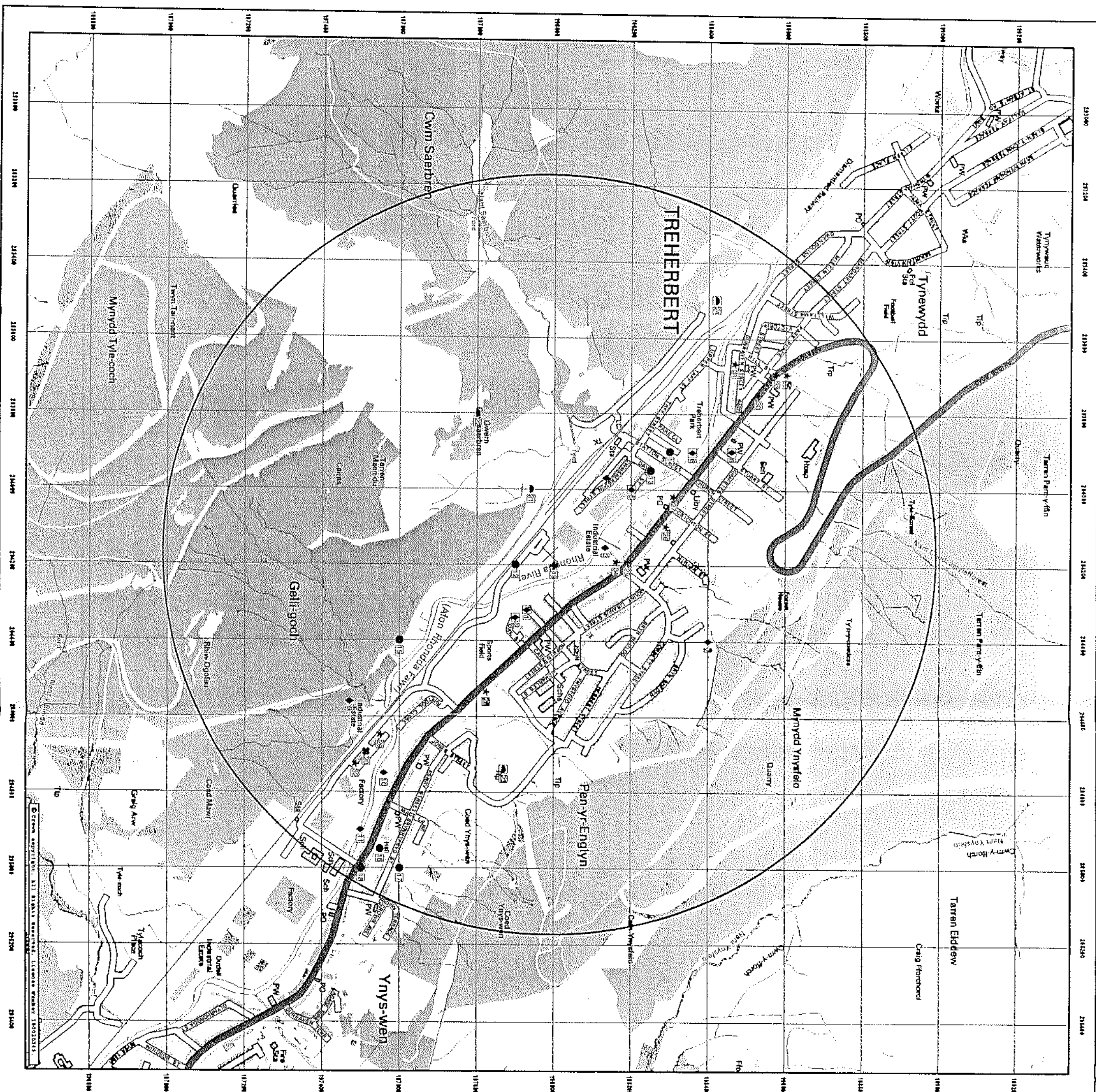
- Specified Site
- ✕ Bearing Reference Point
- Buffer (1000m)
- Reference Number
- Several of Type at Location

Waste

- ▼ Point Location of BGS Recorded Landfill Site
- BGS Recorded Landfill Site
- ▲ Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facilities (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Point Location of Local Authority Recorded Landfill Site
- Local Authority Recorded Landfill Site

Agency and Hydrological

- ▲ Air Pollution Control
- ▼ Air Pollution Control Enforcement
- Point Location of Contaminated Land Register Entry or Notice
- Contaminated Land Register Entry or Notice
- ◆ Discharge Consent
- ▲ Enforcement Or Prohibition Notice
- ▲ Integrated Pollution Control
- Prevention Control
- Pollution Incident to Controlled Waters
- ◆ Substantiated Pollution Incident Register
- ▼ Prosecution Relating to Authorised Processors
- ◆ Prosecution Relating to Controlled Waters
- ▲ Registered Radioactive Substance
- ▲ River Quality Sampling Point
- ◆ Water Abstraction
- ◆ Water Industry Act Referral
- Point Location of Registered Waste Transfer Site
- Point Location of Registered Waste Treatment or Disposal Site
- Registered Waste Treatment or Disposal Site
- ▲ Hazardous Substances
- ✕ COMAH Site
- ✕ Explosive Site
- ✕ NIHS Site
- ✕ Planning Hazardous Substance Enforcement
- ▲ Geological
- ▲ BGS Borehole
- ▲ BGS Recorded Mineral Site
- ▲ Industrial Land Use
- ★ Contemporary Trade Directory Entry
- ★ Fuel Station Entry





Envirocheck Order No. EC11746031_1_1

4:40:42 PM

Rhannab Cynon Tati CF37 2YA

Grid Reference **294170** **197990**

Grid Reference **294170** **197990**

Waste

- | | | | |
|---|---------------------------------|---|---|
|  | Specified Site |  | Point Location of
BGS Recorded Landfill Site |
|  | Bearing Reference Point |  | BGS Recorded Landfill Site |
|  | Buffer (250m) |  | Integrated Pollution Control
Registered Waste Site |
|  | Reference Number |  | Licensed Waste Management
Facilities (Landfill Boundary) |
|  | Several of 'T' type at Location |  | Licensed Waste Management
Facility (Location) |
|  | Pylon |  | Point Location of Local Authority
Recorded Landfill Site |
|  | Overhead Transmission Line |  | Local Authority Recorded
Landfill Site |

 Air Pollution Control

- | Agency and Hydrological | |
|---|---|
|  | Air Pollution Control Enforcement |
|  | Point Location of Contaminated Land Register Entry or Notice |
|  | Contaminated Land Register Entry or Notice |
|  | Registered Waste Transfer Site |
|  | Point Location of Registered Waste Treatment or Disposal Site |

▲ Enforcement Of Pro

- | | | | |
|---|---|---|--|
|  | Integrated Pollution Control |  | Explosive Site |
|  | Integrated Pollution Prevention Control |  | NIHHS Site |
|  | Pollution Incident to Controlled Waters |  | Planning Hazardous Substance Consent |
|  | Substantiated Pollution Incident Register |  | Planning Hazardous Substance Enforcement |

Registered Radiac

- | | | | |
|---|-----------------------------------|---|---------------------------|
|  | Registered Radioactive Substance |  | BGS Borehole |
|  | River Network or Water Feature |  | BGS Recorded Mineral Site |
|  | River Quality Sampling Point | Industrial Land Use | |
|  | Water Abstraction | | |
|  | Water Industry Act Referral | | |
|  | Fuel Station Entry | | |
|  | Contemporary Trade Director Entry | | |



Ordnance Survey
Official Partner
of the
British Geological Survey
1829

Produced by Landmark Information Group Limited. Tel: 0870 850 6670 Fax: 0870 850 6671

Envirocheck[®] Report

Historical Land Use

Report on:
Proposed Civic Amenity Site
Treherbert
Rhondda Cynon Taff

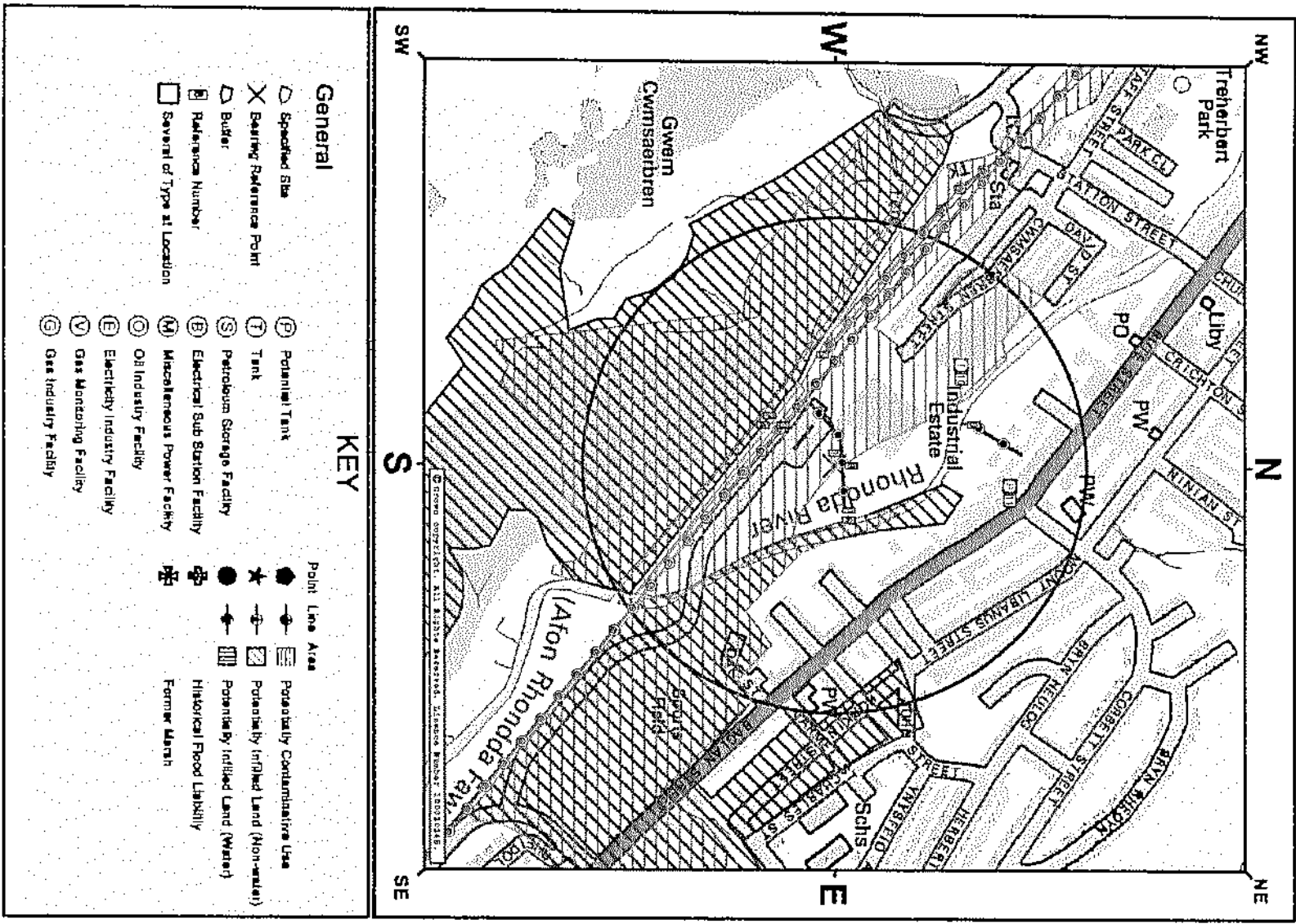
National Grid Reference :
294170, 197990

Prepared For :
Rhondda Cynon Taff C B C
Llwyn Gasian
Library Road
Pontypridd
Rhondda Cynon Taff
CF37 2YA

Client Details:
Special Projects, Church Street, Pontyp

Your Reference:
Mr A Stone, E436

Data Type	On Site	0 to 250m
Historical Land Use Information		
Former Marshes		
Historical Flood Liabilities		
Potentially Contaminative Industrial Uses (Past Land Use)	1	4
Potentially Infilled Land (Non-Water)		2
Potentially Infilled Land (Water)		2
Historical Tanks And Energy Facilities		
Electrical Sub Station Facilities		
Electricity Industry Facilities		
Gas Industry Facilities		
Gas Monitoring Facilities		
Miscellaneous Power Facilities		
Oil Industry Facilities		
Petroleum Storage Facilities		
Potential Tanks		2
Tanks		2



Historical Land Use Information

Map ID	Details		Direction	Distance	NGR
Potentially Contaminative Industrial Uses (Past Land Use)					
1	Use: Railways Date of Mapping: 1884-1965	-	0	294170 197990	
2	Use: Mining of coal & lignite Date of Mapping: 1884-1945	E	56	294230 198000	
3	Use: Railways Date of Mapping: 1884-1983	SW	66	294130 197940	
4	Use: Mining of coal & lignite Date of Mapping: 1900-1965	SW	71	294130 197930	
5	Use: Railways Date of Mapping: 1983	W	114	294060 197980	

Potentially Infilled Land (Non-Water)

6	Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1983	E	56	294230 198000	
7	Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1983	SW	82	294120 197920	

Potentially Infilled Land (Water)

8	Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1945	N	8	294170 198000	
9	Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1965	N	144	294130 198130	

Historical Tanks And Energy Facilities

10	Use: Tanks Scale of Mapping: 1:1,250 Date of Mapping: 1960	NW	163	294070 198120	
10	Use: Tanks Scale of Mapping: 1:2,500 Date of Mapping: 1962	NW	164	294070 198120	
11	Use: Potential Tanks Scale of Mapping: 1:1,250 Date of Mapping: 1968	N	175	294190 198160	
11	Use: Potential Tanks Scale of Mapping: 1:2,500 Date of Mapping: 1962	N	184	294200 198170	

The following mapping has been analysed for Historical Land Use Information.

1:10,560	Mapsheet	Published Date
Glamorganshire	018_00	1884
Glamorganshire	018_SW	1900
Glamorganshire	018_SW	1921
Glamorganshire	018_SW	1945
National Grid	SS99NW	1965
1:10,000	Mapsheet	Published Date
National Grid	SS99NW	1983

The following mapping has been analysed for Historical Tanks and Energy Facilities.

1:2,500	Mapsheet	Published Date
National Grid	SS9397	1962
National Grid	SS9498	1962
National Grid	SS9497	1962
National Grid	SS9398	1962
1:1,250	Mapsheet	Published Date
National Grid	SS9398SE	1960
National Grid	SS9497NW	1960
National Grid	SS9498SW	1960
National Grid	SS9498SW	1968

LANDMARK TERMS AND CONDITIONS

Definitions

"Account" means the credit account established by a Member with Landmark.

"Agreement" means the agreement between Ourselves created by Your acceptance of these Terms.

"Authorised Reseller" means an agent or reseller of Landmark whom Landmark has duly appointed to resell its Reports and Services.

"Client" means the individual or organisation to whom You provide professional services and/or Your professional advice where applicable.

"Content" means any data, computing and information services and software, and other content and documentation or support materials and updates included in and/or supplied by or through the Websites, in Reports or Services or in any other way by Landmark and shall include Landmark developed and Third Party Content.

"Designated Users" means individuals appointed by Members to transact across the Members' Account.

"Intellectual Property Rights" means all forms of intellectual property or protective rights recognised in law.

"Member" means the person, firm or organisation who establishes and/or uses the Account.

"Order" means the request for Services from Landmark by You.

"Property Site" means a land site on which a Member requests Landmark provide either a Report or any other Service.

References to **"We"**, **"Us"** and **"Our"** are references to Landmark Information Group Limited ("Landmark"), whose registered office is 7 Abbey Court, Eagle Way, Exeter, EX2 7HY. Where You are not ordering the Services directly from Landmark, but from an Authorised Reseller, references to "Landmark" or "We", "Us" and "Our" shall be construed so as to mean either Landmark and/or the Authorised Reseller as the context shall indicate.

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"Landmark Fees" means any charges levied by Landmark for Services provided to You

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1. Terms and Conditions

a. These Terms govern the relationship between You and Landmark whether You are an unregistered visitor to the Website or a registered Member purchasing Landmark products or Services from Landmark.

b. Where these Terms are not expressly accepted by You they will be deemed to have been accepted by You, and You agree to be bound by these Terms when You place any Order, or pay for any Services provided or Reports ordered.

c. If the person communicating with Landmark is an Authorised Reseller, they must ensure that You agree to these Terms.

d. The headings in these Terms are for convenience only and shall not affect the meaning or interpretation of any part of these Terms.

e. We may modify these Terms, and may discontinue or revise any or all other aspects of the Services at our sole discretion, with immediate effect and without prior notice. Any amendment or variation to these Terms shall be posted on our Websites. Continued use of the Services by You shall be deemed an acceptance by You to be bound by any such amendments to the Terms.

f. Landmark reserves the right to refuse to supply Services to You or any other potential client without notice or reason.

2. Reports

Whilst Landmark will use reasonable care and skill in providing the Services to You the Services are provided on the express basis that You acknowledge and agree to the following:-

a. The information and data supplied in the Services are derived from publicly available records and other third party sources and Landmark does not warrant the accuracy or completeness of such information or data; and

b. The information and data supplied in the Services are derived solely from those sources specifically cited in the Report. Landmark does not claim that these sources represent an exhaustive or comprehensive list of all sources that might be consulted; and

c. Landmark does not guarantee that all past or current land uses or features will be identified in the Report; and

d. The Services provided by Landmark are professional business to business services and not intended for use or interpretation by persons other than professional persons skilled in the use of property and environmental information; and

e. Landmark shall not be responsible for error or omission in the Report resulting from inaccuracy or inaccuracy in primary or secondary information and data, inaccurate processing of information and data by third parties, computer malfunction or corruption of data whilst in the course of conversion, geo-coding, processing by computer or electronic means, or in the course of transmission by telephone or other communication link, or printing.

f. Landmark reserves the right, without limitation, to change the Reports or Services on offer at any time.

3. Intellectual Property

a. You acknowledge that all Intellectual Property Rights in the Report and Services are and shall remain owned by either Landmark or our Suppliers and nothing in these Terms purports to transfer, assign or grant any rights to You in respect of the Intellectual Property Rights.

b. Subject to clause 6.1, You are entitled to make the following use of the Services and Reports subject always to these Terms and You may, without further charge, make the Report or Services available to:

i. any person who purchases the whole of the Property Site.

ii. any person who provides funding secured on the whole of the Property Site,

iii. any person for whom You act in a professional or commercial capacity, and

iv. any person who acts for You in a professional or commercial capacity.

Accordingly Landmark shall have the same duties and obligations to those persons in respect of the Services as it has to You.

Each of those persons referred to in Clause 3.b. shall have the benefit and the burden of Your rights and obligations under these Terms. The limitations of Landmark's liability as set out in Clause 6 shall apply.

The Report is to be used solely for the benefit of You and Your Client and such persons as are set out in Clause 3.b. and Landmark excludes all liability to all other persons unless Landmark has expressly agreed in writing to the assignment of the benefit of the Report and has been paid Landmark's reasonable fees for so doing.

All parties given access to the Services agree that they will treat as strictly private and confidential the Services and all information which they obtain from the Services and shall restrict any disclosure to employees or professional advisors to enable the relevant party to conduct its internal business. The requirement in this clause to treat the Services as confidential shall include a requirement to maintain adequate security measures to safeguard the Services from unauthorised access, use or copying.

Each recipient of the Services agrees (and agrees it will cause its employees, agents or contractors who may from time to time have access to the Services to agree) it will not, except as permitted herein or by separate agreement with Landmark:-

i. effect or attempt to effect any modification, merger or change to the Service, nor permit any other person to do so; or

ii. copy, use, market, re-sell, distribute, merge, alter, add to or carry on any redistribution, reproduction, translation, publication, reduction to any electronic medium or machine readable form or commercially exploit or in any other way deal with or utilise or (except as expressly permitted by applicable law) reverse engineer, decompile or disassemble the Services, Reports, Content or Website; or

iii. remove, alter or in any way change any trademark or proprietary marking in any element of the Services and You acknowledge the ownership of the Content is as per this Clause, where such Content is incorporated or used into Your own documents, reports, systems or services whether or not these are supplied to any third party.

iv. create any product which is derived directly or indirectly from the data contained in the Services. You shall acknowledge the ownership of the Content where such is incorporated into Your own documents, reports, systems or services whether or not these are supplied to any third party.

b. You are permitted to make five hard copies of any Report, but are not authorised to re-sell the Report, any part thereof or any copy thereof unless you are an Authorised Reseller. Further copies may not be made in whole or in part without the prior written permission of Landmark who shall be entitled to make a charge for each additional copy.

c. You hereby agree to fully indemnify Landmark against any claim losses or other damages suffered by Landmark as a result of any breach by any recipient of the Services of these Terms.

d. You agree that You will comply with any reasonable instructions that We may give from time to time with regard to the use of the Intellectual Property Rights, including but not limited to acknowledging that the Services and Reports are confidential to You, Your Client or the persons set out in Clause 3.b.

e. The mapping contained in any Services is protected by Crown Copyright and must not be used for any purpose outside the context of the Services or as specifically provided by these Terms.

4. Charges

a. Landmark may grant You a credit limit in order to allow You to transact with it or set up an Account and reserves the right to withdraw any such credit limit at any time without prior notice.

b. You are fully responsible for all charges that accumulate on Your Account.

c. VAT at the prevailing rate shall be payable in addition to the Landmark Fees. You shall pay any other applicable indirect taxes related to Your use of the Services.

d. An individual or a monthly invoice showing all Orders created will be generated subject to these Terms. You will pay the Landmark Fees at the rates set out in Landmark's or its Authorised Reseller's invoices. The Landmark Fees are payable in full within 28 days without deduction, counterclaim or set off. You acknowledge that time is of the essence with respect to the payment of such invoices. Non-payment of Landmark Fees may, at Our sole discretion result in Landmark terminating or limiting the use of Your Account and its provision of Services to You. Landmark reserve the right to amend the Landmark Fees from time to time and the Services will be charged at the Landmark Fee applicable at the date on which the Service is ordered.

e. We may charge interest on late payment at a rate equal to 8% per annum above the base lending rate of National Westminster Bank plc.

f. Landmark or its Authorised Reseller shall not be obliged to invoice any party other than You for the provision of Services, but where Landmark or its Authorised Reseller does so invoice any third party at Your request, and such invoice is not accepted or remains unpaid, Landmark or its Authorised Reseller shall have the option at any time to cancel such invoice and invoice You direct for such Services. Where Your order comprises a number of Services or severable elements within any one or more Services, any failure by Landmark or its Authorised Reseller to provide an element or elements of the Services shall not prejudice Landmark's or its Authorised Reseller's ability to require payment in respect of the Services delivered to You.

5. Termination

a. Landmark may suspend or terminate Your rights under these Terms without any liability to You with immediate effect if at any time:-

i. You fail to make any payment due in accordance with Clause 4;

ii. You repeatedly breach or commit or cause to be committed any material breach of these Terms; or

iii. You commit a breach and You fail to remedy the breach within 7 days of receipt of a written notice to do so. Landmark may remedy the breach and recover the costs thereof from You; or

iv. You commit an act of bankruptcy or insolvency, are unable to pay Your debts as or when they fall due or make any composition or arrangement with Your creditors; or go into liquidation whether voluntary or compulsory; or if any order is made or a resolution is passed for Your winding up (except for the purpose of a solvent amalgamation or reconstruction); or if You cease or prepare to cease trading; or if You suffer the appointment of a receiver, administrative receiver, administrator or similar officer over the whole or part of any of Your assets.

if Your rights are terminated under this Clause and You have made an advance payment We will refund You a reasonable proportion of the balance as determined by Us in relation to the value of Services previously purchased.

c. We may suspend the Agreement between You and Landmark for an indefinite period without notice and at any time if in Our opinion You are in breach of any of the provisions of these Terms.

- 7. Events Beyond Our Control** You acknowledge that Landmark shall not be liable for any delay, interruption or failure in the provision of the Services which are caused or contributed to by any circumstances which are outside our reasonable control including but not limited to, lack of power, telecommunications failure or overused, computer malfunction, inaccurate processing of data, or delays in receiving, loading or checking data. Corruption of data whilst in the course of conversion, geo-coding, processing by computer in the course of electronic communication, or printing.
- 8. Severability**
- If any provision of these Terms are found by either a court or other competent authority to be void, invalid, illegal or unenforceable, that provision shall be deemed to be deleted from these Terms and never to have formed part of these Terms and the remaining provisions shall continue in full force and effect.
- 9. Governing law**
- This Agreement shall be governed by and construed in accordance with English law and each party agrees irrevocably submit to the exclusive jurisdiction of the English courts as regards any claim or matter arising under this Agreement, if any Dispute arises out of or in connection with this agreement (a "Dispute") the parties undertake that, prior to the commencement of Court proceedings, they will seek to have the Dispute resolved amicably by use of an alternative dispute resolution procedure acceptable to both parties with the assistance of the Centre for Dispute Resolution (CEDR) if required, by written notice initiating that procedure. If the Dispute has not been resolved to the satisfaction of either party within 60 days of initiation of the procedure or if either party fails or refuses to participate in or withdraws from participating in the procedure then either party may refer the Dispute to the Court.
- 10. Entire Agreement**
- a. These Terms, together with the Prices and delivery details set out on our Websites and Your Order complete the whole of our agreement relating to the supply of Services to You by Landmark. No prior stipulation, agreement, promotional material or statement, whether written or oral, made by any sales or other person or representative on Our behalf shall be understood as a variation of these Terms or as an authorised representation about the nature or quality of any Services Offered for sale by us. Save for fraud or misrepresentation, Landmark shall have no liability for any such representation being untrue or misleading.
- b. These Terms shall prevail at all times to the exclusion of all other terms and conditions including any terms and conditions which You may purport to apply even if such other provisions are submitted in a later document or purport to exclude or override these Terms and neither the course of conduct between parties nor trade practice shall act to modify these Terms.
- 11. General**
- a. You shall not without our prior written consent assign, or transfer in any way the benefit of these Terms in whole or in part or for any of Our obligations under these Terms (save as provided by Clause 3.b). Your right to use the Services, operate Your Account or to designate users is not transferable.
- b. Landmark may assign its rights and obligations under these Terms without prior notice or any limitation. We may authorise or allow our contractors and other third parties to provide to Us and/or to You services necessary or related to the Services and to perform Our obligations and exercise Our rights under these Terms, which may include collecting payment on Our behalf. No waiver on our part to exercise, and no delay in exercising, any right, power or provision hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or provision hereunder preclude the exercise of that or any other right, power or provision.
- c. References in these Terms to any legislation shall be construed as references to the same as amended or re-enacted from time to time and shall include subordinate legislation or regulations.
- d. Unless otherwise stated in these Terms, all notices from You to Landmark must be in writing and sent to the Landmark, registered office (or in the case of an Authorised Reseller, to its registered office address) and all notices from Us to you shall be displayed on our Websites from time to time.
- e. A person who is not a party to any contract made pursuant to these Terms shall have no right under the Contract (Right of Third Parties Act 1999) to enforce any terms of such contract and Landmark shall not be liable to any such third party in respect of any services supplied.
- Landmark reserves the right to monitor or record telephone calls for training purposes.

Envirocheck[®] Report:

Historical Map List

Report on:
Proposed Civic Amenity Site
Treherbert
Rhondda Cynon Taif

National Grid Reference :
294170, 197990

Prepared For :
Rhondda Cynon Taif C B C
599841
Llwyn Castan
Library Road
Pontypridd
Rhondda Cynon TaffCF37 2YA

Client Details:
Special Projects,Church
Street,Pontypridd,

Your Reference
Mr A Stone,E436

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Ordnance Survey County Series Published 1877

(1)

County	Mapsheet	Scale	Year
Glamorganshire	018_05	1:2,500	1877
Glamorganshire	018_09	1:2,500	1877

Ordnance Survey County Series Published 1900

(2)

County	Mapsheet	Scale	Year
Glamorganshire	018_05	1:2,500	1900
Glamorganshire	018_09	1:2,500	1900

Ordnance Survey County Series Published 1919 to 1920

(3)

County	Mapsheet	Scale	Year
Glamorganshire	018_05	1:2,500	1919
Glamorganshire	018_09	1:2,500	1920

Ordnance Survey Plan Published 1962

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS9397	1:2,500	1962
Ordnance Survey Plan	SS9398	1:2,500	1962
Ordnance Survey Plan	SS9497	1:2,500	1962
Ordnance Survey Plan	SS9498	1:2,500	1962

Ordnance Survey Plan Published 1960

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS9398SE	1:1,250	1960
Ordnance Survey Plan	SS9497NE	1:1,250	1960
Ordnance Survey Plan	SS9497NW	1:1,250	1960
Ordnance Survey Plan	SS9498SE	1:1,250	1960
Ordnance Survey Plan	SS9498SW	1:1,250	1960

Ordnance Survey Plan Published 1968 to 1972

(2)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS9497NE	1:1,250	1972
Ordnance Survey Plan	SS9498SE	1:1,250	1968
Ordnance Survey Plan	SS9498SW	1:1,250	1968

Additional SIMs Published 1986 to 1992

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS9397	1:2,500	1992
Ordnance Survey Plan	SS9497	1:2,500	1986
Ordnance Survey Plan	SS9498	1:2,500	1989

Additional SIMs Published 1985 to 1987

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS9398SE	1:1,250	1985
Ordnance Survey Plan	SS9497NE	1:1,250	1987
Ordnance Survey Plan	SS9497NW	1:1,250	1985
Ordnance Survey Plan	SS9498SW	1:1,250	1985

Large-Scale National Grid Data Published 1993

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS9397	1:2,500	1993

Large-Scale National Grid Data Published 1993

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS9398SE	1:1,250	1993
Ordnance Survey Plan	SS9497NE	1:1,250	1993
Ordnance Survey Plan	SS9497NW	1:1,250	1993
Ordnance Survey Plan	SS9498SE	1:1,250	1993
Ordnance Survey Plan	SS9498SW	1:1,250	1993

Large-Scale National Grid Data Published 1995

(2)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS9497NE	1:1,250	1995

Ordnance Survey County Series Published 1884

(1)

County	Mapsheet	Scale	Year
Glamorganshire	017_00	1:10,560	1884
Glamorganshire	018_00	1:10,560	1884

Ordnance Survey County Series Published 1900

(2)

County	Mapsheet	Scale	Year
Glamorganshire	017_NE	1:10,560	1900
Glamorganshire	017_SE	1:10,560	1900
Glamorganshire	018_NW	1:10,560	1900
Glamorganshire	018_SW	1:10,560	1900

Ordnance Survey County Series Published 1921

(3)

County	Mapsheet	Scale	Year
Glamorganshire	017_NE	1:10,560	1921
Glamorganshire	017_SE	1:10,560	1921
Glamorganshire	018_NW	1:10,560	1921
Glamorganshire	018_SW	1:10,560	1921

Ordnance Survey County Series Published 1938 to 1945

(4)

County	Mapsheet	Scale	Year
Glamorganshire	017_NE	1:10,560	1938
Glamorganshire	017_SE	1:10,560	1938
Glamorganshire	018_NW	1:10,560	1945
Glamorganshire	018_SW	1:10,560	1945

Ordnance Survey Plan Published 1964 to 1965

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS99NE	1:10,560	1964
Ordnance Survey Plan	SS99NW	1:10,560	1965

Ordnance Survey Plan Published 1983

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS99NE	1:10,000	1983
Ordnance Survey Plan	SS99NW	1:10,000	1983

10K Raster Mapping Published 1999

(1)

National Grid Series	Mapsheet	Scale	Year
Ordnance Survey Plan	SS99NE	1:10,000	1999
Ordnance Survey Plan	SS99NW	1:10,000	1999

Currently we do not have agreement with Ordnance Survey to provide Large Scale National Grid Data from 1996 onwards.

CLIENT DETAILS Envirocheck Order No. EC11746031_1.1

Customer Ref: M/A Stone, East
 Riverside Cymru Taff C 8 C
 Llyn Cymru Taff C 8 C
 PONTYPRIDD
 Riverside Cymru Taff C 8 C 274

SITE DETAILS Grid Reference 204170 197890

Proposed Civic Amenity Site

Taken from
 Ordnance Survey

Historical Map Legend

Quarry	Sand Pit	Marsh	Reeds
Gravel Pit	Clay Pit	Rough Pasture	Furze
Refuse Heap	Shingle	Osiers	Ford
Railway crossing River or Canal	Railway crossing Road	Level Crossing Road	Level Crossing Railway
Embankment	Cutting	Road over River or Canal	Arrow denotes flow of Water
Road over single Stream			

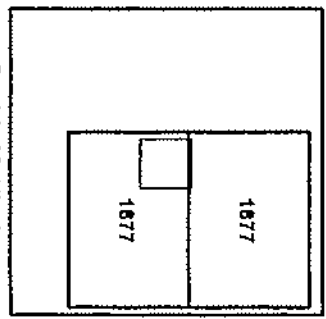
Ordnance Survey County Series

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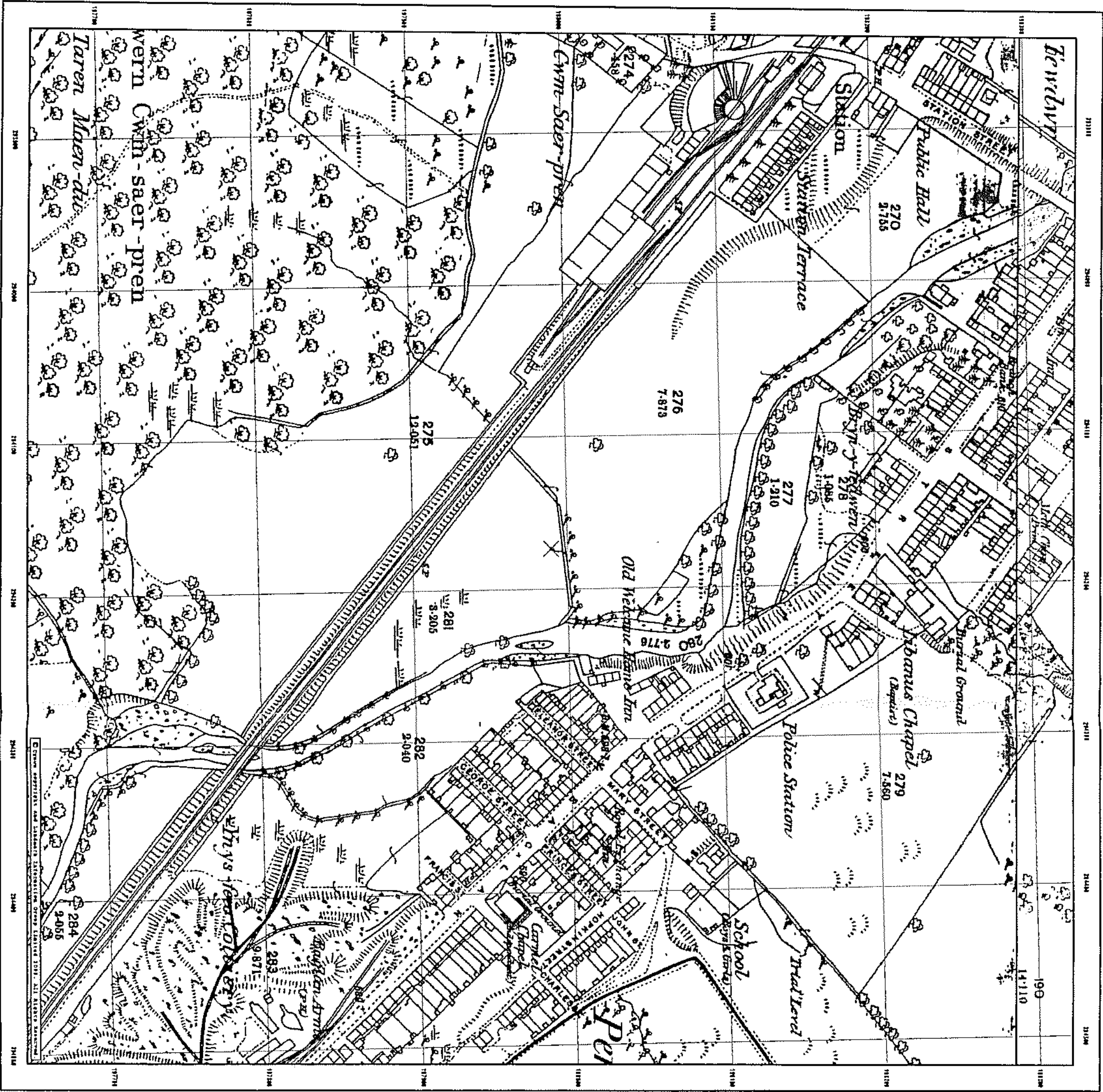
GLAMORGANSHIRE

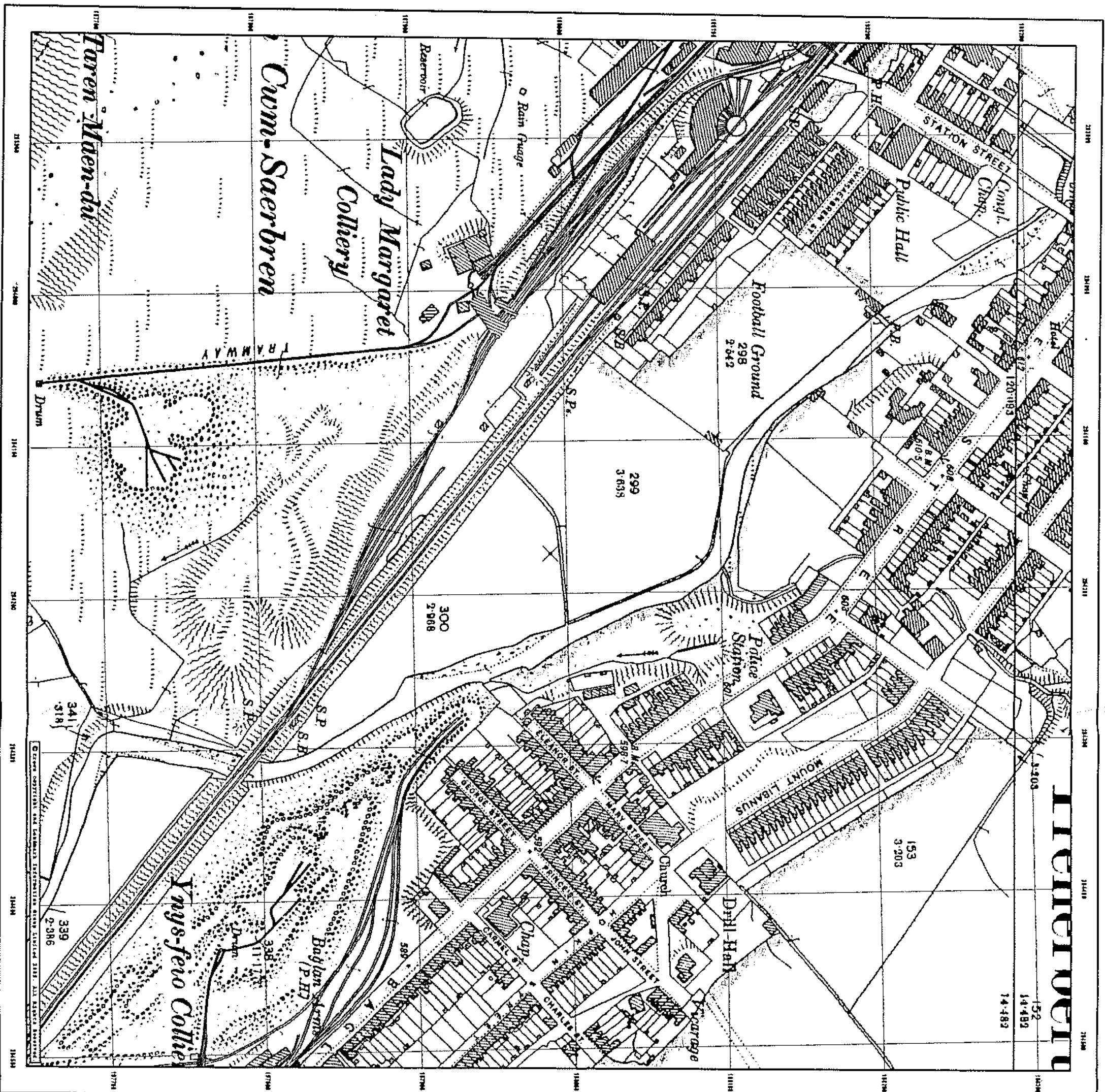
Published 1877

Source map scale - 1:2,500



Date(s) of Publication





Envirocheck[®]

CLIENT DETAILS

Envirocheck Order No. EC11746031_1_1

Customer Ref: Mr A Sinton_E430

Page No. _____

Phyllis Gordon Library Road

Rhonda Cymen Yant C#27 2YA

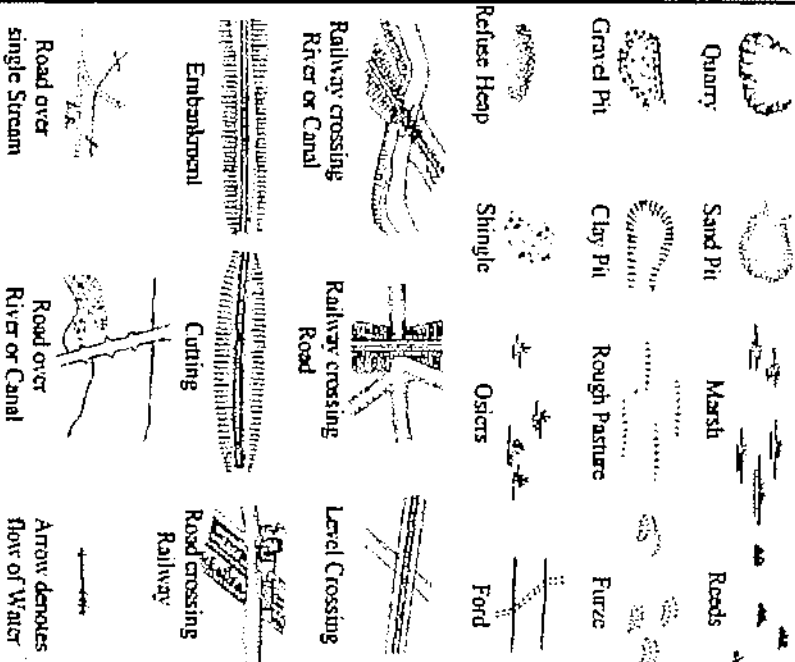
SITE DETAILS

Grid Reference 294170 187890

Proposed Civic Amenity Site

Tŷ Hafnabwrn
Rheolddo Cymen Taff

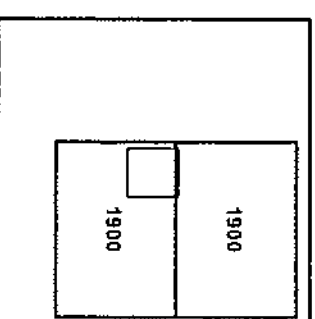
Historical Map Legend

**Ordinance Survey County Series**

The historical situation was very different from today's predominantly built-up coastal regions of England. While the coastal zone in 1850 was very sparsely populated, the majority of the population was concentrated in the inland zone. In 1850 the 11,546 votes were eligible for electing urban ward and 118 for rural. The number of electors was considerably smaller than today. The population data shown in the right hand column were taken from the 1851 Census. The 1851 Census was the first census in which the population of electors was listed. The 1851 Census was the first census in which the population of electors was listed. The 1851 Census was the first census in which the population of electors was listed.

GLAMORGANSHIRE

Source map scale - 1:2,500



Date(s) of Publication : 1991

OTS Ordnance
Survey

L. KODAKAKODS P. 273763

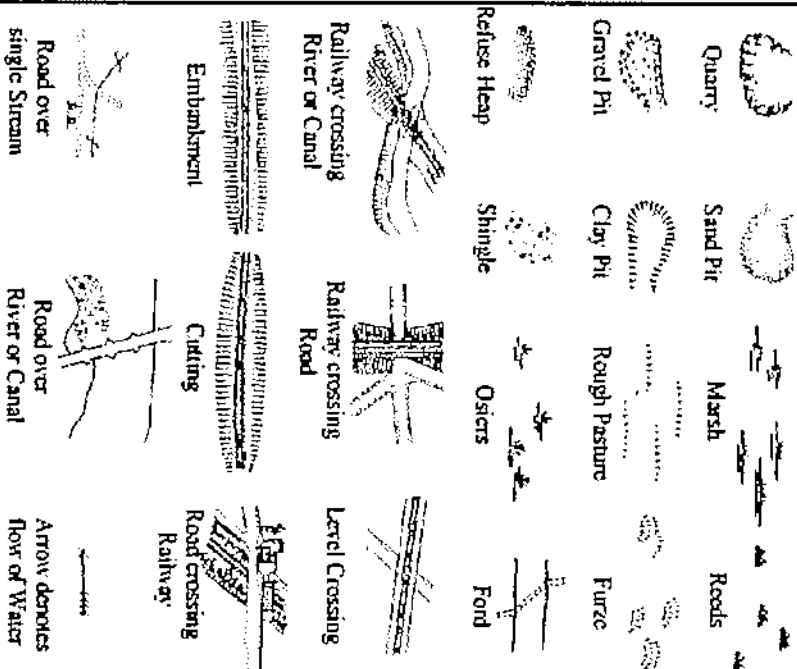


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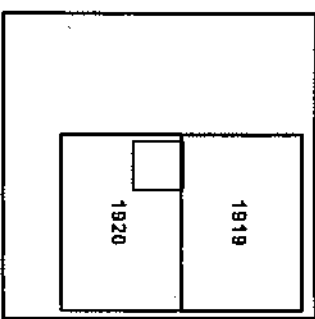
Envirocheck Order No. EC11746031_1_1

Grid Reference 2B4170 197990



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The 16 different samples were represented from areas predominantly dry or the areas selected for England. More samples were collected from the 12,280 acres were selected for mapping in the wettest and by 1985 it covered the whole of what were considered to be the indicative parts of Great Britain. The published data given on the 1984 and 1985 maps were considered to be the best available. Before 1982, all 65 sites were based on the Central Analytical, and subsequent surveys of 1000 samples or more of cereals, giving 10 to 16 different treatments in each year, and



Date(s) of Publication 2018



Produced by Landmark Information Group Limited. Tel: 0878 810 870 Fax: 0870 850 8874

CLIENT DETAILS Envirocheck Order No. EC11746031_1.1

Customer Ref: A/Siemens
Rhonda Green Ltd C & C
Llys Castell Library Road
PONTYPRIDD
Rhonda Green Ltd C737 27A

SITE DETAILS Grid Reference 294170 197990

Proposed Civic Assembly Site

Treherbert
Rhonda Green Ltd

Historical Map Legend

	Inactive Quarry, Chalk Pit or Clay Pit		Active Quarry, Chalk Pit or Clay Pit		Culvert
	Slope		Slope		Coppice, Osier
	Pylon		Electricity Transmission Line		Direction of Water Flow
	Marsh		Sailings		Orchard Tree
	Rough Grassland		Scrub		Heath
	Coniferous Tree (Surveyed)		Non-coniferous Tree (Surveyed)		Non-coniferous Tree (Not Surveyed)
	Coniferous Tree (Not Surveyed)		Non-coniferous Tree (Not Surveyed)		Bracken

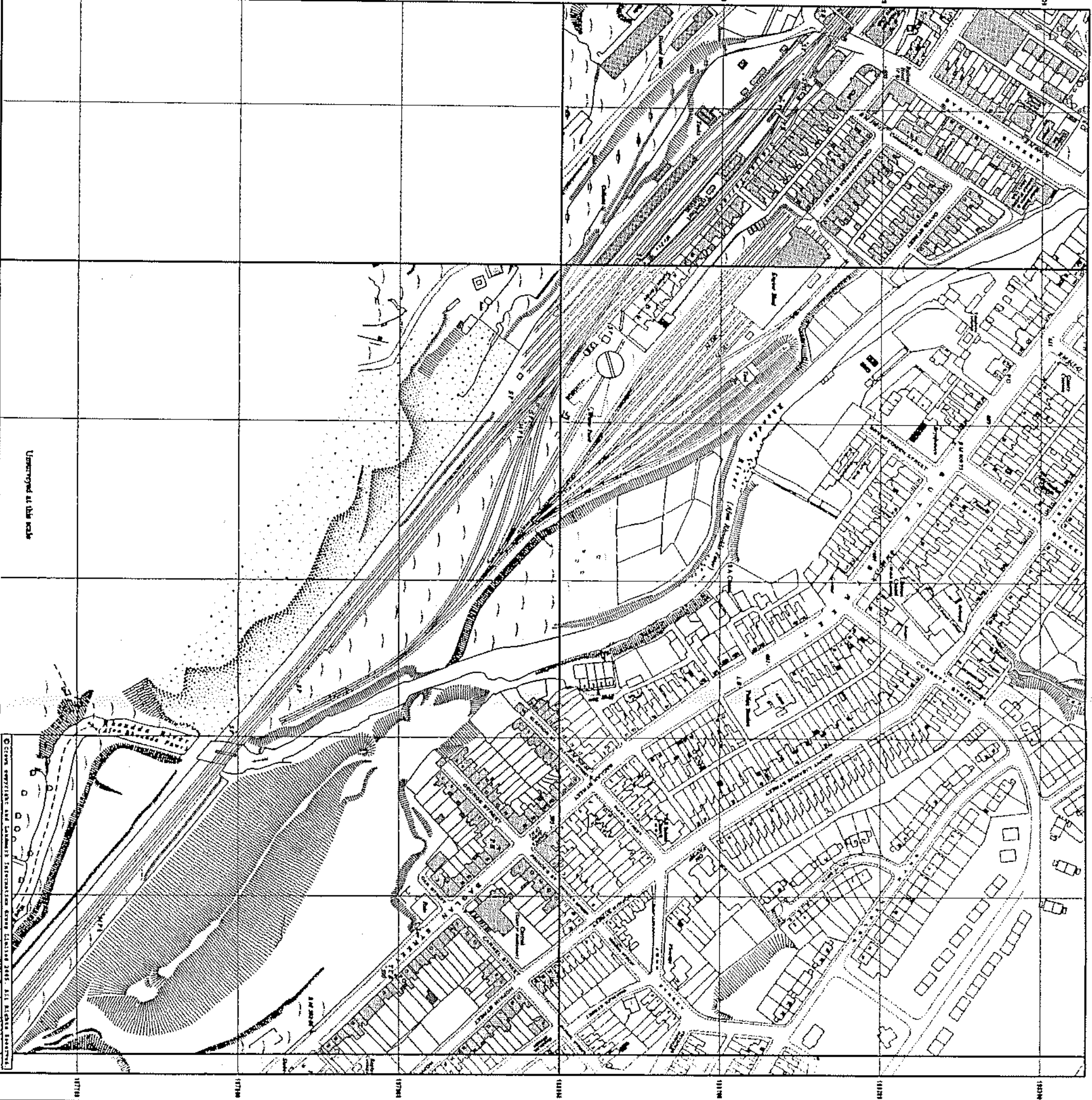
Ordnance Survey Plan

The historical maps shown were reproduced from maps produced by the Ordnance Survey. The maps are based on the 1860 and 1880 editions of the 1:250,000 scale map of Wales and the 1860 and 1880 editions of the 1:50,000 scale map of the Cardiff area. The maps are based on the 1860 and 1880 editions of the 1:250,000 scale map of Wales and the 1860 and 1880 editions of the 1:50,000 scale map of the Cardiff area. The maps are based on the 1860 and 1880 editions of the 1:250,000 scale map of Wales and the 1860 and 1880 editions of the 1:50,000 scale map of the Cardiff area.

ORDNANCE SURVEY PLAN
Published 1960
Source map scale - 1:1,250

Date(s) of Publication 1960

1960	1960	1960
1960	1960	1960



Unsurveyed at this scale

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Ordnance Survey

LANDMARK Information Group

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Envirocheck Order No. EC11746031_1_1

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Grid Reference 294170 197990



Culvert



Copies.

Line	Direction of Water Flow
1	Down
2	Down
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6	Down
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Copies, Office

Results

Orchard Tree

Results

Brackner

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Brackner

92

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D

	(Survived)	(Not Survived)
1. Age		
2. Sex		
3. Education		
4. Income		
5. Marital Status		
6. Religion		
7. Ethnicity		
8. Health Status		
9. Employment Status		
10. Family Size		
11. Social Network		
12. Access to Healthcare		
13. Insurance Coverage		
14. Living Conditions		
15. Mental Health		
16. Physical Health		
17. Chronic Conditions		
18. Medication Use		
19. Hospitalization History		
20. Quality of Life		
21. Patient Satisfaction		
22. Doctor's Recommendation		
23. Compliance with Treatment		
24. Health Literacy		
25. Health Beliefs		
26. Health Expectations		
27. Health Status		
28. Health Status		
29. Health Status		
30. Health Status		

	Tree (Survived)	Tree (Not Survived)
0	0.000000	0.000000
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ORDNANCE SURVEY PLAN

Published 1962
Source map scale - 1:2,500

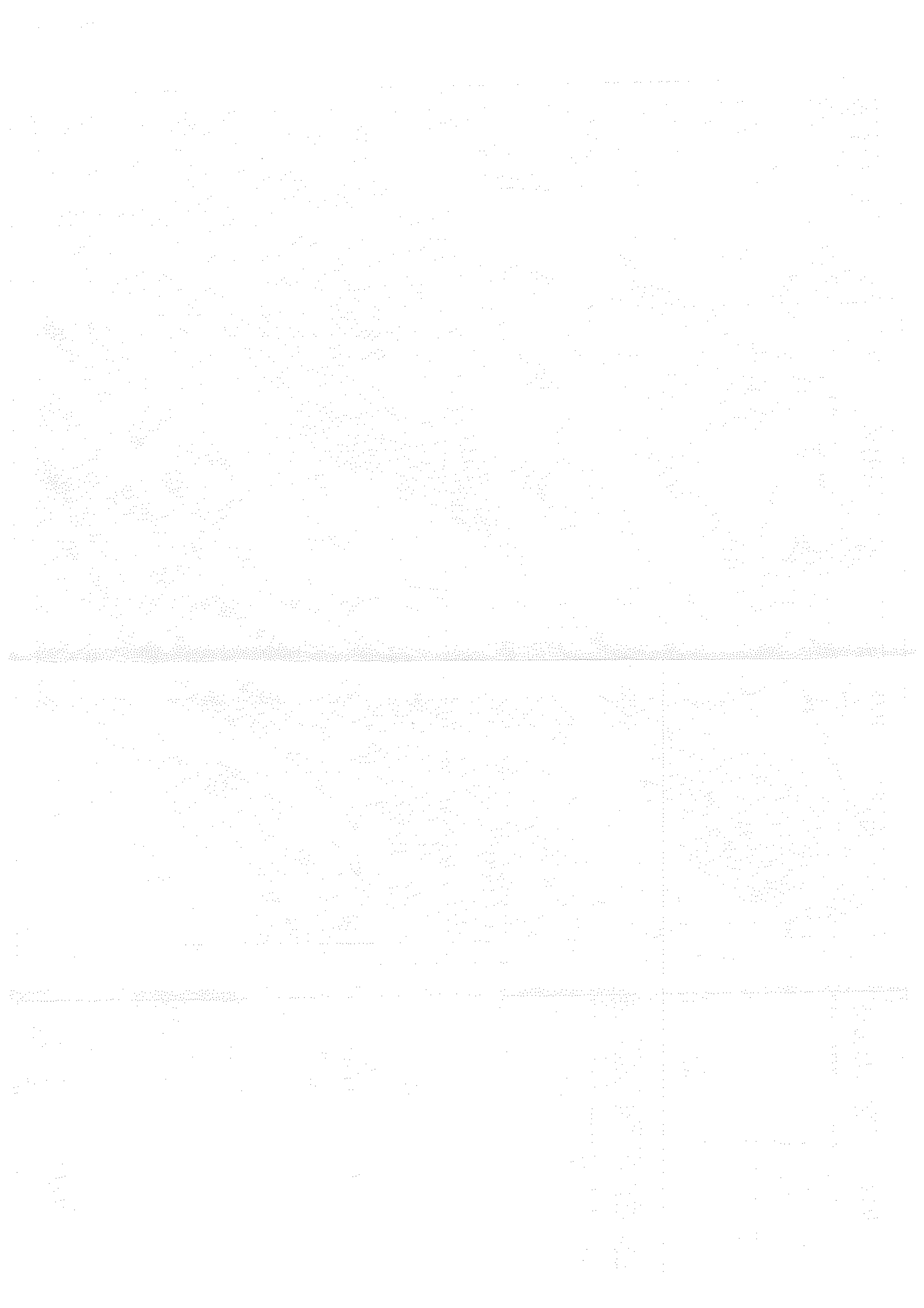
1962	1962
1962	1962

Date(s) of Publication 4-2010

[illegible]

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Envirocheck Order No. EC11746031_1_1

11-11-11

Rhonda Cymru Taff CF37 3YA

Grid Reference 294170 187990

Proposed Civic Attraction Site

Rhonda Cynon Taff

Historical Map Legend



Pit or Clay Pit	Pit or Clay Pi
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Shope



Transmission Line

Wolfer Hoy



Marsh

Orchard Tree

Results



Rough Translations

Heath
crub

Black:



	(Survived)	(Not Survived)
Survived	10	10
Not Survived	10	10

	(Survived)	(Not Survived)
Survived	10	10
Not Survived	10	10

Tree Tree

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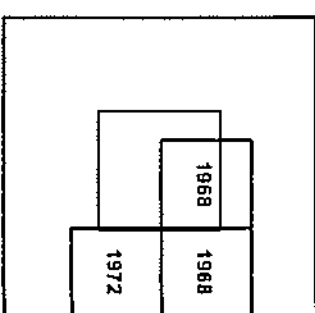
Ordnance Survey Plan

[illegible]

ORDNANCE SURVEY PLAN

Published 1968 to 1972

Source map scale - 1:1,250



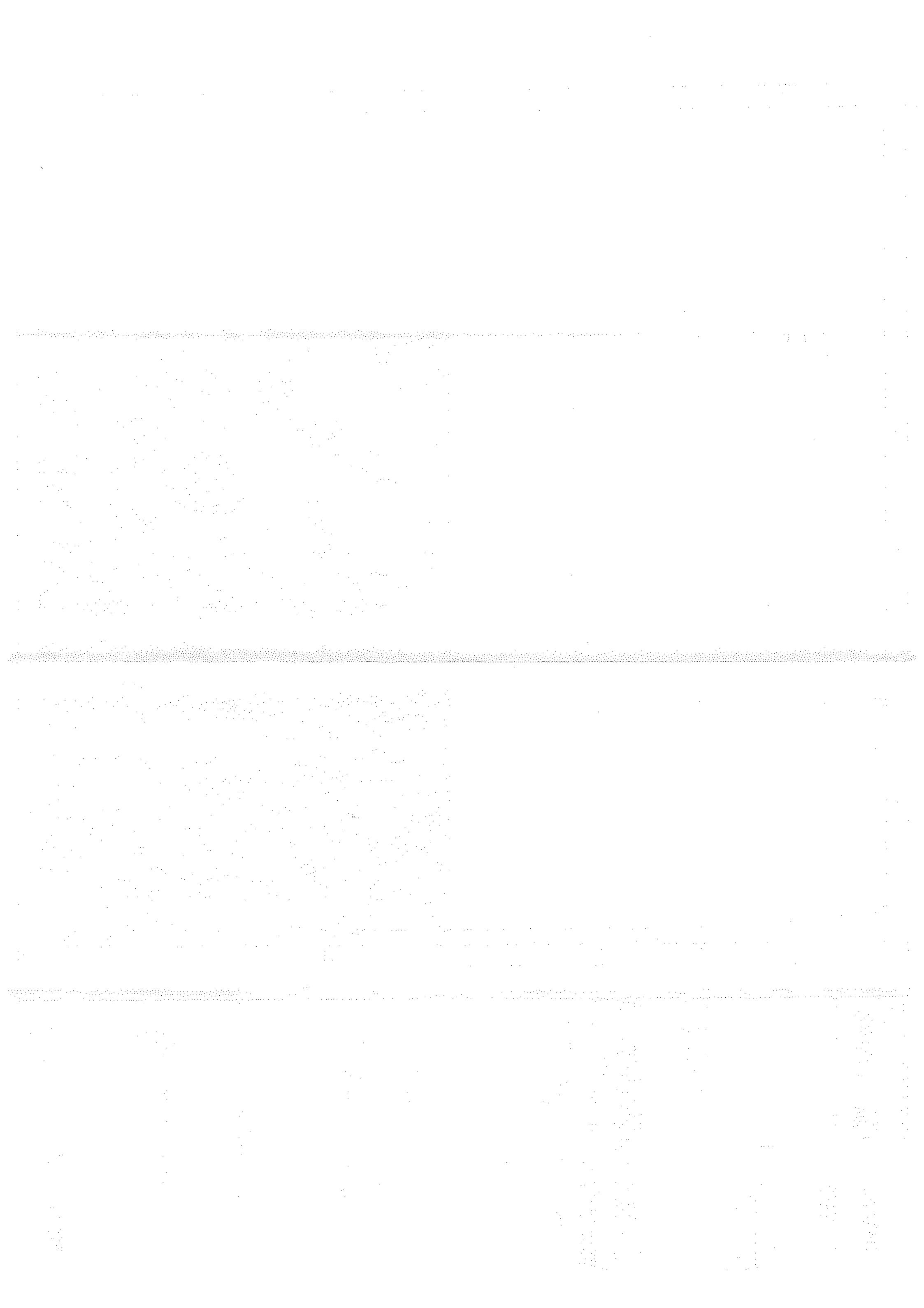
Date(s) of Publication



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CLIENT DETAILS Envirocheck Order No. EC11746031_1.1

Customer Ref: W.A. Stone, 6435
Rhonda Cymen Test C & C
Llyn Cymen Library Road
PONTYPRIDD
Rhonda Cymen Test C73 2YA

SITE DETAILS Grid Reference 294170 197890

Prepared Chris Amenity Site

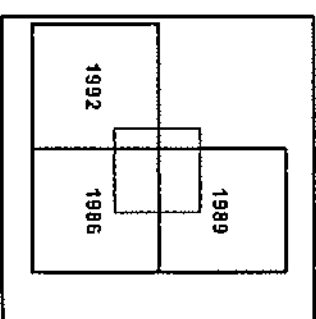
Treherbert
Rhonda Cymen Test

Historical Map Legend

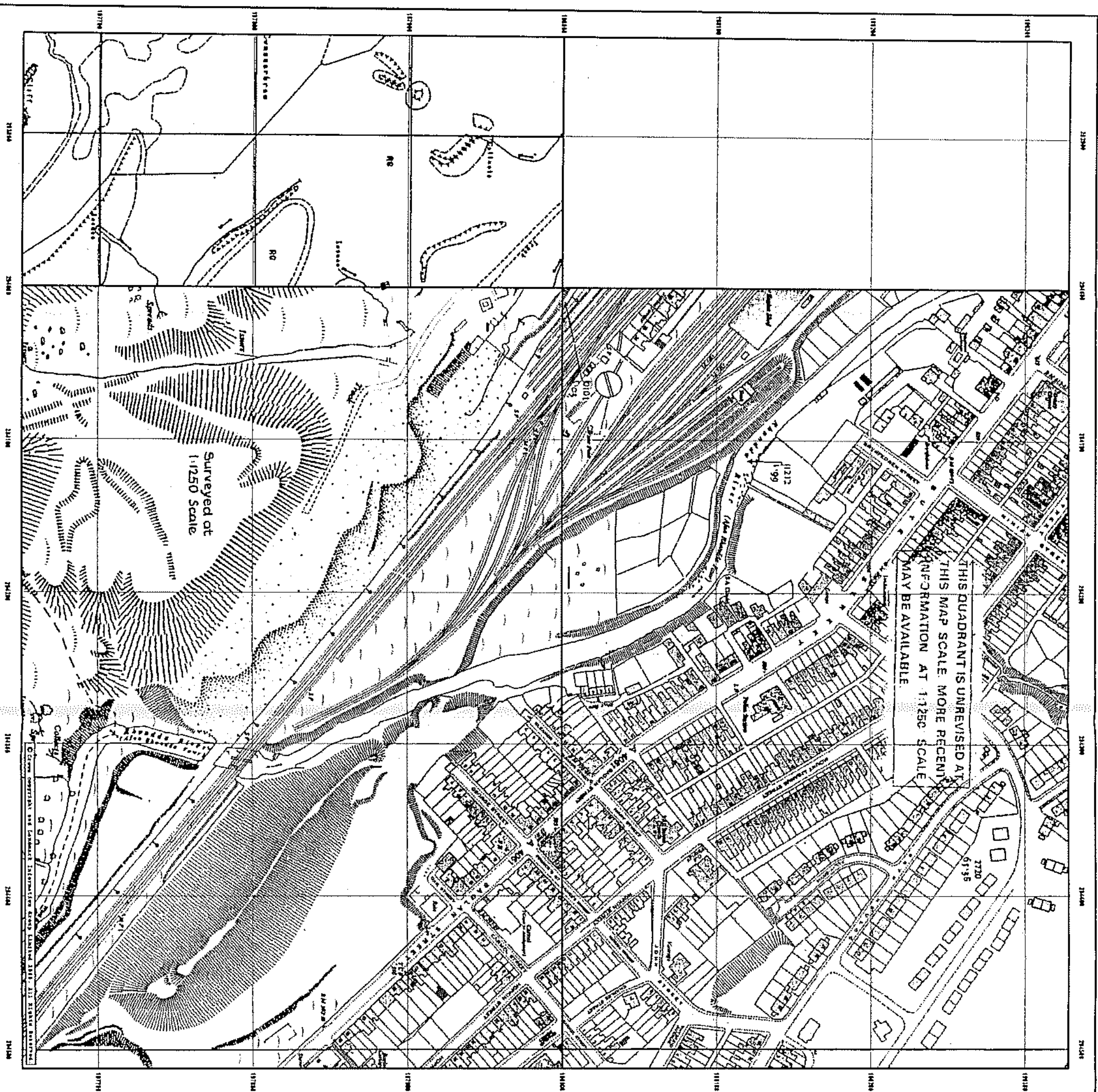
	Active Quarry, Chalk Pit or Clay Pit	Culvert
	Slope	Slope
	Electricity Transmission Line	Direction of Copeck, Osier Water Flow
	Sallings	Orchard Tree
	Scrub	Heath
	Coniferous Tree (Not Surveyed)	Non-coniferous Tree (Not Surveyed)
	Coniferous Tree (Surveyed)	Non-coniferous Tree (Surveyed)

Additional Sites
The 628 sites (Ordnance Survey) are located within the area of the map. The sites are numbered 1 to 628. The sites are numbered 1 to 628. The sites are numbered 1 to 628.

ORDNANCE SURVEY PLAN
Published 1986 to 1992
Source map scale - 1:2,500



Date of Publication 1992





Envelopecheck Order No. EC11746031_1_1

(11-2000-1004 07-144)

Grid Reference	294170	197980
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Active Quantity, Chalk Pit or Clay Pit	Culvert
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21

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Electricity	Direction of Wave Flow	Copics, Oris
Transmission Line		

and Time

Collings	Orchard Trees	Rice's
1	2	3

Brack

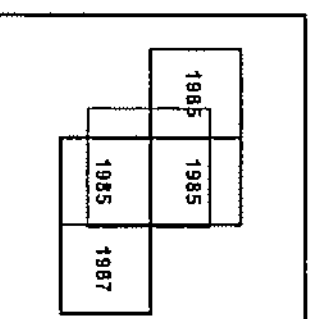
95

	(Not Survived)	(Survived)
(Not Survived)	100	100
(Survived)	100	100

The 628 cards (Consumers Survey's "Survey of Microbes on Microfilm") are further index sections of mapping which were prepared and published in between the main editions to be sure no spots were lost. They date from 1947 to 1951, and contain detailed information on buildings, roads and land-use. These maps were produced in sheets 1:2,500 and 1:7,500 scale.

JAN

1000



Date(s) of Publication 4-2-16



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Envirocheck Order No. EC11745031_1_1

1790-1800

Rhonda Lynn Taff EF37 ZYA

Grid Reference 294170 197990

Proposed Civic Amenity Site

Rhonda L. Cynon-Tolm

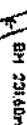
Historical Map Legend



Slope



Stop



Berich Mark



Wells



Wells **Buildings with
Building Seed**



Direction of
Water Flow

☒ Python

Electricity
Transmission Lines

Administrative Boundaries

Civil parish/community boundary

District boundary

County boundary

Boundary post/stone
Boundary marking symbol (note: these
always appear in opposed pairs or groups
of three)

Large-Scale National Grid Data

Large Scale National Grid Data' superimposed SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1982, and continued to be produced until 1989. These maps were the first versions of digital mapping and to provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:25k and 1:12.5k scales.

ORDNANCE SURVEY PLAN

Source map scale = 1:2,500



Date(s) of Publication : 01/10/2015



Introduction



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CLIENT DETAILS

Envirocheck Order No. EC11746031_1.1

Customer Ref: M/A Stone, E436

Rhonda Cynon Taff C B C

Liwyn Castell Library Road

PONTYPRIDD

Rhonda Cynon Taff CF37 2YA

SITE DETAILS

Grid Reference 294170 197990

Proposed Civic Amenity Site

Trefherbert
Rhonda Cynon Taff

Historical Map Legend



Slope



Bench Mark



Well



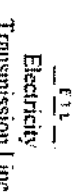
Buildings with Building Seed



Direction of Water flow



Pylon



Electricity Transmission Line

Administrative Boundaries

..... Civil parish/community boundary

--- District boundary

--- County boundary

Boundary post/stone
Boundary meeting symbol (note: these always appear in opposed pairs or groups of three)

Large-Scale National Grid Data

Large-Scale National Grid Data: superimposed grid lines (Ordnance Survey's 'Survey of Information on Microfilm' 1987) and coordinates (Ordnance Survey's 'Survey of Information on Microfilm' 1987) are shown on the map to provide detailed information on business and roads. Grid lines are shown at 100m intervals (1:1250 scale). These maps were produced at both 1:1250 and 1:1250 scales.

ORDNANCE SURVEY PLAN

Published 1993

Source map scale - 1:1,250

1993	1993	1993
1993	1993	1993

Date(s) of Publication 1993



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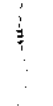
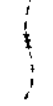
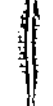
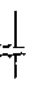
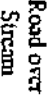
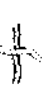
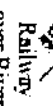
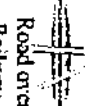


Envirocheck Order No. EC1746031_1_1

11-16-1998 17:54

Grid Reference	294170	197890
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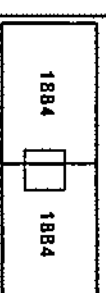
Historical Map Legend



Ordinance Survey County Series

[illegible]**GLAMORGANSHIRE**

Source map scale - 1:10,550



Date(s) of Publication 11/11/11



LANDMARK
Information Group

Produced by Landwehr Information Group Limited. Tel: 0870 850 6670 Fax: 0870 850 6679



A Landmark product

CLIENT DETAILS Envirocheck Order No. EC11746031_1.1

Customer Ref: W/A Shire, E428
Rhonda Green T&P C & C
Llwyn Caplan Library Road
PONTYPRIDD
Rhonda Green T&P CR37 2YA

SITE DETAILS Grid Reference 294170 197980
Proposed Civic Amenity Site

Treherbert
Rhonda Green T&P

Historical Map Legend

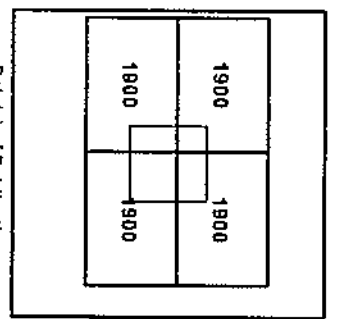
	Quarry		Single		Railway over Road		Road over Railway
	Gravel Pit		Sand Pit		Level Crossing		Railway over River
	Oiler Pits		Road over Stream		Road over River or Canal		Road over Stream
	Rough Pasture		Furze		Sunken Road		Raised Road
	Marsh		Reeds		Instrumental Contour		Sketches Contour
	Osiers		Arrow denotes Flow of Water				

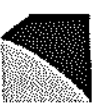
Ordnance Survey County Series

The historical maps above are reproduced from maps produced by the Ordnance Survey for England, Wales and Scotland in the 1840s to 1860s. The maps were produced by the Ordnance Survey for the Admiralty and the War Office. The maps were produced by the Ordnance Survey for the Admiralty and the War Office. The maps were produced by the Ordnance Survey for the Admiralty and the War Office.

GLAMORGANSHIRE
Published 1900

Source map scale - 1:10,560





Envirocheck®

CLIENT DETAILS

Envirocheck Order No. EC11746031_1_1

Customer Ref: Mr A Stone, E434

(13-*see* below) in 3.1.1.

Library: Canton Library Road

Rhonda Cynn Tott CPJ7 2YA

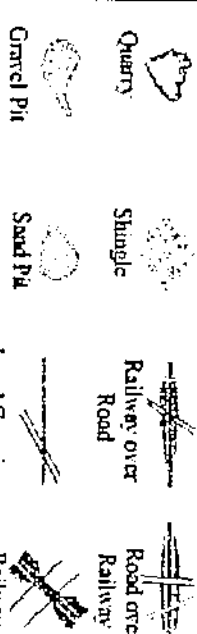
SITE DETAILS

Grid Reference	284170	197990
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Proposed Civic Amenity Site

Rhonda Cymen Taff

Historical Map Legend



Other Pills

Rough Pasture Furze Road over River or Canal

		
Marsh	Roads	Sunken Road
		
Rivulet Road		

Instrumental Contour

Subjects

Arrow denotes
Flow of Water

Ordinance Survey County Series

[illegible]

GLAMORGANSHIRE

Source map scale - 1:10,560

1921	1921
1921	1921

Date(s) of Publication 14 and 15

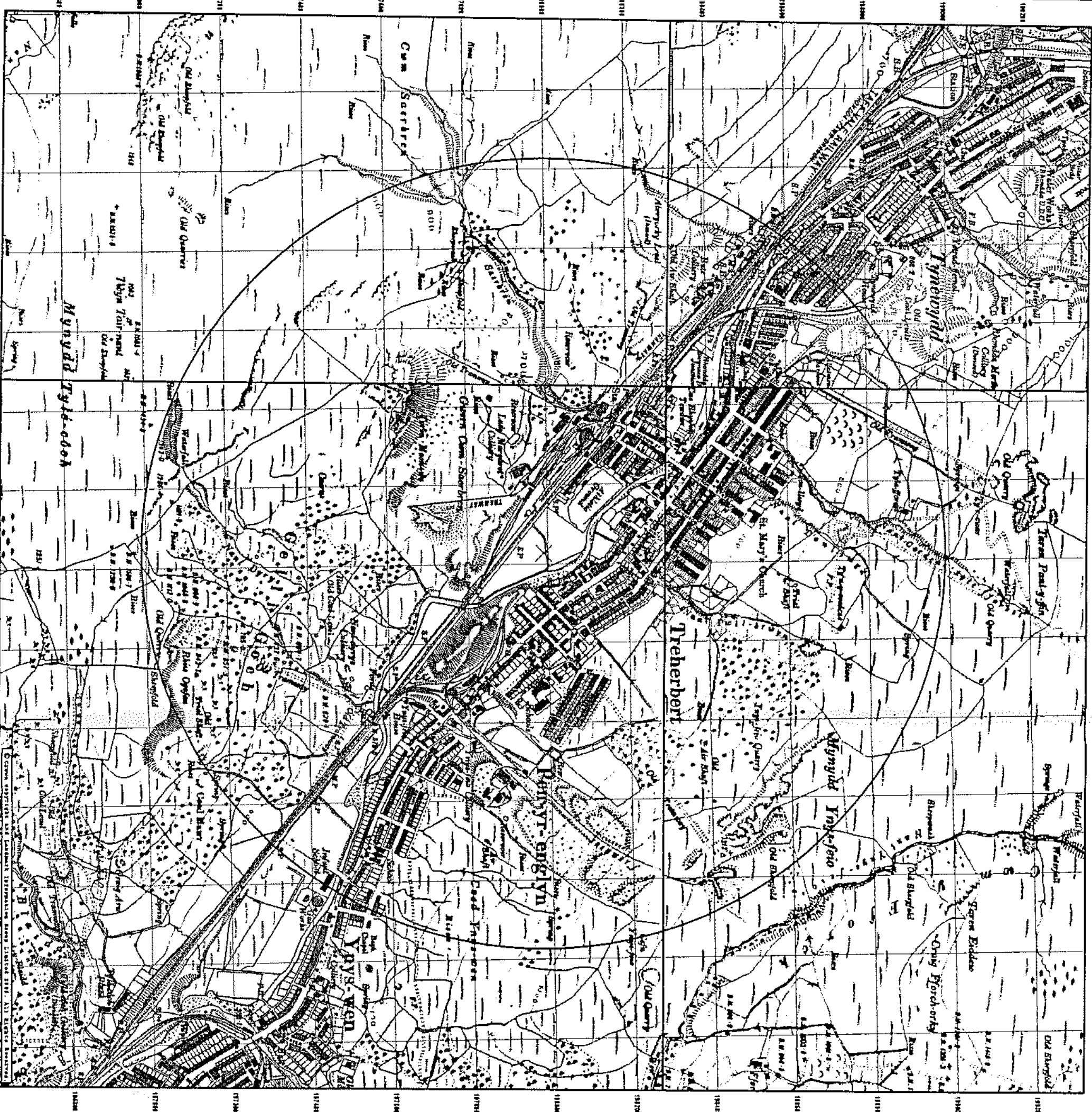


(continued) Financial



Information Group

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CLIENT DETAILS Envirocheck Order No. EC11746031_1.1
(Revision 1.1.1)

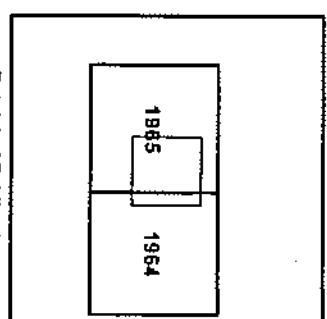
Customer Ref: Mr A Stone, Esq
Riverside Cymru Ltd C & C
Llyn Cymru Library Road
PONTYPRIDD
Riverside Cymru Ltd CF37 2YA

SITE DETAILS Grid Reference 294170 197990
Proposed Civic Amenity Site

Trunkway
Riverside Cymru Ltd

Historical Map Legend	
	Non-coniferous Trees
	Coniferous Trees
	Scrub
	Lake, Loch or Pond
	Electricity Pole
	Marsh
	Standard Gauge Multiple Track
	Standard Gauge Single Track
	Over Crossing Bridge
	Siding, Turnway or Mineral Line
	Narrow Gauge

Ordnance Survey Plan
The historical map shown here is a reproduction of the original map, which was published by the Ordnance Survey in 1964. It is a 1:10,000 scale map, which means that 1 cm on the map represents 100 m on the ground. The map is a black and white line drawing, and it shows the area around the proposed site. The map is a reproduction of the original map, which was published by the Ordnance Survey in 1964. It is a 1:10,000 scale map, which means that 1 cm on the map represents 100 m on the ground. The map is a black and white line drawing, and it shows the area around the proposed site.





CLIENT DETAILS

Envirocheck Order No. EC11746031_1.1
Customer Ref: M1 A Stern, East
Rhonda Cymen Tair C B C
Llynfa Castle Library Road
PONTYPRIDD
Rhonda Cymen Tair C B C
Rhonda Cymen Tair C B C

SITE DETAILS

Grid Reference 294170 197990
Proposed Civic Assembly Site

Treherbert
Rhonda Cymen Tair

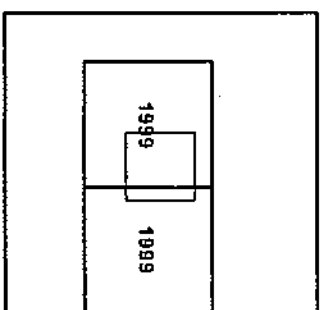
Historical Map Legend

	Non-contiguous		Pylon
	Trees		Telephone Line (white shown)
	Coniferous Trees		Electricity Transmission Line (with poles)
	Orchard		Gravel Pit
	Rough Grassland		Shingle
	Heath		Refuse Tip or Slag Heap
	Scrub		Sand
	Marsh, Salt Marsh or Reeds		Sand Pit
	County Boundary (England only)		Slopes
	Civil Parish or Community Boundary		District, Unitary, Metropolitan, London Borough Boundary
	Constituency Boundary		

10K Raster Mapping

The published maps shown were produced from the Ordnance Survey 1:10,000 colour raster mapping. These maps are derived from the Ordnance Survey 1:10,000 data which was originally published in 1978. The data is highly detailed showing buildings, terrain, and all named features as well as all roads, rivers and paths. Road names are also included together with the names of the various local authorities. Boundary lines are shown in black, county, county authority, district, civil parishes and constituencies.

ORDNANCE SURVEY PLAN
Published 1988
Source map scale - 1:10,000



Date(s) of Publication 1988

