



REPORT TITLE : **Geo-Environmental Report –
Proposed Waste Recycling
Facility, Llantrisant Business Park,
Llantrisant**


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PREPARED BY : 
(Mr Mathew T. C. Lake)

REVIEWED BY : 
(Miss Louise J. Dow)

APPROVED BY : 
(Dr Gwyn C. Lake)

Executive Summary

The site has remained unused until the early 1990's when evidence suggests the site was used as a landfill.

Geologically the site is underlain by the rocks of the Upper Coal Measures (Hughes Sandstone). Glaciofluvial Deposits overlie the solid geology. Made ground associated with landfilling is also present.

In order to confirm the shallow ground conditions a site investigation was carried out comprising ten trial pits. The ground conditions encountered within the trial pits comprised of a Soft to firm light grey gravelly CLAY/ Loose to medium dense light brown clayey GRAVEL with inclusions of red brick to depths of between 0.8m and greater than 2m.

Six representative disturbed representative samples were tested for selected elements/compounds. No contamination was noted at the site in relation to commercial guidelines.

The risk to the aquatic environment was also considered to be low as due to the inert nature of the made ground leachate levels would also be low.

The risk from ground gas was also considered to be low due to the fact that no biodegradable materials were encountered. However, as a precautionary measure, it was recommended that for any future covered buildings that the recommendations for Gas Characteristic 2 should be incorporated in the design of any structures.

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SECTION 1 Introduction and Proposed Development

Tom Pritchard Contracting Limited (the Client) is proposing a new waste recycling station to be constructed on land adjacent to Glanmychydd Fach Farmhouse, Llantrisant.

Terra Firma (Wales) Limited have been commissioned to carry out a geo-environmental assessment of the above site.

Planabuild Limited are the Civil and Structural Engineers for the project.

The main objectives of the geo-environmental assessment programme were to:

- Identify the potential environmental liabilities at the site associated with any soil and groundwater contamination from past site uses.
- Provide a summary of the environmental conditions at the site, together with any necessary remediation works to render the site fit for its intended use.
- Provide recommendations with regard to any other geo-environmental aspects pertaining to the development such as methane and radon gas emissions.

The main objectives of the geo-environmental site investigation were to:

- Determine the type, strength and bearing characteristics of the shallow superficial and underlying solid geology.
- Provide recommendations for a suitable and economic foundation/floor slab solution for the development.
- Provide recommendations with regard to any other geo-technical aspects pertaining to the development.

In order to achieve the above objectives, Terra Firma (Wales) Limited carried out an assessment programme including a review of existing data, followed by a field investigation to confirm the composition of any waste present on site and also to collect and analyse soil samples from selected locations around the site.

1.1 Limitations and Exceptions of Investigation

Tom Pritchard Contracting Limited has requested that a Geo-environmental Site Assessment (GSA) be performed in order to determine if contamination is present beneath the site, the affect if any of radon/landfill gas and to provide remedial recommendation (if necessary) for the safe development of the site.

The GSA was conducted and this report has been prepared for the sole internal reliance of Tom Pritchard Contracting Limited and its design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The report represents the findings and opinions of experienced geo-environmental consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may also be required.

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

The site investigation was specifically limited by the following site constraints:

- water main crossing the site

SECTION 2 Review of Existing Data

2.1 Physical Setting, Current Use and Site Conditions

The site entrance is located off Pantybrad Road at a National Grid Reference of 304125 185122. The location of the site is shown in **Figure 2.1**.

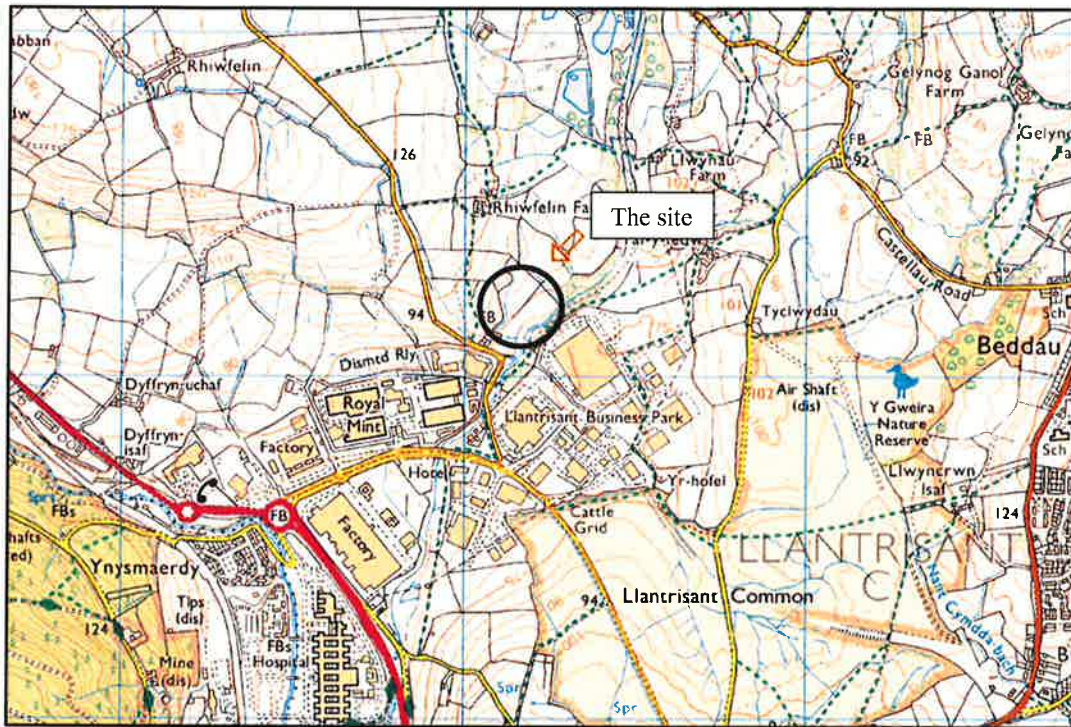


Figure 2.1 Site Location

The site is irregular in shape and covers an area of 2.33 hectares. The site is located in a large field. The south eastern boundary is formed by the Nant Muchudd watercourse. The remaining boundaries of the site are located within the field in which the site is located.

The topography of the site slopes down in a south easterly direction towards the Nant Muchudd watercourse.

2.2 Site History

An Envirocheck history report was obtained for the site. The full report is presented in **Annex A**. The most relevant editions are summarised below.

1875

The 1887 edition shows the site to be located across a number of fields. A river runs along the south eastern boundary of the site. There is a small building shown in the south western corner of the site. A small stream runs along the northern most boundary of the site. An old lime kiln is shown 60m south of the site.

1900 and 1919

The 1900 map shows a rail line which runs on the southernmost side of the river south of the site. There are no changes to the site. A trial shaft is shown 60m south of the site.

2.2 Site History (Continued)

1940, 1961 and 1978

The 1940, 1961 and 1978 editions show no significant change to the site. The railway previously shown is now disused. Development has taken place 70m south of the site, mainly consisting of industrial units.

1990

The 1990 map now shows marshy ground in the northern part of the site.

2006 and 2013

The 2006 and 2013 editions show no significant change to the site or surrounding area.

2.3 Geology

The 1:50000-scale geological map of the area (Sheet 249 solid and drift editions) show the site to be underlain by the Hughes Member (Pennant Sandstone Formation) of the Carboniferous Period. These rocks generally consist of Mudstone, Siltstone and Sandstone.

Superficial deposits in the form of Glaciofluvial Deposits consisting of Sand and Gravel are shown to overlie the solid geology.

Some made ground is expected to overlie the superficial deposits.

2.4 Hydrology

Surface and perched groundwater flows from the site are likely to be in the direction of the Nant Muchudd watercourse, which flows south. Groundwater is likely to form part of the base flow of the watercourse.

2.5 Environment Agency Information

The 'What's in your back yard' feature on the Environment Agency website was consulted for information on the following:

Hydrogeology

According to the Environment Agencies Groundwater Protection Policy, the geology of the area is classed as a Secondary A Aquifer. Superficial deposits are not classified at the site.

Pollution

No incidents of pollution are noted within 400m of the site.

Landfill Records

The site itself is noted as a historic landfill. The site last received waste on the 10th January 1997. There is records of the site receiving inert and industrial waste.

Flooding

The site is not shown to be at risk of flooding, but a watercourse locates along the margin.

Groundwater Source Protection Zones

The site does not locate within a groundwater source protection zone.

SECTION 3 Preliminary Risk Assessment

The following sub-sections detail a preliminary risk assessment that is based on the desk study information.

3.1 General

The contaminated land regime is set out in Part IIA of the Environmental Protection Act (EPA) 1990 and was introduced on the 1st April 2000 in England and 1st July 2001 in Wales.

Part IIA was introduced to achieve two aims:

- (1) The identification of contaminated land
- (2) The remediation of contaminated land that poses an unacceptable risk to human health and/or the environment

Under Part IIA the statutory definition of 'contaminated land' is:

"any land which appears to the local authority in whose area it is situated, to be in such a condition, by reason of substances in, on, or under the land, that:

- (a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) Pollution of controlled waters is being, or is likely to be, caused."

For land to be classified as 'Contaminated Land' there must be a **'pollutant linkage'**. A pollutant linkage requires three essential elements:

- (1) A **CONTAMINANT** (hazard) - a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of **controlled waters**
- (2) A **RECEPTOR** (target) - something which could be adversely affected by a contaminant
- (3) A **PATHWAY** - a route or means which either allows the contaminant to cause significant harm to that receptor, or that there is a significant possibility of such harm being caused to the receptor, or that pollution of controlled waters is being or likely to be caused.

The term 'Risk' is widely used in different contexts and situations, but a prescriptive definition is given by the Guidelines for Environmental Risk Assessment and Management (DEFRA *et al*, 2000):

'Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence'.

A 'Hazard' is defined as *'a property or situation that in particular circumstances could lead to harm'.*

The classification of consequences and probability and determining the risk category are defined in the following sections.

3.2 Classification of Consequence

Table 3.1 Classification of Consequence	
Classification	Definition
Severe	<ul style="list-style-type: none"> • Short term (acute) risk to human health likely to result in significant harm • Short term risk to controlled waters • Catastrophic damage to buildings/structures • Short term risk to an ecosystem or organism within the particular ecosystem
Medium	<ul style="list-style-type: none"> • Chronic damage to human health (long term risk) • Pollution of a sensitive water resource • A significant change in an ecosystem or organism within the ecosystem
Mild	<ul style="list-style-type: none"> • Pollution of non-sensitive water resources • Significant damage to buildings/structures
Negligible	<ul style="list-style-type: none"> • Harm (not necessarily significant) which may result in financial loss • Non-permanent health effects to humans (easily prevented by PPE for example) • Easily repairable effects of structural (building) damage

3.3 Classification of Probability

Table 3.2 Classification of Probability	
Classification	Definition
High	<ul style="list-style-type: none"> • There is a complete pollution linkage and an event appears very likely to occur in the short term and is inevitable in the long term. • Evidence of harm to the receptor
Medium	<ul style="list-style-type: none"> • There is a complete pollution linkage which means that it is probable that an event will occur • The event is not inevitable but possible in short term and likely in the long term
Low	<ul style="list-style-type: none"> • There is a complete pollution linkage and circumstances are possible under which an event could occur • It is not certain that an event will occur in the long term, and it is less likely to occur in the short term
Negligible	<ul style="list-style-type: none"> • There is a complete pollution linkage but circumstances are such that it is improbable that an event would occur even in the long term

3.4 Risk Assessment Matrix

By comparing the consequences of a risk and the probability of the risk of a pollution linkage, the likely risk category can be determined as shown in Table 3.3 below.

Table 3.3 Risk Assessment Matrix					
Increasing acceptability ↘		Consequence			
		Severe	Medium	Mild	Negligible
Probability	High	High	High	Medium / Low	Near zero
	Medium	High	Medium	Low	Near zero
	Low	High / medium	Medium / Low	Low	Near zero
	Negligible	High / medium / Low	Medium / Low	Low	Near zero

High Risk

There is a high probability that severe harm could risk a receptor, or there is evidence that a receptor is being harmed. The risk if realised is likely to result in liability, and urgent investigation or remediation will be required.

Medium Risk

It is probable that harm will arise to a receptor. However it is relatively unlikely that such harm would be severe, or if harm does occur the harm is likely to be relatively mild. Investigation will be required to determine the liability, and some remedial works may be required in the long term.

Low Risk

It is possible that harm may arise to a receptor, but it is likely that the harm would be mild.

Near Zero Risk

There is a very low risk of harm to the receptor. In the event of harm being realised the harm is not likely to be severe.

The following sub-sections detail a preliminary risk assessment, based upon the desk study information.

3.5 Potential Sources of Contamination

The potential contamination beneath the site, whether in the matrix of soil or any groundwater will be related to the sites past use.

The site is has been mainly agricultural throughout the years researched.

Significant contamination, is therefore, not expected over the majority of the site. However, landfilling has occurred on site which could pose a risk in regards to potential low level contamination and ground gas.

3.6 Potential Receptors

The potential receptors of any contamination are taken to be:

During Construction

- Construction workers
- Neighbouring site users
- Passers-by
- The Aquatic Environment - Surface waters, perched groundwater, rivers

Following Construction

- Site End Users - residents, visitors, maintenance contractors
- The Aquatic Environment - Surface waters, perched groundwater, watercourses.
- Building Materials - these are potentially at risk from aggressive ground conditions involving sulphates, sulphides, magnesium ions, ammonium ions, carbon dioxide, chloride ions and phenols.
- Vegetation upon the site is potentially at risk from phytotoxic contaminants.

3.7 Potential Pollution Linkages

The potential pollution linkages relating to human health and the protection of the aquatic environment on the site are as follow:

- Ingestion of soil and soil dust
- Ingestion of home grown vegetables
- Inhalation of soil dust, both indoors and outdoors
- Dermal contact with soil and soil dust
- Inhalation of radon gas
- Indoor migration of landfill gas/ground gas leading to potential risk of explosion
- Surface water runoff
- Leaching into the groundwater
- Groundwater transport
- Permeation of water pipes - Organic contaminants have the potential to be adsorbed into plastic water pipes which may be used for drinking water supply. Toxic and corrosive contaminants may also enter the potable water source.

3.8 Qualitative Preliminary Risk Assessment

A Qualitative Preliminary Risk Assessment (QPRA) aims to make initial assumptions about potential risks posed towards the human health and to the aquatic environment during all stages of the development. Where it is assumed that a potential pollution pathway exists, there is a potential source, a potential receptor and a likely pathway, which links the two. The QPRA can be refined into a qualitative and quantitative risk assessment once the site investigation and laboratory soil chemical testing/environmental assessment has been undertaken. The risk assessment is presented in Table 3.4 on the following page.

3.8 Qualitative Preliminary Risk Assessment (Continued)

Table 3.4 Preliminary Risk Assessment			
Potential Source	Potential Pathway	Potential Target	Preliminary Risk Assessment
Made Ground and contaminated soils	Ingestion	Construction workers	Site is a historic Landfill High Risk
	Dermal contact	Site end Users	
	Inhalation of soil/dust		
Made ground and contaminated soils	Surface runoff	Groundwater/surface water	Secondary A Aquifer The site does not lie within a SPZ Medium Risk
	Leaching		
	Groundwater transport		
Made ground and contaminated soils	Surface runoff	Building Materials	High levels of sulphate can damage building materials. Low Risk
	Leaching		
	Groundwater transport		
Landfill Gas	Inhalation	Site end users	Site is a historic Landfill High Risk
		Construction workers	
		Neighbouring site users/passersby	

3.9 Preliminary Site Conceptual Model

A preliminary site conceptual model is presented in **Figure 3.1** below. It should be noted that the SCM is generalised and not to scale.

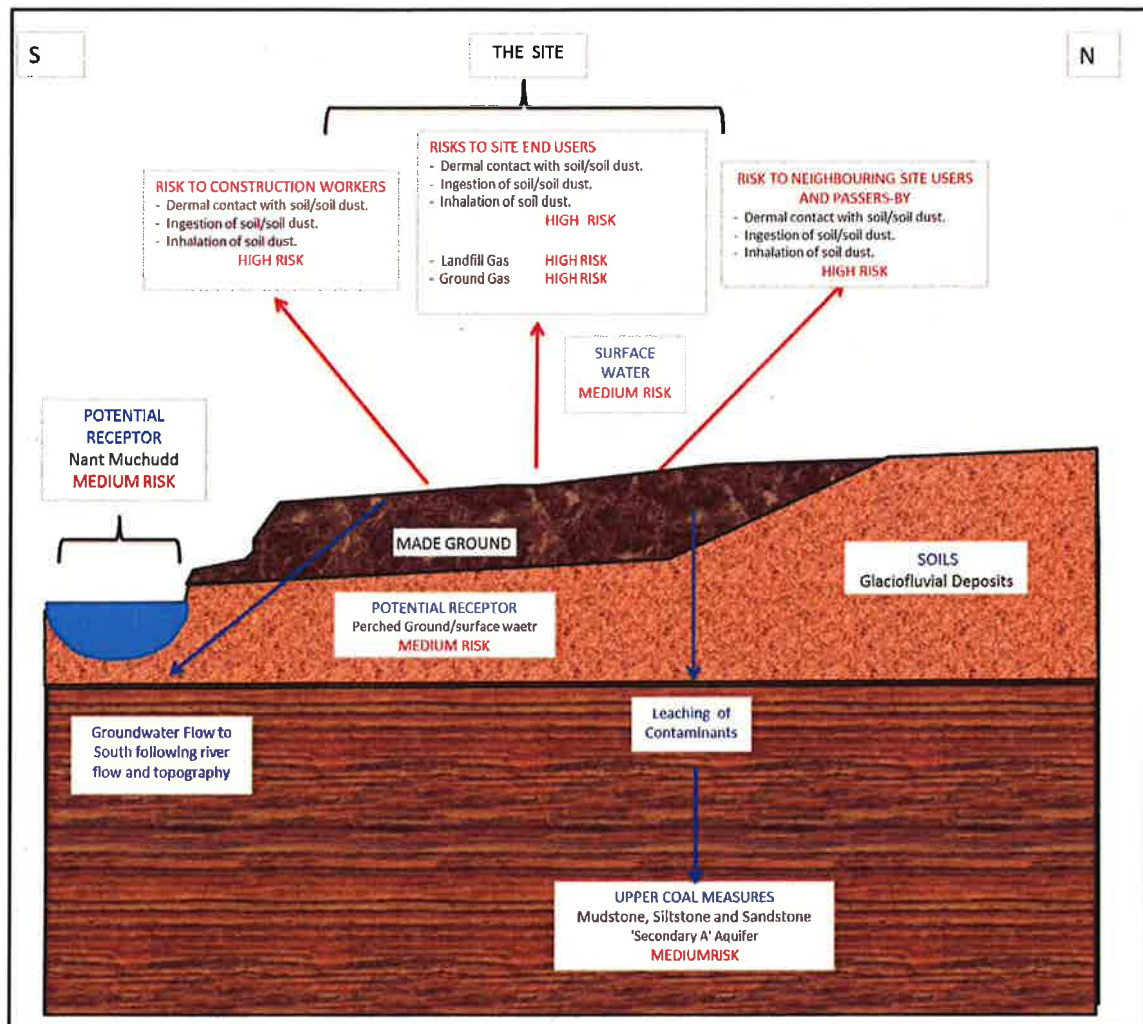


Figure 3.1 Preliminary Site Conceptual Model

SECTION 4 Field Investigation

4.1 Site Works

A geo-environmental site investigation was undertaken in accordance with BS5930:1999, during March 2014. The investigation comprised the excavation of ten trial pits, and chemical testing.

The trial pits were excavated using a tracked 360° excavator.

The fieldworks were supervised by Terra Firma (Wales) Limited, who also logged the trial pits to the requirements of BS5930: 1999.

The detailed trial pit logs are presented in **Annex B**. The locations are presented in **Drawing 01**.

4.2 Exploratory Strategy

It is considered that the number and spacing of trial pits was adequate to provide a general characterisation of the waste present at the site.

4.3 Sampling Regime

During the intrusive investigation small disturbed soil samples were collected. The sample locations and depths are illustrated in the **Table 4.1**.

Table 4.1 Sample Descriptions		
Sample No.	Depth (m)	MCERTS Description
TP3	0.50	Brown gravelly sandy CLAY with odd rootlets
TP3	1.2	Dark brown clayey gravelly SAND
TP4	0.5	Dark brown gravelly sandy CLAY with numerous rootlets
TP7	1.00	Brown gravelly sandy CLAY
TP8	0.50	Brown dark brown gravelly sandy CLAY with odd rootlets
TP9	0.5	Brown gravelly sandy CLAY with odd rootlets

4.4 Quality Assurance

Care was taken to ensure that sampling quality assurance occurred during site works. This included the following measures:

- The use of nitrile gloves at each sampling point.
- Stainless steel shovels were used to collect soil samples. The tool was cleaned with distilled water between each sample point.
- Soil samples were stored at a temperature below 4 degrees.
- No head space was left in sample containers.

4.5 Ground Conditions

The shallow ground conditions encountered by the exploratory holes can in general be summarised as shown in **Table 4.2**.

Table 4.2 Summary of Ground Conditions		
Depth (m)	Thickness (m)	Stratum
GL - 0.8/>1.8	0.8/-	MADE GROUND. Soft to firm light grey gravelly CLAY / Loose to medium dense light brown clayey GRAVEL with inclusions of red brick
0.8 - > 2.0	-	Soft orange brown silty gravelly CLAY

No Groundwater was encountered.

4.6 Laboratory Chemical Testing

During the current site works a number of soil samples were taken and despatched to the laboratories of Derwentside Environmental Testing Services for laboratory chemical testing.

The following chemical tests were undertaken:

4.6.1 Soils

Metals	Semi Metals/Non-Metals	Inorganic Chemicals	Others
Cadmium	Arsenic	Cyanide	pH
Chromium	Selenium	Sulphate	Asbestos
Lead		Sulphide	
Mercury			
Nickel			
Zinc			
Copper			

Organic Chemicals

Phenol
Polyaromatic Hydrocarbons (PAH)

The results of the above chemical tests for soil are presented in **Annex C**.

4.7 Soil Plasticity Testing

During the investigation three samples of the in-situ superficial clay was taken and submitted for plasticity testing. The test results are presented in **Annex D**. The sample from TP1 at 1.5m was found to be of very high plasticity. The sample taken from TP6 at 1.2m was found to be of intermediate plasticity. The sample taken from TP9 at 1.0m was found to be of high plasticity. In line with the NHBC (Chapter 4.2), the samples was calculated as having a modified plasticity indices of 13.5%, 23% and 19%. Soils with an index value of 20-40% are classified as having a medium volume change potential. Values below this are deemed to have a low shrinkage potential.

SECTION 5 Risk Assessment and Evaluation of Analytical Results

5.1 Risk Assessment

5.1.1 Introduction

The results obtained from the investigation, which are discussed in detail in Section 5.2, were used to conduct an environmental risk assessment for the site. The risk assessment aimed to:

- Identify sensitive receptors
- Determine pathways for contaminant migration to the receptors
- Estimate contaminant impact on receptors
- Establish whether remedial action is required
- Calculate remediation target levels if required

The future use of the site i.e. whether it is to be used for residential or commercial purposes has an impact on any risk assessment.

In this case commercial guidelines are appropriate.

5.1.2 Methodology

Environmental risk assessment evaluates the risk to receptors via an analysis of the 'source-pathway-target' linkage. In order for a risk to be present, there must be a contaminant source capable of causing a health risk, a vulnerable receptor, and a pathway linking the two.

This sort of risk assessment is usually conducted using a tiered approach. Tier 1 consists of a comparison of the analytical results obtained from the site investigation with Soil Guideline Values (SGV's) specific to the type of development obtained from The Environment Agency Contaminated Land Exposure Assessment (CLEA) Guidelines.

Where SGV values are not available reference has been made to or Generic Assessment Criteria (GAC) provided by Land Quality Management Limited (LQM) and the Chartered Institute of Environmental Health (CIEH).

Should Tier 1 levels be exceeded, a choice is made either to remediate the site to conservative Tier 1 levels, or proceed to Tier 2. Tier 2 makes use of site-specific data to evaluate acceptable concentrations of chemicals for the particular conditions present at the site.

At each tier, the amount and detail of investigation work increases as more site-specific data are needed to refine the characterisation of the site. Conversely, as site conditions are better understood, a more site-specific remediation strategy can be determined.

For Tier 1, the site itself is considered to be the receptor. Therefore, attenuation of contaminants between the source and receptor is not considered.

A summary of the chemical test results which include the regulatory SGVs or GACs used in the Tier 1 assessment is given in the tables on the following pages.

5.1.3 Sources

The sources of contamination considered in the risk assessment are taken to be concentrations of chemicals beneath the site.

The made ground at the site is considered the source of potential contamination, but the risk assessment does not take into account the origins of the chemicals.

5.1.4 Pathways

The various pathways considered in the risk assessment are given below:

- Direct contact/inhalation/ingestion of affected superficial soils, up to 1.0m in depth
- Wind born dust from affected superficial soils
- Leaching from soils to groundwater and surface water
- Groundwater and surface water transport

5.1.5 Potential Receptors

Potential receptors include site workers, future on site users and visitors, businesses and residents in the area surrounding the site, surface waters, persons who may come into contact with water in the vicinity of the site, and aquatic life within these waters.

5.2 Evaluation of Analytical Results

5.2.1 Soils

For Tier 1, the site itself is considered to be the receptor. Therefore, attenuation of contaminants between the source and receptor is not considered.

A summary of the chemical test results which include the regulatory Soil Guideline Values (SGV's) /Generic Assessment Criteria (GAC) used in the Tier 1 assessment are given in Table 5.1 on the following page:

5.2.1 Soils (Continued)

Table 5.1 Summary of Soil Chemical Test Results Standard Suite						
Substance	SGV/ GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		95% UCL	Number of exceedence s
			Minimum	Maximum		
Arsenic	640	CLEA	7.9	12	8.49	0
Cadmium	230	CLEA	0.5	0.7	0.58	0
Chromium III	30400	CIEH	20	28	23.44	0
Chromium	30400	CLEA	20	28	23.44	0
Hexavalent Chromium	35	CIEH	<1.0	<1.0	0.90	0
Copper	71700	CLEA	16	30	19.07	0
Lead	750	CLEA	15	31	30.00	0
Mercury	3600	CLEA	<0.05	0.17	0.08	0
Nickel	1800	CLEA	17	24	18.60	0
Selenium	13000	CLEA	<0.5	<0.5	0.45	0
Zinc	665000	CIEH	40	83	57.62	0
Cyanide total	480	CLEA	<0.1	0.2	0.13	0
Organic matter	-	-	1.7	5.7	3.22	0
Total Sulphate as SO ₄	2400	BRE	300	500	340	0
pH	-	-	7.5	8.9	7.34	0
PAH	*	-	<1.6	37	13.92	-
Phenol – Monohydric	3200	CLEA	<0.3	<0.3	<0.3	0

Notes:

- CLEA - Soil Guideline Values for residential development
- CIEH - Generic Assessment Criteria for a commercial setting, developed as Land Quality Management by the Chartered Institute of Environmental Health
- BRE - British Research Establishment (buried concrete risk assessment only, not human health related)
- A total of six samples were tested for all substances apart from asbestos
- Three samples were tested for asbestos
- *See speciated PAH results

5.2.1 Soils (Continued)

Table 5.2 Summary of Soil Chemical Test Results Speciated Polycyclic Aromatic Hydrocarbons						
Substance	GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		95% UCL	Number of exceedenc es
			Minimum	Maximum		
Acenaphthene	85000	LQM/CIEH	<0.1	0.7	0.27	0
Acenaphthylene	84000	LQM/CIEH	<0.1	0.2	0.11	0
Anthracene	530000	LQM/CIEH	<0.1	0.8	0.31	0
Benzo(a)anthracene	90	LQM/CIEH	<0.1	3.3	1.25	0
Benzo(a)pyrene	14	LQM/CIEH	<0.1	3.8	1.44	0
Benzo(b)fluoranthene	100	LQM/CIEH	<0.1	3.4	1.27	0
Benzo(k)fluoranthene	140	LQM/CIEH	<0.1	1.6	0.61	0
Benzo(g,h,i)perylene	650	LQM/CIEH	<0.1	2.4	0.91	0
Chrysene	140	LQM/CIEH	<0.1	3.8	1.42	0
Dibenzo(a,h)anthracene	13	LQM/CIEH	<0.1	0.7	0.35	0
Fluoranthene	23000	LQM/CIEH	<0.1	5.4	2.00	0
Fluorene	64000	LQM/CIEH	<0.1	0.6	0.24	0
Indeno(1,2,3-c,d)pyrene	60	LQM/CIEH	<0.1	2.4	0.90	0
Naphthalene	22000	LQM/CIEH	<0.1	0.2	0.11	0
Phenanthrene	54000	LQM/CIEH	<0.1	3.1	1.18	0
Pyrene			<0.1	4.5	1.69	0

Notes:

- CIEH - Chartered Institute of Environmental Health Generic Assessment Criteria for a commercial development
- Six samples was tested for Speciated PAH
- PAH - Polycyclic Aromatic Hydrocarbons

5.3 Contaminants of Concern in Soils

Contaminants of concern are those whose measured concentrations are found to be above the relevant Tier 1 CLEA Soil Guideline Value, CIEH Generic Assessment Criteria or laboratory detection limits.

All of the substances tested for were found to be below the Tier 1 threshold values (commercial).

SECTION 6 Quantitative Risk Assessment/Mitigation Measures

The following risk assessment and mitigation measures are based upon information compiled in the desk study, site investigation and the chemical test results.

6.1 Site Summary

The site entrance is located off Pantybrad Road at a National Grid Reference of 304125 185122.

The site is irregular in shape and covers an area of 2.33 hectares. The site is located in a large field. The south eastern boundary is formed by the Nant Muchudd watercourse. The remaining boundaries of the site are located within the field in which the site is located.

The topography of the site slopes down in a south easterly direction towards the Nant Muchudd watercourse.

6.2 Risks to Human Health

The site has been assessed using Human Health Guidelines for commercial use.

Chemical testing of soil samples revealed no exceedences in any contaminant tested for.

A site risk assessment is presented below and considers the following receptors/targets:

- Future Site Occupiers
- Site Visitors/Passers-by and neighbours during construction phase
- Construction workers

The potential routes of exposure (pathway) considered are:

- Ingestion of soil
- Ingestion of soil dust
- Dermal contact with soil/dust
- Inhalation of fugitive soil

6.2 Risks to Human Health (Continued)

A Qualitative and Quantitative Risk Assessment is presented in the following table.

Table 6.1 - Human Health Risk Assessment				
Source	Pathway	Target	Risk Assessment	Mitigation Measures
In-Situ Soils	Dermal contact with soil/dust Inhalation of soil/dust/vapours Ingestion of soil/dust	Construction workers	Low risk to construction workers involved in excavation phase of development	COSHH assessment and good level of PPE/hygiene by site workers/ staff; dust suppression measures if required.
	Inhalation of fugitive soil dust/vapours Ingestion of soil dust Dermal contact with soil dust	Passersby, neighbouring site occupants	Low risk during construction phase	The site should be managed well including screening and dust suppression measures if required
	Dermal contact with soil dust Inhalation of soil/dust Ingestion of soil/dust/vegetation	Site end users – residents and visitors	Low risk to future site users from contamination.	Site will be capped with hardstanding removing pathway
Landfill /Ground Gas	Inhalation of gas Explosions	Site end users	Low Risk to future site users	Waste was recovered as inert fill with no biodegradable materials and unlikely to produce significant gas

During construction phases, potential human health risks should be mitigated by:

- COSHH Assessment and good standards of site hygiene, PPE etc;
- Appropriate H&S instructions being in place to cover the above;

It should be noted that the appointed contractor should provide Method Statements and Risk Assessments to deal with these matters.

If during the development materials are encountered that are significantly different to those encountered in the investigation, the occurrence should be reported to the Engineer and appropriate action taken prior to continuing with the works.

6.3 Risks to the Aquatic Environment

The chemical test results have shown low levels of the determinants tested for. Leachate levels will also be similarly low.

In addition, the site will be capped with hard standing, reducing infiltration and the potential for leaching of contaminants.

There should therefore be no risk to the aquatic environment.

6.4 Assessment of the Risk from Ground Gas

It is understood that that development will not consist of any covered buildings other than a gate house. The type of development combined with the lack of biodegradable materials in the made ground makes the potential risk from ground gas negligible.

However, as a precaution it is recommended that for any covered buildings to be constructed on site that Gas Characteristic Situation 2 is used and the recommended measures incorporated for the future buildings.

Such measures will include the use of a methane membrane and underfloor venting.

6.4 Refined Site Conceptual Model

The site conceptual model (SCM) is presented in **Figure 6.1** below. It should be noted that the SCM is generalised and not to scale.

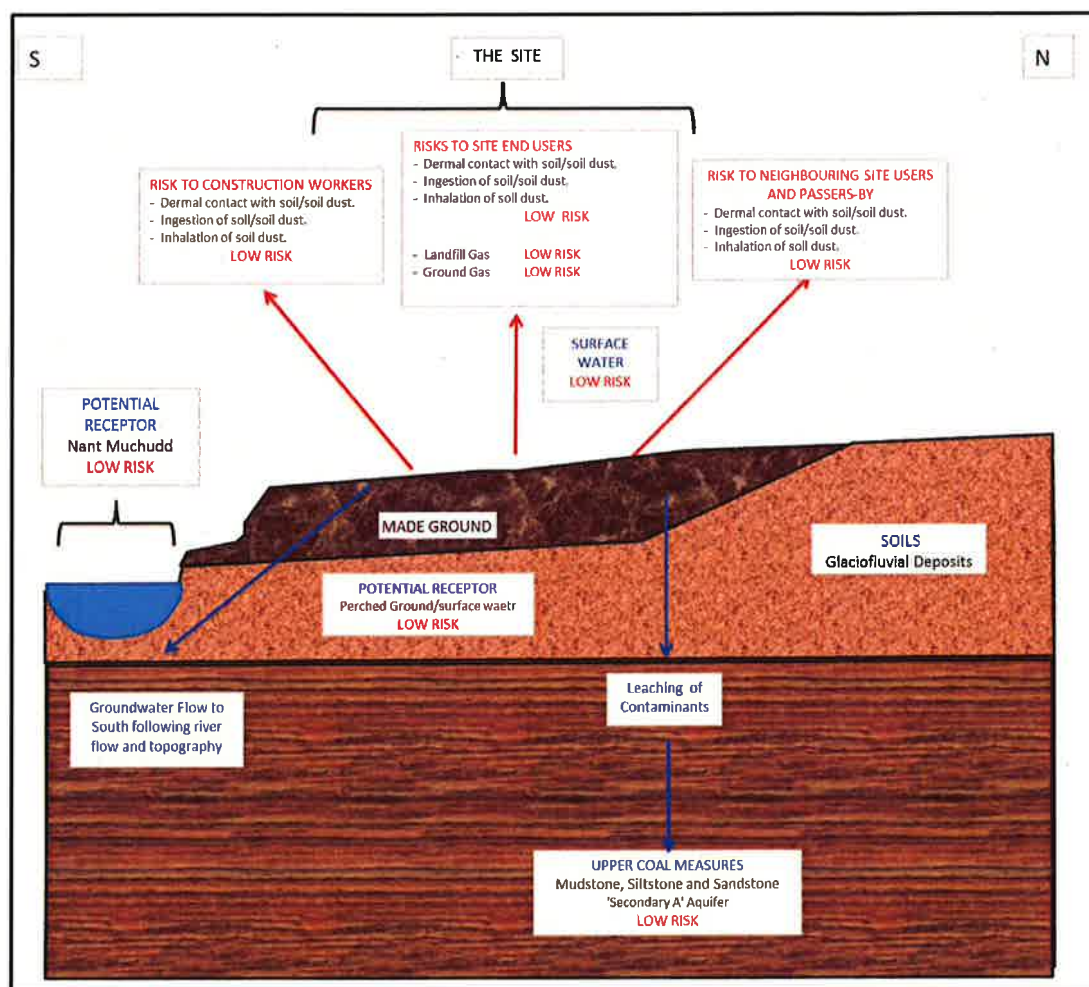
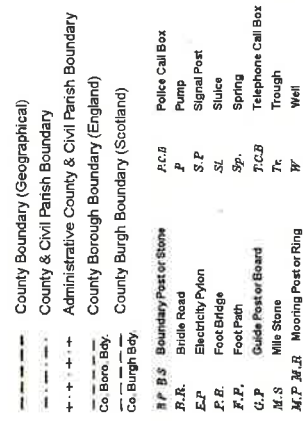
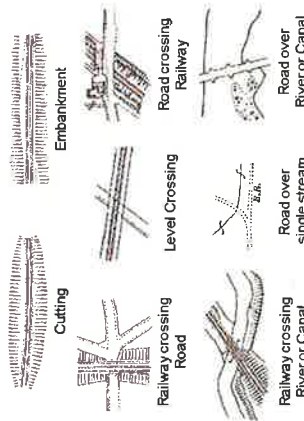
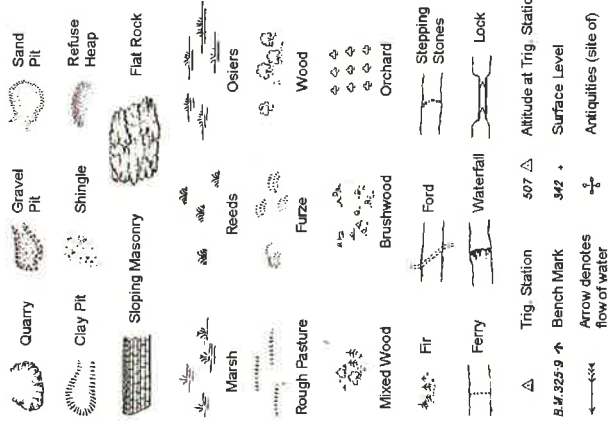


Figure 6.1 Final Site Conceptual Model

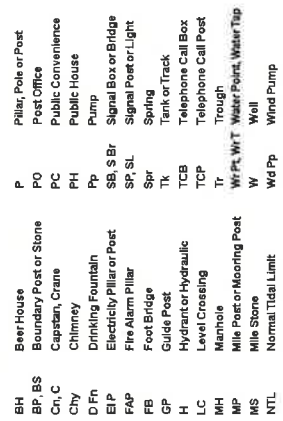
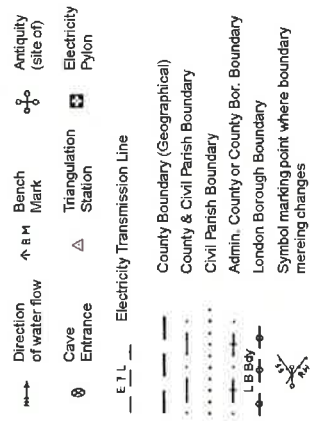
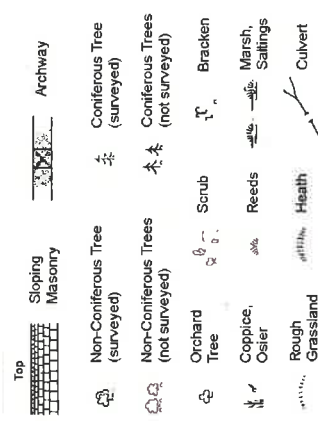
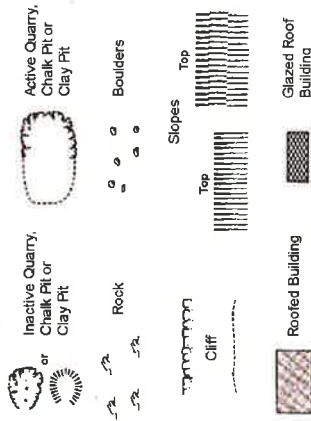
<p>ANNEX A Envirocheck History Report</p>

Historical Mapping Legends

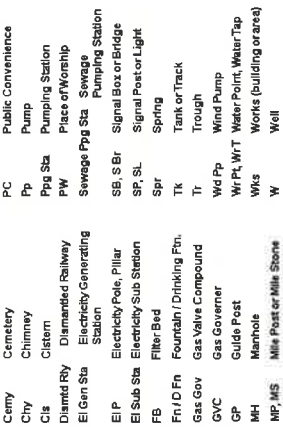
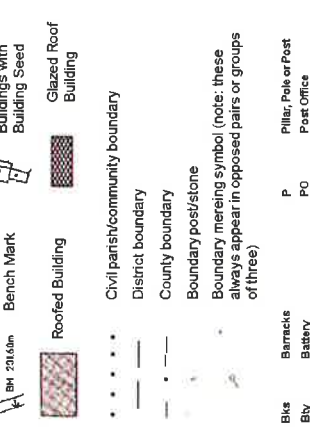
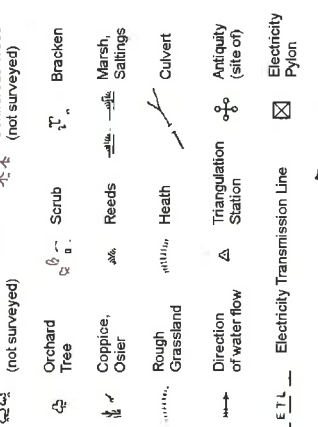
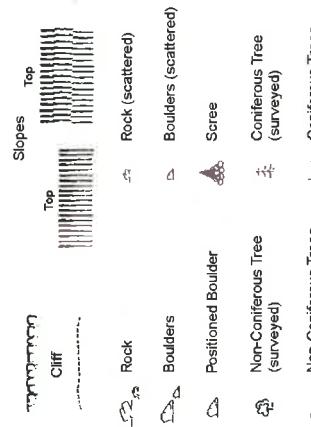
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



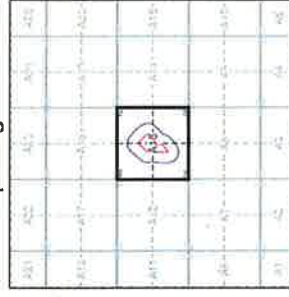
Large-Scale National Grid Data 1:2,500 and 1:1,250



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Glamorganshire	1:2,500	1875 - 1876	2
Glamorganshire	1:2,500	1900	3
Glamorganshire	1:2,500	1919	4
Glamorganshire	1:2,500	1940	5
Ordnance Survey Plan	1:2,500	1960 - 1962	6
Additional SIMs	1:2,500	1960 - 1986	7
Ordnance Survey Plan	1:2,500	1972 - 1978	8
Supply of Unpublished Survey Information	1:2,500	1973	9
Additional SIMs	1:2,500	1988 - 1989	10
Ordnance Survey Plan	1:2,500	1990 - 1991	11
Additional SIMs	1:2,500	1990 - 1993	12
Large-Scale National Grid Data	1:2,500	1993	13
Large-Scale National Grid Data	1:2,500	1994	14
Large-Scale National Grid Data	1:2,500	1996	15

Historical Map - Segment A13



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Site: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyduin, CF72 8LP



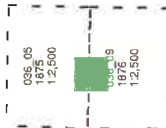
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



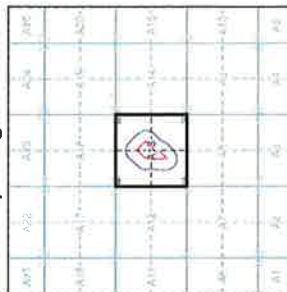
Glamorganshire
Published 1875 - 1876
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

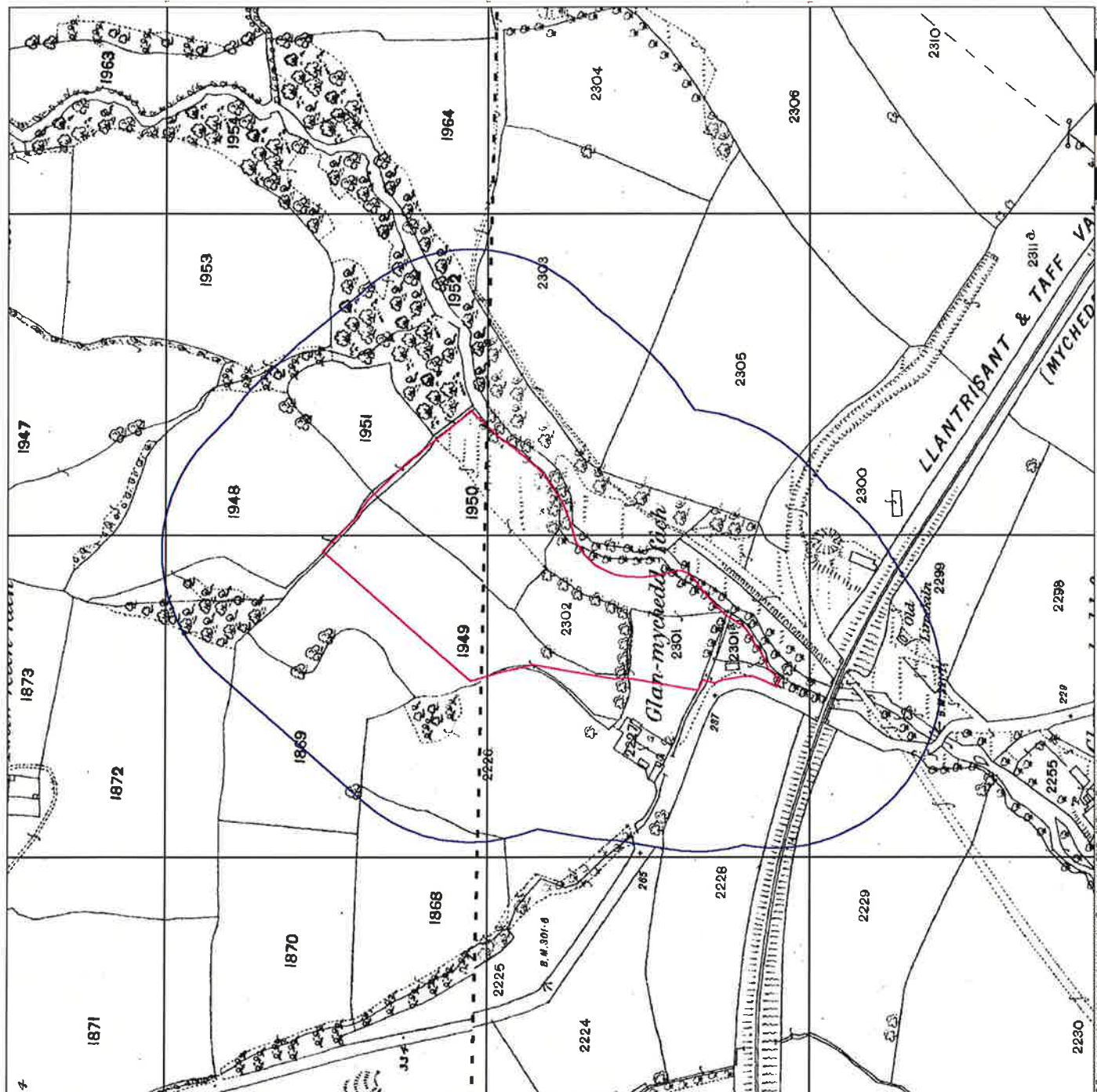
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Customer Ref: 12640
National Grid Reference: 304170, 185160
Site:
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9932
Fax: 0844 844 9951
Web: www.envirocheck.co.uk





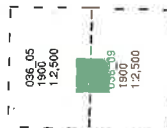
Glamorganshire

Published 1900

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the Ordnance Survey archives. The maps were digitised at a scale of 1:2,500 and then reprojected to the current datum. The scale adopted for England, Wales and Northern Ireland in 1894 was the whole of what was considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 54430027_1.1

Customer Ref: 12640

National Grid Reference: 304170, 185160

Site: A

Site Area (Ha): 2.33

Search Buffer (m): 100

Site Details

Llantrisant, Pontydu, CF72 8LP



Tel: 0844 544 8822
Fax: 0844 544 8823
Web: www.landmark.co.uk



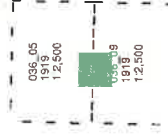
Glamorganshire

Published 1919

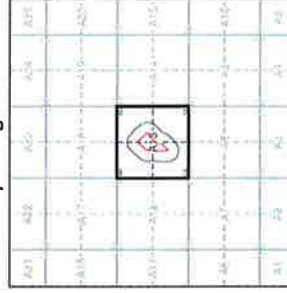
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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

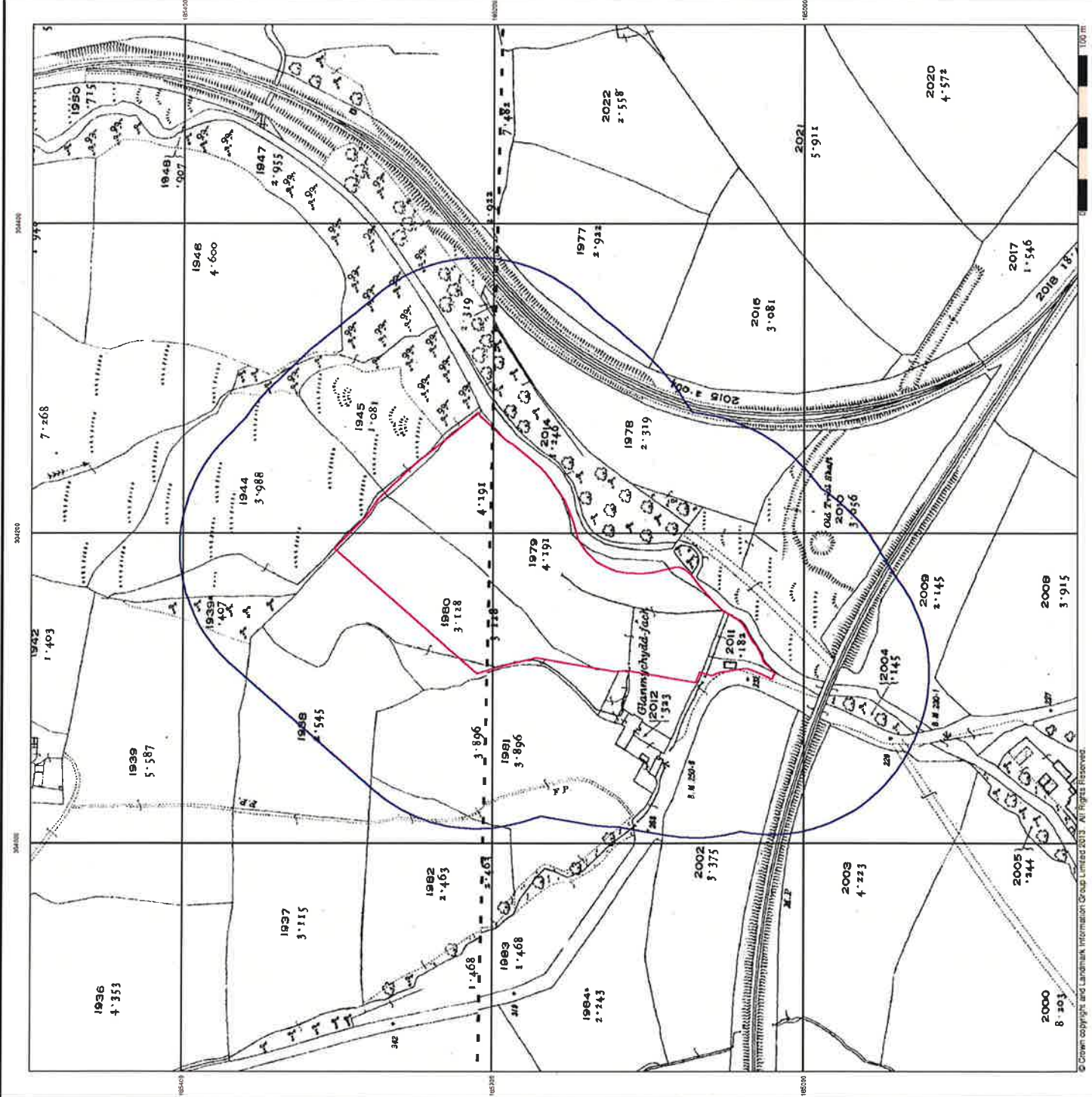
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Site: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9922
Fax: 0844 844 9961
Web: www.envirocheck.co.uk





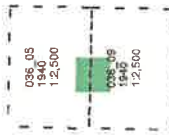
Glamorganshire

Published 1940

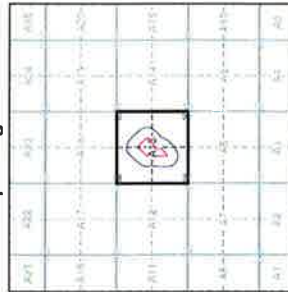
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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 54430027_1_1

Customer Ref: 12640

National Grid Reference: 304170, 185160

Site:

Site Area (Ha): 2.33

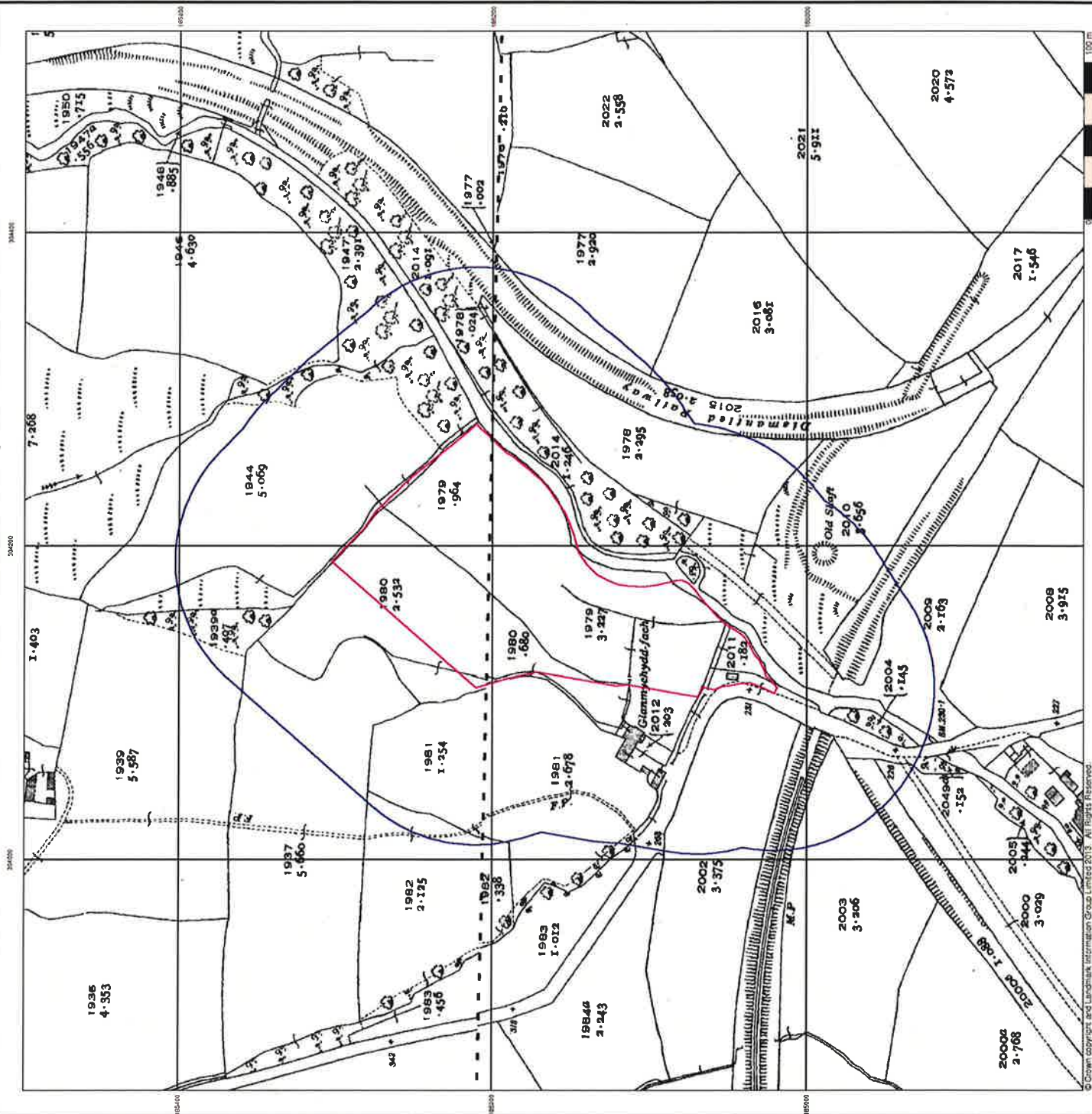
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Site Details

Llantrisant, Pontydu, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk





Ordnance Survey Plan Published 1960 - 1962

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

ST0085	1960	12,500
ST0085	1961	12,500
ST0085	1961	12,500
ST0084	1961	12,500
ST0084	1962	12,500

Historical Map - Segment A13



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Site:
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.innordcheck.co.uk



**Additional SIMs
Published 1960 - 1986
Source map scale - 1:2,500**

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

ST0385	1980	1:2,500
ST0384	1981	1:2,500
ST0484	1985	1:2,500

Historical Map - Segment A13



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
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Ordnance Survey Plan Published 1972 - 1978

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

ST0485	1978
ST0484	1978
ST0384	1972
ST0384	1978
ST0384	1978
ST0384	1978

Historical Map - Segment A13



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Site: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9552
Fax: 0844 844 9551
Web: www.ennotech.co.uk

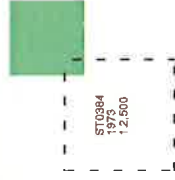


**Supply of Unpublished Survey
Information
Published 1973**

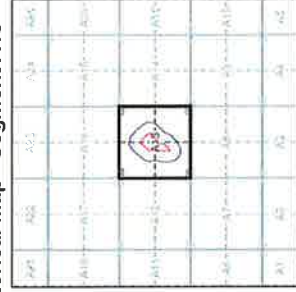
Source map scale - 1:2,500

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Site: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

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Fax: 0844 544 9951
Web: www.envirocheck.co.uk



Additional SIMs

Published 1988 - 1989

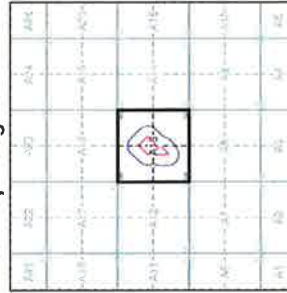
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

ST0384	1988	1:2,500
ST0484	1989	1:2,500

Historical Map - Segment A13



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Site: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyduon, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

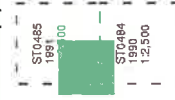


Ordnance Survey Plan Published 1990 - 1991

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1856 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

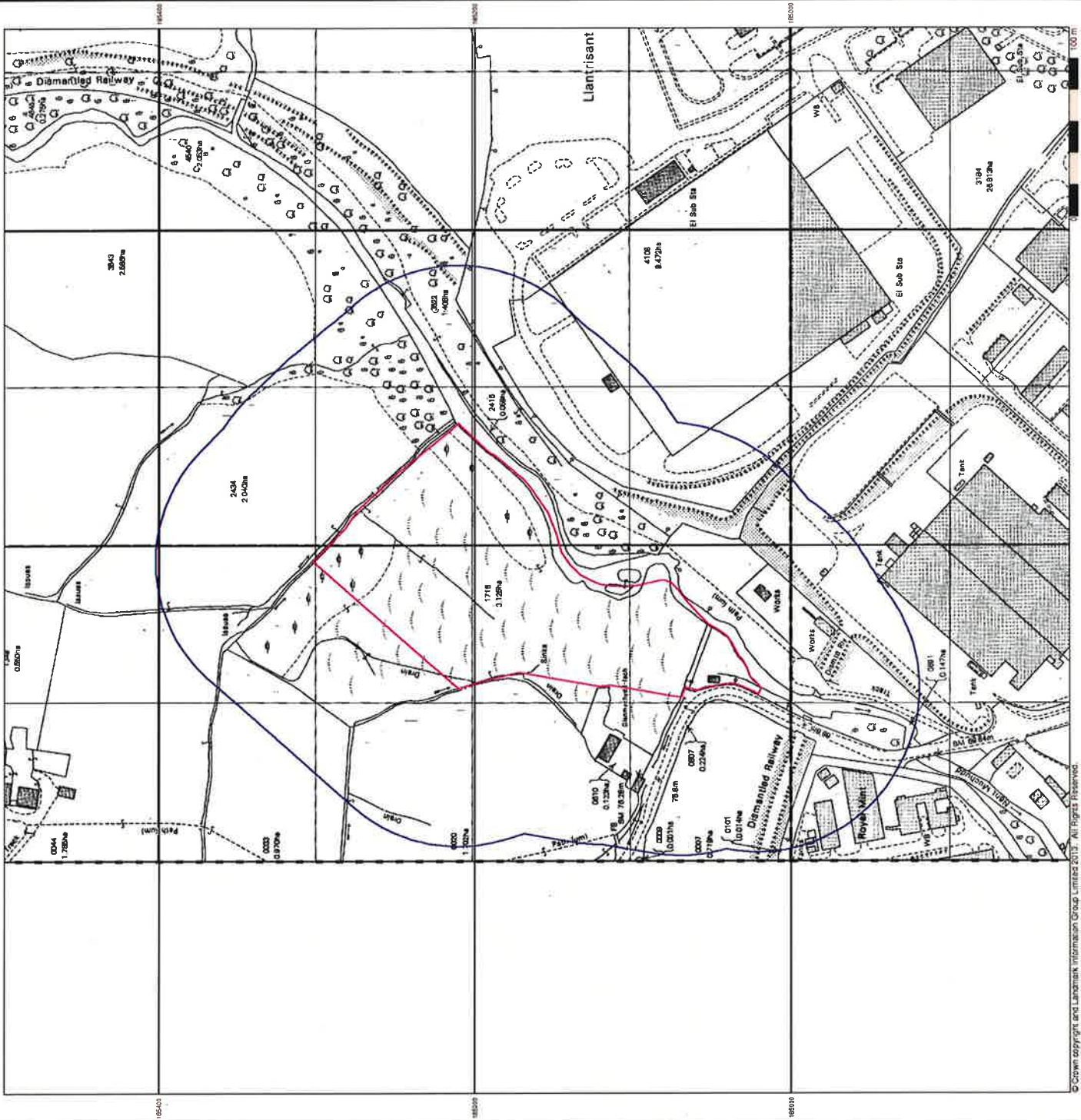
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Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

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Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk





**Additional SIMs
Published 1990 - 1993**

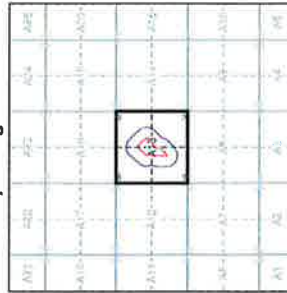
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

ST0384	1990	1:2,500
ST0384	1993	1:2,500

Historical Map - Segment A13



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyclun, CF72 8LP



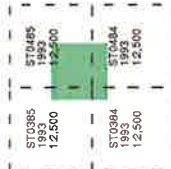
Tel: 0844 844 9922
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Source map scale - 1:2,500

Large Scale National Grid Data superseded SIM cards (Ordnance Survey's Survey of Information on Microfilm) in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2 500 and 1:1 250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Details:
Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
A
Slice:
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk





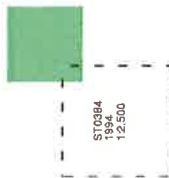
Large-Scale National Grid Data

Published 1994

Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the forerunners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Site: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyduon, CF72 8LP



Tel: 0844 544 9952
Fax: 0844 544 9961
Web: www.envirocheck.co.uk

344000

344000

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185400

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185500

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185600

100 m

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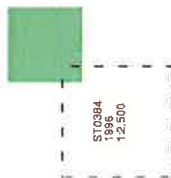


Large-Scale National Grid Data Published 1996

Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the forerunners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 100

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit	Sand Pit	Other Pits	Quarry	Shingle	Orchard	Marsh	Ostlers	Reeds	Deciduous	Brushwood	Fir	Surface Level
Arrow denotes flow of water	Site of Antiquities	Pump, Guide Post, Signal Post	Trigonometrical Station	Bench Mark	Well, Spring, Boundary Post	Instrumental Contour	Fenced Minor Roads	Unfenced Minor Roads	Sunken Road	Road over Railway	Railway over River	Level Crossing
County Boundary (Geographical)	County & Civil Parish Boundary	Administrative County & Civil Parish Boundary	County Borough Boundary (England)	County Borough Boundary (Scotland)	Rural District Boundary	Civil Parish Boundary						

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry	Gravel Pit	Disused Pit or Quarry	Lake, Loch or Pond	Boulders	Non-Coniferous Trees	Orchard	Scrub	Coppice	Bracken	Heath	Rough Grassland	Saltings	Direction of Flow of Water	Building	Glasshouse	Sloping Masonry	Pylon	Electricity Transmission Line	Pole	Standard Gauge Multiple Track	Standard Gauge Single Track	Siding, Tramway or Mineral Line	Narrow Gauge	Geographical County	Administrative County, County Borough or County of City	Municipal Borough, Urban or Rural District, Borough or District Council	Borough, Borough or County Constituency	Civil Parish	Boundary Post or Stone	Police Station	Post Office	Public Convenience	Public House	Signal Box	Spring	Telephone Call Box	Telephone Call Post	Well
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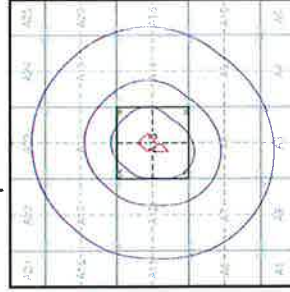
1:10,000 Raster Mapping

Gravel Pit	Rock	Boulders	Shingle	Sand	Slopes	General detail	Overhead detail	Multi-track railway	County boundary (England only)	District, Unitary, Metropolitan, London Borough boundary	Area of wooded vegetation	Non-coniferous trees (scattered)	Coniferous trees (scattered)	Orchard	Rough Grassland	Scrub	Water feature	Mean high water (springs)	Telephone line (where shown)	Bench mark (where shown)	Point feature (e.g. Guide Post or Mile Stone)	Site of (antiquity)	General Building
Refuse tip or slag heap	Rock (scattered)	Boulders (scattered)	Mud	Sand Pit	Top of cliff	Underground detail	Narrow gauge railway	Single track railway	Civil, parish or community boundary	Constituency boundary	Non-coniferous trees	Coniferous trees	Positioned tree	Coppice or Osiers	Heath	Marsh, Salt Marsh or Reeds	Flow arrows	Mean low water (springs)	Electricity transmission line (with poles)	Triangulation station	Pylon, flare stack or lighting tower	Glasshouse	Important Building

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Gloucestershire	1:10,560	1884 - 1885	3
Gloucestershire	1:10,560	1900	4
Gloucestershire	1:10,560	1921	5
Gloucestershire	1:10,560	1921	6
Gloucestershire	1:10,560	1947 - 1953	7
Historical Aerial Photography	1:10,560	1947 - 1949	8
Ordnance Survey Plan	1:10,560	1953	9
Ordnance Survey Plan	1:10,000	1964 - 1965	10
Ordnance Survey Plan	1:10,000	1974 - 1976	11
Rhonda Cynon Taff	1:10,000	1978	12
Ordnance Survey Plan	1:10,000	1980 - 1984	13
Ordnance Survey Plan	1:10,000	1993	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2013	16

Historical Map - Slice A



Order Details

Order Number: 54430027_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9652
Fax: 0844 844 9551
Web: www.landmark.co.uk

Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale	b. Drawn to scale	Government and Administrative Buildings	Military and Industrial Buildings	Subway Entrance	Prominent Fireproof Building	Non-fireproof Building (non-dwelling)	Factory, mill, and flour mill, with chimneys	Power Station, drawn to scale	Radio Station, drawn to scale	Abandoned Open-pit Mine or Quarry	Oil Deposit or Well	Fuel Storage Tanks	Bench Mark	Drill Hole	Single-track Railroad	Double-track Railroad	Double-track Railroad with Station Building	Confiscated Forest	Deciduous Forest	Citrus Orchard	Wet Ground	Scattered Vegetation

243.8 Values for prominent elevations

Numbers for spot elevations, depth soundings, contour lines, etc.

0.2 Velocity of the current, width of river bed, depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (for reference and phonetic interpretation of map text)

А а (A)	Б б (B)	В в (V)	Г г (G)	Д д (D)	Е е (E)	Ё ё (YO)	Ж ж (ZH)	З з (Z)	И и (I)	Й й (Y)	К к (K)	Л л (L)	М м (M)	Н н (N)	О о (O)	П п (P)	Р р (R)	С с (S)	Т т (T)	У у (U)	Ф ф (F)	Х х (KH)	Ц ц (TS)	Ч ч (CH)	Ш ш (SH)	Щ щ (SCH)	Ъ ъ (hard sign)	Ы ы (Y)	Ь ь (soft sign)	Э э (E)	Ю ю (YU or IU)	Я я (YA or IA)
---------	---------	---------	---------	---------	---------	----------	----------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	----------	----------	----------	----------	-----------	-----------------	---------	-----------------	---------	----------------	----------------

1:25,000 mapping

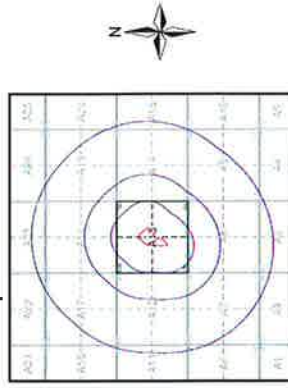
a. Not drawn to scale	b. Drawn to scale	Government and Administrative Buildings	Military and Industrial Buildings	Subway Entrance	Demolished Buildings	Built-Up Area with Fireproof Buildings	Individual Fireproof Building	Individual Dwelling, Fireproof	Factory or Mill with Chimney	Non-Operating Shaft or Mine	Stone Quarry	Small Hydroelectric Power Station	Oil or Natural Gas Ditch	Cemetery	Bench Mark (monumented)	Radio Tower	Radio Station	Small Bridge	Pipe Culvert	Tunnel	Double-track Railroad with First Class Station	Water Reservoir or Rain Water Pit	Well	Heavy (Index) Contour Line	Half Contour Line and Value	Spot Elevation Value	Mixed	Deciduous	Coniferous	Scrub

Key to Numbers on Mapping

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Glamorganshire	1:10,560	1884 - 1885	3
Glamorganshire	1:10,560	1900	4
Glamorganshire	1:10,560	1921	5
Glamorganshire	1:10,560	1921	6
Glamorganshire	1:10,560	1947 - 1953	7
Historical Aerial Photography	1:10,560	1947 - 1949	8
Glamorganshire	1:10,560	1953	9
Ordnance Survey Plan	1:10,000	1964 - 1965	10
Ordnance Survey Plan	1:10,000	1974 - 1976	11
Rhonda Cynon Taff	1:10,000	1978	12
Ordnance Survey Plan	1:10,000	1980 - 1984	13
Ordnance Survey Plan	1:10,000	1993	14
10K Raster Mapping	1:10,000	2006	15
VictorMap Local	1:10,000	2013	16

Russian Map - Slice A



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



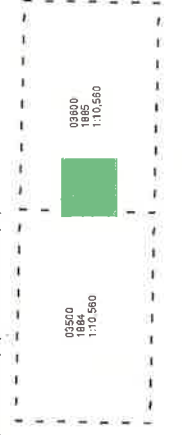
Glamorganshire

Published 1884 - 1885

Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale applied for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid, in 1970, the first revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyduon, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Glamorganshire
Published 1900

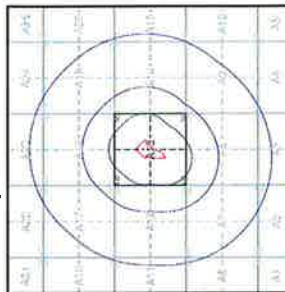
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with military camps and airfields left as black rectangles. These were initially produced using the National Grid, but in 1970 the revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

OSNE 1920 1:10,560	OSBNW 1900 1:10,560
OSSE 1920 1:10,560	OSSW 1900 1:10,560

Historical Map - Slice A



Order Details

Order Number: 54430027_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9552
Fax: 0844 844 9551
Web: www.terrafirma.co.uk



Glamorganshire
Published 1921

Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in adjoining areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overlaid with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

039NE	038NW
1921	1921
1:10,560	1:10,560
039SE	038SW
1921	1921
1:10,560	1:10,560

Historical Map - Slice A



Order Details

Order Number: 54430027_1_1
Customer Ref: 12540
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontydundun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.terrafirma.co.uk

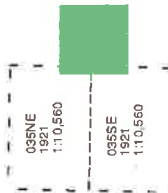


Glamorganshire
Published 1921

Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The remaining maps created in the 1970s and 1980s were produced at a scale of 1:10,000 or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontydundun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.enniview.co.uk



Glamorganshire

Published 1947 - 1953

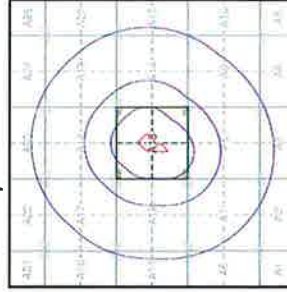
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas: these maps were often some years later than the surveyed date. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first revision of OS maps were produced using the Transverse Mercator Projection. The revision of OS maps was not until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

035NE	036NW
1953	1947
1:10,560	1:10,560
035SE	036SW
1953	1947
1:10,560	1:10,560

Historical Map - Slice A



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.enructrack.co.uk



Historical Aerial Photography Published 1947 - 1949

Source map scale - 1:10,560

The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

© Landmark Information Group and/or Data Suppliers 2010.

Map Name(s) and Date(s)

STONNW	STONNE
1949	1947
1:10,560	1:10,560
STONSW	STONSE
1949	1947
1:10,560	1:10,560

Historical Aerial Photography - Slice A



Order Details

Order Number: 54430027_1_1
Customer Ref: 12540
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 544 9952
Fax: 0844 544 9951
Web: www.envirocheck.co.uk

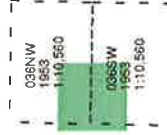


Glamorganshire
Published 1953

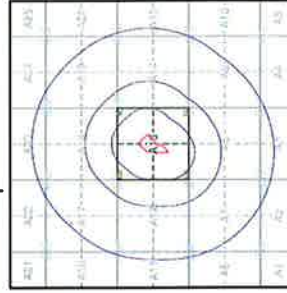
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in adjoining areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontydu, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.terraviva.co.uk



Ordnance Survey Plan Published 1964 - 1965

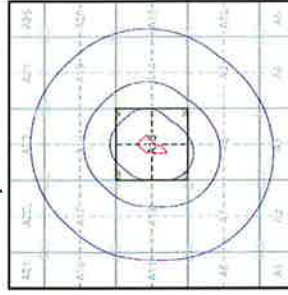
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

ST08NW	ST08NE
1965	1965
1:10,560	1:10,560
ST08SW	ST08SE
1965	1964
1:10,560	1:10,560

Historical Map - Slice A



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Site: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontydu, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirock.co.uk



Ordnance Survey Plan Published 1974 - 1976

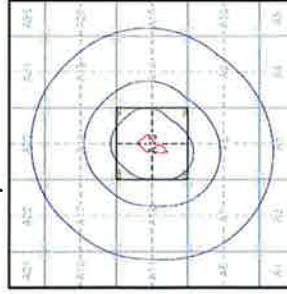
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys in outlying county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

ST08NW	1974	1:10,000
ST08SE	1974	1:10,000

Historical Map - Slice A



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontydu, CF72 8LP



Tel: 0344 844 9552
Fax: 0344 844 9551
Web: www.earthconnect.co.uk

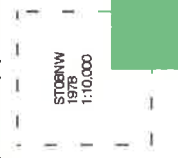


Rhondda Cynon Taff Published 1978

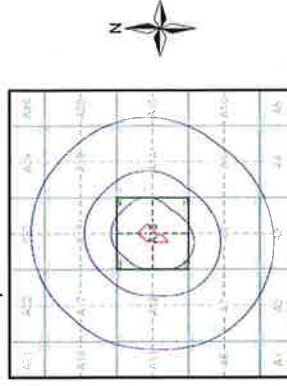
Source map scale - 1:10,000

These maps were produced by the Russian military during the Cold War between 1950 and 1997, and cover 103 towns and cities throughout the U.K. The maps are produced at 1:25,000, 1:10,000 and 1:5,000 scale, and show detailed land use, with colour-coded areas for development, green areas, and non-developed areas. Buildings are coloured black and important building uses (such as hospitals, post offices, factories etc.) are numbered, with a numbered key describing their use. They were produced by the Russians for the benefit of navigation, as well as strategic military sites and transport hubs, for use if they were to have invaded the U.K. The detailed information provided indicates that the areas were surveyed using land-based personnel, on the ground, in the cities that are mapped.

Map Name(s) and Date(s)



Russian Map - Slice A



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontydund, CF72 8LP



Tel: 0844 844 8952
Fax: 0844 844 8951
Web: www.envirocheck.co.uk



Ordnance Survey Plan Published 1980 - 1984

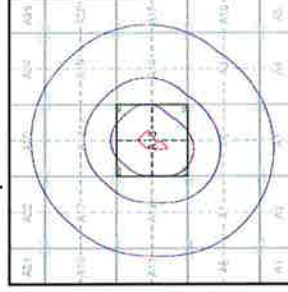
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,000 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,000 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

ST08NE	1984	1:10,000
ST08SW	1980	1:10,000

Historical Map - Slice A



Order Details

Order Number: 54430027_1_1
Customer Ref: 12540
National Grid Reference: 304170, 185160

Site Details

Site Area (Ha): 2.33
Search Buffer (m): 1000
Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 344 9952
Fax: 0844 544 9951
Web: www.terrafirma.co.uk



Ordnance Survey Plan Published 1993

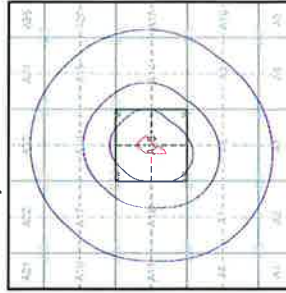
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in adjoining areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These are actually overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

ST08NW	ST08NE
1993	1993
1:10,000	1:10,000
ST08SW	ST08SE
1993	1993
1:10,000	1:10,000

Historical Map - Slice A



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0344 844 9952
Fax: 0844 844 9951
Web: www.earthcheck.co.uk



10k Raster Mapping

Published 2006

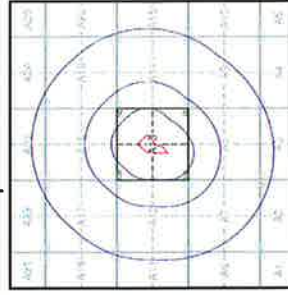
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

ST08NW	2006	1:10,000
ST08NE	2006	1:10,000
ST08SW	2006	1:10,000
ST08SE	2006	1:10,000

Historical Map - Slice A



Order Details

Order Number: 54430027_1_1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyclun, CF72 8LP



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Fax: 0844 844 9951
Web: www.earthcheck.co.uk



VectorMap Local Published 2013

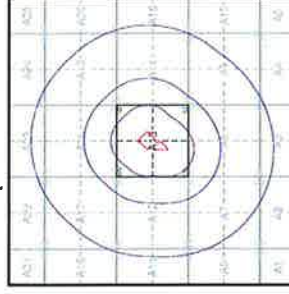
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:2500 scale (covering major towns and cities), 1:2500 scale (smaller towns, villages and developed rural areas), and 1:10,000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

ST08NW	ST08NE
2013	2013
Variable	Variable
ST08SW	ST08SE
2013	2013
Variable	Variable

Historical Map - Slice A



Order Details

Order Number: 54430027_1.1
Customer Ref: 12640
National Grid Reference: 304170, 185160
Slice: A
Site Area (Ha): 2.33
Search Buffer (m): 1000

Site Details

Llantrisant, Pontyclun, CF72 8LP



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.earthcheck.co.uk

ANNEX B
Trial Pit Logs



Project Name
Recycling Facility

Project No.
12640

Co-ords: -
Level: -

Date
03/03/2014

Location: Llantrisant

Dimensions: 1.50m

Scale
1:20

Client: Tom Pritchard

Depth
2.00m

1.00m

Logged By
TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.40	D		0.30			Loose dark brown very clayey silty SAND with frequent roots and rootlets. TOPSOIL	
						Loose clayey gravelly SAND. Gravels are fine to coarse subangular to rounded.	
			1.00			Soft orange brown silty gravelly CLAY becoming cobbly with depth. Gravels are fine to coarse subangular to rounded.	1
1.50	D		2.00			Trialpit Complete at 2.00 m	2
							3

Remarks:

Groundwater: Wet at 2.0m.





Project Name
Recycling Facility

Project No.
12640

Co-ords: -
Level: -

Date
03/03/2014

Location: Llantrisant

Dimensions: 1.50m

Scale
1:20

Client: Tom Pritchard

Depth
1.30m

1.00m

Logged By
TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.50	D		0.30			MADE GROUND: Loose dark brown clayey gravelly SAND with frequent roots and rootlets.	
1.00	D					MADE GROUND: Loose clayey gravelly SAND. Gravels are fine to coarse subangular to rounded. Probably reworked natural ground.	1
			1.30				
Trialpit Complete at 1.30 m							2
							3

Remarks:

Groundwater: None encountered





Project Name
Recycling Facility

Project No.
12640

Co-ords: -
Level: -

Date
03/03/2014

Location: Llantrisant

Dimensions: 1.50m

Scale
1:20

Client: Tom Pritchard

Depth
1.50m

1.00m

Logged By
TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10						MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. TOPSOIL
0.50	D					MADE GROUND: Loose to medium dense light brown clayey GRAVEL. Gravel is fine to coarse sub angular to angular.
0.60						MADE GROUND: Soft to firm light grey gravelly CLAY. Gravels are fine to coarse subangular and tabular.
1.00						MADE GROUND: Medium dense to dense dark grey sandy GRAVEL with low cobble and low boulder content. Gravels are fine to coarse and rounded.
1.20	D					
1.50						Trialpit Complete at 1.50 m

Remarks:

Groundwater: Wet below 0.6m.





Project Name Recycling Facility	Project No. 12640	Co-ords: Level:	Date 03/03/2014
Location: Llantrisant	Dimensions: Depth 1.70m	1.50m 1.00m	Scale 1:20
Client: Tom Pritchard			Logged By TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.50	D		0.30			MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. TOPSOIL (Thickening from 0.3 to 0.6m from west to east)	
			1.20			MADE GROUND: Loose to medium dense light brown clayey GRAVEL. Gravel is fine to coarse sub angular to angular.	1
			1.70			MADE GROUND: Medium dense to dense dark grey sandy GRAVEL with low cobble and low boulder content. Gravels are fine to coarse and rounded.	2
Trialpit Complete at 1.70 m							3

Remarks:

Groundwater: Wet below 0.6m.





Project Name
Recycling Facility

Project No.
12640

Co-ords: -
Level: -

Date
03/03/2014

Location: Llantrisant

Dimensions: 1.50m

Scale
1:20

Client: Tom Pritchard

Depth
1.50m

1.00m

Logged By
TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.10			MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. TOPSOIL	
			0.25			MADE GROUND: Loose to medium dense light brown clayey GRAVEL. Gravel is fine to coarse sub angular to angular.	
						MADE GROUND: Medium dense to dense dark grey sandy GRAVEL with low cobble and low boulder content. Gravels are fine to coarse and rounded. With rare whole red house bricks.	
1.30	D		1.50			Trialpit Complete at 1.50 m	

Remarks:

Groundwater: None encountered.





Project Name
Recycling Facility

Project No.
12640

Co-ords: -
Level: -

Date
03/03/2014

Location: Llantrisant

Dimensions: 1.50m


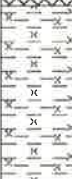
Scale
1:20

Client: Tom Pritchard

Depth
1.50m

1.00m

Logged By
TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.20	D		0.10			MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. TOPSOIL	
			0.50			MADE GROUND: Loose to medium dense light brown clayey GRAVEL. Gravel is fine to coarse sub angular to angular.	
			1.00			MADE GROUND: Medium dense to dense dark grey sandy GRAVEL with low cobble and low boulder content. Gravels are fine to coarse and rounded. Saturated.	
			1.50			Stiff dark brown silty CLAY.	
Trialpit Complete at 1.50 m							

Remarks:

Groundwater: Wet below 0.5m.





Project Name
Recycling Facility

Project No.
12640

Co-ords: -
Level: -

Date
03/03/2014

Location: Llantrisant

Dimensions: 1.50m

Depth
1.60m

1.00m

Scale
1:20

Logged By
TW

Client: Tom Pritchard

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.00	D		0.10			MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. TOPSOIL	
						MADE GROUND: Loose to medium dense light brown clayey GRAVEL with low to medium cobble content. Gravel is fine to coarse sub angular to angular.	
			0.80			MADE GROUND: Loose to medium dense light grey clayey GRAVEL with low to medium cobble content. Gravel is fine to coarse sub angular to angular.	1
			1.60			MADE GROUND: Medium dense to dense dark grey sandy GRAVEL with low cobble content. Gravels are fine to coarse and rounded.	2
						Trialpit Complete at 1.60 m	3

Remarks:

Groundwater: None encountered.





Project Name
Recycling Facility

Project No.
12640

Co-ords: -
Level: -

Date
03/03/2014

Location: Llantrisant

Dimensions: 1.50m

Scale
1:20

Client: Tom Pritchard

Depth
1.80m

1.00m

Logged By
TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.10			0.10			MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. TOPSOIL	
0.40	D					MADE GROUND: Loose to medium dense light brown clayey GRAVEL. Gravel is fine to coarse sub angular to angular. Occasional fragments of red house brick. Large boulder exposed and handlebars to a child's bicycle recovered at 1.0mbgl.	1
			1.30			MADE GROUND: Medium dense to dense dark grey sandy GRAVEL with low cobble and low boulder content. Gravels are fine to coarse and rounded.	
			1.80			Trialpit Complete at 1.80 m	2
							3

Remarks:

Groundwater: None encountered.





Project Name Recycling Facility	Project No. 12640	Co-ords: - Level: -	Date 03/03/2014
Location: Llantrisant		Dimensions: 1.50m Depth 1.70m	Scale 1:20
Client: Tom Pritchard			Logged By TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.50	D		0.30			Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. TOPSOIL	
			0.50			Soft to firm light brown sandy gravelly CLAY.	
1.00	D					Soft to firm dark brown sandy gravelly CLAY. Low rounded cobble content.	1
			1.70			Trialpit Complete at 1.70 m	2
							3

Remarks:

Groundwater: None encountered.





Project Name
Recycling Facility

Project No.
12640

Co-ords: 0E - 0N
Level: 0.00 m AOD

Date
03/03/2014

Location: Llantrisant

Dimensions: 1.50m

Scale
1:20

Client: Tom Pritchard

Depth
1.30m

1.00m

Logged By
TW

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.00	D		0.20	-0.20		MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. TOPSOIL	1
						MADE GROUND: Loose to medium dense dark brown clayey sandy GRAVEL. Gravel is fine to coarse sub angular to angular.	
			0.80	-0.80		Medium dense to dense dark brown sandy GRAVEL with low rounded cobble content. Gravels are fine to coarse and rounded.	
			1.30	-1.30		Trialpit Complete at 1.30 m	
							2
							3

Remarks:

Groundwater: None encountered.



ANNEX C
Laboratory Chemical Test
Results - Soils



Certificate of Analysis

Certificate Number 14-00949

18-Mar-14

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 14-00949

Client Reference 12640

Contract Title Llantrisant

Description 6 Soil samples.

Date Received 11-Mar-14

Date Started 11-Mar-14

Date Completed 18-Mar-14

Test Procedures Identified by prefix DETSn (details on request), Asbestos Analysis DETSC 1101.

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read 'Rob Brown'.

Rob Brown
Business Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 14-00949

Client Ref 12640

Contract Title Llantrisant

Sample ID	Depth	Lab No	Completed	Matrix Description
TP3	0.5	618616	18/03/2014	Brown gravelly sandy CLAY with odd rootlets
TP3	1.2	618617	18/03/2014	Dark brown clayey gravelly SAND
TP4	0.5	618618	18/03/2014	Dark brown gravelly sandy CLAY with numerous rootlets
TP7	1	618619	18/03/2014	Brown gravelly sandy CLAY
TP8	0.5	618620	18/03/2014	Brown dark brown gravelly sandy CLAY with odd rootlets
TP9	0.5	618621	18/03/2014	Brown gravelly sandy CLAY with odd rootlets

Summary of Chemical Analysis

Soil Samples

Our Ref 14-00949

Client Ref 12640

Contract Title Llantrisant

Lab No	618616	618617	618618	618619	618620	618621
Sample ID	TP3	TP3	TP4	TP7	TP8	TP9
Depth	0.50	1.20	0.50	1.00	0.50	0.50
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Arsenic	DETSC2301#	0.2	mg/kg	7.9	8.3	12	9.0	9.1	9.7
Cadmium	DETSC2301#	0.1	mg/kg	0.5	0.5	0.7	0.7	0.7	0.7
Chromium	DETSC2301#	0.15	mg/kg	27	23	23	28	33	20
Chromium III	DETSC2301*	0.15	mg/kg	27	23	23	28	33	20
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC2301#	0.2	mg/kg	16	16	30	19	25	17
Lead	DETSC2301#	0.3	mg/kg	15	39	34	28	51	19
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.09	0.17	0.08	0.06	0.05
Nickel	DETSC2301#	1	mg/kg	17	22	24	18	21	21
Selenium	DETSC2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC2301#	1	mg/kg	40	62	83	54	72	64
Inorganics									
pH	DETSC 2008#			8.9	7.9	7.8	8.2	8.5	7.5
Cyanide total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1	< 0.1	0.2
Organic matter	DETSC 2002#	0.1	%	1.7	5.0	5.7	1.8	2.3	2.8
Total Sulphate as SO4	DETSC 2321#	0.01	%	0.05	0.03	0.03	0.04	0.04	0.03
PAHs									
Acenaphthene	DETSC 3301	0.1	mg/kg	0.7	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	3.3	< 0.1	< 0.1	0.8	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	3.8	< 0.1	< 0.1	0.9	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	3.4	< 0.1	< 0.1	0.5	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	1.6	< 0.1	< 0.1	0.4	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	2.4	< 0.1	< 0.1	0.6	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	3.8	< 0.1	< 0.1	0.7	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.7	< 0.1	< 0.1	0.6	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	5.4	0.2	0.3	0.9	0.6	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	0.6	0.1	< 0.1	0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	2.4	< 0.1	< 0.1	0.4	< 0.1	< 0.1
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	3.1	0.3	0.2	0.6	0.4	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	4.5	0.2	0.3	0.7	0.4	< 0.1
PAH	DETSC 3301	1.6	mg/kg	37	< 1.6	< 1.6	7.2	< 1.6	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Asbestos Analysis

Soil Samples

Our Ref 14-00949

Client Ref 12640

Contract Title Llantrisant

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
618616	TP3 0.50	SOIL	NAD	none	John Leeson
618617	TP3 1.20	SOIL	NAD	none	John Leeson
618619	TP7 1.00	SOIL	NAD	none	John Leeson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 14-00949
Client Ref 12640
Contract Llantrisant

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
618616	TP3 0.50 SOIL		GJ 250ml (250ml), PT 1L (1kg)	Sample date not supplied	
618617	TP3 1.20 SOIL		GJ 250ml (250ml), PT 1L (1kg)	Sample date not supplied	
618618	TP4 0.50 SOIL		GJ 250ml (250ml), PT 1L (1kg)	Sample date not supplied	
618619	TP7 1.00 SOIL		GJ 250ml (250ml), PT 1L (1kg)	Sample date not supplied	
618620	TP8 0.50 SOIL		GJ 250ml (250ml), PT 1L (1kg)	Sample date not supplied	
618621	TP9 0.50 SOIL		GJ 250ml (250ml), PT 1L (1kg)	Sample date not supplied	

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

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

<p>ANNEX D Plasticity Test Results</p>
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Laboratory Report



Contract Number: 22652

Client's Reference: **12640**

Report Date: **25-03-2014**

Client **Terrafirma Wales Ltd**
5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff
CF23 7HB

Contract Title: **Llantrisant**
For the attention of: **Tom Walby**

Date Received: **18-03-2014**
Date Commenced: **18-03-2014**
Date Completed: **25-03-2014**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - UKAS *	3.0
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - UKAS *	3.0

Notes: **Observations and Interpretations are outside the UKAS Accreditation**

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Approved Signatories:

Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - Emma Williams (Office Manager)

Paul Evans (Quality/Technical Manager) - Vaughan Edwards (Managing Director)

Client ref: 12640
Location: Llantrisant
Contract Number: 22652-180314

[illegible]

Note: Results on this table are in summary format and may not meet the requirements of the relevant standards, additional information is held by the laboratory



Checked By

DP Gang
Approved By:

Date Approved: 25.3.14

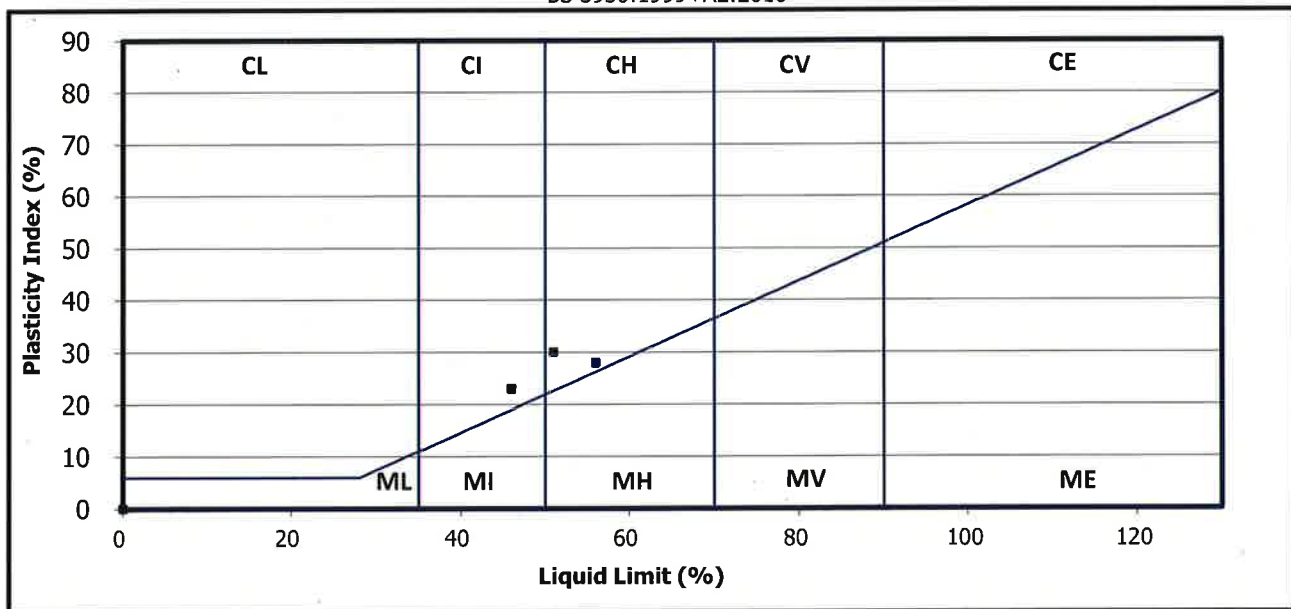
**Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5**

Client ref: 12640
Location: Llantrisant
Contract Number: 22652-180314

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
TP1		1.50	24	51	21	30	45	CH High Plasticity
TP6		1.20	22	46	23	23	100	CI Intermediate Plasticity
TP9		1.00	35	56	28	28	67	CH High Plasticity

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

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



GSTL
GEO Site & Testing Services Limited

Emma Williams

Emma Williams (Office Manager)
Checked By
Date Approved: 25.3.14

Ben Sharp

Ben Sharp (Contracts Manager)
Approved By:





12640

Recycling Facility, Llantrisant

Site Layout

02

Not To Scale

Approximate Site Boundary

Approximate Trial Pit Location

